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**A STUDY ON WORKING WOMEN POLICE AND THEIR WELL  
BEING IN THIRUVANNAMALAI DISTRICT**

Project report submitted to

**BHARATHIAR UNIVERSITY**

In partial fulfillment of the requirements

For the award of the degree of

**MASTER OF SCIENCE**

**IN**

**STATISTICS**

Submitted by

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UNDER THE GUIDENCE OF

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**DEPARTMENT OF STATISTICS**

**BHARATHIAR UNIVERSITY**

**Accredited with 'A ++' Grade by NAAC**

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**APRIL - 2024**

# CERTIFICATE

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## CERTIFICATE

This is to certify that the project work entitled "**A STUDY ON WORKING WOMEN POLICE AND THEIR WELL BEING IN THIRUVAN-NAMALAI DISTRICT**", submitted to the Bharathiar University, Coimbatore, in partial fulfillment of the requirements for the award of the degree of **Master of Science in Statistics** is a record of original research work done by **AAKASH E (22STAC01)** during the period of his study in the **Department of Statistics** at Bharathiar University, under my supervision and guidance and the project has not formed the basis for the award of any Degree/Diploma/Associateship/ Fellowship or other similar title to any of candidate of any University.

Head of the Depatement  
**(Dr. R. JAISANKAR)**

Signature of the Guide  
**(Dr. V. KAVIYARASU)**

Coimbatore  
April 2024

# **DECLARATION**

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## **DECLARATION**

I **AAKASH E** hereby declare that the project work entitled "**A STUDY ON WORKING WOMEN POLICE AND THEIR WELL BEING IN THIRUVANNAMALAI DISTRICT**" submitted to the Bharathiar University, Coimbatore, in partial fulfilment of the requirements for the award of the degree of **Master of Science in Statistics** is a record of original research work done by me under the supervision and guidance of **Dr.V.KAVIYARASU, Associate Professor, Department of Statistics**, Bharathiar University,Coimbatore and it has not formed the basis for the award of any Degree/Diploma /Associate-ship/Fellowship or other similar title to any of candidate of any University.

Signature of the Candidate

(**AAKASH E**)

## **ACKNOWLEDGMENT**

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## ACKNOWLEDGEMENT

“The only source of knowledge is experience”

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“Develop an attitude of gratitude, and give thanks for everything that happens to you, knowing that every step forward is a step toward achieving something bigger than and better than your current situation”

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# CHAPTER 1

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# CHAPTER 1

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## INTRODUCTION

In recent years, Tiruvannamalai district has witnessed a significant increase in the number of women joining the police force, reflecting a broader societal shift towards gender equality and female empowerment. This trend marks a departure from traditional norms and underscores the importance of exploring the experiences and well-being of women in law enforcement roles within the district.

This study seeks to delve deeper into the lives of working women police officers in Tiruvannamalai, aiming to understand the challenges they encounter, the support systems available to them, and the overall impact of their profession on their well-being. By examining various dimensions such as physical health, mental resilience, job satisfaction, work-life balance, and career advancement opportunities, we aim to provide a comprehensive analysis of the factors influencing the lives of these women in uniform.

Through interviews, surveys, and focus group discussions, we intend to capture the voices and perspectives of women police officers themselves, allowing them to share

their experiences, struggles, and aspirations. By doing so, we hope to identify specific areas where interventions and support mechanisms can be implemented to enhance the well-being and professional growth of women in law enforcement roles.

Ultimately, the findings of this study will not only contribute to a better understanding of the challenges faced by women police officers in Tiruvannamalai district but also serve as a foundation for policy recommendations and initiatives aimed at fostering a more inclusive and supportive work environment for women in law enforcement across the region. Through collaboration and concerted efforts, we can strive towards ensuring that working women in the police force receive the recognition, support, and opportunities they rightfully deserve.

- To assess the current status of women's representation in the police force within Tiruvannamalai district.
- To examine the challenges and barriers faced by women police officers in performing their duties effectively.
- To evaluate the impact of gender-specific issues on the overall well-being and job satisfaction of women in law enforcement.
- To identify strategies and interventions to enhance the well-being and professional growth of working women police officers in Tiruvannamalai district.

## 1.1 The Origin of Women Police in Tamil Nadu

The need for a Women's Police wing came to be realised with the increasing difficulties experienced in dealing with women offenders. The first batch of Women Police comprising one Sub-Inspector, and twenty Constables was recruited in 1973 and they were attached to Chennai City Police. These Women Police in Tamil Nadu performed

traffic and band bust duties. Sometimes they assisted the Policemen in searching, interrogation and escorting women offenders. Some Women Police were also utilized in frisking duty at Air Port. In 1976, Women Police wings were formed each in Madurai, Coimbatore and Tiruchirappalli, with strength of one Sub-Inspector, sixty Head Constables and six hundred Constables for augmenting the strength of Women Police in Tamil Nadu. It was proposed to form sixty Women Police units each consisting of one Sub-Inspector, one Head Constable and ten Constables and to station these Women Police in sixty Police Stations. In the meantime, the Government of Tamil Nadu decided to create an All-Women Police Station in Chennai city to ventilate the grievances of Women. The first All Women Police Station in Tamil Nadu was inaugurated by the Honourable Chief Minister of Tamil Nadu Dr. J. Jayalalitha on 13.4.1992. At present All Women Police Stations have been created in almost all District Headquarters and in large cities. As on May 2001 there were fifty-seven All Women Police Stations with a sanctioned strength of twenty-five to thirty-six Women Police each consisting of 7 one-Woman Inspector, three Women Sub-Inspectors, two Women Head Constables, the rest being Grade I Women Constables and Grade II women Constables.

## **1.2 Women in Indian Police Service**

The first Indian Police Service woman was recruited in the year 1973. It does not mean that women were not interested to join in the Indian Police Service. The Union Public Service Commission discouraged women entering in the Indian Police Service as the Commission thought that Police service was not a suitable service for women. When Mrs. Kiran Bedi insisted that she should be allowed to join the Indian Police Service, the Commission could not do anything. She was the first Indian Police Servicewoman Police Officer to be recruited. She underwent the same training and hardships as any other male Police. She is asked to perform the different types of Police duties, which are performed by male Police in her rank. At present more number women are interested to join the Indian Police Service. They are treated in the same way as Policemen are

treated and perform all types of Police duties in the Police department. At present there are more than thirty women Indian Police Service Officers serving at different places in India.

### **1.3 Working women**

Since ages, women continue to feel to be a weaker section of society. During the last few decades, industrialization, urbanization, increasing level of education, awareness of rights, wider influence of media and westernization has changed the status and position of women. Today, the status of Indian women has totally changed. The number of educated women including the number of working women is increasing. At present, women are in a position to compete with men in all walks of life.

### **1.4 Concept of Work-Life Balance**

WLB doesn't mean an equal balance. On a daily basis, person's WLB might vary over time. The present right parity may not be tomorrow. The pure adjusts additionally contrast when one is singular and one gets married and when he/she have youngsters. Specifically, working women can't part her individual life and family life, as both of these are associated and requires a great deal of consideration. So, work-life balance is a notion that portrays the idyllic of splitting individual's time and energy between work and other vital phases of their life.

### **1.5 Scope of the study**

The scope of a study on working women in the police force is broad and multifaceted, covering various aspects of their professional lives, challenges faced, and opportunities for improvement. The scope encompasses both quantitative and qualitative dimen-

sions, allowing for a comprehensive understanding of the experiences of women in law enforcement.

- Analysing the demographic composition of women in the police force, including age, educational background, and years of service, provides a foundational understanding of the workforce.
- Investigating the nature and extent of the workload carried by women police officers, including the types of duties assigned, shift patterns, and the overall intensity of responsibilities.
- Assessing the levels of job satisfaction among women in the police force, examining factors such as recognition, teamwork, professional development, and overall fulfilment in their roles.
- Exploring the impact of the job on the physical and mental health of women officers, including stress levels, coping mechanisms, and access to mental health resources.
- Evaluating the work environment, focusing on aspects such as workplace culture, inclusivity, support networks, fairness in promotions, and perceptions of gender equality within the police force.
- Examining the challenges and strategies employed by women police officers to maintain a balance between their professional and personal lives, including the role of family support and flexible work arrangements.
- Investigating the perceived opportunities for career growth among women officers, assessing the availability and effectiveness of training programs, mentorship initiatives, and promotional pathways.
- Identifying and analysing instances of gender bias, discrimination, and stereotyping within the police force, aiming to understand the specific challenges faced by women officers and the impact on their professional experiences.

## **1.6 Limitation**

- Women in the police force may encounter gender bias and stereotyping, where traditional gender roles and expectations influence perceptions of their capabilities. Prejudices regarding physical strength, decision-making, or leadership abilities can hinder career advancement.
- The prevailing workplace culture within law enforcement agencies may be male-dominated, fostering an environment that does not always prioritize or accommodate the unique needs of female officers. A lack of inclusivity can contribute to feelings of isolation and hinder professional development.
- Balancing the demands of a challenging job with family responsibilities can be particularly challenging for women in the police force. Irregular working hours, shift patterns, and the demanding nature of the job may impact their ability to maintain a healthy work-life balance.
- Insufficient support systems, including mentorship programs, counselling services, and resources tailored to the needs of women officers, may limit their ability to navigate the challenges unique to their gender.
- For women officers who are mothers, the availability of resources for maternal and child health may be insufficient. The lack of family-friendly policies, such as maternity leave and childcare support, can pose challenges to career continuity.

## **1.7 Objectives**

- Determine the workload of women police officers in Tiruvannamalai District.
- Evaluate job satisfaction levels among working women police officers
- Examine the physical and mental health status of working women police officers.

- Investigate the work environment and its impact on the well-being of women police officers.
- Assess the balance between work and personal life for women police officers.
- Examine opportunities for career growth and advancement for women in the police force.
- Investigate any gender-based challenges faced by women police officers in their professional roles.

