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Analyzing the Impact of Government Expenditure on the Health Sector: Evidence from Pakistan

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Abstract

The study on the impact of government expenditure on the health sector of Pakistan is significant as it delves into a critical aspect of public policy that directly affects the well-being of citizens and the overall development of the country. By analyzing data from 1990 to 2015, the research aims to understand the relationship between government spending in the health sector and various economic indicators. The findings of this study could have significant implications for policymakers in Pakistan. Understanding the impact of government expenditure on the health sector can inform decisions related to budget allocation, resource allocation, and policy priorities. If the research uncovers a positive relationship between government spending on health and economic growth indicators, it could provide justification for increasing investments in healthcare infrastructure, personnel, and services. Conversely, if the study reveals inefficiencies or mismatches in government spending on health, it could highlight areas for improvement in healthcare delivery, governance, and policy implementation. This could lead to targeted interventions aimed at enhancing the effectiveness and efficiency of healthcare spending, ultimately improving health outcomes for the population and contributing to sustainable economic growth. The analysis of different factors influencing the health sector in Pakistan, including infant mortality rate, government expenditure as a percentage of GDP, improved sanitation facilities, and literacy rate, provides valuable insights into the dynamics of healthcare outcomes and the determinants of population health. The positive relationship observed between infant mortality rate and crude death rate underscores the importance of addressing factors that contribute to infant mortality, such as inadequate healthcare access, poor maternal and child health services, and insufficient sanitation infrastructure. By improving these aspects, policymakers can work towards reducing infant mortality rates and overall crude death rates. On the other hand, the negative relationship between improved sanitation facilities and crude death rate suggests that investments in sanitation infrastructure can have significant public health benefits, including reducing the incidence of waterborne diseases and improving overall hygiene standards. Similarly, the negative relationship between literacy rate and crude birth rate highlights the role of education in empowering individuals, particularly women, to make informed decisions about family planning and reproductive health. The positive relationship between government expenditure and crude birth rate indicates that increased investment in healthcare services and maternal and child health programs can lead to higher birth rates. However, it is essential to ensure that government expenditure is effectively allocated and transparently utilized to maximize its impact on improving healthcare outcomes and population health. These empirical findings underscore the multifaceted nature of healthcare interventions and the need for comprehensive strategies that address various determinants of health. By targeting investments in sanitation infrastructure, education, and healthcare services, policymakers can work towards improving health outcomes and promoting sustainable development in Pakistan.

Keywords: Government expenditure, health sector, Pakistan, ARDL technique, economic indicators
JEL Codes: H51, I15, O55

1. INTRODUCTION

Government expenditure in the health sector plays a pivotal role in shaping the accessibility and quality of healthcare services available to the population. Adequate funding enables the establishment and maintenance of healthcare infrastructure, the provision of essential medical supplies and equipment, and the recruitment and training of healthcare professionals. Therefore, analyzing the impact of government spending on health allows policymakers and stakeholders to evaluate the effectiveness of resource allocation and identify areas for improvement. Moreover, understanding the relationship between government expenditure on health and key health indicators such as infant mortality rate, life expectancy, and disease prevalence provides valuable insights into the overall health status of the population. It allows for the assessment of progress towards achieving healthcare-related goals and targets, such as those outlined in national health policies and international development agendas. Furthermore, by examining the linkages between government investment in health and broader socio-economic outcomes, such as education attainment, employment opportunities, and economic productivity, the study contributes to our understanding of the interplay between health and development. A healthy population is not only essential for individual well-being but also for sustainable economic growth and social progress.

In analyzing the health sector, it is crucial to consider key health indicators that provide insights into the demographic and health characteristics of a population. Two fundamental indicators in this regard are the crude birth rate (CBR) and the crude death rate (CDR), which are widely used to assess population dynamics and overall health outcomes. The crude

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birth rate represents the number of live births occurring in a given population during a specified period, typically expressed per 1,000 individuals per year. It serves as a measure of fertility and reflects the reproductive behavior of a population. A high crude birth rate may indicate high fertility rates, which can have implications for population growth, resource allocation, and socio-economic development. Conversely, a low crude birth rate may reflect declining fertility rates and aging populations, posing challenges such as labor shortages and increased healthcare costs for the elderly. On the other hand, the crude death rate measures the number of deaths occurring in a population over a specific time period, usually expressed per 1,000 individuals per year. It provides insights into mortality patterns and overall health conditions within a population. A high crude death rate may signal health challenges such as infectious diseases, inadequate healthcare access, or poor sanitation and hygiene practices. Conversely, a low crude death rate indicates better health outcomes, access to healthcare services, and overall population well-being. Analyzing trends and patterns in crude birth and death rates over time can offer valuable insights into the effectiveness of healthcare systems, public health interventions, and socio-economic development initiatives. By monitoring changes in these indicators, policymakers and health authorities can identify areas for improvement, target resources more effectively, and develop evidence-based strategies to address health challenges and promote population well-being.

To analyse the health sector some of the health indicators such as crude birth rate and crude death rate are been determined (Todaro,2007). Indeed, life expectancy is a crucial metric in assessing the overall health and well-being of a population. It represents the average number of years a person can expect to live from birth, reflecting the prevailing health conditions, healthcare services, and socio-economic factors within a society. Life expectancy is influenced by various factors, including healthcare infrastructure, access to medical services, public health interventions, sanitation, nutrition, education, income levels, and environmental conditions. Improvements in healthcare, advancements in medical technology, disease prevention efforts, and overall socio-economic development contribute to increased life expectancy rates over time. The crude birth rate and crude death rate are essential components in the determination of life expectancy. The crude birth rate measures the number of live births per 1,000 individuals in a population during a specific period, typically one year. Meanwhile, the crude death rate represents the number of deaths per 1,000 individuals in the population during the same period. By analyzing trends in these rates and considering other relevant factors, policymakers and health authorities can assess the overall health status of a population and identify areas for improvement. Increasing life expectancy often correlates with advancements in healthcare, education, and socio-economic development, indicating progress in enhancing overall quality of life and well-being.

Efforts to improve life expectancy include investments in healthcare infrastructure, disease prevention and control programs, maternal and child health initiatives, access to clean water and sanitation, education on healthy lifestyle choices, and addressing social determinants of health such as poverty and inequality (World Bank (2016). The allocation and subsequent reduction in the budget for the health sector by the Government of Pakistan, as highlighted in the Economic Survey of 2015, underscores the challenges and priorities within the country's healthcare system. The initial allocation of Rs 9863 million demonstrates the government's recognition of the importance of investing in healthcare infrastructure, services, and programs to address the health needs of the population. However, the subsequent revision and reduction of the budget to Rs 9437 million reflect the fiscal constraints and competing demands faced by the government in allocating resources across various sectors.

