



Potential Short-term Research Projects – Coronavirus (COVID-19)

Name of Project: Agent-Based Simulation of the Spatial Contagion of the Coronavirus in Israeli Cities

Goals: we propose simulating the spatial outcomes of policy measures for containing the spread of coronavirus in the large cities of Israel

Defining the proposal:

- simulations relating to the short-term (2-3 months): spatial planning research
- simulation relating to the long term (1-2 years): spatial economic research

Description: We have developed an agent based micro-simulation model that has been used to simulate the resilience of cities to major disasters. At the heart of the model are programmable 'agents' whose behavior is determined by a suite of decision rules. The model can relate to real-world urban contexts or to hypothetical urban spaces. It has been used to simulate the effects of major shocks such as earthquakes and missile attacks on large cities in Israel (Jerusalem, Tel Aviv and Haifa). Results have been reported in over 10 papers in international peer-reviewed journals and books over the last few years. Three versions of the model exist: one runs on the REPAST Symphony platform, one is based on Python code and a newer version runs in MATLAB.

This model is highly suited for simulating the spatial contagion effects of the coronavirus in Israeli cities. For simulations over the short term (up to 4 months), we suggest addressing the following questions relating to a given city:

- How many are likely to be affected by the coronavirus epidemic over the time period?
- How many fatalities can be expected over the time period?
- When does the epidemic reach its maximum height and what is the nature of this peak (flat vs. steep) ?
- What is the anticipated time till the effects of the epidemic dissipate?

The above represent the baseline outcome variables of the simulation. We can also run the simulations under different policy (intervention) scenarios and then compare the outcomes with the baseline. These scenarios include:

- Introducing quarantine areas by number of infected persons, e.g. full quarantine for all citizens residing within an areas in which infection rates exceed 25%.
- Limitations on mobility:
 - Limiting general mobility of the population (e.g. by time of day or number of activities)
 - Limiting mobility by age

- Limiting mobility by activity type of the population (e.g. permitting only work-related activities)
- Limit mode of transport, (e.g. closing down public transport)
- Limit number of visits per building (e.g. no more than 100 people visiting each building per day)
- Closing down specific functions in the city, for example the largest commercial areas
- Reducing population density, e.g. moving some of the population away and gradually permitting citizens to return.

The simulation capabilities of the model are derived from a series of (estimated) parameters that can be easily adjusted to increase model stability and robustness. The key parameters relating to the spatial contagion of the coronavirus within an urban area relate to:

- Probability of infection as a function of age and health status (studying scenarios with differing intensity of infection)
- Probability of death and/or time to recovery (risk over time, function of age and health status)
- Time until visible symptoms appear/diagnosis (random, normal distribution)
- Time until diagnosis
- Compliance with quarantine

The simulation model results will facilitate a comparison of the outcomes discussed above (rate of infection and death, time and extent of peak, time till dissipation) and an assessment of the utility and efficiency of each of the possible interventions.

Participants (Israel):

Professor Daniel Felsenstein, Department of Geography, Hebrew University of Jerusalem

Dr Yair Grinberger, Department of Geography, Hebrew University of Jerusalem

Time Frame: We can simulate both the short term contagion effects (up to 4 months) and the longer term outcomes (2-3 years). Short term effects will relate to the spread of the virus in relation to policy measures. Longer term outcomes will also incorporate wider economic effects such as change in income and employment (and even land use patterns) in the aftermath of the virus.

Estimated Budget: 60-70,000 NIS for 3-4 months.

Name of project: Info-gaps and Info-demics: Managing uncertainty in new-disease epidemics

Description: We address two complementary issues: the information environment and the epidemic dynamics.

Categories: Risk, social, behavioural.

1. *Information environment.* The contemporary information environment is an ecosystem of online and offline interactions among human and non-human informational agents (Floridi). An info-demic is a flood of information, including correct information and misinformation, disinformation and malinformation. This definition emerged during SARS crisis and has been recently adopted by World Health Organisation in describing the current online information ecosystem related to COVID-19. How is the information environment affected by an info-demic crisis? What is gained by analysing the information environment as affected by a new pandemic disease? In Floridi's model, what happens online and offline is strongly intertwined and continuously redefines the comprehension of each domain for each agent. These dynamics among agents and across domains produce knowledge that enters the decision-making processes at both private and policy levels.