## **1.8 Need for the study**

- Understanding the experiences of working women in the police force helps assess the level of gender representation and diversity within law enforcement agencies.
- It provides insights into the challenges and opportunities women face in traditionally male-dominated professions.
- Studying working women in the police force helps identify any barriers or obstacles that may hinder their professional growth.
- It contributes to the promotion of equal opportunity and workplace equity by addressing issues such as gender bias, discrimination, and harassment.
- Investigating the experiences of female officers can provide valuable information on how their presence influences policing strategies and outcomes.
- It helps assess whether a diverse police force leads to improved community relations and more effective law enforcement.
- Understanding the challenges faced by working women in balancing their professional and personal lives can inform policies and practices that promote work-life balance.

## **CHAPTER 2**

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## **CHAPTER 2**

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### **ABOUT WOMEN POLICE**

#### **2.1 Introduction**

The study examines many pioneering studies in other countries to understand the general problems the women police face in Tamil Nadu and worldwide. Although women police in Tamil Nādu constitute 19.1 per cent of the total force of women police in Tamil Nādu across the world, they face serious problems such as the balance between work and life, sexual harassment, hindrances to performance, lack of facilities provided to women vis-a-vis male police officers, etc.

#### **2.2 Tamil Nadu is a pioneer in All women's police stations**

The State of Tamil Nadu pioneered the All-Women Police Station (AWPS) concept. The State has 224 such stations. An AWPS is a system to deal with crimes against

women. These include sexual harassment cases booked under the IPC and serious crimes against children.



Figure 2.1: All women police station

They also address issues that women face, such as dowry disputes. As per statistics, Tamil Nadu has the highest number of all-women police stations in the country. At least one all-women police station is present in every subdivision in the State. There are over 20,000 women in the police force of the State. This includes many senior IPS officers. Thirty per cent of police jobs are reserved for women at the entry level. In addition to AWPS, the State has a particular security group. It is also the home of the nation's first women's commando unit. All these measures have helped the State maintain law and order. However, recent attacks on women have been shocking. Several incidents of rape attempts have been reported. One such case is of a 7th-class student, Punitha, returning from school in the Tuticorin district. When a local goon approached her, she resisted the attempt but was strangled with her dupatta. Her pursuer was arrested under the Goonda Act and detained for a year.

## **2.3 Work-life balance of women police in Tamil Nādu**

The women's police force in Tamil Nādu must manage the dual lives of work and family. They face many problems related to stress, family bonding, time management, and worry. Several training programs are occasionally organised for women police personnel to promote their self-image and enhance performance. Some studies were conducted to evaluate the work-life balance among women police in Tamil Nadu. This was done using a questionnaire. It contained questions regarding the dimensions of work-life balance, job satisfaction, personal profile, and organisational profile of women employees. As a result, various initiatives have been undertaken to address the concerns of women in the police force. However, the implementation of these initiatives remains a challenge. This is especially true in Tamil Nadu, where women police personnel number over 20,000. Work-life balance is a hot topic in academia. The concept is not a definite science but is a vital concern for human resources practitioners. As a result, studies have been conducted to understand the complexities of the concept. To evaluate the work-life balance of women police in Tamil Nadu, we designed a questionnaire. We obtained the responses of over 100 women personnel of the Tamil Nadu Police before coming to the above conclusion. The study was carried out using a questionnaire. Primary data was collected from women police of Tiruvannamalai district.

## **2.4 Functioning of women police in Tamil Nādu**

The function of women police in Tamil Nādu is to protect against crime against women and children. Women police officers are assigned to select posts in the police force. They also handle sexual harassment cases booked under the IPC. Women police personnel have to face challenges and problems such as fewer opportunities for promotions and long working hours. In addition, they need special training to address crimes against women. Moreover, they work under appalling conditions, such as a lack of toilets, frequent night duties, postings in remote locations, uncomfortable uniforms, poor living

conditions due to low salaries, lack of gender parity in the force, absence of creches in some areas, terrible family life due to irregular working hours.

## **2.5 Problems of women police in Tamil Nadu**

Women officers in Tamil Nadu face various challenges. They must deal with women's problems in society and within their families. Moreover, they are required to be free from the stereotypical gender bias in the police force. While the role of women police has increased over the past few years, they have also faced some difficulties. These include a lack of proper infrastructure and hygiene facilities. In addition, a large percentage of women police officers are getting married. There are no creches available for them to leave their young children. Some women are forced to lock their children up when on duty. One of the most common complaints against the women police is that they are not sensitive towards their victims. Many women police have been dealt with under disciplinary rules by their superiors because of their 'insensitive' behaviour. The Tamil Nadu government has set up a particular cell to help women who have been abused.

## **2.6 Contribution of women police in Tamil Nadu**

As a state, Tamil Nadu is the pioneer in setting up an all-women police station (AWPS) in the country. The AWPS was established in response to the rising crime against women in the 1980s. It was meant to encourage women to report crimes. In addition, the AWPS was also designed to provide dowry services. AWPS is an adjunct to regular police stations. These officers are responsible for handling severe crime against women and children. They also handle cases of dowry deaths and sexual harassment. The main intention behind setting up AWPS is to ensure the complainants are dealt with politely. AWPS personnel are also tasked with handling sexual harassment cases booked under

the Tamil Nadu Prohibition of Women Harassment Act. They are trained to conduct an investigation and pursue prosecution in court. Most police officials in the State fall into the age group of fewer than 30 years. Most of them are married. Most women personnel have kids. Therefore, they face many problems in their work life.

## **2.7 Facilities for women police in Tamil Nadu**

The Tamil Nadu Government is introducing facilities for women police. They have presented creches at several places to care for their children while working. They have also acquired mobile toilets so women performing bandobast duties in remote areas can access toilet facilities. Still, Women in the force face several challenges. They need to have a good balance between their work and family. This can be a challenge for women because of the demanding work hours. Moreover, they have to deal with sensitive issues. In addition, women cops are required to commit to their jobs. A large percentage of them are married and have children. That means they have to spend much time at the station. Besides, they have to deal with sexual assaults and juvenile delinquents. However, women's safety is a priority for the Tamil Nadu Government. To ensure that women's complaints are dealt with efficiently, the State has a particular cell for women. It will help them with legal aid and counselling. Also, it will help them find shelter for victims.

## **2.8 Performance of women police in Tamil Nadu**

One of the primary law enforcement agencies in Tamil Nādu is the Police Department. It is the fifth-largest state police force in the country and has existed for 150 years. There are over 200 women's police stations in the State. These all-women units mainly deal with issues related to women, such as crime, sexual assault, family disputes, etc. AWPS also handles cases involving serious crimes. The State of Tamil Nadu is one

of the pioneers in the field of AWPS. Approximately 40% of all AWPSs in India are in the southern states of Tamil Nadu, Kerala, and Karnataka. Generally, all-women police units consist of fifteen women constables, two female sub-inspectors, and a female Inspector. A few years ago, the Indian government set the goal of having at least 33 per cent of women in the police department. Tamil Nadu police are trying to achieve the purpose of 33 percent of women police personnel in the state.

## 2.9 Chennai (Madras) History

### Women in Tamil Nadu Police complete 50 years



Figure 2.2: Usha Rani Narendra, first woman SI, Tamil Nadu Police, courtesy the Tamil Nadu Police Journal

The first batch of women in Tamil Nadu Police, consisting of an SI, an HC and 20 PCs was recruited in 1973 in the State. That first woman SI was Usharani Narendra, who was a special invitee when the police museum was inaugurated in 2021. The women police induction parade happened at the Rajarathinam Stadium, Egmore, on November 1, 1974, with the then Chief Minister of the State, M Karunanidhi being the Chief Guest. Rather coincidentally, he was also to inaugurate the stadium lights. FV Arul, IGP, welcomed the gathering and expressed the hope that just as the lights would illuminate the stadium, so would the women bring brightness to the police force.

Having been recruited in December 1973, they had completed one year of training and were now ready to go into the field. They had all been trained in karate as well. On this occasion, the State Government was happy to increase the monthly pay of women constables from Rs 150 to Rs 200. In his address, the Chief Minister M Karunanidhi outlined what was expected from the women in the police – offering protection to women in general, escorting women criminals as and when required, and assisting male police personnel during raids on brothels and places where women were exploited. This was to largely remain the duties of women in the force, with the addition of providing security during festivals and processions. The nature of work would change over time and is still transforming but several practical difficulties, not the least being the lack of public toilets for women has proved a huge deterrent. Four years after the first batch of women in Tamil Nadu police joined, it was time to add to their numbers, this time from the rest of the state. That was when 13 grade I PCs were recruited for Madurai and Trichy. In 2017, this batch had a gala reunion to commemorate forty years of their being part of the police. By 1990, the strength of the women police had gone up to 857. Pointing out that this was less than two-percent of the total police force, the Second Police Commission had recommended an annual recruitment of 500 women to raise the total women police strength to 5,000 within a decade. Meanwhile, in 1989 the State Government ordered a minimum of 30 percent reservation for women in vacancies to be filled up in all Government services through direct recruitment. The Police department sought exemption from this reservation pointing out the existence of separate women police units and employment of women in ministerial staff, Police Radio Branch and Fingerprint Bureau. The Government, however, turned down this request. Since then, 30 percent reservation in fresh recruitment has been in force and at present, the strength of women in Tamil Nadu Police is over 20,000. Women Police component in the force has thus gone up from two percent to around 20 now. Tamil Nadu has an exclusive Women Battalion of TSP. In 1992, All Women Police Stations (AWPS) were pioneered in the State and the first of these was opened by the then CM J Jayalalithaa in the Thousand Lights area of the city. This experiment has been

extended to all sub-divisional headquarters. The State now has 222 All Women Police Stations. Another development has been the sanction of one-Woman Sub Inspector and two Women Constables for each Police Station. At present, women constitute two battalion strengths of the TSP. There is one exclusive Mahila Battalion and the other women personnel are scattered among different battalions.

