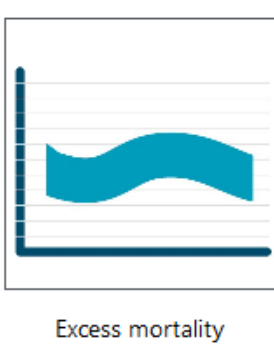
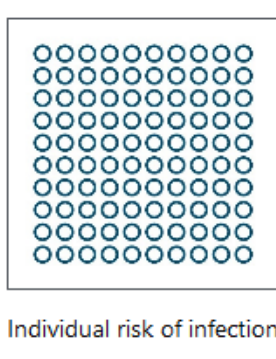


Characteristics of measures during a pandemic

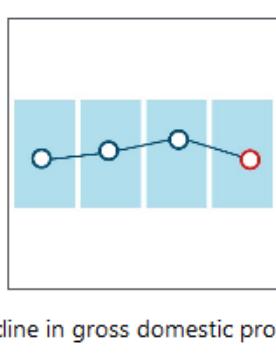
In this study each participant is asked to choose between several alternatives. Each of the alternatives contains a bundle of characteristics with different levels. All measures and consequences of the pandemic used in the study are presented below.



Excess mortality



Individual risk of infection



Decline in gross domestic product



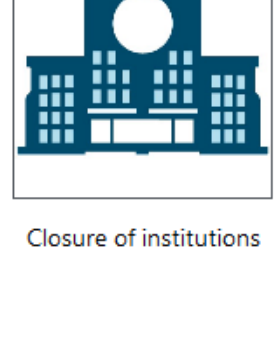
Decline in individual annual income



Measures on exit restrictions



Measures on contact restrictions



Closure of institutions



Personal data

Detailed presentation of the individual characteristics and levels

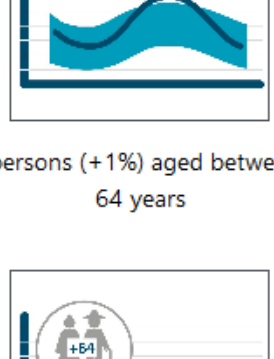
Excess mortality within the next 6 months in Germany

Problem: The exact number of deaths attributable to the coronavirus cannot be determined exactly.

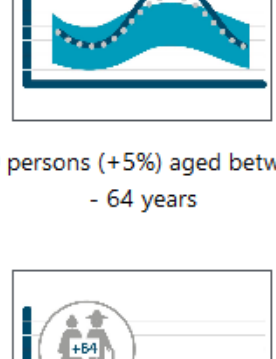
Possible solution: The excess mortality, calculated from the difference between observed and expected deaths, allows conclusions to be drawn about the true extent of a pandemic.

Explanation: During and after a pandemic it is difficult to determine the exact number of deaths attributable to the virus. The excess mortality indicator provides information on the actual extent of the pandemic. The excess mortality rate is the difference between the deaths actually observed and those expected under normal circumstances in the same period of previous years. This gives an approximate picture of the actual impact of a pandemic on deaths. However, high excess mortality can also have other causes such as an increased incidence of fatal accidents or other diseases. Once the capacity limits of the health care system are reached, deaths can also be due to inadequate general care. In this survey, the average excess mortality is presented for a period of 6 months. Two age groups are distinguished, 0 to 64 years and over 64 years. The excess mortality is expressed as a percentage and in absolute figures.

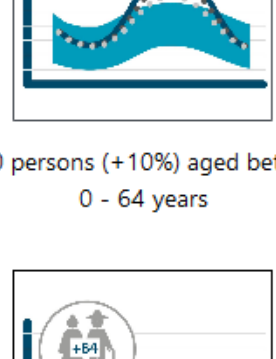
Pros and cons: The excess mortality indicator gives an approximate estimate of the fatal consequences of a pandemic. However, an increase in deaths can also be due to other causes that are not direct consequences of a viral disease.



