Data Analysis and Visualization Project

Time Series Analysis on Mental Disorder in Pakistan

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Abstract

This report presents a detailed analysis of mental health disorders in Pakistan, utilizing data spanning from 1990 to 2019. Through time series analysis, stationarity testing, and ARIMA modeling, key trends and patterns in mental health disorder prevalence are identified. The analysis reveals a consistent increase in depressive disorders, stable patterns in schizophrenia prevalence, and varying trends in anxiety disorders over time. Recommendations are provided to address mental health challenges in Pakistan, emphasizing awareness, strengthening mental health services, and integrating mental health into primary care. Future research directions include longitudinal studies and policy evaluation to further improve mental health outcomes in Pakistan.

1 Introduction

Mental health disorders represent a significant public health concern globally, with profound implications for individuals, communities, and healthcare systems. In Pakistan, where mental health resources are often limited and stigmatization remains prevalent, understanding the prevalence and trends of these disorders is paramount for effective intervention and policy development. This report aims to provide a comprehensive analysis of mental health disorders in Pakistan, utilizing robust data and analytical techniques to inform evidence-based strategies for addressing mental health challenges in the country.

2 Dataset Overview

The dataset utilized in this analysis comprises data on the prevalence of several mental health disorders in Pakistan, spanning from 1990 to 2019. These disorders include schizophrenia, depressive disorders, anxiety disorders, bipolar disorders, and eating disorders. Each disorder's prevalence is measured as a share of the population and is age-standardized to account for demographic variations. The dataset is structured with columns representing countries, years, and the prevalence of each disorder.

	Country	Code	Year	Schizophrenia	Depressive	Anxiety	Bipolar	Eating
0	Afghanistan	AFG	1990	0.223206	4.996118	4.713314	0.703023	0.127700
1	Afghanistan	AFG	1991	0.222454	4.989290	4.702100	0.702069	0.123256
2	Afghanistan	AFG	1992	0.221751	4.981346	4.683743	0.700792	0.118844
3	Afghanistan	AFG	1993	0.220987	4.976958	4.673549	0.700087	0.115089
4	Afghanistan	AFG	1994	0.220183	4.977782	4.670810	0.699898	0.111815
...	...	...	...	...	...	...	...	...
6188	Zimbabwe	ZWE	2015	0.201042	3.407624	3.184012	0.538596	0.095652
6189	Zimbabwe	ZWE	2016	0.201319	3.410755	3.187148	0.538593	0.096662
6190	Zimbabwe	ZWE	2017	0.201639	3.411965	3.188418	0.538589	0.097330
6191	Zimbabwe	ZWE	2018	0.201976	3.406929	3.172111	0.538585	0.097909
6192	Zimbabwe	ZWE	2019	0.202482	3.395476	3.137017	0.538580	0.098295

6193 rows × 8 columns

Figure 1: Dataset Sample

3 Time Series Analysis

A detailed time series analysis was conducted to examine the temporal trends of mental health disorders in Pakistan. Notable observations include a consistent upward trend in depressive disorders, stable patterns in schizophrenia prevalence, and varying trends in anxiety disorders over time. These findings provide insights into the evolving landscape of mental health disorders in Pakistan and highlight areas of concern for policymakers and healthcare professionals.

4 Major Steps

Following steps are involved in Time Series Analysis

4.1 Data Preprocessing

Prior to analysis, the data underwent preprocessing to ensure consistency and reliability. This involved cleaning the data to remove any inconsistencies, missing values, or outliers that could affect the analysis. Additionally, transformations were applied to achieve stationarity where necessary.

4.2 Exploratory Data Analysis (EDA)

Exploratory data analysis was conducted to gain insights into the underlying patterns and trends in mental health disorder prevalence over time. Line plots, histograms, and other graphical methods were used to visualize the data and identify any systematic variations.