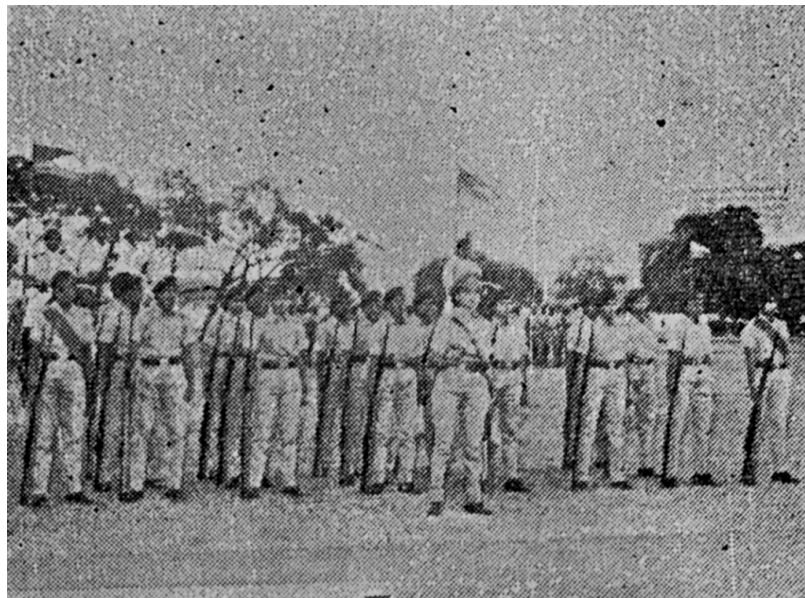


Figure 2.3: The first parade of the whole women unit, Tamil Nadu police, dated Nov 1, 1974, courtesy the Tamil Nadu Police Journal

The first proposal to recruit women in the Madras Police was made as early as in 1919. That was when the city police were trying their best to eradicate prostitution. F Armitage, then Commissioner of Police Madras was all for tightening laws and the Government of India went to the extent of suggesting that the Government of Madras hires women police personnel to tackle the issue. PC Moore, then IGP concurred but nothing came out of the suggestion thereafter. The first women police force in India came about in Delhi and Punjab in 1949. By 1955, proposals were once again afoot in Madras, for the recruitment of women. The recruitment of one-woman SI, four

HCs and 30 women PCs was approved with no action ensuing. The Punjab Police Commission headed by Justice Mahajan; former Chief Justice of the Supreme Court of India was appointed in 1961 to consider the recruitment of women into the police. This body sought the views of the state Governments in 1961-62, and the then Chief Secretary and IGP of the Government of Madras declared in no uncertain terms that recruiting women into the police department would be most unwise. This perception, however, did not last long.



Three years after the first batch of women recruits joining the subordinate ranks, it was time for the first women to join the gazetted ranks in Tamil Nadu. In 1976, Letika (Dhar) Saran and G Thilakavathi became the first women IPS officers of the TN cadre. “I can still recall Mr Eric Stracey once remarking that when women joined the police it would be time for him to hang up his boots,” says Letika. “Years later, I called on him in Australia and reminded him about it. He smiled.” Thilakavathi was born in and completed her schooling in the Dharmapuri District of Tamil Nadu. An alumnus of Auxillium College, Vellore and Stella Maris Madras, she began her police career as an ASP serving in Vellore and later Trichy. She subsequently served as Dy Commissioner of Police of Chennai and Superintendent of Police in the Civil Supplies CID and Commercial Crime Investigation Wing, before being promoted to

the rank of DIG, while being posted to the Railways in early 1993. Later that year, she was appointed the DIG for the Chengalpattu-MGR range, that covered districts Chengalpattu East and West, and Arcot. In the process became the first woman DIG of the State. In 2007, she was promoted to ADGP. In 2010, she was posted as chairman of the Tamil Nadu Uniformed Services Recruitment Board, upon receiving a promotion to the rank of DGP. In many ways an icon, Thilakavathi's name would inspire even an eponymous film! Post retirement, she had devoted time to writing, which has always been a passion for her. Letika Saran was born in Idukki District in Kerala. Her postings include ADGP; Training and Project Director, Tamil Nadu Police Academy; Inspector-General of Police, Directorate of Vigilance and Anti-Corruption (DVAC). She became the Commissioner of Police, Greater Chennai on 20 April 2006. On 8 January 2010, she was appointed as Director General of Police (DGP) for Tamil Nadu, becoming the second female DGP of a state in India and the first for Tamil Nadu. Saran's appointment was later challenged by another IPS officer who claimed his seniority had been overlooked. In October 2010, the Madras High Court overturned Saran's appointment and ruled that a list of three eligible candidates must be presented from which the state government would make their selection. The state government, "after due consideration and in full compliance with the directions of the Supreme Court," again chose Saran from the list. She was re-appointed on 27 November 2010. She retired in April 2012. Since then, there have been a number of women IPS officers in the TN cadre. This article quotes extensively from the account of Tamil Nadu police written by the late Amit Verma IPS for the Madras Gazette brought out by S Muthiah on behalf of the Association of British scholars and published by Palaniappa Bros. The profiles of Thilakavathi and Letika Saran are from wikipedia.

### **Golden Jubilee of Women Police in Tiruvannamalai**



Figure 2.4: Tiruvannamalai District Superintendent of Police office celebrated the Golden Jubilee of Women Police.

Tiruvannamalai District Superintendent of Police Karthikeyan presided over the function. Vellore Cargo DIG was the special invitee. Muthuswamy attended and congratulated the women police officers. Reshma, who serves in the armed forces, cut the cake and distributed it to all the participants. DIG gave certificates to the policemen who performed well in the ceremony. Presented by Muthuswamy. Tiruvannamalai Rural Deputy Superintendent of Police Ashwini and women police inspectors and policemen working in various towns of the district participated in this.

## **2.10 Review of literature**

**Tripathi, Naidu, Thapa. Biswas (1993)** in their study about, ' Stress, Health and Performance a study of police organization in Uttar Pradesh' described problems faced by police personnel. e.g. Irregular working hours, leave problems, no social life, No promotion, Family neglected and separation, Risk to life, No Government support,

Inadequate infrastructure, Pressure of officers, Political influences, Frequently transfers Transport house, Attitude of officers, Children education, Mass inadequate, Poor salaries.

**S. Padma et al., (2013)** in her study on “Role of Family Support in Balancing Personal and Work Life of Women Employees”. The main objective of the study is based on the Economy and Financial needs of the Family made the women to come out the home and work for livelihood. The present study was on Female Police Personnel which was conducted in Andhra Pradesh State Police Department, AP, India particularly on Women Police Constables and Head Constable. Children age category, elder parent In-laws health care on Work Life Balance of Women Employees are also included in the study. Various Statistical tools were used to meet the above-mentioned objectives. The results revealed that Women with the responsibility of elder parent’s health need to be given a helping hand to balance their personal and professional works.

**Lokanadha Reddy, et al. (2014)** assessed the quality of work life encompasses things that affect their well-being such as salary and benefits. Quality of work life is increasingly a significant part of the total benefits package. It is evident from the review of literature that the studies on quality of work life concerning banking sector, particularly of an inter-sectoral approach, are scanty and not adequate enough to arrive at meaningful inferences. It was an attempt on QWL in the organized public and private sector banks. It recognized the various factors involved in the quality of work life of employees in the banking sector and suggested that the higher authorities of banking industry shall initiate necessary steps for effective implementation of the insights of the policy of Quality of work life.

**Usha Devi, Preema,, and Swathi (2018)** they are said to this paper has taken an honest, and holistic attempt to analyze the present scenario in concern with the quality service among Women Police, and its expected progress in the light of work-life balance with thorough discussions of challenges. The objective is to study the Association between Personal life, and Quality service, and Quality service,, and to suggest suitable measures, and recommend appropriate steps for implementation based on the

findings of the study.

**Thasneem, and Sangeeta (2019)** a study constant struggle, and a good amount of effort for maintaining a balance between work, personal life,, and family life could have serious implications on the life of an individual. Women police personnel are not an exception in this. Most of them express that they have felt stress in their life arising mainly from the workplace. As Women are sensitive and delicate, they face various difficulties in balancing their personal life and work. This study documents the issues of work-life balance that the women police personnel encountered both in their work - life and family life.

**Bhuvaneswari and Thirumooorthi (2019)** this research study is an attempt to spot out the effects of work-life balance, and to explore the main factors which cause work-family challenges among categories of women personnel in the police department.

# **CHAPTER 3**

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# CHAPTER 3

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## METHODOLOGY

### 3.1 Introduction

The chapter is organized as follows as Descriptive Statistics, Chi-Square analysis, Mann-Whitney U test, Kruskal-Wallis test, Multiple regression, Logistic regression, Naïve-Bayes classifier, Ada boost analysis.

### 3.2 Descriptive Statistics

There are some important measures which help to know the data better. These measures gives the idea of overall distribution of the observation in the dataset. These measures together can be called as descriptive statistics.

## **Measures of central tendency**

These measures are also called as statistical averages or averages. A measure of central tendency is value around all the observation have a tendency to cluster. **Mean**

It is most common measure of central tendency and may be defined as the value which we get by dividing the total of the values given items in series by the total number of items.

### **Mean**

$$\bar{x} = \sum \frac{x_i}{n}$$

Where,

n=Total number of items

$x_i$  of ith Value item X, i=1,2,...,n ix

## **Percentage analysis**

Percentage analysis is the method to represent raw streams of data as a percentage (a part in 100 - percent) for better understanding of collected data. Percentage change can be applied to any quantity that you measure over time. It's also used to compare the values of different currencies.

## **Graphical Representation of Data**

### **Meaning of Graphic Representation of Data**

Graphic representation is another way of analysing numerical data. A graph is a sort of Graph through which statistical data are represented in the form of lines or curves drawn across the coordinated points plotted on its surface. Graphs enable us in studying the cause-and-effect relationship between two variables. Graphs help to measure the extent of change in one variable when another variable changes by a certain amount.

