

Coal consumption as a moderator in the link between industrial output and life expectancy in ASEAN nations

Abstract

This study examines the relationship between industrial output and life expectancy in ASEAN countries from 2000 to 2021, emphasizing coal consumption as a moderating factor. Using the Panel ARDL method, the findings reveal that industrial output positively impacts life expectancy, highlighting the economic benefits of industrialization, such as improved healthcare access and job creation. Model 1's industrial output coefficient is 0.1542, while Model 2's is 0.2352, both models giving a p-value of 0.0000. However, this positive effect is significantly offset by coal consumption, which detracts from life expectancy due to environmental degradation and health hazards such as respiratory and cardiovascular diseases. This coefficient is 0.0722 (p-value: 0.0000) in Model 2 and 0.8457 (p-value: 0.0000) in Model 1. The study further shows that the interaction between industrial output and coal consumption exacerbates these adverse effects, underlining the critical need for sustainable industrial practices. Practical implications include the necessity for targeted green policies, such as phasing out coal subsidies, adopting renewable energy technologies, and implementing carbon taxation, to mitigate the detrimental health impacts of coal consumption while maintaining industrial growth. Identifying critical thresholds, such as coal consumption exceeding 50% of the energy mix or industrial output growth surpassing 5–10% annually without corresponding energy efficiency improvements, provides actionable insights for policymakers. These findings highlight the importance of balancing industrial development with sustainable health and environmental outcomes through informed policy interventions.

Keywords

ASEAN; Coal consumption; Environmental degradation; Industrial output; Life expectancy