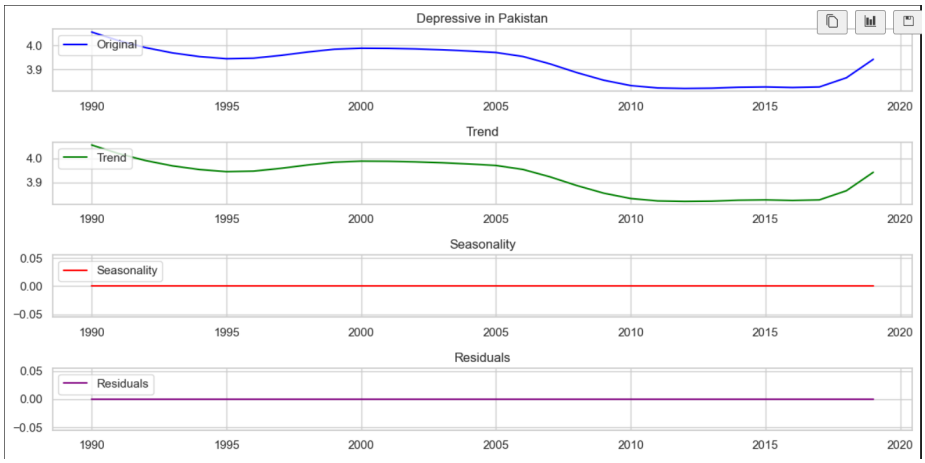

Figure 2: Visualization of Depressive Disorder

Figure 3: Visualization of Anxiety Disorder

4.3 Stationarity Testing and Differencing

To ensure accurate modeling, Augmented Dickey-Fuller tests were conducted to assess the stationarity of the data. Differencing was applied to non-stationary series to achieve stationarity, enabling robust modeling and forecasting of mental health disorder prevalence. This step was essential for obtaining reliable insights into the underlying dynamics of mental health disorders in Pakistan.

4.4 Autocorrelation Analysis

Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF) plots were generated for each mental health disorder. These plots provided insights into the correlation between observations at different time lags, aiding in the selection of appropriate parameters for ARIMA modeling. The analysis of autocorrelation patterns helped refine the modeling approach and improve the accuracy of future forecasts.