## Pie Graph

A pie Graph is a type of graph that represents the data in the circular graph. A pie Graph requires a list of categorical variables and the numerical variables. Here, the term “pie” represents the whole and the “slices” represents the parts of the whole. In this article, we will discuss the definition of a pie Graph, its formula, an example to create a pie Graph, uses, advantages and disadvantages in detail.

### Pie Graph Formula

The pie Graph is an important type of data representation. It contains different segments and sectors in which each segment and sectors of a pie Graph forms a certain portion of the total(percentage).

The total of all the data is equal to  $360^{\circ}$ .

The total value of the pie is always 100%.

To work out with the percentage for a pie Graph, follow the steps given below: Categorize the data

- Calculate the total
- Divide the categories
- Convert into percentages
- Finally, calculate the degrees

Therefore, the pie Graph formula is given as

$$(\text{Given Data}/\text{Total value of Data}) \times 360^{\circ}.$$

## **Bar Diagram**

Also known as a column graph, a bar graph or a bar diagram is a pictorial representation of data. It is shown in the form of rectangles spaced out with equal spaces between them and having equal width. The equal width and equal space criteria are important characteristics of a bar graph.

Note that the height (or length) of each bar corresponds to the frequency of a particular observation. You can draw bar graphs both, vertically or horizontally depending on whether you take the frequency along the vertical or horizontal axes respectively.

## **Likert scale**

### **Definition**

A Likert scale is a unidimensional scale that researchers use to collect respondents' attitudes and opinions. Researchers often use this psychometric scale to understand the views and perspectives towards a brand, product, or target market.

Different variations are focused directly on measuring people's opinions, such as the Guttman scale, Bogardus scale, and Thurstone scale. Psychologist Rensis Likert established a distinction between a scale that materializes from a collection of responses to a group of items (maybe 8 or more). Responses are measured in a range of values.

### **Types of Likert Scales**

The Likert Scale has become a favourite among researchers to collect opinions about customer satisfaction or employee experience. You can divide this scale primarily into two major types:

1. Even Likert Scale
2. Odd Likert Scale

## **Even Likert Scale**

- Researchers use even Likert scales to collect extreme feedback without providing a neutral option.
- 4-Point Likert Scale for importance: This type of Likert scale allows researchers to include four extreme options without a neutral choice. Here the various degrees of importance are represented in a 4-Point Likert Scale.
- 8-Point Likelihood of recommendation: This is a variation of the previously explained 4-point Likert scale, the only difference being, this scale has eight options to collect feedback about the likelihood of a recommendation.

## **Odd Likert Scale**

- Researchers use the odd Likert scale to give the respondents the choice of responding neutrally.
- 5-point Likert scale: With five answer options, researchers use this odd Likert scale question to gather information about a topic by including a neutral answer option for respondents to select if they don't wish to answer from the extreme choices in their research design.
- 7-point Likert scale: The 7-point Likert scale adds two more answer options at extreme ends of a 5-point Likert scale question.
- 9-point Likert scale: A 9-point Likert scale is quite uncommon, but you can use it by adding two more answer options to the 7-point Likert scale question

## **Likert scale data and analysis**

Researchers use surveys regularly to measure and analyze the quality of products or services. The Likert scale is a standard classification format for studies. The respon-

dents provide their opinion (data) about the quality of a product/service from high to low or better to worse using two, four, five, or seven levels. Researchers and auditors generally group collected data into a hierarchy of four fundamental measurement levels – nominal, ordinal, interval, and ratio measurement levels for further analysis:

- **Nominal data:** Data in which the answers classified into variables need not necessarily have quantitative data or order is called nominal data.
- **Ordinal data:** Data in which it is possible to sort or classify the answers, but it is impossible to measure the distance is called ordinal data.
- **Interval data:** Aggregate data in which measurements of orders and distances can be made is called interval data.
- **Ratio data:** Ratio data is similar to interval data. The only difference is an equal and definitive ratio between each data and absolute “zero” being treated as a point of origin.

### 3.3 Chi-Square Statistics

A chi-square  $\chi^2$  statistic is a test that measures how a model compares to actual observed data. The data used in calculating a chi-square statistic must be random, raw, mutually exclusive, drawn from independent variables, and drawn from a large enough sample. For example, the results of tossing a fair coin meet these criteria. Chi-square tests are often used to test hypotheses. The chi-square statistic compares the size of any discrepancies between the expected results and the actual results, given the size of the sample and the number of variables in the relationship. For these tests, degrees of freedom are used to determine if a certain null hypothesis can be rejected based on the total number of variables and samples within the experiment. As with any statistic, the larger the sample size, the more reliable the results.

**Null Hypothesis  $H_0$ :** Assume that there is no association between the two variables.

**Alternative Hypothesis  $H_1$ :** Assume that there is association between the two variables.

Formula for Chi-Square,

$$\tilde{\chi}^2 = \sum_{k=1}^n \frac{(O_k - E_k)^2}{E_k}$$

where,

c=Degrees of freedom

O=Observed value(s)

E=Expected value(s)

## Independence

When considering student gender and course choice, a  $\chi^2$  test for independence could be used. To do this test, the researcher would collect data on the two chosen variables (gender and courses picked) and then compare the frequencies at which male and female students select among the offered classes using the formula given above and a  $\chi^2$  statistical table. If there is no relationship between gender and course selection (that is if they are independent), then the actual frequencies at which male and female students select each offered course should be expected to be approximately equal, or conversely, the proportion of male and female students in any selected course should be approximately equal to the proportion of male and female students in the sample. A  $\chi^2$  test for independence can tell us how likely it is that random chance can explain any observed difference between the actual frequencies in the data and these theoretical expectations.

## **Goodness-of-Fit**

$\chi^2$  provides a way to test how well a sample of data matches the (known or assumed) characteristics of the larger population that the sample is intended to represent. This is known as goodness of fit. If the sample data do not fit the expected properties of the population that we are interested in, then we would not want to use this sample to draw conclusions about the larger population.

**Degrees of freedom is calculated by using the following formula**

$$DF = (r-1) (c-1)$$

Where,

DF = Degree of freedom

r = number of rows

c = number of columns

**Level of significance:** 5% at the level of significance.

### **Conclusion**

It is the same for the Chi-Square test of Independence. If the calculated value of the Chi- Square test is greater than the table value, we will reject the null hypothesis. If the calculated value is less than table value, we will accept the null hypothesis.

## **3.4 Mann-Whitney U test**

Mann-Whitney U test is the non-parametric alternative test to the independent sample t-test. It is a non-parametric test that is used to compare two sample means that come from the same population, and used to test whether two sample means are equal or not. Usually, the Mann-Whitney U test is used when the data is ordinal or when the assumptions of the t-test are not met.

### 3.4.1 Uses of Mann-Whitney U Test

Mann-Whitney U test is used for every field, but is frequently used in psychology, healthcare, nursing, business, and many other disciplines. For example, in psychology, it is used to compare attitude or behaviour, etc. In medicine, it is used to know the effect of two medicines and whether they are equal or not. It is also used to know whether or not a particular medicine cures the ailment or not. In business, it can be used to know the preferences of different people and it can be used to see if those changes depending on location.

**Objective:** To test if two random samples could have come from two populations with the same mean.

**Limitations:** it is assumed that the two populations have continuous frequency distributions with the same shape and spread.

#### Assumptions

- The sample drawn from the population is random.
- Independence within the samples and mutual independence is assumed. That means that an observation is in one group or the other (it cannot be in both).
- Ordinal measurement scale is assumed.

**Null Hypothesis  $H_0$ :** There is no significant difference between the two independent group samples.

**Alternative Hypothesis  $H_1$ :** There is significant difference between the two independent group samples.

#### Test statistics:

$$u = n_1 n_2 + \frac{n_1(n_2 + 1)}{2} \sum_{i=n_1+1}^{n_2} R_i$$

Where,

$U$  = Mann-Whitney  $U$  test

$N_1$  = sample size one

$N_2$  = sample size two

**Level of significance:** 5% at the level of significance.

### Conclusion

If  $R \geq R_\alpha$  accept  $H_0$  and if  $R \geq R_\alpha$  reject  $H_1$ .

## 3.5 Kruskal-Wallis test

The Kruskal-Wallis test is a nonparametric (distribution free) test, and is used when the assumptions of one-way ANOVA are not met. Both the Kruskal-Wallis test and one-way ANOVA assess for significant differences on a continuous dependent variable by a categorical independent variable (with two or more groups). In the ANOVA, we assume that the dependent variable is normally distributed and there is approximately equal variance on the scores across groups. However, when using the Kruskal-Wallis Test, we do not have to make any of these assumptions. Therefore, the Kruskal-Wallis test can be used for both continuous and ordinal- level dependent variables. However, like most non-parametric tests, the Kruskal-Wallis Test is not as powerful as the ANOVA.

**Objective:** To test the  $k$  random samples drawn from the  $k$  populations have the same mean.

### Assumptions

- The sample sizes of each sample should be at least 5.
- The sample sizes need not be equal.
- The frequency distributions of  $K$  populations should be continuous.

**Null Hypothesis  $H_0$ :** There is no significant difference between the means of the k populations are equal.

**Alternative Hypothesis  $H_1$ :** There is significant difference between the means of the k populations are equal.

**Test statistics:**

$$H = \frac{12}{N(N+1)} \sum \frac{R_i^2}{n_i} - 3(N+1)$$

Here, the statistic H follows  $\chi^2$  distribution with (K-1) degrees of freedom.

**Conclusion:**

If  $H \leq \chi^2_{(\alpha)}$  accept  $H_0$  and if  $H \geq \chi^2_{(\alpha)}$  reject  $H_0$  or accept  $H_1$ .

