HELICON

Unravelling the long-term and indirect health impact of the COVID-19 crisis in Belgium

Contract - B2/202/P3/HELICON

Summary

Context

The COVID-19 pandemic was exceptional in its public health impact and societal consequences. The onset of the crisis was characterized by much uncertainty and concerns about how vulnerable groups were affected over time, the long-term health effects of COVID-19 infections, and the broader effects on non-COVID care.

Objectives

HELICON aimed to address three research objectives:

A. Identify sociodemographic and socio-economic factors of risk and resilience through the assessment of the social patterning of COVID-19 vaccination, infection, hospitalizations and mortality.
B. Describe the medium- and long-term direct health impact of COVID-19 infections with regard to healthcare use after COVID hospitalization.
C. Assess the indirect health impact of the COVID-19 crisis in terms of non-COVID morbidity and mortality and the health economic impact of delayed health care use.

Methods

Health, social, and administrative data from multiple sources were combined—including vaccination records, hospital surveys, national sociodemographic and mortality data, and the Belgian Cancer Registry—to investigate COVID-19 outcomes, excess mortality and non-COVID morbidity and mortality. Using advanced statistical and simulation methods, the project examined hospitalizations, mortality, post-acute complications, delayed non-COVID care, and healthcare costs, considering age, sex, socioeconomic status (income, education and employment), migrant background, household composition, and pandemic dynamics.

Conclusions

HELICON demonstrated that COVID-19 disproportionately affected socially and economically vulnerable groups in Belgium.

A. Municipalities with greater socioeconomic deprivation experienced higher COVID-19 incidence compared to the less deprived areas, although these inequalities varied over time. COVID-19 hospitalization and mortality were higher among older adults, men, residents of collective households and individuals with a migration background. Important educational and income disparities were also observed for COVID-19 hospitalization and mortality. COVID-19 vaccination

uptake was lower among younger individuals, men, persons with a migrant background, and persons with lower educational attainment or lower income levels.

B. Patients hospitalized with COVID-19 experienced substantial post-acute health consequences in the aftermath. COVID-19 hospitalization was associated with increased risks of cardiovascular and pulmonary complications, especially after severe illness. Lower income was a risk factor for post-acute pulmonary complications. In-hospital mortality was higher among patients with lower education or income, without employment, living in collective households, men, older adults, and residents of the Walloon or Brussels-Capital Region. Although healthcare costs in the year following COVID-19 hospitalization were generally lower than after non-COVID hospitalization, considerable social disparities were found among COVID-19 hospitalized patients with higher costs among persons with lower education, lower income, older age, or living in collective households.

C. HELICON also revealed that the indirect toll of the COVID-19 pandemic on non-communicable diseases in Belgium was multifaceted—showing sharp but temporary declines in acute cardiovascular care and delayed yet measurable health and economic impacts in cancer. Although the overall effects were modest due to the rapid recovery of healthcare services, the findings highlight persistent vulnerabilities in the continuity of care and emphasise the need for resilient, equitable, and data-driven preparedness strategies to mitigate future health crises.

Policy recommendations

The HELICON project highlights that pandemic resilience requires proactive, equity-oriented strategies. Strengthening health promotion, disease prevention, and protection, alongside robust primary care and public health networks, reduces vulnerability and ensures continuity of care for disadvantaged groups. Investments in data infrastructure, interdisciplinary research, and implementation science are essential to translate evidence into actionable policy, monitor inequalities, and guide preparedness planning.

Operationalizing preparedness requires

(1) embedding readiness within routine systems,
(2) improving collaboration between data holders,
(3) developing sustainable research infrastructure,
(4) building capacity for evidence-informed decision-making, and
(5) fostering societal trust through transparent communication and community engagement.

These measures together create a resilient, equitable, and responsive public health system capable of addressing both direct and indirect impacts of future health crises.

Keywords

COVID-19; Social inequalities; Hospitalization; Mortality; Vaccination; Health care use; Health care costs; Pandemic preparedness