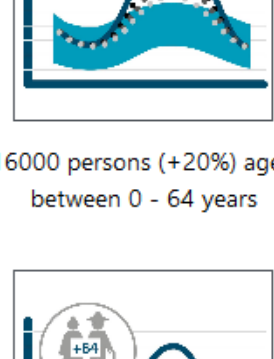
800 persons (+1%) aged between 0 - 64 years



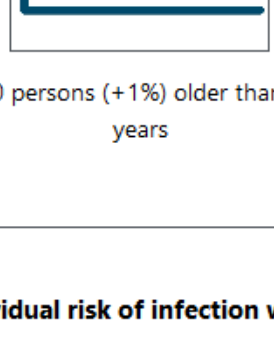
4000 persons (+5%) aged between 0 - 64 years



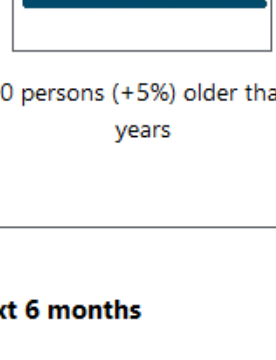
8000 persons (+10%) aged between 0 - 64 years



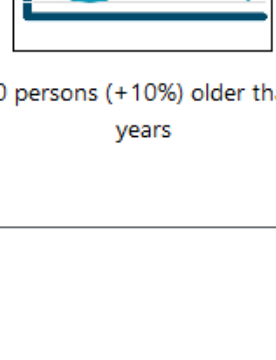
16000 persons (+20%) aged between 0 - 64 years



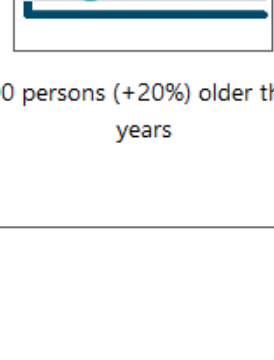
800 persons (+1%) older than 64 years



4000 persons (+5%) older than 64 years



8000 persons (+10%) older than 64 years



16000 persons (+20%) older than 64 years

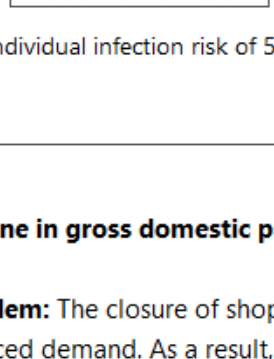
Individual risk of infection within the next 6 months

Problem: The individual risk of infection with the coronavirus varies from person to person.

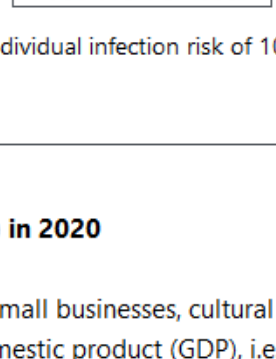
Possible solution: Compliance with hygiene regulations, contact restrictions and curfews reduce the risk of infection.

Explanation: The risk of infection with the coronavirus can vary from person to person. It depends on the state of health, previous illnesses, age, professional activity, family situation, housing situation or individual behavior. Well targeted measures contribute to reducing the risk of infection and preventing the spread of coronavirus. These include isolation of risk groups, quarantining of potentially and actually infected persons, closing of public facilities, cancellation of major events, relocation of work to the home if possible, and exit and contact restrictions.

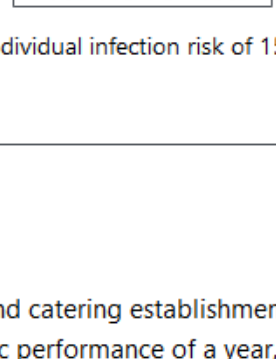
Pros and cons: The individual risk of infection depends on various influencing factors such as state of health, housing situation or social behavior.