### 3.6 Multiple Regression Model

Galton studied the average relationship between these two variables graphically and called the line of regression. Regression lines study the average relationship between two variables. Regression analysis may be broadly defined as the analysis of relationship among variables. It is one of the most widely used statistical tools because it provides a simple method for establishing a functional relationship expressed in the form of an equation connecting the response or dependent variable  $y$ , and one or more independent variables,  $X_1, X_2, \dots, X_p$ . The equation, or to be more precise, the regression equation takes the form

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p$$

Where  $\beta_0, \beta_1 X_1, \beta_2 X_2, \dots, \beta_p X_p$  are called the regression coefficients and are determined from the data. A regression equation containing only one independent variable is called a simple regression equation. The correlation and regression based on two variables.

1. Independent
2. Dependent or criterion

A regression equation containing more than one independent variable is called multiple regression equation. Multiple correlations indicate the strength of taken together. It is related to the dependent variable.

In forecasting building models that related the dependent variables can be effective. Such models can be powerful analytical tools that provide predication as well as Insights into the cause-and-effect relationship between the dependent and independent variables. Multiple regressions are an important methodology in building models because it measures the simultaneous influences of a number of independent variables upon one dependent variable.

### 3.7 Logistic regression

The crucial limitation of linear regression is that it cannot deal with dependent variable's that are dichotomous and categorical variable. Many interesting variables are dichotomous: for example, consumers make a decision to buy or not buy, a product may pass or fail quality control, there are good or poor credit risks, an employee may be promoted or not. A range of regression techniques have been developed for analyzing data with categorical dependent variables, including logistic regression and discriminant analysis.

Logistical regression is regularly used rather than discriminant analysis when there are only two categories of the dependent variable. Logistic regression is also easier to use with SPSS than discriminant analysis when there is a mixture of numerical and categorical independent variable's, because it includes procedures for generating the necessary dummy variables automatically, requires fewer assumptions, and is more statistically robust. Discriminant analysis strictly requires the continuous independent variables (though dummy variables can be used as in multiple regression). Thus, in

instances where the independent variables are categorical, or a mix of continuous and categorical, and the dependent variable is categorical, logistic regression is necessary. Since the dependent variable is dichotomous we cannot predict a numerical value for it using logistic regression, so the usual regression least squares deviations criteria for best fit approach of minimizing error around the line of best fit is inappropriate. Instead, logistic regression employs binomial probability theory in which there are only two values to predict: that probability ( $p$ ) is 1 rather than 0, i.e. the event/person belongs to one group rather than the other. Logistic regression forms a best fitting equation or function using the maximum likelihood method, which maximizes the probability of classifying the observed data into the appropriate category given the regression coefficients.

## Main Uses of Logistic Regression

- The first is the prediction of group membership. Since logistic regression calculates the probability of success over the probability of failure, the results of the analysis are in the form of an odds ratio.
- • Logistic regression also provides knowledge of the relationships and strengths among the variables (e.g. marrying the boss's daughter puts you at a higher probability for job promotion than undertaking five hours unpaid overtime each week).

## Assumptions

- Logistic regression does not assume a linear relationship between the dependent and independent variables.
- The dependent variable must be a dichotomy (2 categories).
- The independent variables need not be interval, nor normally distributed, nor linearly related, nor of equal variance within each group.

- The categories (groups) must be mutually exclusive and exhaustive; a case can only be in one group and every case must be a member of one of the groups.
- Larger samples are needed than for linear regression because maximum likelihood coefficients are large sample estimates. A minimum of 50 cases per predictor is recommended.

**Null Hypothesis  $H_0$ :** There is no relationship between the two samples.

**Alternative Hypothesis  $H_1$ :** There is no relationship between the two samples.

**Test statistics:**

$$\text{Logit}(p) = \frac{p}{1-p} \ln \frac{p}{1-p}$$

$$\text{Logit}(p) = \frac{p}{1-p(x)} \ln \frac{p}{1-p(x)} = a + b_1 x_1 + b_2 x_2 + \dots$$

$$p = \frac{e^{(a+b_1 X_1 + b_2 X_2 + \dots)}}{1 - e^{(a+b_1 X_1 + b_2 X_2 + \dots)}}$$

where,

p = the probability that a case is in a particular category.

e = the base of natural logarithms (approx. 2.72),

a = the constant of the equation and,

b = the coefficient of the predictor variables.

**Level of significance:** 5% at the level of significance.

### Conclusion

If the calculated value of the logistic regression is greater than the table value, we will reject the null hypothesis. If the calculated value is less than table value we will accept the null hypothesis.

## 3.8 Naive Bayes classifier

This is a classification technique based on Bayes' theorem with an assumption of independence between predictors. In simple terms, a Naive Bayes classifier assumes that the presence of a particular feature in a class is unrelated to the presence of any other feature.

Naive Bayesian model is easy to build and particularly useful for very large data sets. Along with simplicity, Naive Bayes is known to outperform even highly sophisticated classification methods.

Bayes theorem provides a way of calculating posterior probability  $P(c|x)$  from  $P(c)$ ,  $P(x)$  and  $P(x|c)$ . Look at the equation below:

$$P(c|x) = \frac{P(x|c)P(c)}{P(x)}$$

$$P(c|X) = P(X_1 | c) \times P(X_2 | c) \times \dots \times P(X_n | c) \times P(c)$$

Where,

$P(c|x)$  is the posterior probability of class (target) given predictor (attribute).

$P(c)$  is the prior probability of class.

$P(x|c)$  is the likelihood which is the probability of predictor given class.

$P(x)$  is the prior probability of predictor.

## 3.9 Ada boosting

Ada boost stands for “Adaptive Boosting.” It is a boosting algorithm that uses a weighted combination of weak learners to create a strong learner. The algorithm works by assigning higher weights to misclassified samples and lower weights to correctly classified samples.

The Ada boost algorithm has two main components: a weak learner component and

a weighting component. The weak learner component is responsible for generating a sequence of weak learners, each of which is assigned a weight based on its accuracy. The weighting component is used to adjust the weights of the training samples based on the accuracy of the weak learners.

To understand how Ada boost works, consider the following example:

Suppose we have a dataset of patients with certain medical conditions, and we want to predict whether a patient will have a certain disease based on their symptoms. The dataset contains various features such as age, gender, and symptoms. We can use Ada boost to train a model that predicts whether a patient will have the disease or not.

The Ada boost algorithm starts by initializing the weights of each training sample to be equal. It then trains a weak learner on the dataset and evaluates its performance. The weak learner may be any algorithm that produces a binary output, such as a decision tree, logistic regression, or perceptron.

If the weak learner correctly classifies a sample, its weight is decreased, and if it misclassifies a sample, its weight is increased. The algorithm then re-weights the samples based on their weights, with misclassified samples receiving a higher weight. This process is repeated for a specified number of iterations, with each iteration producing a new weak learner that is weighted based on its accuracy.

The Ada boost algorithm can be represented mathematically as follows:

$$\text{minimize } \sum_{i=1}^n w_i \exp(-y_i f(x_i))$$

where,

$n$ =is the number of samples,

$w_i$ =is the weight of the ‘i-th’ sample,

$y_i$ =is the true label of the ‘i-th’ sample,

$f(x_i)$ = is the prediction of the model on the ‘i-th’ sample, and

$\exp(-y_i f(x_i))$ =is the exponential loss function that penalizes misclassified samples.

# **CHAPTER 4**

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# CHAPTER 4

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## ANALYSIS AND INTERPRETATION

### 4.1 Introduction

This chapter provides the statistical analysis for the “**A STUDY ON WORKING WOMEN POLICE AND THEIR WELL BEING IN THIRUVANNAMALAI DISTRICT**”. For this analysis a suitable questionnaire was framed and data was collected in the entire Tiruvannamalai district around 101 women police was identified by random sampling methods as sample size of 150 is targeted and achieved with 101 and the population size is 510. Proper care was taken for the data collection and later data were classified using MS Excel software and suitable statistical software like SPSS, Minitab, MS excel and R Programming was used for analysing the data and the following statistical analysis was carried out:

1. Descriptive Statistics
2. Chi-Square analysis
3. Mann-Whitney U test
4. Kruskal-Wallis test
5. Multiple regression
6. Logistic regression
7. Naïve-Bayes classifier
8. Ada boost analysis

## **4.2 Descriptive statistics**

The descriptive statistics provides the details pertaining to study the basic demographic variables such as age group, marital status, social status, education qualification, Job environment and work condition among the police women.

#### 4.2.1 Distribution of Age group among the police women

Table 4.1: percentage analysis of age group

S.NO	AGE	PERCENTAGE
1	18-25	14.85%
2	26-35	47.52%
3	36-45	31.68%
4	46-60	5.94%

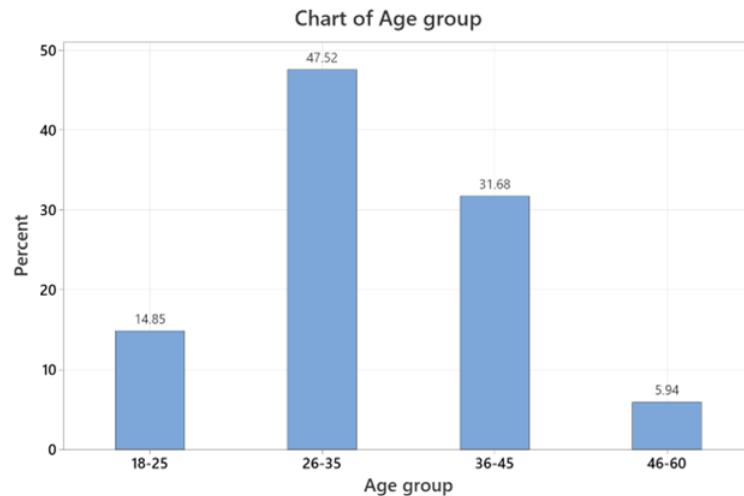


Figure 4.1: Bar chart for percentage analysis of age group

#### Interpretation

The bar chart illustrates the percentage distribution of age groups, indicating the prominence related to Age of the respondent. In this study majority of the respondents are belongs to 26-35 age group consists of 48%, followed by 36-45 age group consists of 32%, 18-25 age group is 15% and 46-60 are in 5%. Hence it concluded that majority of the women police are in the age group of 26-35 in Tiruvannamalai district.