The reduction in the budget for the health sector may have implications for the delivery of healthcare services, procurement of essential medical supplies and equipment, infrastructure development, and implementation of public health initiatives. It may also impact the government's ability to achieve its healthcare objectives and improve health outcomes for the population. The discrepancy between the initially allocated budget and the revised budget underscores the need for effective fiscal management, transparent budgetary processes, and strategic prioritization of spending to ensure optimal utilization of limited resources. It also highlights the importance of monitoring and evaluation mechanisms to track budget execution and address any discrepancies or challenges that may arise during implementation. The allocation and distribution of budgetary resources for the health sector across provinces in Pakistan reflect the varying priorities and challenges faced by different regions in addressing healthcare needs and improving health outcomes. In Sindh, the share of the health sector budget has fluctuated over the years, ranging from 7 to 9 percent of the total provincial budget. Despite increases in population and the prevalence of epidemic diseases, the allocation for healthcare has not shown a significant upward trend. This poses challenges for the provision of adequate healthcare services and infrastructure development in the province. On the other hand, Punjab has demonstrated an increase in the health sector budget compared to previous years. The government allocated additional funds for health projects and initiatives, including provisions for free medicines and the establishment of new healthcare facilities. The announcement of new job opportunities for doctors further reflects the government's commitment to strengthening the healthcare workforce in the province.

In Baluchistan, efforts have been made to enhance healthcare services through the establishment of vaccination centers and allocations for equipment purchases and free medicine provision. These initiatives aim to improve access to healthcare services, particularly in underserved areas of the province. Khyber Pakhtunkhwa has proposed a substantial budget allocation for the health sector, reflecting the government's prioritization of healthcare investments to address the healthcare needs of the population. This underscores the importance placed on improving health outcomes and strengthening healthcare infrastructure in the province. The distribution and utilization of healthcare resources in Pakistan are influenced by various socio-economic and political factors that shape healthcare policies and practices. Despite an increase in the number of doctors and nurses, the efficient utilization of healthcare personnel remains a challenge due to systemic inefficiencies and shortcomings in healthcare management (Siddique, 1996). One of the key issues is the lack

of comprehensive planning that takes into account environmental factors and considers the interdependence of various factors such as human resources, environmental conditions, and development goals. This oversight hampers the ability to provide adequate healthcare facilities and services that can contribute to the overall welfare of the nation. Moreover, socio-economic disparities and political dynamics also impact the distribution of healthcare resources, leading to unequal access to healthcare services across different regions and population groups. These disparities further exacerbate health inequities and hinder efforts to improve health outcomes nationwide.

Addressing these challenges requires a holistic approach that integrates socio-economic considerations, environmental factors, and political dynamics into healthcare planning and policymaking. It also calls for greater collaboration between government agencies, healthcare institutions, and civil society to ensure the efficient allocation and utilization of healthcare resources for the benefit of all segments of society.

The World Health Organization (WHO) plays a crucial role in promoting and ensuring access to healthcare services, both in developed and developing countries. It serves as a global authority on public health issues and works to address health challenges worldwide. In developing countries where healthcare infrastructure and resources may be limited, WHO provides technical assistance, resources, and support to strengthen healthcare systems and improve health outcomes. Developed countries often provide aid to developing nations through organizations like WHO to help address healthcare disparities and ensure that all individuals have access to basic health facilities. This aid may include financial assistance, medical supplies, training programs, and technical expertise to support healthcare delivery and infrastructure development. By coordinating international efforts and mobilizing resources, WHO contributes to the achievement of global health goals and the promotion of health equity. Its initiatives focus on a wide range of health issues, including infectious diseases, maternal and child health, non-communicable diseases, and health emergencies, among others. Through partnerships with governments, non-governmental organizations, and other stakeholders, WHO works to strengthen health systems, improve access to essential medicines and vaccines, and promote health policies that prioritize the needs of vulnerable populations. In this way, WHO plays a vital role in advancing the health agenda worldwide and working towards the goal of health for all. Access to clean and safe drinking water is essential for maintaining public health and preventing the spread of waterborne diseases. In many rural areas of Pakistan, however, access to such water remains a significant challenge. Unlike urban areas where households often have access to piped water, rural communities rely on alternative sources such as motor pumps, dug wells, and water from canals or rivers. Unfortunately, these sources may not always provide water that is free from contaminants, leading to an increased risk of disease among rural populations.

According to the Population Association of Pakistan, the lack of access to safe drinking water in rural areas contributes to higher disease rates, particularly among children and pregnant women. Waterborne diseases such as diarrhea, cholera, and typhoid can spread more easily when water sources are contaminated, leading to illness and even death, especially among vulnerable populations. The World Bank's data highlights the serious health challenges faced by Pakistan, particularly concerning child and maternal health. The high rates of child mortality and maternal deaths underscore the urgent need for improved access to healthcare services, including access to clean water and sanitation facilities. Additionally, the prevalence of malnutrition and vitamin deficiencies further exacerbates health issues, particularly among children and women of childbearing age. Addressing the issue of access to clean water requires concerted efforts from government authorities, policymakers, and local communities. Investments in water infrastructure, such as piped water systems and water treatment facilities, are essential to ensure that rural communities have access to safe drinking water. Furthermore, educational programs on hygiene and sanitation practices can help raise awareness about the importance of clean water and prevent waterborne diseases. By prioritizing efforts to improve access to clean water, Pakistan can take significant strides towards improving public health outcomes and reducing the burden of water-related diseases on its population.

2. LITERATURE REVIEW

The study conducted by Rashid et al. (2014) sheds light on the significant role of foreign aid in shaping social and economic policies in Pakistan, particularly in the realm of population programs. With the aim of improving societal conditions, the government has initiated various population programs with the assistance of foreign aid. The research focuses on analyzing the fertility rate in Pakistan, considering several key factors including fertility rate itself, prices, birth rates, foreign aid, female literacy rate, and the implementation of healthcare programs such as the Lady Health Worker program and basic health units. Utilizing an autoregressive model, the study investigates the relationship between foreign aid and its utilization in the health sector, specifically its impact on the fertility rate. Surprisingly, the initial analysis indicates a positive correlation between foreign aid and the fertility rate. However, upon further examination and testing, it is revealed that this relationship is actually negative in Pakistan. Furthermore, the study uncovers additional insights, showing that prices are negatively associated with the fertility rate, suggesting that economic factors play a role in shaping demographic trends. Additionally, the findings highlight the importance of female education, as an increase in female literacy rates is found to correspond with a decrease in the fertility rate.

Ramzan (2014) emphasizes the paramount importance individuals place on safeguarding their health, recognizing that various factors such as transportation and land use planning can pose hazards to health. The author underscores the critical link between health and productivity, noting that a healthy population contributes to a more efficient labor force, thereby fostering economic growth and individual welfare. In this study, Ramzan collects data on key health indicators including infant mortality rate, waterborne diseases, malnutrition, unhealthy dietary habits, life expectancy, as well as population growth from the World Development Indicators (WDI). The author seeks to analyze the relationship between these health

indicators and economic growth. The findings of the research are expected to shed light on the intricate connections between health outcomes and broader socioeconomic factors such as literacy rate and GDP growth. It is anticipated that the study will provide valuable insights into how improvements in health can positively impact economic development and vice versa, thereby informing policy decisions aimed at promoting both health and economic well-being in society.