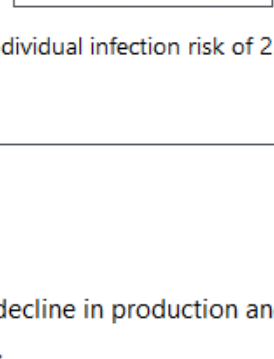
Individual infection risk of 5%



Individual infection risk of 10%



Individual infection risk of 15%



Individual infection risk of 25%

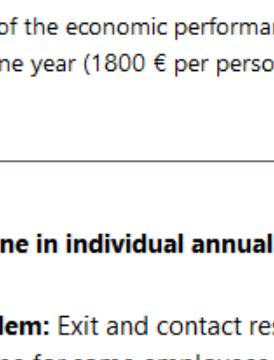
Decline in gross domestic product (GDP) in 2020

Problem: The closure of shops, large and small businesses, cultural institutions and catering establishments leads to a decline in production and reduced demand. As a result, the gross domestic product (GDP), i.e. the economic performance of a year, also declines.

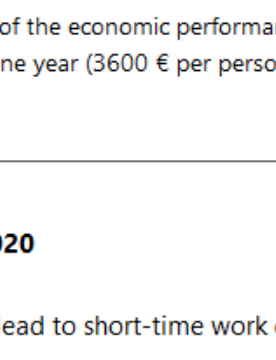
Possible solution: The further decline in GDP must be halted by rapid but controlled relaxation of corona measures.

Explanation: The closure of entire companies, plants and shops leads to a decline in production and reduced demand. Less goods and services are produced. Depending on the duration of the closures, there may be a more or less severe decline in gross domestic product (GDP). The overall economic situation will deteriorate increasingly with continuing restrictions. Depending on the duration of the measures and the resulting reduction in production, the decline in GDP can be between 4% and 19% of a country's economic performance. This corresponds to an average loss of between 1800 € and 9000 € per inhabitant in Germany.

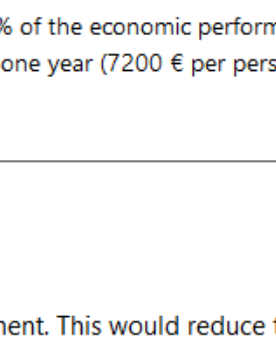
Pros and cons: The decline in GDP can be reduced by the rapid re-opening of relevant sectors of the economy. If the pandemic is not brought under control, the possible consequences could be an increased risk of infection, a higher number of new infections and deaths.



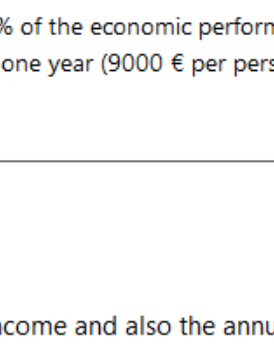
-4% of the economic performance of one year (1800 € per person)



-8% of the economic performance of one year (3600 € per person)



-15% of the economic performance of one year (7200 € per person)



-19% of the economic performance of one year (9000 € per person)

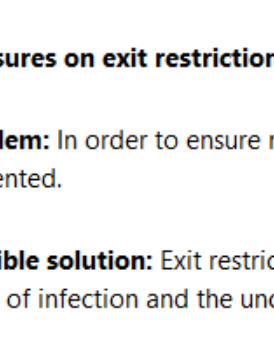
Decline in individual annual income in 2020

Problem: Exit and contact restrictions can lead to short-time work or unemployment. This would reduce the monthly income and also the annual income for some employees.

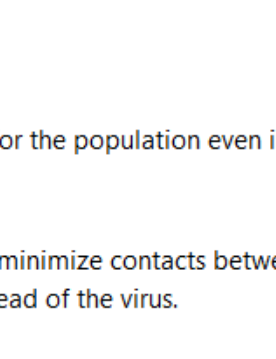
Possible solution: Restarting businesses, industries and companies.