#### 4.2.2 Distribution of Martial Status among the police women

Table 4.2: percentage analysis of Marital Status

S.NO	MARITAL STATUS	PERCENTAGE
1	MARRIED	71.28%
2	UNMARRIED	28.71%

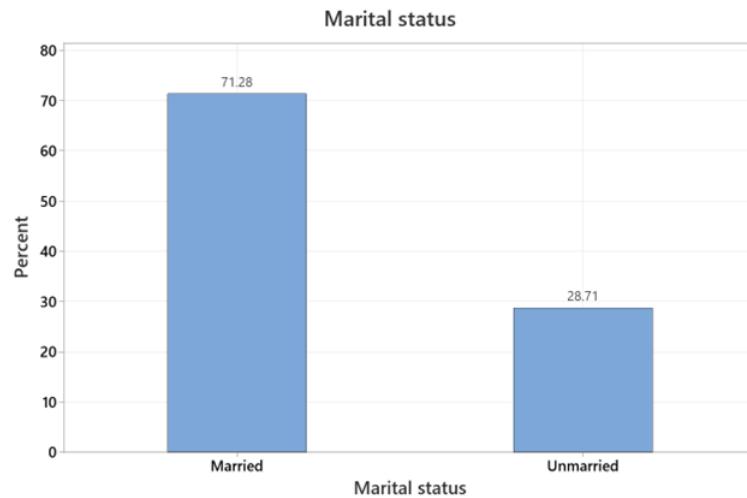


Figure 4.2: Bar chart for percentage analysis of Marital Status

#### Interpretation

The bar chart illustrates the percentage distribution of marital status. In this study majority of the respondents are belongs to married which consist of 71.28% followed by unmarried of 28.71%. Hence it concluded that majority of the women police are married women police working in Tiruvannamalai district.

#### 4.2.3 Distribution of Social Status among the police women

Table 4.3: percentage analysis for social status

S.NO	SOCIAL STATUS	PERCENTAGE
1	BC	39.6%
2	MBC	44.6%
3	OC	1%
4	SC	14.9%

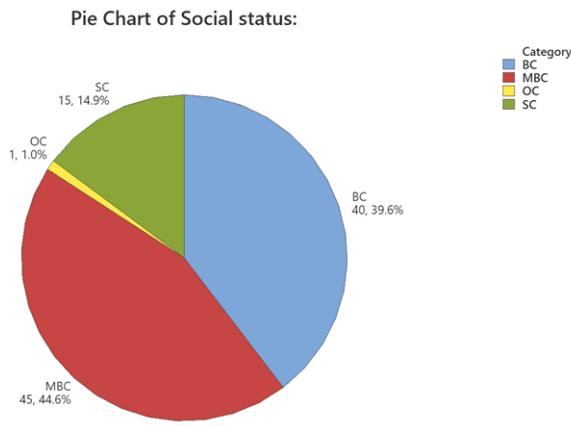


Figure 4.3: percentage analysis for social status

#### Interpretation

The pie chart visually depicts the percentage distribution of social statuses, MBC (Most Backward Class) consist of 44.6%, such as BC (Backward Class) consist of 40%, SC (Scheduled Caste) consists of 15%, OC (Open Category) consists of 1%, and. Each segment of the pie represents the proportion of individuals belonging to each social category, offering insights into societal demographics and representation.

#### **4.2.4 Distribution of Education Qualification among the police women**

Table 4.4: percentage analysis of education qualification

S.NO	EDUCATION QUALIFICATION	PERCENTAGE
1	HIGHER SCHOOL	18.8%
2	POST GRADUATE	22.8%
3	UNDER GRADUATE	58.4%

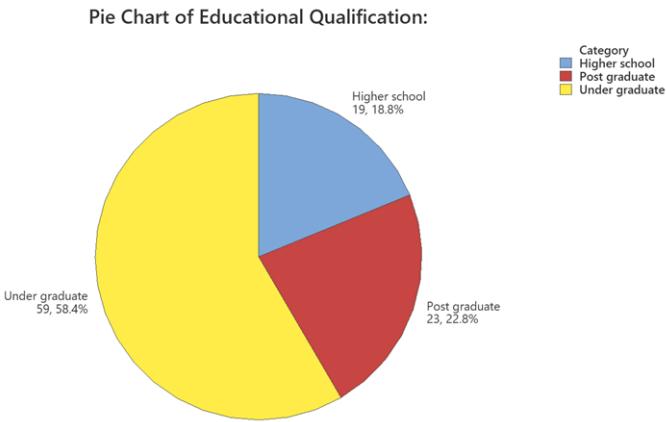


Figure 4.4: Pie chart for percentage analysis of education qualification

#### **Interpretation**

The pie chart visually presents the percentage distribution of education qualifications, categorizing them into groups like undergraduate consist of 59%, postgraduate consist of 23% and higher school consist of 19%. Hence it concluded that majority of the women police are study at undergraduate level in Tiruvannamalai district.

#### 4.2.5 Distribution of Job environment and work condition among the police women

Table 4.5: percentage analysis of job environment and work condition

S.NO.	JOB ENVIRONMENT AND WORKING CONDITION	YES/NO	PERCENTAGE
1.	FRIENDLY	YES	88%
		NO	13%
2.	ENCOURAGING	YES	83%
		NO	18%
3.	ARE THEY UNFRIENDLY	YES	21%
		NO	80%

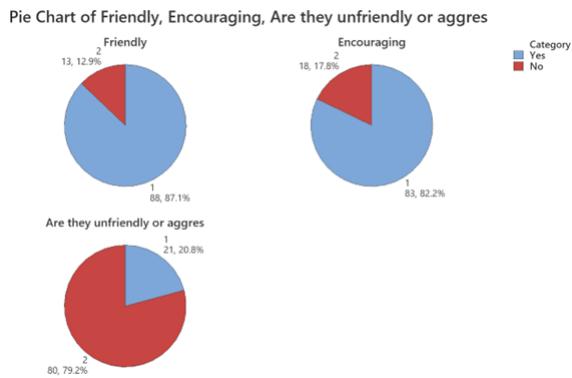


Figure 4.5: Pie Chart for percentage analysis of job environment and work condition

#### Interpretation

The pie chart depicts women police officers' perceptions of their job environment and working conditions. Firstly, it illustrates that 87.1% find the atmosphere friendly, with only 12.9% disagreeing. Secondly, in terms of encouragement, 82.2% feel positively, while 17.8% express a negative sentiment. Lastly, regarding whether the environment is unfriendly or aggressive, a notable majority, 79.2%, deny such conditions, though 20.8% acknowledge experiencing them. Overall, the chart suggests a generally positive outlook on the job environment and working conditions among women in the police force, despite a minority reporting less favourable experiences.

### 4.3 Average score analysis

S.NO.	STATEMENT	Always	Sometimes	Rarely	Never	Average
a.	Do you feel comfortable among your male colleagues?	40	44	8	9	3.17
b.	Do you always accept what your male colleagues' views?	34	54	13	0	3.24
c.	Do you differ from your male colleague's view?	10	33	23	35	2.2
d.	Do your colleagues accept your suggestions?	15	71	10	5	2.98

#### Interpretation

The Likert scale analysis provides insights into the perceptions and experiences of female respondents in relation to their male colleagues.

- Among the women police majority of respondents response to the question comfortable among male colleagues which states that the average score says that 3.17 hence they preferred always comfortable among the male police officers.
- Among the women police majority of respondents response to the question always accept what your male colleagues' views which states that the average score says that 3.24 hence they preferred always accept what your male colleagues' views.
- Among the women police majority of respondents response to the question differ from your male colleague's view which states that the average score says that 2.2 hence they preferred sometimes differ from your male colleague's view.
- Among the women police majority of respondents response to the question colleagues accept your suggestions which states that the average score says that 2.98 hence they preferred sometimes the colleagues accept your suggestions.

S.NO	STATEMENT	Strongly Agree	Agree	Neutral	Disagree	Strongly Dis-agree	Average
a.	There is a strong system of emotional support in place for women in the police force, both from a person that you work with and supervisors.	19	30	27	10	15	<b>2.206</b>
b.	I feel that my personal safety concerns are adequately addressed and prioritized by the department.	15	23	28	27	8	<b>2.086</b>
c.	There is a strong sense of friendship and mutual support among women in the police force.	21	31	43	6	0	<b>2.466</b>
d.	Opportunities for professional growth and advancement are equally accessible to both men and women in the police department	26	43	25	5	2	<b>2.593</b>
e.	The workload in my role is balanced and manageable, allowing for a healthy work-life integration.	9	27	34	17	14	<b>2.02</b>
f.	The training programs provided by the police department effectively address the psychological well-being and needs of women officers	19	42	17	21	2	<b>2.386</b>

## Interpretation

- Among the women police majority of respondents response to the question there is a strong system of emotional support in place for women in the police force, both from a person that you work with and supervisors which states that the average score says that 2.206 hence they preferred Agree for a strong system of emotional support in place for women in the police force, both from a person that you work with and supervisors.
- Among the women police majority of respondents response to the question I feel that my personal safety concerns are adequately addressed and prioritized by the department which states that the average score says that 2.086 hence they preferred Agree for I feel that my personal safety concerns are adequately addressed and prioritized by the department.
- Among the women police majority of respondents response to the question there is

a strong sense of friendship and mutual support among women in the police force which states that the average score says that 2.466 hence they preferred Neutral for there is a strong sense of friendship and mutual support among women in the police force.