At the private level: Citizens need assistance on the following interrelated issues. (1) How to distinguish correct and useful information from false or unlikely statements? (2) How to proactively help relieve the course of the info-demic?

At the policy level: Decision makers and officials need assistance to communicate effectively with the public. How can public officials exploit the information environment to counter the adverse side of the info-demic during a new-disease pandemic? What and how much information should be communicated, and in what ways?

2. *Epidemiological modelling.* The general format of epidemiological models are common to many diseases. However, the dimensions, parameters and functional relationships in these models are uncertain when confronting a new disease. We use info-gap decision theory to show how to use epidemiological models to support public health policy. Policy issues include (1) allocation of resources between containment of the disease, treatment of the sick, and development of new treatments; (2) allocation of effort between short-term or local activities and long-term national and global activities; (3) forecasting the future of the pandemic; (4) managing the information environment (which connects back to the first component of the project).

The information environment and epidemiological modelling interact. The information environment influences how agents interact, which needs to be considered in epidemiological models. Conversely, epidemiological models can assist policy makers in their decisions and public communications. We explore these interactions.

Israeli Researcher:

Prof. Yakov Ben-Haim, Yitzhak Moda'i Chair in Technology and Economics, Technion – Israel Institute of Technology

Time frame: 4 months

Estimated Budget: 80,000 NIS total - 40,000 NIS Israeli researcher; 40,000 NIS European researcher but in this project important to the project.

Name of Project: Using Crowd Sourcing for Protracted Crisis Management

Goal: Aiding in real time public policy as input for decision-making during the emergency.

There are six categories of policy questions to be addressed through crowd sourcing.

- Situation evaluation
- No policy change projections – short, mid, long range
- Opinions about steps needing to be taken now, mid, long range
- Opinions about compliance to- and efficacy of- steps thus far taken
- Responses to the specific short, mid, long-range plans.
- Opportunity to raise novel ideas, like the idea of the silent radio channel during the Gulf War, or for instance, the current endeavor to suggest Coronavirus remedies (see <https://bit.ly/3aMldGv>)

Specific questions to be posed, focusing on economic, cascading impacts:

What do people think about:

- probabilistic loss vis-a-vis the certain losses from the actions taken
- steps taken are indeed necessary or are they too hysterical?
- about the next policy steps which are being considered (closing universities, schools, public transport)
- about long-range possibilities?

We will establish a panel database (i.e., cross-section and longitudinal data), and collect (and analyze time-wise) responses relating to preferences, heuristics, and biases, e.g., risk attitudes and time preferences.

Israeli Participants:

Prof. Eran Feitelson, Hebrew University, Public Policy and Planning

Prof. Doron Kliger, University of Haifa, Economics and Behavioral Economics

Prof. Deborah Shmueli, University of Haifa, Public Policy and Planning

Prof. Avi Gal, Data Science, Technion

Time Frame: 4 months (which can be extended) but with monthly reporting and analysis.

Estimated Budget: 50,000 NIS

Name of Project: Characterization of Corona virus contamination among persons with lower income, refugees, new immigrants

Goal: to study implications and ways of enhancing social justice in the time of the Corona Pandemic.

Description: We suggest documenting the patterns of spread and occurrence of COVID-19 disease among underprivileged populations such as new immigrants and refugee communities. It is conceivable that lack of funds, inappropriate housing, and lack of medical insurance might lead to an increased rate of infection. The study will document infection using social media and online surveys in Israel and other countries. If indeed, there are communities with increased rate of undetected infected persons, an appropriate response would be recommended to authorities.

Israeli Researchers:

Shai Linn MD, DrPH, Shay Gueron PhD, University of Haifa. Together with public health officials in Israel.

Time frame: About 4 months. Four one month stages will be: developing tools (questionnaires, surveys, social media exploration), dissemination, monitoring, reporting.