Meghani, et al. (2014) underscored the federal government's initiatives to formulate national policies aimed at enhancing research, foreign assistance, and training to propel the nation forward. Despite the current emphasis on advancing technology, the authors lament the lack of attention given to improving the health sector. The study utilizes quantitative data on total government expenditure on health, GDP, GNP, and foreign aid to analyze tertiary healthcare in Pakistan. Meghani and colleagues emphasize that health shocks can give rise to various challenges including an increase in diseases, unemployment, and poverty. In light of these findings, the authors advocate for appropriate administration and oversight of the healthcare system. They call for concerted efforts to address the shortcomings in the health sector and stress the importance of prioritizing healthcare initiatives to safeguard the well-being of the population and promote sustainable development in Pakistan.

Shaikh and colleagues (2013) highlighted disparities within recent healthcare reforms, emphasizing issues such as inadequate financing, resource misallocation, and mismanagement of health services. Pakistan's health indicators reveal alarming rates of population growth, infant and maternal mortality, and incidents of low birth weight babies. Empirical evidence underscores significant portions of the health budget being diverted to non-developmental funds and expenses. Both medical education systems and governmental initiatives have failed to instill a sense of moral responsibility in young doctors to serve rural and underserved populations. Pakistan continues to grapple with stark health inequalities between socio-economic classes. It is imperative to devise, develop, and implement human resource policies for primary healthcare that are tailored to the socio-cultural dynamics of local communities.

Bashir et al. (2012) emphasized the pivotal role of education and health in fostering economic development. They argued that these sectors not only enhance productivity and economic growth but also contribute to employment generation. According to the authors, providing comprehensive healthcare and educational facilities helps bridge disparities and promotes employment opportunities in both the short and long term. The study utilized data on education expenditure, total enrollment, hospital infrastructure, health expenditure, and employment levels to examine the interplay between education, health, and employment. Education was identified as a key driver of human resource development, while good health was deemed essential for overall well-being. Employing various statistical methods including ordinary least squares, Granger causality test, chi-square tests, co-integration model, and employment model, the researchers investigated the relationships among education, health, and government expenditure. Their findings indicated a positive long-run relationship among education, health, and government expenditure. Moreover, they concluded that increased government investment in health and education could lead to higher employment levels in Pakistan, underlining the importance of prioritizing these sectors for sustainable economic development.

Valeecha and Reza's (2012) study delved into the profound implications of structural loans on both the health status and economic trajectory of a nation. Their research methodology employed sophisticated regression analysis techniques to meticulously examine the intricate relationships among structural loans, government expenditure, and key health indicators, with a specific focus on the infant mortality rate. To ensure the robustness of their findings, the study rigorously assessed statistical issues such as multicollinearity, heteroscedasticity, coefficient of determination, and autocorrelation among the variables under scrutiny. Through the application of ordinary least square techniques, the researchers were able to unravel the nuanced dynamics governing these relationships, shedding light on the complex interplay between structural adjustment loans and health outcomes. Furthermore, the study ventured beyond mere correlations, exploring the broader context by examining the connections between per capita income, government health expenditure, worker remittances, and structural loans. In doing so, it provided a comprehensive understanding of how these factors collectively shape a nation's health landscape and economic trajectory. Notably, the findings underscored a positive association between structural adjustment loans and health indicators, emphasizing the pivotal role of equitable wealth distribution as a cornerstone of governmental policy aimed at fostering sustainable economic growth.

Drabo and Ebeke (2010) examined the impact of foreign remittances on healthcare services in developing countries. They analyzed quantitative data on per capita income, foreign remittances, and health aid per capita to assess the relationship between these variables. Their findings revealed that an increase in foreign remittances tended to augment healthcare services in poorer countries. Moreover, they observed that higher levels of foreign remittances, coupled with government expenditure in low-income countries, could further enhance the provision of healthcare facilities. The study underscored the significant role of foreign remittances in bolstering healthcare infrastructure across various socio-economic strata within developing nations. These findings highlighted the potential of foreign remittances to contribute positively to the improvement of healthcare services, thereby fostering better health outcomes in these regions.

Ahmed (2009) emphasized the intricate relationship between employment, contraceptive use, and fertility rates. The study highlighted that fertility rates tend to increase with employment opportunities, while increased utilization of contraceptives has been shown to reduce fertility rates. It argued that political democratic governments have a vested interest in championing such initiatives to achieve replacement-level fertility rates in the foreseeable future. Furthermore, the study stressed the importance of prioritizing human resource development, particularly in addressing intellectual gaps at the senior management level, to ensure the smooth operational implementation of these initiatives. In the context of Pakistan's demographic transition, the study noted that while declining mortality rates have been observed relatively late compared to other developing countries, the slower decline in fertility rates has maintained a high population growth profile. This phenomenon has resulted in enhanced life expectancy but has also led to a youthful population profile due

to the significant gap between declining mortality and high fertility rates. Moreover, the study highlighted the role of increasing women's empowerment and status in contributing to the reduction of fertility rates. Overall, Ahmed's analysis underscored the importance of comprehensive policies and initiatives aimed at addressing demographic challenges and promoting sustainable population growth.

Shirazi and Ali (2007) examined the utilization of foreign aid in Pakistan, focusing on its allocation towards savings, trade, and investment gap financing. They observed that foreign aid played a crucial role in addressing economic disparities by supporting various sectors, including trade and investment. Their analysis revealed that foreign aid in Pakistan typically took the form of emergency relief, technical assistance, and project aids. However, they noted that while some studies suggested a modest increase in investment expenditures due to foreign aid, there was only a marginal reduction in allocations for health and education sectors. The authors highlighted the inconclusive nature of the impact of foreign aid on economic growth and development, as indicated by various studies. Despite the debate surrounding its effectiveness, foreign aid remained an important source of financing for addressing Pakistan's socio-economic challenges.

Akram and Khan (2007) assert that GDP per capita experiences a positive long-term influence from health indicators. They argue that individuals aspire for higher income per capita, a goal achievable through the accumulation of human capital, which encompasses health, training, migration, and education, thereby enhancing individual productivity. The relationship between health and GDP per capita operates through two main mechanisms: (I) Enhanced health and other forms of physical human capital increase GDP per capita by boosting the productivity of existing resources and facilitating the adoption of new technological advancements. (II) Economic growth fosters improvements in sanitation systems and innovations in medical technologies, consequently increasing life expectancy and reducing infant mortality rates. To investigate these relationships, the study employs methods such as co-integration, causal modeling, and error correction modeling. It uncovers a unidirectional causal relationship wherein population per bed, age dependency, life expectancy, and mortality rate influence per capita GDP. Additionally, the findings reveal a poor allocation of public health expenditure and emphasize the long-term impact of human capital indicators such as education and health on economic growth. Interestingly, the study concludes that there exists no short-term relationship between health indicators and economic growth, with health indicators—education, life expectancy, age dependency, and mortality rate—serving as independent variables while economic growth functions as the dependent variable.