- Among the women police majority of respondents response to the question Opportunities for professional growth and advancement are equally accessible to both men and women in the police department which states that the average score says that 2.593 hence they preferred Agree for professional growth and advancement are equally accessible to both men and women in the police department.
- Among the women police majority of respondents response to the question the workload in my role is balanced and manageable, allowing for a healthy work-life integration which states that the average score says that 2.02 hence they preferred Neutral for the workload in my role is balanced and manageable, allowing for a healthy work-life integration On.
- Among the women police majority of respondents response to the question the training programs provided by the police department effectively address the psychological well-being and needs of women officers which states that the average score says that 2.386 hence they preferred Agree for the training programs provided by the police department effectively address the psychological well-being and needs of women officers.

## 4.4 Chi-Square Test

### 4.4.1 Chi-Square Test for marital status and job satisfaction

A chi-square test for independence can be studied to assess the association between marital status and job satisfaction among the women police in Tiruvannamalai.

**Null Hypothesis  $H_0$ :** There is no association between marital status and job satisfaction on women police.

**Alternative Hypothesis  $H_1$ :** There is an association between marital status and job satisfaction on women police.

**Level of significance:** 5% at the level of significance.

### Chi-Square Test

Table 4.6: Chi-square test between Marital status and job satisfaction

Marital status.	Job satisfaction		
	No	Yes	All
Married	41	31	72
Unmarried	11	18	29
All	52	49	101

	Chi-Square	df	P-Value	Significant/not Significant
Pearson	2.992	1	0.084	Not Significant

### Interpretation

Since the chi-square is (0.084) is greater than p-value of 0.05: We fail to reject the null hypothesis and infer that, there is no statistically significance evidence to support the relationship between marital status and job satisfaction among the women police. Hence it is concluded that the job satisfaction is independent with the martial status.

#### **4.4.2 Chi-Square Test for nature of police ranks and talent of women police**

A chi-square test analysing the association between the nature of police rank and the extent to which talent of women police is utilized.

**Null Hypothesis  $H_0$ :** There is no association between the nature of rank and the extent to which the talent of women police is utilized.

**Alternative Hypothesis  $H_1$ :** There is a relationship between the nature of rank and the extent to which the talent of women police is utilized.

**Level of significance:** 5% at the level of significance.

#### **Chi-Square Test**

Table 4.7: Chi-square test between nature of rank and talent of women police is utilised

Talent of women police is utilised	nature of rank			All
		To a great extent	To a lesser extent	
Constable	12	12	5	24
Head Constable	37	5	42	
Assistant Sub-Inspector	12	9	21	
Sub-Inspector	8	6	14	
All	69	32	101	

	Chi-Square	df	P-Value	Significant/not Significant
Pearson	21.778	3	0.000	Significant

#### **Interpretation**

Since the chi-square is extremely low (0.00) is less than p-value of 0.05: We reject the null hypothesis and inferred that there is strong statistical evidence to support the relationship between the nature of police rank and the extent to which the talent of women police is utilized.

#### **4.4.3 Chi-Square Test is studied for number of children and how they adjust your working hours in their job**

A chi-square test analysing the relationship between the number of children and the ability to adjust work hours to accommodate family commitments.

**Null Hypothesis  $H_0$ :** There is no relationship between having children and the ability to adjust work hours to accommodate family commitments.

**Alternative Hypothesis  $H_1$ :** There is a relationship between having children and the ability to adjust work hours to accommodate family commitments.

**Level of significance:** 5% at the level of significance.

#### **Chi-Square Test**

Table 4.8: Chi-square test for children and working hours

Can you adjust your work hours for your family commitments	number of children		
	Yes	No	All
Yes	32	28	60
No	18	23	41
All	50	51	101

	Chi-Square	df	P-Value	Significant/not Significant
Pearson	0.867	1	0.352	Not Significant

#### **Interpretation**

Since the chi-square is (0.352) is greater than p-value 0.05: we fail to reject the null hypothesis. There is no statistically significant association between having children and the ability to adjust work hours to accommodate family commitments based on the data analysed.

## 4.5 Mann-Whitney test for comparing marital status and talent of women police

The Mann-Whitney U test, also known as the Wilcoxon rank-sum test, is a non-parametric test used to assess whether two independent samples come from populations with the same distribution. A Mann-Whitney test is analysing to comparing marital status and talent of women police.

**Null Hypothesis  $H_0$ :** There is no significant difference in talent levels between married and unmarried women police officers.

**Alternative Hypothesis  $H_1$ :** There is a significant difference in talent levels between married and unmarried women police officers.

**Level of significance:** 5% at the level of significance.

Table 4.9: Mann-Whitney test between Marital status and talent of women police.

Sample	N	Median
Marital status	101	2
Talent of women police	101	1

### Test

Method	W-Value	P-Value	Significant/not Significant
Not adjusted for ties	12271.50	1.000	not Significant

### Interpretation

Since if the Maan-Whitney is 1.000 is greater than p-value of 0.05: we fail to reject the null hypothesis, indicating that there is insufficient evidence to conclude a significant difference in talent levels between married and unmarried women police officers.

## 4.6 Kruskal-Wallis Test for comparing education qualification and the nature of police rank

The Kruskal-Wallis test is a non-parametric test used to determine whether there is a statistical evidence between two or more independent groups. It's often used as an alternative to the one-way analysis of variance (ANOVA) in parametric when the assumptions of ANOVA are violated, particularly when the data are not normally distributed or when the sample sizes are small.

A Kruskal-Wallis test is studied to compare education qualification and the nature of job

**Null Hypothesis  $H_0$ :** There is no difference in the distribution of the nature of jobs across different education qualification groups.

**Alternative Hypothesis  $H_1$ :** There is a difference in the distribution of the nature of jobs across different education qualification groups.

**Level of significance:** 5% at the level of significance.

### Descriptive Statistics

What is your nature of rank	N	Median	Mean Rank	Z-Value
Constable	24	5	71.3	3.89
Head Constable	42	4	43.6	-2.14
Assistant Sub-Inspector	21	4	36.0	-2.64
Sub-Inspector	10	4	49.2	-0.20
Inspector	4	5	90.0	2.72
Overall	101		51.0	

Method	DF	H-Value	P-Value
Not adjusted for ties	4	26.80	0.000
Adjusted for ties	4	34.26	0.000

## **Interpretation**

Since the Kruskal-Wallis is extremely low (0.000) is less than p-value of 0.05: We reject the null hypothesis. There is strong statistical evidence to support a difference in the distribution of the nature of jobs across different education qualification groups.

## **4.7 Multiple Regression Analysis**

This analysis is to study about is there any relationship exists between the independent variable and the dependent variable among the women police.

**Dependent variable:** Job satisfaction versus.

**Independent variable:** Age group, Marital status, Do you have any children?, Educational Qualification, Why do you join the police force, Do you feel that, public is co-operating with you, Do you feel that this job affects my life than an ordinary women?, To what extent do you think the talent of women police is utilised?, Similar jobs like men, women police mostly preferred? administrative jobs, women police mostly preferred? Female department jobs, women police mostly preferred? Less risk but competent job, women police mostly preferred? Where is your work place located?, Can you adjust your work hours to better accommodate your family commitments? Do you feel comfortable among your male colleagues? Do your colleagues accept your suggestions? There is a strong system of emotional support in place for women in the police force, both from a person that you work with and supervisors. The workload in my role is balanced and manageable, allowing for a healthy work-life integration. We use Multiple regression to determine how well the model fits for the job satisfaction of women police.

Term	Coefficient	Standard Error	Coefficient	T-Value	P-Value	VIF
Constant	-0.051	0.360		-0.14	0.888	
Age group,	0.1359	0.0324		4.19	0.000	5.13
Marital status,	-0.0531	0.0989		-0.54	0.593	15.75
presence of children	-0.035	0.110		-0.31	0.754	23.01
Educational Qualification,	0.1665	0.0290		5.74	0.000	2.74
Joining reason	0.0802	0.0268		3.00	0.004	3.90
Public cooperation	-0.0029	0.0292		-0.10	0.922	5.77
Job impact on life to ordinary women	-0.1571	0.0649		-2.42	0.018	8.10
Utilization of women police talent	0.1665	0.0533		3.12	0.002	4.84
Similar jobs like men	0.1050	0.0700		1.50	0.138	7.54
administrative jobs	0.3417	0.0576		5.93	0.000	4.14
Female department jobs	-0.1024	0.0687		-1.49	0.140	2.39
Less risk but competent job	-0.0267	0.0780		-0.34	0.733	9.98
your work place located	-0.0970	0.0470		-2.06	0.042	4.27
Work hour adjusted for family commitment	0.0362	0.0560		0.65	0.520	6.16
comfortable among your male colleagues	-0.0633	0.0366		-1.73	0.088	4.21
colleagues accept your suggestions	0.0484	0.0446		1.09	0.280	4.48
Emotional support system for women police	-0.0767	0.0154		-4.98	0.000	3.10
Balanced workload for work life integration	0.0797	0.0180		4.43	0.000	3.42

## Coefficient

## Model Summary

Standard Error (S)	R-square	R-square (adjusted)	R-square (predicted)	Durbin-Watson Statistics
0.113368	83.95%	80.42%	68.94%	2.45805

## Interpretation

### Regression equation

Job satisfaction = - 0.051 + 0.1359 Age group - 0.0531 Marital status - 0.035 presence of children + 0.1665 Educational Qualification + 0.0802 Joining reason- 0.0029 Public cooperation- 0.1571 Job impact on life to ordinary women + 0.1665 Utilization of women police talent + 0.1050 Similar jobs like men + 0.3417 administrative jobs - 0.1024 Female department jobs - 0.0267 Less risk but competent job - 0.0970 22. your work place located + 0.0362 Work hour adjusted for family commitment - 0.0633 comfortable among your male colleagues + 0.0484 colleagues accept your suggestions - 0.0767 Emotional support system for women police + 0.0797 Balanced workload for work life integration.