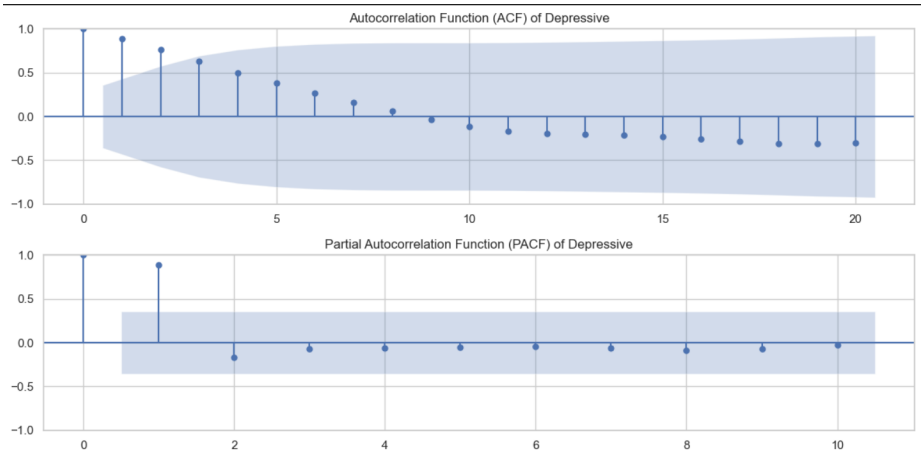

Figure 4: Auto correlation of Depressive disorder

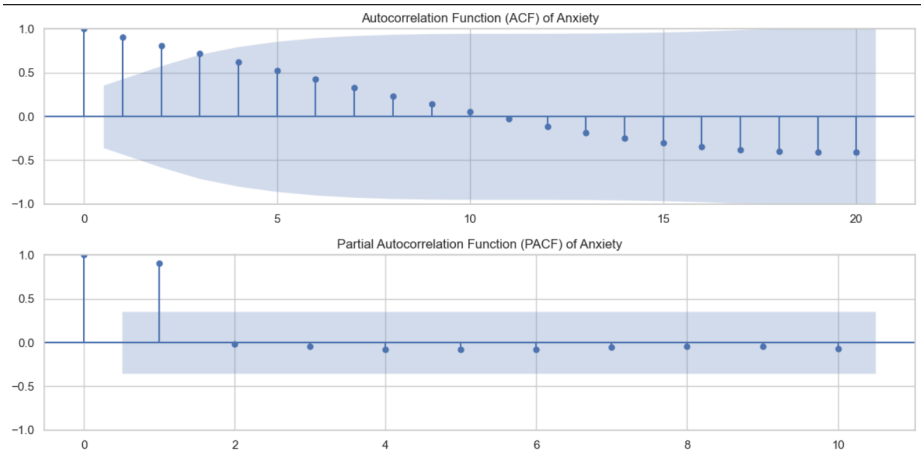

Figure 5: Auto correlation of Anxiety disorder

4.5 ARIMA Modeling

ARIMA (AutoRegressive Integrated Moving Average) models were employed to forecast the prevalence of depressive and anxiety disorders in Pakistan. The differenced data was utilized for modeling, and ARIMA parameters were selected based on ACF/PACF analysis and model evaluation criteria. Future values were forecasted for the next ten years, providing valuable insights into potential trends and patterns. These forecasts serve as valuable tools for policymakers and healthcare professionals in planning and resource allocation for mental health services.

5 Results and Findings

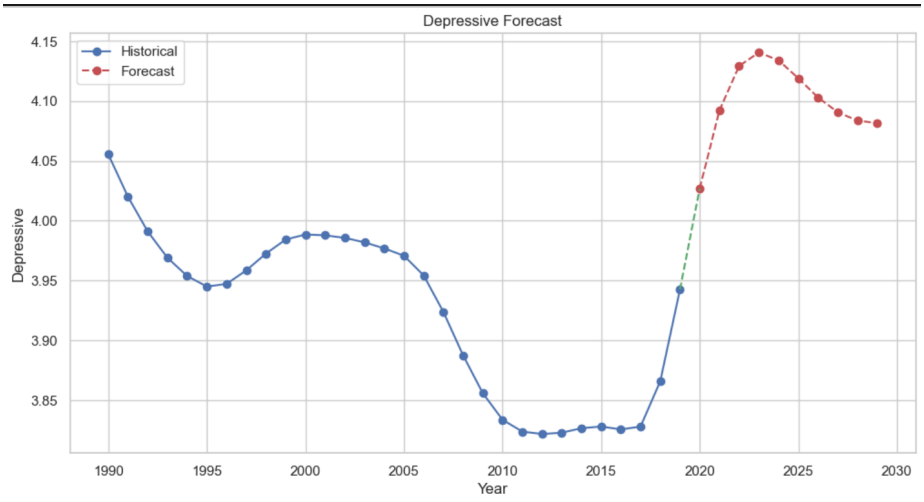

Figure 6: Forecasting Results of Depressive disorder

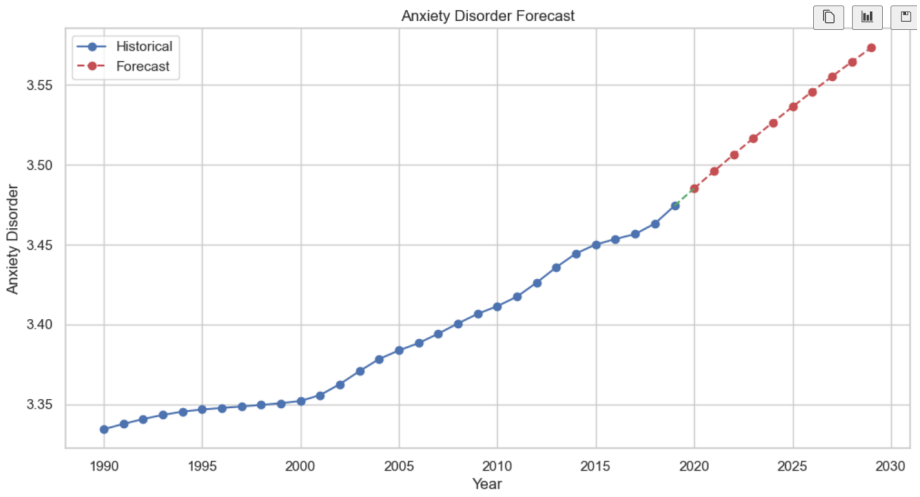

Figure 7: Forecasting Results of Anxiety disorder

6 Conclusion

The analysis provides comprehensive insights into the prevalence and trends of mental health disorders in Pakistan. Key findings include the escalating prevalence of depressive disorders and the fluctuating patterns of anxiety disorders over time. These insights are essential for informing evidence-based interventions and policies aimed at improving mental health outcomes in Pakistan. By addressing the underlying determinants of mental health disorders and implementing targeted interventions, Pakistan can work towards creating a more inclusive and supportive environment for individuals living with mental illness.