Akram and Khan (2007) underscored the presence of inequality in resource distribution and the unfair provision of health services attributable to government expenditure. They highlighted the critical role of health in enhancing the efficiency of the labor force, which in turn drives revenue generation and economic growth. Recognizing the importance of bolstering human capital, the government subsidizes the provision of health facilities to its citizens, with the study emphasizing the significance of standards and measures of living in Pakistan. The research employed methodologies such as the Gini coefficient and concentration coefficient to assess the relationship between household preventive measures and the availability of health facilities, including clinics and general hospitals, as well as services for mother-child health. The findings revealed higher levels of inequality in resource and expenditure distribution concerning preventive facilities, general hospitals, clinics, and mother-to-child health compared to relatively lower concentration coefficients. The study positioned the development of the health sector as the dependent variable, with government expenditure encompassing preventive measures, general clinics and hospitals, and mother-to-child health services constituting the independent variables. This analysis sheds light on the disparities in healthcare access and resource allocation, underscoring the need for targeted interventions to address inequities and promote inclusive healthcare development.

Nishtar (2007) provides valuable insights into the health status of the Pakistani population, as well as the country's health system and information infrastructure. She presents recommendations aimed at strengthening Pakistan's health information system by focusing on institutional arrangements and enhancing data sources and collection mechanisms. The study gathers quantitative data on various health indicators, including the crude death rate, crude birth rate, life expectancy, population demographics (both rural and urban, male and female), mortality and morbidity rates, maternal and child health, communicable and non-communicable diseases, injuries, mental health issues, disabilities, and dependency ratios. This comprehensive dataset forms the basis for quantitative analysis. Over time, the birth rate in Pakistan has shown an increasing trend, although there has been a sudden decrease noted in recent periods. Conversely, the death rate has been steadily increasing due to insufficient healthcare facilities. Meanwhile, life expectancy rates have exhibited fluctuations, influenced by the rise in diseases to which individuals lack immunity. Notably, maternal and child health have not received adequate attention in the healthcare system. These findings underscore the need for targeted interventions and policy measures to address healthcare challenges and improve health outcomes in Pakistan. Strengthening the health information system and prioritizing maternal and child health are vital steps toward achieving comprehensive healthcare reform and ensuring the well-being of the population.

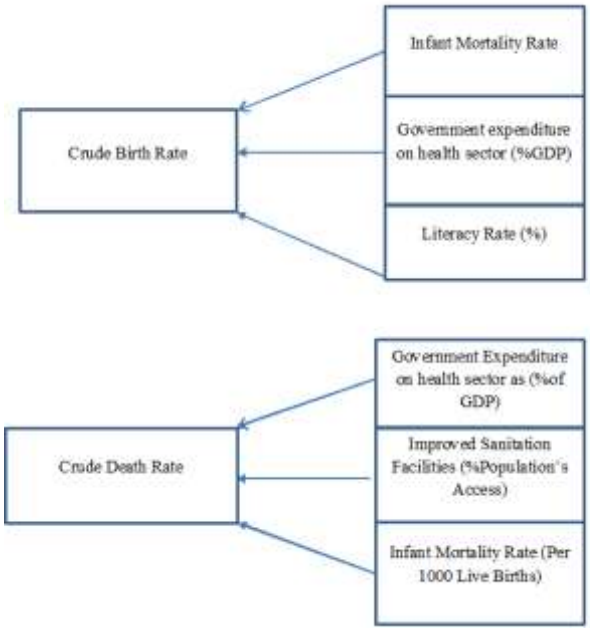
Shezad (2005) highlights the diverse approaches to financing health programs aimed at improving health outcomes. The level of health expenditure varies significantly between developing and developed countries, with low-income countries often lacking adequate financial protection against the costs of illness. The quality of health services and health outcomes are influenced by both income levels and overall health expenditure. Notably, Shezad's study in Pakistan revealed negative price elasticity estimates, indicating a decline in demand for healthcare as prices increase. In cases where demand is inelastic, increases in healthcare prices result in higher revenue, as the positive effect outweighs the negative impact on demand. Conversely, inelastic healthcare prices lead to a reduction in revenue, as the negative demand effect surpasses the positive price effect. These findings underscore the importance of carefully considering price elasticity in health financing strategies, particularly in low-income settings where financial protection against healthcare costs remains

incomplete. Effective health financing mechanisms can play a crucial role in ensuring access to quality healthcare services and improving health outcomes for all segments of the population.

Toor and Butt (2001) discuss the correlation between investment in human capital, particularly through health expenditure, and increased productivity. They consider health expenditure as an independent variable that influences health outcomes. The study utilizes quantitative data on various factors including the age and gender of the child, the mother's level of education, household per capita income, reported instances of the child's illness, immunization status, past and current treatments received by the child, and the child's place of residence. These data are employed to assess the relationship between health expenditure and its impact on individual health outcomes. Regression analysis is employed to elucidate the relationship between these variables. However, the results indicate that the relationship between health inputs and health outcomes appears somewhat ambiguous due to the involvement of numerous other variables or factors. This suggests that while investment in health expenditure may play a role in improving health outcomes, the relationship is complex and influenced by various additional factors. Further research and analysis may be required to fully understand the dynamics at play and to develop more effective strategies for investing in human capital through healthcare expenditure.

Siddiqui et al. (1995) emphasize the role of improving the health status of the population as a crucial component of human capital. They assert that the provision of better health facilities is contingent upon changes in the socio-economic conditions of the country, including factors such as education, Gross National Product (GNP) per capita, and urbanization. The study investigates the relationship between these socio-economic factors and health facilities in developing countries. Utilizing multivariable regression analysis, the researchers explore the relationship between GNP, education, and urbanization. The findings indicate that an increase in GNP correlates with an increase in the number of doctors and nurses per capita. Additionally, GNP and education are found to be collinear. Moreover, the study reveals that GNP serves as an important determinant of non-developmental government expenditure, with higher resource consumption leading to increased expenditure on healthcare. In short, the variables considered in the research—GNP, education, and socio-economic changes—are identified as independent variables that significantly impact government expenditure on the health sector. This underscores the importance of economic development and investment in education as drivers of improved healthcare provision and overall population health.

3. THEORETICAL FRAMEWORK



4. RESULTS AND INTERPRETATIONS

Table 1 presents the results of stationarity tests conducted for various variables. Stationarity, a fundamental concept in time series analysis, determines whether a series exhibits stable statistical properties over time. Firstly, for the Crude Birth Rate, the calculated test statistic of -5.08 exceeds the critical value of -3.00, indicating strong evidence against the presence of a unit root and supporting the stationarity of the series. Similarly, for Government Expenditure % of GDP, the calculated value of -4.54 exceeds the critical value of -3.58, with a very low p-value of 0.0001, indicating strong evidence against the presence of a unit root and supporting the stationarity of the series.

Conversely, the Crude Death Rate and Literacy Rate show slightly different results. The calculated test statistic for Crude Death Rate is -2.07, falling slightly below the critical value of -1.95, with a p-value of 0.03. This suggests weaker evidence against the presence of a unit root, indicating a potential lack of stationarity, although further investigation may be needed for confirmation. Similarly, the Literacy Rate's calculated value of -2.15 also falls slightly below the critical value of -1.95, with a p-value of 0.03, suggesting a similar need for further investigation regarding its stationarity.