## Conclusion

The model has a standard error of 0.113368, indicating a reasonably good fit. R-square of 83.95% shows a substantial portion of variance explained, while the adjusted R-square of 80.42% is a more reliable measure considering the number of variables. The predicted R-square of 68.94% suggests potential for improvement in generalizability. Finally, the Durbin-Watson statistic of 2.45805 indicates no significant autocorrelation in the residuals.

## 4.8 Logistic Regression

### Binary logistic Regression

**Dependent variable:** working condition versus **Independent variable:** To what extent do you think the talent of women police is utilised?, Do you have any access to health and wellness programs provided by your police department?, Is there easy access to counselling or mental health services for women officers in your police department?, Similar jobs like men, Administrative jobs, Female department jobs, Less risk but competent job, Is there any support or assistance provided for childcare services for working women in your department?

### Regression Equation

$$P(2) = \exp(Y') / (1 + \exp(Y'))$$

$Y' = -149.9 + 35.4 \text{ Women police talent utilization} - 34.0 \text{ Health and wellness programs provided by your police department} + 10.60 \text{ 19 counselling or mental health services for women police} + 10.42 \text{ 20 Similar jobs like men} + 46.9 \text{ Administrative jobs} - 36.3 \text{ Female department jobs} + 12.0 \text{ Less risk but competent job} + 38.1 \text{ 24 Child care support for working women police}$

## Coefficient

Term	Coefficient	SE Coefficient	Z-Value	P-Value	VIF
Constant	-149.9	80.0	-1.87	0.061	
Women police talent utilization	35.4	18.3	1.94	0.053	12.35
Health and wellness programs provided by your police department counselling or mental health services for women police	-34.0	17.2	-1.98	0.048	10.26
	10.60	8.19	1.29	0.196	2.14
Similar jobs like men	10.42	7.84	1.33	0.184	2.38
Administrative jobs	46.9	22.6	2.08	0.038	6.95
Female department jobs	-36.3	34.0	-1.07	0.286	1.81
Less risk but competent job	12.0	13.0	0.92	0.357	5.98
Child care support for working women police	38.1	21.7	1.76	0.078	2.55

## Model Summary

Deviance R-Square	Deviance R-Square(adjusted)	AIC	AICc	BIC	Area Under ROC Curve
99.87%	91.42%	18.12	20.10	41.66	1.0000

## Goodness-of-Fit Tests

Test	df	Chi-Square	P-Value
Pearson	92	0.06	1.000

## Interpretation

The logistic regression equation provided suggests that various factors influence the extent to which the talent of women in the police force is utilized. The coefficients represent the impact of each variable on the likelihood of women's talent utilization. For instance, a positive coefficient like +46.9 for "Similar jobs like men" indicates that when women have roles similar to men, their talent utilization is more likely. Conversely, negative coefficients such as -34.0 for "Access to health and wellness programs" suggest that inadequate access may hinder talent utilization. Furthermore, positive coefficients for support systems like childcare services (+12.0) and counselling (+10.42) indicate they positively influence talent utilization. Therefore, comprehensive support systems, equitable job assignments, and access to wellness programs can enhance the utilization of women's talent in policing.

## 4.9 Naivebayes

**Dependent variable:** Job satisfaction

**Independent variable:** Age, Marital Status, Education Qualification, Social Status, Nature of work

$$\begin{bmatrix} prediction & Yes & No \\ Yes & 1 & 0 \\ No & 1 & 5 \end{bmatrix}$$

[1] "Accuracy: 0.857142857142857"

### Interpretation

The confusion matrix you provided shows the performance of a Naive Bayes classifier on a binary classification task. Let's break down what the confusion matrix tells us and how it relates to the overall accuracy of 85.7%.

### Confusion Matrix

$$\begin{bmatrix} prediction & ActualPositive & ActualNegative \\ Positive & TruePositives(TP) & FalsePositive(FP) \\ Negative & FalseNegatives(FN) & TrueNegatives(TN) \end{bmatrix}$$

In this case:

- TP (True Positives): 1. These are the cases where the model correctly predicted the class as "Yes".
- FP (False Positives): 0. These are the cases where the model incorrectly predicted the class as "Yes" when it actually belonged to the "No" class.
- FN (False Negatives): 1. These are the cases where the model incorrectly predicted the class as "No" when it actually belonged to the "Yes" class.
- TN (True Negatives): 5. These are the cases where the model correctly predicted the class as "No".

## Accuracy

The accuracy you provided is calculated as the ratio of correctly classified instances ( $TP + TN$ ) to the total number of instances:  $\text{Accuracy} = (TP + TN) / (TP + TN + FP + FN)$ . In this specific case, the accuracy is 85.7%, which means the model correctly classified 85.7% of the instances in the test data. This is a good accuracy, but it's important to consider the distribution of the classes in your data to interpret the confusion matrix more effectively.

## 4.10 Ada Boost

Confusion matrix

<i>prediction</i>	<i>Yes</i>	<i>No</i>
<i>yes</i>	28	1
<i>No</i>	0	2

[1] "Accuacy: 0.967741935483871"

## Interpretation

The accuracy calculation and confusion matrix are indicative of the performance of a predictive model, specifically an AdaBoosting model.

<i>prediction</i>	<i>Yes</i>	<i>No</i>
<i>yes</i>	28	1
<i>No</i>	0	2

- The confusion matrix is a tabular representation of the model's performance on a test dataset. In this matrix:
  - The rows represent the predicted classes. The columns represent the actual classes.

- The numbers in the matrix indicate the counts of observations.

In this case:

- There are 28 instances where class 1 was correctly predicted (true positives).
- There are 2 instances where class 2 was correctly predicted (true negatives).
- There's 1 instance where class 1 was incorrectly predicted as class 2 (false negatives).
- There are no instances where class 2 was incorrectly predicted as class 1 (false positives).

## Accuracy

The accuracy is a metric that measures the proportion of correctly classified instances out of all instances in the test dataset. It is calculated as the sum of the diagonal elements (true positives and true negatives) of the confusion matrix divided by the sum of all elements in the confusion matrix.

$$\text{Accuracy} = (28 + 2) / (28 + 1 + 0 + 2) = 30 / 31 \quad 0.967741935483871$$

So, the accuracy of the Ada Boosting model on the test dataset is approximately 96.77%. This means that the model correctly classified about 96.77% of the instances in the test dataset.

## **CHAPTER 5**

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# CHAPTER 5

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## CONCLUSION

### 5.1 Findings

- **Demographic Analysis:** Various visual representations like bar charts and pie charts are utilized to present demographic data, including age groups, marital status, social statuses, education qualifications, and perceptions of women police officers regarding their job environment.
- **Likert Scale Analysis:** The analysis of responses on a Likert scale suggests a generally positive relationship between female and male colleagues within the workplace, though there are occasional disparities indicating room for improvement in inclusivity and collaboration.
- **Chi-square Tests:**
  - a. The first chi-square test fails to reject the null hypothesis, indicating no statistically significant evidence supporting a relationship between marital status and job satisfaction among women police officers.

- b.The second chi-square test rejects the null hypothesis, suggesting a strong statistical relationship between the nature of police rank and the extent to which the talent of women police is utilized.
- c.The third chi-square test also fails to reject the null hypothesis, indicating no statistically significant association between having children and the ability to adjust work hours to accommodate family commitments.
- **Mann-Whitney Test:** Fails to reject the null hypothesis, suggesting insufficient evidence to conclude a significant difference in talent levels between married and unmarried women police officers.
  - **Kruskal-Wallis Test:** Rejects the null hypothesis, indicating strong statistical evidence supporting a difference in the distribution of job nature across different education qualification groups.
  - **Regression Analysis:** The regression equation identifies various factors influencing the utilization of women's talent in the police force, including job assignments, access to support systems, and wellness programs.
  - **Naive Bayes Classifier:** Achieves an accuracy of 85.71% on the test data, indicating proficient classification based on the provided features.
  - **Ada Boosting Model Accuracy:** The Ada Boosting model achieves an accuracy of approximately 96.77% on the test dataset, demonstrating highly accurate classification performance.

## 5.2 Suggestion

The analysis delves into multiple aspects of the dataset, employing various statistical tests and machine learning techniques. Demographic data, including age groups, marital status, social statuses, education qualifications, and perceptions of women police officers regarding their job environment, are visually represented through bar charts and pie charts. The Likert scale analysis unveils a predominantly positive relationship between female and male colleagues within the workplace, yet acknowledges occasional disparities that suggest room for improvement in inclusivity and collaboration. Chi-square tests yield mixed results, indicating no significant evidence supporting a relationship between marital status and job satisfaction among women police officers, but revealing strong statistical relationships between police rank and talent utilization, as well as no significant association between having children and the ability to adjust work hours. The Mann-Whitney test fails to identify a significant difference in talent levels between married and unmarried women police officers. Conversely, the Kruskal-Wallis test provides strong statistical evidence supporting differences in job nature distribution across various education qualification groups. Additionally, regression analysis identifies key factors influencing the utilization of women's talent in the police force, while machine learning models like Naive Bayes and Ada Boosting exhibit high accuracy in classifying test data.

### **5.3 Conclusion**

The objectives aim to understand and address the experiences of women serving as police officers in Tiruvannamalai District. Firstly, the plan seeks to assess their workload and challenges, followed by an evaluation of job satisfaction levels and any associated concerns. Additionally, it aims to examine their physical and mental well-being in relation to their profession and assess the impact of their work environment on their overall health. The plan also seeks to understand their ability to balance work and personal life, identifying areas where support may be needed. Furthermore, it aims to explore career advancement opportunities and address any gender-based challenges they may face in their roles. By addressing these objectives, we can gain insights to improve working conditions, promote well-being, and foster gender equality within the police force. Ultimately, this holistic approach aims to create a more supportive and equitable environment for women police officers in Tiruvannamalai District, enhancing their professional experiences and overall satisfaction.

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## **Appendix**

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## CHAPTER 6

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## APPENDIX