Explanation: Continued restrictions on exit and contact lead to short-time work and rising unemployment. In addition, some workers have to reduce their weekly working hours in order to ensure that their children are adequately cared for in the event of the closure of day-care centres and schools. This reduces the monthly income in the period of the initial and contact restrictions and overall the individual annual income. The reduction in annual income can be between 10% and 75% depending on the employment relationship and the duration of the measures. In order to prevent a greater decline in annual income, the country's temporarily closed economic and industrial sectors would have to resume work and open up public facilities such as day-care centres and schools. However, if a pandemic were not yet brought under control, the consequences would be an increased risk of infection, a higher number of new infections and deaths.

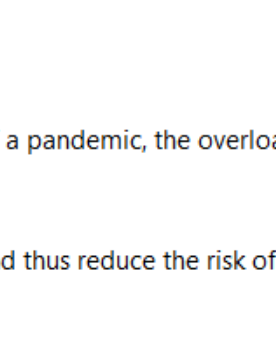
Pros and cons: Increasing economic losses are prevented. However, a rapid economic recovery could encourage further spread of the virus.



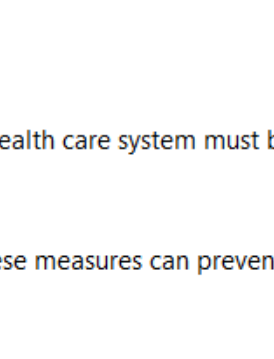
Decline in individual annual income of -10%



Decline in individual annual income of -25%



Decline in individual annual income of -50%



Decline in individual annual income of -75%

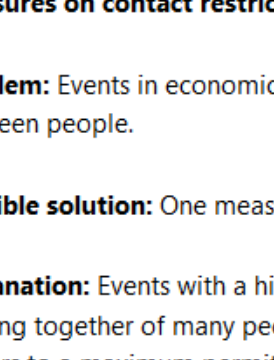
Measures on exit restrictions

Problem: In order to ensure medical care for the population even in the event of a pandemic, the overloading of the health care system must be prevented.

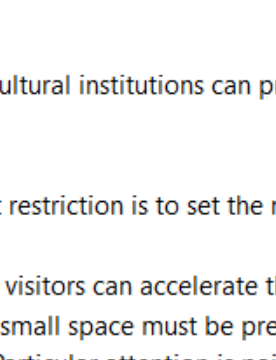
Possible solution: Exit restrictions help to minimize contacts between people and thus reduce the risk of infection. These measures can prevent a wave of infection and the uncontrolled spread of the virus.

Explanation: In order to ensure the health care of all people during a pandemic, the health care system needs to be kept free of overburdening. It must be avoided that many people become infected with the coronavirus in a short time. Because then the health care system would quickly reach its capacity limits. Exit restrictions can help to prevent this. In addition to recommendations on the observance of hygiene measures and the regulation of a minimum distance between persons, various measures on exit restrictions can be adopted to contain the pandemic. Exit restrictions may mean the closing of national borders or state borders or a strict domestic curfew. This would greatly restrict people's freedom of movement. The exit restrictions may be maintained for several weeks or months.

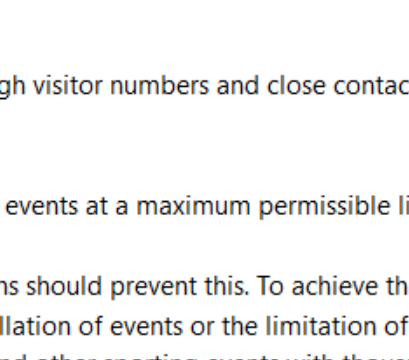
Pros and cons: Measures on exit restrictions are intended to prevent a wave of infection in order to slow down or prevent its spread. Increasing numbers of infections and deaths can be avoided. However, long-term exit restrictions would result in sustainable economic and social development. Isolation of the population could also lead to undesirable consequences and challenges for individuals and society, such as increasing depression due to lack of social contact and other social needs.