Moreover, the Infant Mortality Rate and Improved Sanitation Facilities both demonstrate clear evidence against the presence of a unit root. The calculated test statistic for Infant Mortality Rate is notably large at -16.7, far exceeding the critical value of -1.95, with a very low p-value of 0.0001, strongly supporting the stationarity of the series. Likewise, for Improved Sanitation Facilities, the calculated value of -5.41 significantly surpasses the critical value of -3.63, with a p-value of 0.0013, providing strong evidence against the presence of a unit root and affirming the stationarity of the series. Lastly, the logarithm of Crude Birth Rate (LOG CBR) exhibits a calculated test statistic of -4.32, which exceeds the critical value of -3.00, with a p-value of 0.0029. This indicates strong evidence against the presence of a unit root and supports the stationarity of the series.

Table 1: Stationarity Results

Variable	Calculated value	Critical value	P-values
Crude Birth rate	-5.08	-3.00	0.0005
Crude Death rate	-2.07	-1.95	0.03
Government Expenditure % of GDP	-4.54	3.58	0.0001
Literacy Rate	-2.15	-1.95	0.03
Infant Mortality Rate	-16.7	-1.95	0.0001
Improved Sanitation Facilities	-5.41	-3.63	0.0013
LOG CBR	-4.32	-3.00	0.0029

Table 2 outlines the level of integration for each variable, essential for understanding their behavior over time. Beginning with the Crude Birth Rate (CBR), it is found to be integrated of order 1 (I(1)), indicating the presence of a unit root and the need for differencing to achieve stationarity. Conversely, the Crude Death Rate (CDR) shows an integration level of 0 (I(0)), suggesting that it is stationary without requiring differencing. Moving on to the Literacy Rate (LR) and Government Expenditure (GE), both variables exhibit an integration level of 1 (I(1)), similar to the Crude Birth Rate, implying the necessity for differencing to attain stationarity. In contrast, the Infant Mortality Rate (IMR) and the variable denoted as CBR 1 are both integrated of order 0 (I(0)), indicating stationarity without differencing. Lastly, the Improved Sanitation Facilities (IS) variable also demonstrates an integration level of 0 (I(0)), implying that it is stationary without requiring differencing. Understanding the integration level of each variable is crucial for selecting appropriate time series models and ensuring accurate analyses of their long-term trends and relationships.

Table 2: level of Integration

Variable	**Level of integration**
CBR	1
CDR	0
LR	1
GE	1
IMR	0
CBR 1	0
IS	0

Table 3 presents the short-run results of the analysis, providing key statistical measures to assess the goodness of fit of the model. The calculated R-squared (R2) value is reported as 0.95, indicating that the model explains approximately 95% of the variability in the dependent variable. This high R-squared value suggests that the independent variables included in the model are highly effective in explaining the variation observed in the dependent variable. Additionally, the Adjusted R-squared (Adjusted R2) value is provided as 0.93. The Adjusted R-squared value takes into account the number of predictors in the model, providing a more reliable measure of the goodness of fit, particularly when comparing models with different numbers of predictors. A value of 0.93 suggests that approximately 93% of the variability in the dependent variable is explained by the independent variables after adjusting for the number of predictors in the model.
Overall, the high values of both R-squared and Adjusted R-squared indicate that the model is a good fit for the data and that the included independent variables are effective in explaining the variation observed in the dependent variable in the short run.

Table 3: Short run results

Variable Name	Calculated Value
R^2	0.95
Adjusted R^2	0.93

Table 4 presents the results of the bound test, which is commonly used in cointegration analysis to determine the existence of a long-run relationship between variables. The calculated value obtained from the bound test is reported as 6.88. This calculated value is then compared to the critical values of the test, represented by the lower and upper bounds. The lower bound, reported as 3.38, and the upper bound, reported as 4.23, serve as thresholds for determining the significance of the calculated value. If the calculated value exceeds the upper bound or falls below the lower bound, it suggests evidence of

cointegration, indicating a long-run relationship between the variables under consideration. In this case, the calculated value of 6.88 exceeds both the lower and upper bounds, indicating strong evidence of cointegration between the variables. Therefore, it suggests the presence of a long-run relationship among the variables analyzed.

Table 4: Bound Test Results

Calculated Value	Lower bound	Upper bound
6.88	3.38	4.23

Table 5 presents the long-run results of the analysis, providing coefficients and associated probabilities for each variable included in the model. For the variable "Improved Sanitation Facilities," the coefficient is reported as -0.46, and the associated probability is 0.11. This indicates that for each unit increase in Improved Sanitation Facilities, there is an expected decrease of 0.46 units in the dependent variable. However, with a probability of 0.11, this relationship may not be statistically significant at conventional levels. Similarly, for the variable "Health Expenditure," the coefficient is reported as -1.41, with an associated probability of 0.15. This suggests that for each unit increase in Health Expenditure, there is an expected decrease of 1.41 units in the dependent variable. However, the probability of 0.15 indicates that this relationship may not be statistically significant at conventional levels. In contrast, for the variable "Infant Mortality Rate," the coefficient is reported as 0.26, with an associated probability of 0.0009. This indicates that for each unit increase in Infant Mortality Rate, there is an expected increase of 0.26 units in the dependent variable. With a probability of 0.0009, this relationship is highly statistically significant at conventional levels. Overall, these results provide insights into the long-run relationships between the variables studied, indicating which variables have statistically significant effects on the dependent variable and which may not.

Table 5: Long Run Result

Variable Name	Coefficient	Probability
Improved Sanitation Facilities	-0.46	0.11
Health Expenditure	-1.41	0.15
Infant Mortality Rate	0.26	0.0009

Table 6 presents the results of a heteroscedasticity test, which is used to assess whether the variance of the errors in a regression model is constant across observations. In this table, the calculated value of the F statistic for the heteroscedasticity test is reported as 0.065. The F probability associated with this calculated value is given as 0.065. The F probability represents the significance level associated with the calculated F statistic. In this context, a probability of 0.065 indicates that there is a 6.5% probability of observing an F statistic as extreme as the one calculated under the null hypothesis of homoscedasticity (constant variance of errors). Typically, if the F probability is less than a chosen significance level (e.g., 0.05), it suggests evidence of heteroscedasticity, meaning that the variance of the errors is not constant across observations. Conversely, if the F probability is greater than the chosen significance level, there is insufficient evidence to reject the null hypothesis, indicating that the variance of the errors is approximately constant across observations. In this case, with an F probability of 0.065, the test does not provide strong evidence of heteroscedasticity at conventional significance levels. However, the significance threshold chosen for decision-making should be based on the specific context and requirements of the analysis.