Estimated Budget: 75,000 NIS

Name of Project: Mitigating and managing the Corona crises: Legal and institutional comparative analysis

Goal: Legal implications

Description: The Corona pandemic raises crucial regulatory questions that impact all spheres of life, ranging from contracts, torts and criminal law to labor law and business associations, and from family law to the regulation of education. By way of examples, in contract law, the question of frustration is raised when deals can not be performed on account of the pandemic (or the legal measures that render performance impossible). In tort law, question of liability of individuals who fail to take precaution, or of state agencies who failed to treat individuals (or address the threat properly) may be litigated. Criminal law may be engaged to the extent violations of emergency decrees are prosecuted. Labor law questions include the rights of employees to receive compensation for their employment being suspended, as well as matters pertaining to the right to strike during a pandemic. Business associations raise regulatory questions ranging from matters of corporate governance in emergencies to questions of insolvency on account of the economic crisis that follows a pandemic. Family law has to account for isolating orders leading to court orders pertaining to children being frustrated, and education law has to negotiate closure of schools or families pulling their children out of the system on account of fear for their health. On a deeper level, Fundamental rights such as freedom of movement, privacy and due process (including access to courts) have to be balanced against the over-arching public interest in maintaining a functioning health system (which itself impacts rights). Questions of constitutional structure loom, as the possibility of shifting to an emergency regime, with the suspension of ordinary legislative and executive processes may need to be considered. Similarly, access to courts may be impeded on account of the virus. In Israel, the crises is managed so far by the Prime Minister office, the health ministry and the National Security Council (rather than NEMA), while the major legal instrument is the Mandatory Nation Health Ordinance, which provides far reaching powers to interfere with a host of rights. While Israel has developed expertise and experience in managing national security crises, it's capacity to handle a health-related crisis has not been tested. Therefore, much can be gained by conducting a comparative research into the manner in which other countries manage the crisis from a regulatory perspective, and how they address the potential clashes noted above.

The aim of the research is:

To analyze and conceptualize the decision-making and legal procedures utilized in Israel so far
To provide comparative perspective of other countries (Italy, Germany, UK, Japan and the US)
management of the crises and legal tool

Analyze the Israeli case in the broader perspective of emergency mitigation and management, in light of the expertise gathered in these fields

Israeli Researchers:

Prof. Eli Salzberger, Faculty of Law, University of Haifa, Minerva Center for Rule of Law under Extreme Conditions

Prof. Amnon Reichman, Faculty of Law, University of Haifa, Minerva Center for Rule of Law under Extreme Conditions

Prof. Gad Barzilai, Faculty of Law, University of Haifa, Minerva Center for Rule of Law under Extreme Conditions

Prof. Itamar Mann, Faculty of Law, University of Haifa, Minerva Center for Rule of Law under Extreme Conditions

Time frame: 6 months

Estimated Budget: 50,000 NIS

Name of Project: Building public resilience and trust in times of Coronavirus global pandemic hazards: An integrative approach of the person within society

Categories: Crisis management, Social behavior during emergencies, Management and Policy.

In the recent two decades many societies have experienced mass emergencies, natural disasters, terror attacks and other crisis situations due to climate change, globalization and the mutual dependence between societies. The close ties between societies have increased the probability of cascading emergencies, as we have witnessed with the most recent alarming example of the global outbreak of the Coronavirus.

Such situations call for coordinated government actions, international cooperation between governments and other sectors such as non-governmental organizations and the private sector. Concurrently, governments all over the world develop and implement policy measures to minimize the effects of crises such as pandemics and increase public readiness, as well as improve the handling of crisis when it happens. Part of public readiness and coping is reflected in their emotional response and emotion regulation. As people are provided a surplus of information, they may panic. The stress and anxiety ubiquitous of the current Coronavirus coping can have weakening effects on the immune system through hormonal regulatory depletion. In order to be effective, measures and policies require the active cooperation of citizens and communities who may bear significant costs and thus should be involved in relevant decisions. The extent to which people are willing to pay such costs and cooperate with policy measures may therefore influence both the effectiveness of policy and the outputs and outcomes of emergency situations, and may be shaped by their emotional coping (e.g., anxiety). As people understand the information provided by officials through emotional and cognitive filters.