1 to 6 months closure of national borders



1 to 6 months closure of federal states and national borders



1 to 6 months strict curfew

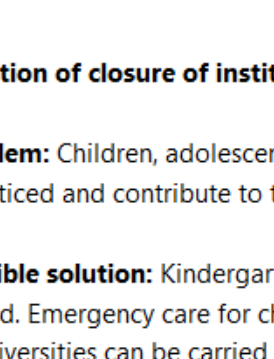
Measures on contact restrictions

Problem: Events in economic, public and cultural institutions can promote the spread of the virus due to high visitor numbers and close contacts between people.

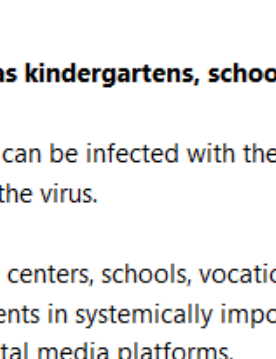
Possible solution: One measure of contact restriction is to set the number of visitors for public and private events at a maximum permissible limit.

Explanation: Events with a high number of visitors can accelerate the spread of the virus. Contact restrictions should prevent this. To achieve this, the coming together of many people in a very small space must be prevented. Possibilities would be the cancellation of events or the limitation of visitors to a maximum permitted number. Particular attention is paid to national football league matches and other sporting events with thousands of visitors, as well as trade fairs and concerts with a very high expected number of visitors. However, a maximum limit can also be set for meetings with a smaller number of people, such as business meetings or family celebrations. Taking into account the minimum distance as well as prescribed hygiene measures, events with different maximum permitted number of people are conceivable. The number can be limited to 5, 500 or 5000 persons. The restriction can be maintained for a period of 1 month, 3 months or 6 months. Any infringement of the restrictions would result in the imposition of fines.

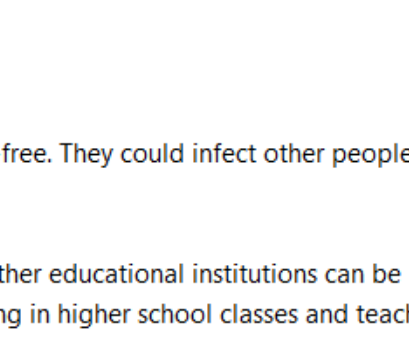
Pros and cons: A reduction in the upper limit for visitor numbers at certain events does not necessarily mean a reduction in the number of infections, as infected persons may also attend several small events and, if minimum distances are not observed, may infect other people in their daily lives. However, a simultaneous infection of many people can be prevented by upper limits. Long-term contact restrictions can have negative social and societal consequences.



1 to 6 months max. 5 persons



1 to 6 months max. 500 persons



1 to 6 months max. 5000 persons

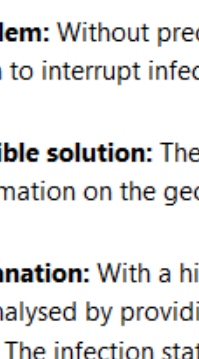
Duration of closure of institutions such as kindergartens, schools and universities

Problem: Children, adolescents and adults can be infected with the coronavirus, but may remain symptom-free. They could infect other people unnoticed and contribute to the spread of the virus.

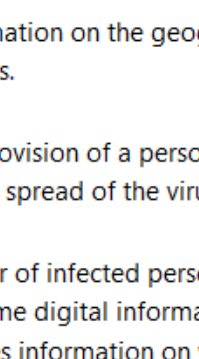
Possible solution: Kindergartens, day-care centers, schools, vocational schools, colleges, universities and other educational institutions can be closed. Emergency care for children of parents in systemically important occupations is maintained. Teaching in higher school classes and teaching at universities can be carried out using digital media platforms.

