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Health Care Organisation

TESTING FOR COVID-19 IN LATVIA: ANALYSIS OF PUBLIC–PRIVATE PARTNERSHIPS

Arturs Kaļva[1,#], Dāvids Orlovs[2], Girts Briģis[1] Sergejs Kruks[3], and Dins Šmits[1]

[1] Department of Public Health and Epidemiology, Faculty of Health and Sports Sciences, Rīga Stradiņš University, 16 Dzirciema Str., Rīga, LV-1007, LATVIA

[2] Department of Radiology, Pauls Stradiņš Clinical University Hospital; Faculty of Residency, Rīga Stradiņš University, 16 Dzirciema Str., Rīga, LV-1007, LATVIA

[3] Department of Communication Culture and Multimedia, Faculty of Social Sciences, Rīga Stradiņš University, 16 Dzirciema Str., Rīga, LV-1007, LATVIA

[#] Corresponding author, arturs.kalva@gmail.com

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Private–public partnership is a collaboration between two major sectors of a municipalities economy. It is a so called "win-win" partnership, where both parties can benefit in achieving their planned goals while working jointly. In December 2019, in China, the first reported cases of COVID-19 were detected. The virus spread quickly throughout China and reached Latvia in March 2020. In this study we analyse the role of private–public partnerships in organising effective COVID-19 testing of the population in Latvia. By 1 June 2020, Latvia had the 3rd lowest incidence of COVID-19-caused deaths per 100,000 inhabitants. This study included a systematic review, data acquisition, analysis of the findings, and conclusions were drawn and discussed. During the 1st wave of the pandemic, the private sector collected and conducted more than 95% of the COVID-19 testing in Latvia. The study showed that there could be many contributing factors to success of Latvia during the 1st wave of the pandemic, one of which was that Latvia seemed to rely more on the private sector to organise the testing, which seemed to pay off at first.

Keywords: *public–private partnership during pandemic, COVID-19 testing, primary healthcare.*

INTRODUCTION

Health wellbeing of the population is the aim of any country. It is one of the key factors for people to successfully participate in social activities and the country's economy. There are many tools and models put into place to strive for this objective that together make systems, which is framed also in the constitutions of nations (Franken and Koolman, 2013; Papp *et al*., 2014). The Constitution of the Republic of Latvia in Article 111 states that "The State shall protect human health and guarantee a basic level of medical assistance for everyone" (The Constitution of the Republic of Latvia, 1992).

This article of the constitution is implemented in the Health Care Financing Law (Law on Public–Private Partnership, 2009). The law describes the levels of health care, the principles of financing and its organisation. The main Latvian health system financial sources are the State budget from general revenues, specific bugdet subsidies, patient co-payments, local government budget financing and their own revenue, and private insurance. Public finances can be used for State paid medical assistance minimum payments, for prophylaxis, research and development programmes, disease prevention, control measures, etc. However, legislation does not describe private sector finance than can or cannot flow into the system. Also, Latvian law does not specify what financial sources can be used to sustain an opportunity for any public–private partnership, including financial sources for this collaboration (Health Care Financing Law, 2017).

Most Latvian hospitals are publicly owned (belonging to the state or municipalities), which include university hospi-

tals — Pauls Stradiņš Clinical University Hospital, Rīga East University Hospital and Children's Clinical University Hospital. General practices develop their own practicum and are independent. Pharmacies and dentistry care mostly are private businesses (except, for example, the Rīga Stradiņš University Institute of Stomatology) (Mitenbergs *et al*., 2020). Latvian health system has only a few main public laboratories that perform the functions of a reference laboratory — National Microbiology Reference Laboratory (Rīga East Clinical University Hospital); Institute of Food Safety, Animal Health, and Environment (BIOR), which in case of emergency can perform most types of necessary emergency testing (About the State Civil Defense Plan, 2020; On the reorganisation of the Food and Veterinary Service and the state agency "Latvia Fish Resource Agency" and the establishment of the state scientific institute "Scientific Institute of Food Safety, Animal Health and Environment "BIOR"", 2009)

The Central Laboratory, the E. Gulbja Laboratory, the MFD laboratory, and the NMS laboratory are privately owned laboratories which, in collaboration with hospitals and other healthcare services, perform all of the main clinical laboratory tests. These laboratories execute the state order regarding laboratory examinations to patients who are appointed by physicians who are in contract with the National Health Service Republic of Latvia, and thus laboratory examinations that are covered by the state (C. Laboratory, 2021; E. G. Laboratory, 2021; M. Laboratory, 2021; N. Laboratory, 2021).

This is an example of the so-called cooperation between the public and private sectors or public–private partnership. A private–public partnership is a collaboration that includes the public sector or the State and private sector. This is a form of voluntary collaboration and is helping countries to solve some challenges that may arise in many fields. Both cooperating partners share risks and responsibilities, benefits, and resources. Public–private partnerships (PPP) can be used, for example, to build a new system in different fields, to make and manage different reforms, to provide health care services, etc. (Joudyian *et al*., 2021)

The Organisation for Economic Co-operation and Development (OECD) defines public–private partnership as a long-term agreement between both sectors that is long term and can provide some infrastructure benefits such as roads and social buildings, e.g., prisons, hospitals. In recent studies a proposition was made that partnership between both sectors can be a solution to issues that both sectors would not be able to solve on its own (OECD/ADB, 2019).