This research will trace potential factors that influence citizens' willingness to pay and cooperate with policy measures to mitigate the current pandemic focusing on three types of factors: 1) the performance of the public sector and its relations with citizens – public trust in government and the responsiveness and transparency of emergency management; 2) attitudes and feelings about personal and collective resilience, and social solidarity; 3) the communication between government and citizens in a digitized and open society. The research will use surveys, focus groups and big data analysis. It will provide scientific insights and practical implications for the current pandemic and future emergencies.

Researchers:

Prof. Mizrahi Shlomo, Department of Public Administration and Policy, School of Political Sciences-University of Haifa

Prof. Vigoda-Gadot Eran, Department of Public Administration and Policy, School of Political Sciences-University of Haifa

Dr. Cohen Nissim (Nessi), Department of Public Administration and Policy, School of Political Sciences-University of Haifa

Dr. Ben-Eliyahu Adar, Counseling and Human Development Program, Faculty of Education-University of Haifa

Dr. Hertz Uri, Department of Cognitive Sciences-University of Haifa

Dr. Miller-mor Attias Rotem, Department of Public Administration and Policy, School of Political Sciences-University of Haifa

Efrat Mishor, Ph.D. Candidate, Department of Public Administration and Policy, School of Political Sciences-University of Haifa

Gal Levy, M.A. Student, Counseling and Human Development Program, Faculty of Education-University of Haifa

Time frame (short-term during emergency ~ up to say 4 months which is the focus right now; longer term extension is viable):

- 1st month – Building the research plan
- Phase 1 – survey at the peak of the Coronavirus outbreak when people are in confinement (in 1-2 weeks)
- 2nd & 3rd months – Collecting and analyzing essential and preliminary data
- Phase 2 – survey after the Coronavirus peak for retroactive accounts
- 4th month – Analysis, writing the first report, submission.

Estimated Budget: For our project we estimate 50,000 NIS (15,000 NIS for two surveys, 25,000 NIS for assistants, 10,000 NIS for analysis and reports).

Name of Project: Ethical considerations for quarantining individuals with suspected COVID-19 exposure

Goal: to study implications and ways of enhancing social justice and ethics in the time of the Corona Pandemic.

Description: Individuals who are suspected to have been exposed to COVID-19 are quarantined. States may impose criminal charges against individuals who defy the quarantine order, and do not comply. Detection measures and police surveillance are employed in order to find non complying persons. These measures may be highly unethical, and may constitute a privacy violation. We suggest characterizing the bioethical issues that are related to the quarantine orders, and developing multilingual tools of informed consent that should be imposed whenever quarantine is ordered. This is intended to achieve efficient quarantine together with the proper respect for individual rights and the potential breach of privacy.

Israeli Researchers:

Shay Gueron PhD, Shai Linn MD, DrPH. Together with public health officials in Israel.

Time frame: 4 months. One month for establishing the collaboration with all the above Researchers, 2 months in developing tools and informed consent forms, one month for preparing the report and recommendations.

Estimated Budget: 75,000 NIS, research assistants, software and access to the social media and data storage.

Name of Project: The Impact of Coping with a Global Epidemic on Managing Daily Participation among Breast Cancer Survivors

Categories: Public health of vulnerable population

Description: Maintaining a satisfying level of participation in meaningful daily activities facilitates independence, quality of life and emotional wellbeing after breast cancer (BC). However, coping with a global epidemic may cause disruptions in daily participation in general population and the more so for BC survivors that need an ongoing management for their medical treatment and complex condition in the short and long-term after diagnoses. BC survivors may benefit from tele-rehabilitation that enables them to receive treatment from their home providing an answer to issues of fatigue and concerns regarding their vulnerable immune system in crowded places such as clinic especially in a global epidemic situation. **The aims of the suggested study are:** 1) examine which daily activities are restricted as a result of a global epidemic; 2) to examine the impact of a global epidemic on daily participation for a satisfying level; 3) to understand from the women's self-perspective how and which strategies they use to maintain a satisfying daily participation; 4) to examine the impact of providing a short on-line self-management strategies on maintain a satisfying daily participation. **Hypotheses:** women will report decreased satisfaction levels in their daily participation; providing a short on-line self-management strategies intervention will improve satisfaction with daily participation. **Methods:** a mixed design study (single arm pre–post design qualitative); 30 women will be included; Assessments will be administered online pre and post intervention; the intervention will be administered in a weekly (one meeting for 8 weeks) online individual setting, and will focus on and providing strategies to manage and improve daily participation.