Explanation: Younger people, especially small children, often find it more difficult to always adhere to the prescribed hygiene measures and the minimum distance. Infections in children with the coronavirus may go unnoticed. Then they could unconsciously spread the virus in kindergartens and schools. Temporary closure of care and educational institutions could prevent the rapid spread of the virus. Moreover, many older teachers belonging to the risk group would also benefit from the closure of the institutions, as they would not have to expose themselves to an additional risk of infection. Although the closures will lead to reduced infection rates, the need for childcare at home may place an additional burden on parents. However, the children's performance at school could decline. And educationally disadvantaged children may not receive the learning support they need to maintain or catch up with the performance levels of other children.

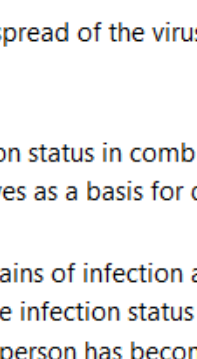
Pros and cons: Closures of care and educational institutions can prevent the virus from spreading rapidly. Continuing closures, however, lead to an additional burden on parents and a decline in the level of school performance.



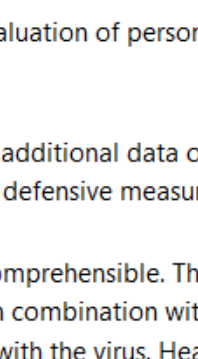
1 month closure of institutions



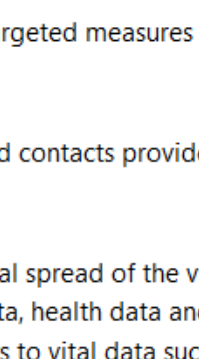
2 months closure of institutions



3 months closure of institutions



4 months closure of institutions



6 months closure of institutions

Transmission and evaluation of personal data

Problem: Without precise information on the geographical spread of the virus and the evaluation of personal data, no targeted measures can be taken to interrupt infection chains.

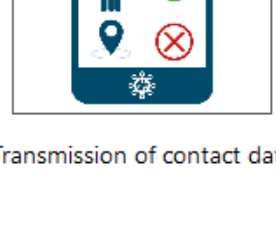
Possible solution: The digital provision of a person's infection status in combination with additional data on location and contacts provides information on the geographical spread of the virus and serves as a basis for decisions on defensive measures.

Explanation: With a high number of infected persons, the chains of infection are hardly comprehensible. The geographical spread of the virus can be analysed by providing real-time digital information on the infection status of people in combination with location data, health data and contact data. The infection status includes information on whether a person has become infected with the virus. Health data refers to vital data such as resting pulse, heart rate, body temperature or blood pressure. With contact data we mean encounters with other people. Location data shows the visited places within a certain time period. The information can be used to create a basis for decisions on targeted measures to interrupt infection chains and rapidly during the pandemic. The additional health data can also contribute to the analysis of the pandemic, e.g. providing evidence of symptoms of viral infection. The data on possible contacts with infected persons also help to trace the chains of infection geographically and to intervene with targeted measures. During data transmission, the conventional national and international data protection regulations are observed.

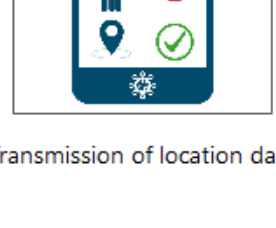
Pros and cons: The real-time digital transmission of relevant data on the occurrence of an infection anonymates the geographical tracking of the virus and the infection chains. Measures can be implemented in a targeted manner. The data transfer is anonymous and subject to data protection. Improper handling and storage of data, faulty transmission or security gaps on the transporting medium increase the risk of hacker attacks and the misuse of personal information. Users may also have reservations regarding the use of the data.



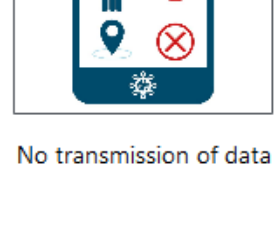
Transmission of data on health, contacts and location



Transmission of data on health and contacts



Transmission of data on health and location



Transmission of data on contact and location

Transmission of health data

Transmission of contact data

Transmission of location data

No transmission of data