



INTRODUCTION

Alzheimer's disease and other dementias (ADOD) are a growing cause of mortality world wide, yet long-term, sex-specific mortality trajectories differ substantially across regions. Comparative analyses between low-middle income and high-income countries remain limited.

OBJECTIVES

This study aimed to analyse trends in age-standerized mortality rates for ADOD in Pakistan and the Unites States between 1990-2021. It compared sex-specific mortality patterns and changes over time, and demonstrated mortality trends using Joinpoint regression (APC and AAPC). It identified disparities in dementia mortality between a lower-middle income and a high-income setting.

METHODS

We analyzed ADOD mortality data from the Global Burden of Disease (GBD) database for Pakistan and the United States from 1990-2021. Age-standardized mortality rates (AAMRs) per 100,000 population were examined by sex. Temporal trends were assessed using Joinpoint regression to estimate annual percent change (APC) and average annual percent change (AAPC) with 95% confidence intervals.

KEY TAKEAWAYS

- Dementia mortality trends differ markedly between Pakistan and the United States. While mortality rates have largely stabilised in the US, Pakistan shows divergent trends between men and women.
- Women consistently experienced higher ADOD mortality than men in both countries. However, the gender gap widened substantially in Pakistan over the study period.
- Public health implications are region specific. The findings suggest that Pakistan requires targeted interventions, particularly focusing on women, to address the increasing dementia-related mortality burden.

RESULTS

Between 1990 and 2021, Pakistan recorded 297,798 ADOD-related deaths, while US recorded 4,683,698 deaths, reflecting a substantially higher mortality burden in the US. In Pakistan, male age-standardized mortality rates (AAMRs) decreased from 5.10 to 4.51 per 100,000, while female AAMRs increased from 5.77 to 6.52 per 100,000, indicating divergent mortality trends between the sexes, conversely, in the US, mortality rates remained relatively stable, while male AAMRs changing only slightly from 25.80 to 25.60 per 100,000 and female AAMRs from 31.58 to 31.60 per 100,000. Joinpoint analysis showed that in Pakistan, male mortality significantly declined (AAPC= -0.40%; 95% CI: -0.52 to -0.28), whereas female mortality significantly increased (AAPC= +0.39%; 95% CI: 0.32 to 0.47), in contrast, the US exhibited only minimal changes, with a slight decline among males (AAPC= -0.03%; 95% CI: -0.06 to -0.01) and near-complete stability among females (AAPC= -0.003%; 95% CI: -0.02 to 0.01). By 2021, the widening sex disparity in Pakistan resulted in female mortality rates being approximately 44% higher than male mortality rates, whereas the sex gap in the US remained stable over time.

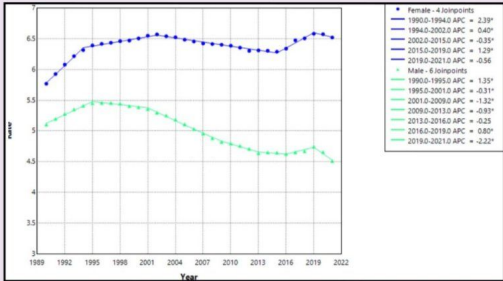


Fig 1.A: illustrates Joinpoint analysis of ADOD mortality rates (ASMR) in Pakistan from 1990 to 2021

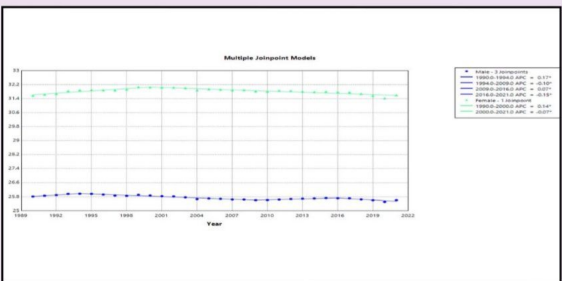


Fig 1.B: illustrates Joinpoint analysis of ADOD mortality rates (ASMR) in the United States from 1990 to 2021

LIMITATIONS

This study relied on analysis of secondary GBD modelled estimates, which may be affected by under-reporting, misclassification, and variations in diagnostic practices across countries. The analysis was ecological and therefore cannot establish casual relationships or account for individual-level risk factors. Additionally, comparisons were limited to only two countries.

CONCLUSION

ADOD mortality trajectories differ strikingly between Pakistan and the United States. Pakistan exhibits a rapidly widening female excess driven by rising female mortality alongside declining male mortality, whereas the United States demonstrates long-term stabilization for both sexes. These findings highlight region-specific and sex-specific dynamics in dementia mortality and underscore the need for targeted public health strategies, particularly addressing the growing female burden in low-middle-income settings.

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