

ABSTRACT

Estimating the burden of disease plays a crucial role in shaping public health strategies globally. It helps optimize resource allocation, assesses health interventions' effectiveness, identifies health inequities, and facilitates international collaboration. Distinguishing between communicable and non-communicable diseases is essential for developing targeted health policies and management approaches. Communicable diseases, such as infections, spread from person to person and require preventive control measures, whereas non-communicable diseases, like cardiovascular conditions, are chronic and influenced by behavioral, genetic, and environmental factors. In developing countries like Pakistan, the impact of these diseases, compounded by socio-economic disparities and insufficient healthcare resources, presents significant challenges. This research, focusing on the burdens of communicable (COVID-19) and non-communicable (cardiovascular diseases) diseases on family caregivers in Punjab, Pakistan, aims to provide insights into the socio-economic, psychological, and financial burdens faced by caregivers, contributing to more informed public health policies.

The study followed a cross-sectional survey research design to explore the financial, social, and psychological burdens on family caregivers in Punjab, Pakistan. The targeted population included 5,770 caregivers of COVID-19 survivors and 5,550 caregivers of cardiovascular disease survivors, who were selected using a convenient sampling method. A combination of online surveys, including Google Forms, was employed to collect data from caregivers within their social networks. The reliability results of the developed scales for financial ($\alpha > 0.90$), social ($\alpha > 0.85$), and psychological ($\alpha > 0.78$) burden validate the tools and can be used for the quantification of the burden of communicable and non-communicable diseases on family caregivers. The findings of the confirmatory factor analysis also validated the proposed structural models for the economic, social, and psychological burden both for communicable and non-communicable diseases ($RMR < 0.05$; $RMSEA < 0.05$; $GFI > 0.90$; $AGFI > 0.90$). The outcomes of the research depicted an elevated financial, social, and psychological burden on family caregivers with demographic profile as female, aged over 45 years, unemployed, married, income below 60,000 (PKR), up to the secondary level of education, belonging to the rural area, lives in the joint family system, lives in the same house as the survivor, survivor admitted to hospital, ICU and faced some permanent disability as a result of the disease than the respective competitive counterparts.

The estimated overall indirect costs of cardiovascular diseases (CVD) among the working population in Pakistan reveal a significant economic impact over the years 2017-18 to 2022-23. The indirect costs adjusted under the productivity correction factor of 0.65, measured in million PKR, are 17719.9 in 2017-18, 16334.3 in 2018-19, 15490.6 in 2019-20, 23838.7 in 2020-21, 18573.2 in 2021-22, and 14992.8 in 2022-23. These costs as a percentage of the GDP to the working population are 3.05, 2.69, 2.44, 3.24, 2.12, and 1.65 for the respective study years. The estimated indirect productive capacity loss due to absenteeism due to CVD for the working population is 2289.6 in 2017-18, 2063.0 in 2018-19, 1931.3 in 2019-20, 2239.1 in 2020-21, 2420.6 in 2021-22, and 1957.7 in 2022-23. The projected indirect cost of mortality due to cardiovascular diseases (CVD) among the working population in Pakistan illustrates a substantial economic burden over the fiscal years from 2017-18 to 2022-23. The indirect costs 7

(million PKR) for the study periods are 14525.5, 13457.9, 12796.9, 20715.4, 15197.3, and 12262.2, respectively.

The study underscores the critical need for policies that support family caregivers, particularly in developing countries like Pakistan, where the healthcare system is under pressure. The significant burden on caregivers, especially in terms of financial, social, and psychological impacts, calls for targeted interventions to alleviate stress and improve the quality of life for both caregivers and patients. Moreover, the research highlights the gaps in disease burden data, urging for more localized studies and better data integration to inform public health strategies. Addressing these issues could help design more effective health policies and interventions that support both caregivers and patients, contributing to improved health outcomes.

Keywords: Burden of Disease; COVID-19; CVD; Structural Equation Models; Odds Ratio; Indirect Costs.