Table 6: Heteroscedasticity Test

Variable Name	Calculated value
F probability	0.065

Table 7 presents the results of an autocorrelation test, which is used to assess whether there is serial correlation among the residuals of a regression model. In this table, the calculated value of the F statistic for the autocorrelation test is reported as 0.61. The F probability associated with this calculated value is given as 0.61. The F probability represents the significance level associated with the calculated F statistic. In this context, a probability of 0.61 indicates that there is a 61% probability of observing an F statistic as extreme as the one calculated under the null hypothesis of no autocorrelation (i.e., the residuals are not serially correlated). Typically, if the F probability is less than a chosen significance level (e.g., 0.05), it suggests evidence of autocorrelation, meaning that there is serial correlation among the residuals. Conversely, if the F probability is greater than the chosen significance level, there is insufficient evidence to reject the null hypothesis, indicating that there is no significant autocorrelation among the residuals. In this case, with an F probability of 0.61, the test does not provide strong evidence of autocorrelation at conventional significance levels. However, the significance threshold chosen for decision-making should be based on the specific context and requirements of the analysis.

Table 7: Autocorrelation results

Variable Name	Calculated Value
F probability	0.61

Table 8 presents the results of a bound test, commonly used in econometrics to assess the existence of cointegration among variables. The calculated value obtained from the bound test is reported as 4.04. This value is then compared to

the critical values of the test, represented by the lower and upper bounds. The lower bound, reported as 2.97, and the upper bound, reported as 3.74, serve as thresholds for determining the significance of the calculated value. If the calculated value exceeds the upper bound or falls below the lower bound, it suggests evidence of cointegration, indicating a long-run relationship between the variables under consideration. In this instance, the calculated value of 4.04 exceeds both the lower and upper bounds, suggesting evidence of cointegration among the variables. Therefore, it indicates the presence of a long-run relationship among the variables analyzed.

Table 8: Bound Test Results

Calculated Value	Lower bound	Upper bound
4.04	2.97	3.74

Table 9 presents the long-run results of the analysis, displaying coefficients and associated probabilities for each variable included in the model. For the variable "Infant Mortality Rate," the coefficient is reported as 0.04, and the associated probability is 0.05. This suggests that for each unit increase in Infant Mortality Rate, there is an expected increase of 0.04 units in the dependent variable. However, with a probability of 0.05, this relationship may not be statistically significant at conventional levels. For the variable "Government Expenditure," the coefficient is reported as 0.07, with an associated probability of 0.62. This implies that for each unit increase in Government Expenditure, there is an expected increase of 0.07 units in the dependent variable. However, the probability of 0.62 indicates that this relationship may not be statistically significant at conventional levels. In contrast, for the variable "Literacy Rate," the coefficient is reported as -0.001, with an associated probability of 0.88. This suggests that for each unit increase in Literacy Rate, there is an expected decrease of 0.001 units in the dependent variable. With a probability of 0.88, this relationship is highly likely to occur due to random chance and is not statistically significant at conventional levels. Overall, these results provide insights into the long-run relationships between the variables studied, indicating which variables have statistically significant effects on the dependent variable and which may not.

Table 9: Long Run results

Variable Name	Coefficient	Probability
Infant Mortality Rate	0.04	0.05
Government Expenditure	0.07	0.62
Literacy Rate	-0.001	0.88

5. DISCUSSION

The results of the ARDL test indicate a long-run relationship between several variables in the health sector of Pakistan. Specifically, crude birth rate, literacy rate, infant mortality rate, improved sanitation facilities, and government expenditure exhibit significant relationships at varying levels of significance. At the 10% level of significance, there is a long-run relationship between crude birth rate and government expenditure, literacy rate, and infant mortality rate. Similarly, at the 5% level of significance, significant relationships are observed between crude death rate, infant mortality rate, improved sanitation facilities, and government expenditure. Interestingly, the impact of government expenditure on the health sector appears to be insignificant, contrary to expectations. This finding suggests that despite the allocation of funds to the health sector over the years, improvements may not have been realized as anticipated. One notable finding is the inverse relationship between improved sanitation facilities and crude death rate. This suggests that as sanitation facilities improve, the crude death rate tends to decrease. This could be attributed to the provision of better facilities, increased health programs, and enhanced family planning initiatives, all of which contribute to better health outcomes (MNCH, 2006).

According to the World Health Organization (WHO), floods can have severe health consequences, particularly due to the increased risk of waterborne diseases such as cholera, rotavirus, and typhoid. The contamination of water sources during floods can lead to outbreaks of these diseases, posing significant risks to public health.

Furthermore, floods can also exacerbate pregnancy complications, as women may not have access to proper healthcare facilities or services during such emergencies. This lack of access to essential maternal healthcare can increase the risk of maternal and infant mortality rates in the affected areas.

In essence, floods not only cause immediate health hazards but also have long-term implications for maternal and infant health outcomes. It underscores the importance of disaster preparedness, emergency response planning, and the provision of adequate healthcare services, especially in vulnerable regions prone to flooding.

The disparity in access to improved sanitation facilities between rural and urban areas exacerbates health inequalities, particularly in terms of reducing crude death rates. While efforts have been made to improve sanitation facilities as part of the Millennium Development Goals (MDGs), the impact on crude death rates remains insignificant, especially in rural regions where access to healthcare infrastructure is limited.

Research from the World Bank (2015) suggests that health plans primarily focus on urban areas, leading to a neglect of rural sanitation needs. Consequently, despite improvements in sanitation facilities, the benefits in terms of reducing crude death rates may not be realized uniformly across different geographical areas.

Furthermore, findings from the Economic Survey (2014) highlight the importance of addressing rural sanitation issues to achieve health-related development goals. However, the urban bias in government health expenditure exacerbates

disparities, as urban households tend to have greater access to better-quality healthcare services compared to their rural counterparts. This bias may contribute to widening health inequalities between richer and poorer households.

Addressing these disparities requires a more equitable distribution of health resources and investments, with a focus on expanding access to improved sanitation facilities in rural areas. By prioritizing rural healthcare infrastructure and addressing urban biases in health expenditure, governments can work towards reducing crude death rates and promoting health equity across all segments of society.

The neglect of the water and sanitation sector in Pakistan poses significant challenges and risks to public health and socio-economic development. With the current trend continuing, a substantial portion of the population will remain deprived of safe drinking water and adequate sanitation facilities, exacerbating existing health and hygiene issues.

Weaknesses in the water supply systems, including low water pressure and leaky pipes, have facilitated the infiltration of contaminated water, leading to outbreaks of waterborne diseases in various cities. For instance, major epidemics occurred in Faisalabad, Karachi, Lahore, and Peshawar in 2006, highlighting the urgent need for improved water infrastructure and sanitation management.

Furthermore, the construction and maintenance of water supply systems are costly and challenging for local communities to sustain. Additionally, hygiene education and user participation have historically been neglected, further exacerbating sanitation challenges.

To address these issues, policy reforms are necessary to prioritize investments in water supply and sanitation infrastructure and to promote hygiene education and community participation. Initiatives such as the Social Action Plan launched by the federal government in 1992 represent important steps towards addressing these challenges, but sustained efforts and investments are needed to ensure universal access to safe drinking water and adequate sanitation facilities for all Pakistanis.

The observed insignificant impact of government expenditure on reducing crude death rates in Pakistan can be attributed to various factors related to budget allocation and governance (Akram & Khan, 2007). Firstly, while the federal government may allocate a significant share of the budget to the health sector, the actual distribution of funds to regions or provinces may not always translate into effective utilization for health-related purposes. Regional representatives may divert funds for their own interests, leading to inefficient use of resources.