Research subjects: women in the first year after diagnosed with breast cancer will be recruited from social network groups.

Israeli Researchers: Khawla Loubani, Dr. Naomi Schreuer & Dr. Rachel Kizony from the Occupational Therapy Department, Faculty of Welfare and Health Sciences, University of Haifa,

Time frame: 8 weeks intervention.

Estimated Budget: 50,000 NIS

Name of Project: The coronavirus pandemic – Estimating the costs to the economy versus the different measures being taken. A sensitivity analysis

Main objective of the project: The aim of this study is to compare the economic impact and the health benefits obtained (using measures such as years of life lost) under different policies of social distancing (closing of schools, businesses, etc.) isolation of contacts and travel restrictions.

Categories: Economics, health economics, public health, health emergencies

Description: The COVID-19 pandemic has resulted in extraordinary measures being taken to control the spread the disease in different countries. In the early containment and delay phases, countries have instituted requirements for isolation of patients, self-isolation of contacts for at least 14 days, severe travel restrictions and closure of schools and academic institutions. In addition, restrictions on gatherings of large numbers of people and advice to older to avoid visiting public places, is having a major impact on places of entertainments, small businesses, restaurants, etc.

All these measures will have a major impact on the economy of the country. The measures used to contain and slow down the pandemic at the country level are important to allow the health services to be upgraded and prevent a sudden increase in severe cases requiring hospitalization. It also should reduce large scale absenteeism during a short period of time, impacting on the ability to maintain essential services.

While it seems logical that these steps should improve the ability of health system to function as it should, it is not clear to what extent they will actually save lives. The aim of this study is to carry out basic modeling and a sensitivity analyses of the economic impact under different scenarios and estimate the years of life lost under stringent restrictions of social isolation and travel restrictions as opposed to milder restrictions. Among other things, the study will apply economic modelling based on HTA analysis (including cost per QALYs units) to assess the long-term economic savings to the economy, from reduced morbidity and overall death toll, vs. the short and term losses to the Israeli economy, due to the current restrictions.

Israeli Researchers:

Manfred S Green, MPH,MD,PhD, Prof., University of Haifa, Epidemiologist and Specialist in Public Health and Health Management

Meir Pugatch PhD, Assoc. Prof, University of Haifa, General and Health Economist,

Dorit Nitzan MPH,MD, Head of Emergency Preparedness, World Health Organization, European Region, Specialist in Pediatrics and Global Health

Time Frame: The aim is complete the study in four months, which will include developing the protocol, collecting the data, analyzing the data, and preparing the report.

Estimated budget: 50,000 shekels (research assistant and statistical/technical consultation) for a period of four months.

Name of Project: Autonomous lodgings - emergency quarantine & treatment

Categories: Technology / design / urban planning / economy / social psychology / public health

Description: Autonomous lodgings - emergency quarantine & treatment (ALEQT) can provide portable solutions to the spread of an epidemic such as COVID-19. This idea started as a remedy for the uprooted in the aftermath of a catastrophic earthquake, and it seems to have a potential for epidemics. We will develop autonomous and portable units for lodging of individuals, families, and communities. Such units can be deployed quickly and do not need infrastructures. Hence they can be moved according to changing needs. Each unit has the capacity to generate energy (solar), produce potable water (condensation), and recycle waste (no sewage installations). A more detailed description of the novel technologies involved is given in the interim report of our group.

Mobilizing such ALEQT will allow the authorities to address the changing needs of the population according to the poorly predictable spreading trajectories of the epidemic (in the country and between countries). The mobility alleviates the need to consider the long term effects on the local environment and the limitations set by adherence to regulations. Portable autonomous lodgings can be useful in a variety of emergency situations such as nuclear disasters and radioactive contamination, and damage to water and energy resources.