Moreover, the inconsistency between budget allocations and actual disbursements exacerbates the issue. Initial budget allocations may appear substantial, but subsequent revisions often result in fewer funds being allocated to the health sector, diminishing the impact of government expenditure on improving healthcare services.

Additionally, the shifting priorities of government policies further hinder the development of the health sector. While some administrations prioritize health and education, others may focus more on sectors like industry, agriculture, or infrastructure development. This inconsistency in policy focus can lead to inadequate attention and investment in healthcare infrastructure and services.

Furthermore, the division of responsibilities between the federal and provincial governments as outlined in the Constitution of Pakistan adds complexity to healthcare governance. With health primarily being the responsibility of provincial governments, there may be disparities in resource allocation and healthcare delivery across different regions, contributing to the challenges in effectively reducing crude death rates through government expenditure alone.

The findings indicating a positive relationship between infant mortality rate and crude death rate suggest a concerning trend in Pakistan's healthcare system. Factors such as malnutrition, diarrhea, acute respiratory illnesses, and other communicable diseases contribute significantly to the burden of infant mortality. Additionally, high maternal mortality rates are attributed to various factors including a high fertility rate, low skilled birth attendance, illiteracy, malnutrition, and inadequate access to emergency care services. These issues underscore the need for comprehensive healthcare interventions targeting maternal and child health to address the root causes of infant and maternal mortality in Pakistan.

Furthermore, the results indicating an increase in crude birth rate with government expenditure highlight the complex dynamics between healthcare financing and population dynamics. The long-run relationship between government expenditure and crude birth rate suggests that sustained investments in healthcare infrastructure and services can potentially contribute to improvements in birth rate trends. However, it's essential to ensure that the allocated funds are effectively transmitted and utilized to address the underlying factors influencing birth rates, such as access to family planning services, maternal healthcare, and education.

Moreover, the observation that the relationship between public spending and healthcare system performance remains uncertain underscores the need for evidence-based policymaking and targeted interventions. While increased government expenditure may be necessary, its effectiveness in improving healthcare outcomes depends on various factors including governance, healthcare delivery mechanisms, and the allocation of resources. Therefore, policy interventions should prioritize not only increased funding but also reforms aimed at enhancing the efficiency, accessibility, and quality of healthcare services to achieve meaningful improvements in population health indicators in Pakistan.

The discrepancy in findings regarding the impact of public spending on health status highlights the complexity of healthcare financing and its relationship with population health outcomes. Studies such as those by Carrin and Politi (1995) suggest that the effect of public spending on health status may not be significant, indicating potential limitations or inefficiencies in the allocation and utilization of healthcare resources.

However, other research, including studies by Gupta et al. (1999, 2001) and Novignon et al. (2012), suggests a lower or positive effect of public spending on health outcomes. These findings imply that increased healthcare financing, along with the provision of health insurance and social security benefits, may lead to improvements in population health indicators such as the crude birth rate.

Support for the notion that government expenditure on healthcare can influence crude birth rates is provided by Akram & Khan (2007). However, their findings also suggest that the impact of government expenditure on crude birth rate may be insignificant in the case of Pakistan. This insignificance could be attributed to the manner in which funds are allocated and utilized within the healthcare sector. Specifically, the allocation of a low share of the budget for the health sector by the federal government, coupled with the decentralized decision-making process where funds are transferred to regions or provinces, may result in suboptimal utilization of resources and limited impact on population health outcomes.

Overall, the mixed findings underscore the need for further research to better understand the complex relationship between healthcare financing, government expenditure, and population health outcomes, particularly in the context of Pakistan's healthcare system. Effective policy interventions should aim to address systemic challenges and inefficiencies in healthcare financing and delivery to maximize the impact of public spending on improving population health indicators such as the crude birth rate.

The influence of federal bureaucracy and external financing institutions on decision-making in Pakistan's health sector has been a longstanding challenge. The financial constraints faced by the country, coupled with issues of mismanagement of human resources, have exacerbated the situation. As a result, the provision of healthcare services, particularly in government facilities, has been inadequate, leading to widespread dissatisfaction among the population.

Studies such as that by Shaikh (2013) provide evidence of the challenges faced by individuals utilizing government health facilities in Pakistan. These challenges include shortages of essential medicines, long distances to healthcare facilities, and poor behavior from healthcare staff. Such deficiencies in the healthcare system not only undermine public confidence in the government's ability to provide adequate healthcare but also contribute to negative health outcomes among the population.

Addressing these issues requires comprehensive reforms aimed at improving the efficiency and effectiveness of healthcare delivery in Pakistan. This may involve measures to enhance the allocation and utilization of healthcare resources, strengthen governance and accountability mechanisms, and prioritize the needs of underserved populations, particularly those in rural and remote areas. Additionally, efforts to improve the working conditions and professionalism of healthcare staff are essential to enhancing the quality of care provided in government health facilities. Overall, addressing the challenges in Pakistan's healthcare system requires concerted efforts from policymakers, healthcare providers, and other stakeholders to ensure equitable access to quality healthcare for all citizens.

The findings suggest that an increase in literacy rates is associated with a decrease in the crude birth rate in Pakistan. This relationship can be attributed to several factors, including heightened awareness about family planning methods, improved access to contraceptives, and the empowerment of women through education. Studies such as those by Bhutto & Butt (2014) and the Economic Survey (2014) support this assertion, highlighting the role of education in facilitating reproductive health choices and reducing fertility rates.

The promotion of family planning programs and the dissemination of information through various media channels have contributed to the increased use of contraceptives among the population, particularly among women with higher literacy levels. This trend reflects a broader global effort to address population growth as a driver of poverty and resource depletion, as noted by the Earth Policy Institute (2011).

However, despite the potential benefits of increased literacy rates on reducing population growth, the impact remains insignificant in Pakistan due to systemic challenges in the education sector. Issues such as inadequate funding, gender inequality, and disparities between rural and urban areas hinder the effective implementation of literacy programs and limit their impact on population control efforts. The prevailing gender disparities, particularly in rural areas, where women often have limited access to education and economic opportunities, further exacerbate the challenge of controlling the crude birth rate (Chaudhry, 2009).

Addressing these systemic challenges requires comprehensive reforms in the education sector, including increased investment in education, targeted interventions to promote gender equality, and efforts to improve access to quality education in rural areas. By addressing these underlying issues, Pakistan can harness the potential of education to effectively reduce population growth and promote sustainable development.

The observed increase in crude birth rate with rising infant mortality rate reflects complex socio-economic dynamics, particularly prevalent in rural areas of Pakistan. In these regions, cultural and economic factors often influence family planning decisions, with many households viewing children as potential contributors to family income and security. The desire for larger families as a form of social security amidst income inequality contributes to the persistence of high birth rates, even in the face of elevated infant mortality rates.