Israeli Participants: Prof Amos Agnon, Earth Sciences, Hebrew University; M. Weinstein, Jerusalem College of Technology; and (subject to confirmation); Prof. Eran Feitelson, Geography, Hebrew University; Eran Lederman, Michael Turner, Bezal'el

Time frame: (short-term during emergency ~ up to say 4 months which is the focus right now; longer term): short-term, long-term

Estimated Budget: We will need 300,000 NIS to jumpstart the project, hiring experts/students in the technological disciplines, as well as from design, urban planning, finance/economy, social psychology, and public health.

Name of Project: The “Coronavirus Domino Effect” of the Tourism Industry: Analysis and Recommendations

Project Aims: The proposed socio-economic project aims to draw practical recommendations regarding the future recovery of the tourism industry in Israel, with an emphasis on its workforce. The Economic and Social recommendations are towards needed steps to be taken in the tourism industry for the process of recovery that will take place at the time the virus will be defeated.

Description: The tourism industry is an umbrella for multiple sectors: aviation (including airlines, airports, and related services), hotels and other accommodation forms (such as short rental apartments, B&B, hostels and camping sites), restaurants, attractions (natural and human-made, including religious and heritage sites, museums, theme parks, visitor centers, and nature reserves), land transportation modes (shuttles and coaches) -and a long list of intermediates (tourist guides, tour operators, travel agents, online travel agents, insurance companies, etc.).

The contribution of the tourism industry in Israel is estimated to be 2.6% of the GDP and 3.6% of the workforce. The share of the workforce rises to 6% when including indirect sectors and contributors. In Italy, on the other hand, the percentage of tourism is 13% of the GDP and contains a similar proportion of the workforce.

The Covid19 virus pandemic negatively affected the different sectors of tourism, until the industry had to close down, sector by sector. The proposed project aims to portray and analyze the process of collapsing, by date, sub-sector and impact, and to recommend needed steps for the process of recovery that will take place at the time the virus will be defeated.

To meet this goal, the project has two stages. In the first stage, it will:

1. analyze the sequence and patterns of the crisis in the Israeli tourism industry from 31/12/2019 until the ban on large gatherings (18/3/2020) and its economic implications.
2. compare this process to past crises in Israel (the second Lebanon War in 2006 and the Tsuk Eitan military operation in 2015).
3. compare this sequence of events to the current crisis in Italy (31/12/2019 to 11/3/2020 when commercial activity in Italy was halted)
4. comparison to the past crisis that was caused by a sequence of significant earthquakes in Italy (August to October 2016).

In the second stage, the recovery of the tourism industries in three leading countries in Asia (Possibly South Korea, China, Singapore or Hong Kong) who are defeating the virus epidemic, will be analyzed. The aim of this analysis is to indicate the sequence of subsectors of recovery, the timeline of improvements, the different stages, and the share of the workforce that were engaged in the recovery process according to sub-sectors.

This process of recovery will be compared to the pattern of the recovery in Italy and Israel past events as mentioned above, to test its feasibility for the tourism industry in democratic and Western countries. Therefore, recommendations will be given towards needed steps to be taken in the tourism industry of Israel.

Israeli Researchers:

Prof Noga Collins Kreiner – Department of Geography and Environmental Studies, Haifa University, Israel.

Dr Yael Ram - Department of Tourism Studies, Ashkelon Academic College, Israel.

Research Assistant- Mr. Benny Ben Israel (MA, fluent in Italian, Hebrew and English). Owner, 'Moltoben'- Travel Agency Israel – Italy.

Time frame: 4 months from the beginning of the research.

Time	T+1	T+2	T+3	T+4	T+5 and more
Description	Identify subsectors of analysis – Israel and Italy	Analysis of the past events (Covid19 virus and other events)		Writing the interim/final report	Extending the analysis under budget consideration
	Data collection	Examination of the situation in leading Asia countries			
Outcome	Framework of analysis			Final report and recommendation	
Budget (Research Assistant- Part time Salary)	4000 NIS	4000 NIS	4000 NIS	4000 NIS (A total of 16,000 NIS for 4 month)	

Estimated Budget:: 16,000 NIS for 4 months.