Infant mortality rates serve as a critical indicator of the health status of a population, with high rates typically signaling underlying issues such as inadequate nutrition, poor maternal and child healthcare, and prevalent infectious diseases, often exacerbated by contaminated drinking water sources. The lack of access to quality healthcare services, particularly for impoverished women during pregnancy and childbirth, significantly contributes to the elevated mortality rates among infants.

Furthermore, societal factors such as drug addiction among pregnant women and early pregnancies among teenagers further compound the challenges in reducing infant mortality rates. Low birth weights, often resulting from maternal malnutrition and inadequate prenatal care, also contribute to the vulnerability of infants to various health risks.

The theories of Malthus and Ricardo, which suggest a relationship between population growth and income, provide additional context to these dynamics. Malthus famously posited that population growth would eventually outpace the capacity for food production, leading to socio-economic challenges. Siddiqui (1996) further explores this concept, suggesting that an increase in fertility rates may be perceived as a means to enhance family income, particularly in contexts

of economic uncertainty and income inequality. Addressing the complex interplay of socio-economic factors contributing to high infant mortality rates and crude birth rates requires multifaceted interventions. These may include improving access to quality healthcare services, particularly maternal and child healthcare, enhancing nutritional support for pregnant women and infants, implementing comprehensive family planning programs, and addressing broader socio-economic disparities. By addressing these underlying issues, Pakistan can work towards improving health outcomes and promoting sustainable socio-economic development. The decision-making process surrounding family planning in Pakistan is influenced by a myriad of socio-economic and cultural factors, often resulting in unplanned pregnancies and high birth rates, despite efforts to promote contraception and reproductive health education.

Siddiqui (1996) highlights the economic motivations behind family planning decisions among poor parents, who may seek to replace lost children or anticipate future support from their offspring. Additionally, factors such as control of fatal diseases, early marriages, low status of women, and cultural practices contribute to the increase in fertility rates and, consequently, the birth rate (Economic Survey, 2014).

The inverse relationship between death rate and average lifespan underscores the role of wealth and access to resources in improving health outcomes and extending life expectancy. However, disparities in access to healthcare and family planning services persist, particularly among marginalized communities. The prevalence of unplanned pregnancies in Pakistan underscores the need for improved access to family planning services and education. Despite the desire for smaller family sizes among some couples, barriers such as limited access to contraception and inadequate family planning advice contribute to the continuation of unplanned pregnancies. Unsafe abortions remain a significant concern, often resorted to as a form of family planning in the absence of effective contraceptive methods. Ali (2013) emphasizes the importance of increasing contraceptive use to reduce the incidence of unsafe abortions and maternal deaths, highlighting the need for comprehensive reproductive health programs that address both access to contraception and family planning education. Efforts to address these challenges require a multifaceted approach, encompassing improved access to contraception and reproductive healthcare services, comprehensive family planning education, and initiatives to empower women and promote gender equality. By addressing these underlying factors, Pakistan can work towards reducing unplanned pregnancies, improving maternal and child health outcomes, and promoting sustainable population growth.

Toor (2007) highlights the significant impact of women's education on fertility rates within a society, indicating that educated women tend to have lower fertility rates compared to their uneducated counterparts. This disparity in fertility rates is often influenced by the overall educational distribution within the community.

Educational attainment among women plays a crucial role in shaping reproductive behaviors and family planning decisions. As women gain access to higher levels of education, they are more likely to delay marriage, pursue careers, and make informed choices regarding childbirth and family size. This trend is attributed to factors such as increased awareness of contraceptive methods, greater autonomy in decision-making, and improved access to reproductive healthcare services. Furthermore, the quality of education and the standard of educational attainment also contribute to variations in fertility outcomes. Disparities in educational opportunities and resources can impact the effectiveness of educational interventions aimed at reducing fertility rates. Therefore, efforts to improve women's education must focus not only on increasing enrollment rates but also on enhancing the quality and relevance of educational programs.

In societies where aggregate education levels are higher, there is often a significant reduction in fertility rates, leading to improved socio-economic outcomes and overall welfare. Education serves as a powerful tool for empowering women, promoting gender equality, and facilitating sustainable development.

By investing in women's education and ensuring equitable access to quality education for all, societies can effectively address population growth challenges, enhance maternal and child health, and promote economic prosperity. Education emerges as a key determinant in shaping the demographic landscape and fostering positive social change.

6. CONCLUSIONS

The study explores the relationship between government expenditure on the health sector and labor productivity in Pakistan. It employs stationarity tests and autoregressive lag distributive methods to analyze the impact of health expenditure on the health sector. The empirical and theoretical findings of the study suggest that the influence of health expenditure on the health sector of Pakistan is notably insignificant at the 5% level of significance. This implies that despite government investment in the health sector, there is limited evidence to suggest a substantial improvement in labor productivity. The findings suggest that other factors may be at play or that the allocation of health expenditure may not be effectively utilized to enhance labor productivity. The insignificance of the impact underscores the complexity of the relationship between health expenditure and labor productivity. It may indicate inefficiencies in resource allocation, challenges in healthcare delivery, or broader structural issues within the labor market that need to be addressed to realize the potential benefits of increased health expenditure. The findings suggest that while the government allocates significant funds to the health sector, the utilization of these resources is hindered by dishonesty and corruption. Despite the positive relationship between government expenditure and crude birth rate (CBR), this relationship is found to be insignificant. This result aligns with expectations given the prevailing economic conditions in Pakistan, where funds may not be effectively allocated or distributed to local bodies.

Moreover, the study reveals a significant positive relationship between infant mortality rate and CBR. This indicates that, particularly in rural areas, cultural beliefs influenced by Islamic scholars and low literacy levels contribute to higher birth rates, even in the face of increasing infant mortality rates. Conversely, the negative relationship between literacy rate and CBR is found to be insignificant. This suggests that while education levels have not been adequately addressed in Pakistan, the impact of literacy on reducing birth rates is not yet realized due to insufficient facilities and awareness

programs. However, there are indications that initiatives aimed at women's empowerment and family planning programs may lead to a reduction in crude birth rates over time. These programs, coupled with increased consciousness among women about family planning, have the potential to positively influence birth rate trends in Pakistan. The positive relationship between improved sanitation facilities and crude death rate (CDR) indicates that access to clean water can potentially reduce mortality rates. However, this relationship is found to be insignificant, reflecting the challenges in transparently providing and effectively utilizing such facilities. Without proper planning and implementation, the potential benefits of improved sanitation may not be fully realized. Given the critical role of health in various aspects of society, including productivity, GDP, trade, and education, it is essential to address the issues surrounding sanitation and health care provision in Pakistan. Transparent and efficient allocation of resources is necessary to improve health outcomes and drive overall socio-economic development. The significant positive relationship between CDR and infant mortality rate underscores the interconnectedness of these health indicators. Both factors reflect the overall health status of a population, and their correlation highlights the need for comprehensive health interventions to address preventable causes of mortality, particularly among infants. Similarly, while government expenditure shows a positive relationship with CDR, its insignificance suggests that the allocation and utilization of funds in the health sector may lack transparency and effectiveness. Addressing governance issues and enhancing accountability mechanisms are crucial steps toward improving the impact of government spending on health outcomes in Pakistan.

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