The Latvian Law on Public–Private Partnership determine the criteria for such a collaboration, which include: one or more public and private parts; perform some executing construction or providing services; it should be a long-term co-operation (up to 30 or more years); both parts use the available resources; and all partners share the risks and liabilities. The Central Finance and Contracting Agency (CFCA) has been the monitoring institution that follows all potential and those in execution projects between public and private partners. The agency describes the 11 steps that are mandatory to implement such cooperation in Latvia. These eleven steps include starting with defining the problem and identifying solutions,and ending with the conclusion of several contracts, including a several-month (on average eight months) contract coordination process (Law on Public–Private Partnership, 2009).

At the time of the research, information about the first and only public–private partnership project ever in Latvia can be found in CFCA. This project was the design, construction, financing, and maintenance of the town Ķekava bypass road (Public–private partnership, 2021).

In December 2019, in the city of Wuhan, China, several cases of atypical pneumonia were reported. At first, the pathogen was not identified, declaring the cause unknown. On 3 January 2020, more than 30 confirmed cases of atypical pneumonia were reported from Wuhan, China. The search for the cause continued and by 5 January 2020. Influenza, SARS-CoV, and MERS-CoV were excluded, narrowing it down to just a few possibilities. The pathogen was identified as a virus, a strain of the coronavirus family and was called SARS-CoV-2 (COVID-19 virus). The first genome of the new novel coronavirus was released on 10 January 2022 and the first fatality was reported. The spread of the virus continued to grow. The first reported case outside China was confirmed on 13 January 2020 in Thailand (Gralinski and Menachery, 2020; WHO Timeline – COVID-19, 2020). The World Health Organisation declared a worldwide pandemic on 11 March 2020, just a couple of months after the first cases were reported (WHO Director-General's opening remarks at the media briefing on COVID-19, 2022). A worldwide lockdown ensued, with most of the countries locking its borders, limiting social contact to limit the spread of COVID-19 virus (Caristia *et al*., 2020; Euronews, 2020).

To control the spread of the virus, starting from the beginning of the pandemic, many mechanisms had to be put into place to support the healthcare system, like decreasing social contacts, masks, isolation, etc. One of the most important highlighted mechanisms was early infected person detection (Wang *et al*., 2020). There are several ways how to detect Sars-CoV-2 virus presence in the human organism. The standard methods of testing are nucleic acid tests that detect traces of the virus RNA. The "golden standard" is a polymerase chain reaction (PCR) test that is taken with a swab from the person's nose and throat and later analysed in the laboratory. Others include rapid antigen testing and blood testing (WHO, 2020).

There are many known ways to organise such a complex urgent process. One of the possible scenarios of how to execute countrywide management of a health crisis can be through public–private partnership. An example can be taken from a county in Korea, where rapid management for such an event was developed based on previous experiences in the region and in the world. In their example, strong pub-

lic sector response in the initial stages of the pandemic was implemented and backed by strong supply of medical care from the private sector. In the initial stages of the pandemic, this public–private partnership was deemed very successful to restrict virus spread (Kim *et al*., 2021).

The aim of the study was to determine the role of PPPs in organising effective COVID-19 testing of the population in Latvia.

LATVIA DURING THE FIRST WAVE OF THE PANDEMIC

Responding to first reports of severe acute respiratory syndrome coronavirus, on 30 January 2020, Latvia's government released a statement suggesting avoiding visiting China's Hubei province, where the virus was most prevalent (Avoid travel to China's Hubei province, says Latvian Foreign Ministry, 2020). As the spread of the virus expanded, Latvia continued to inform its citizens about precautionary measures. On 27 February 2020, Estonia declared its first positive COVID-19 case for a patient, who travelled to Estonia through Latvia, spending more than 2.5 hours in Latvian public transport. By that time, Latvia had only performed a few tests on travellers from heavily affected areas. The first positive COVID-19 test was confirmed on 11 March 2020 from a patient who travelled from Italy to Latvia (First case of COVID-19 coronavirus confirmed in Latvia, 2020).

On 12 March 2020, the Prime Minister of Latvia declared that a state of emergency will be put into place starting 13 March 2020. This included closure of all schools, limited public gatherings, and many more restrictions to restrict the spread of the virus. Many financial benefits were announced by the state to support the financial sector (Latvian government announces widespread measures to contain coronavirus). On 17 March 2020, all international travel from and to Latvia was halted, with exception of repatriation travel in order to safely bring Latvian citizens home. All travellers succumbed to a 14-day quarantine (Latvia to close borders to passenger traffic on Tuesday 17 March, 2020). Restrictions and safety measures were continued at the beginning of April (Latvia extends state of emergency by one month, 2020). Cases remained in low numbers for a few months, which prompted the Latvian government to relieve restrictions in late May. The state of emergency ended on 10 June (Latvia's state of emergency comes to an end on June 10, 2020).

The cases started to spike at the end of September and continued to rise till the end of the year, prompting stronger restrictions issued by the government, which also included a curfew in late December (All European countries (except the Vatican) now require self-isolation upon arrival in Latvia, 2020).

Starting from January 2020, Latvia had implemented special algorithms for emergency medical services, which looked for special signs and symptoms in patient anamnesis, such as travelling to other countries, especially China, fever, cough etc. (Kariņš: Dienesti ir gatavi iespējamai jaunā koronavīrusa izplatībai Latvijā, 2020). If present, the emergency medical service brigade would suit up in special gear and visit the patient in their homes, collect nasopharyngeal swabs and send them to testing for the presence of COVID-19. If patients were in bad condition, they were transfered to the Latvian Centre of Infectology. At first testing could not be performed in Latvia and the samples were sent abroad. However, on 31 January 2020, Latvia had received all the necessary equipment and was able to start testing for COVID-19 (Feldmanis, 2020).

Starting from 13 March 2020, testing was also made possible for persons who experienced symptoms of COVID-19 (fever, cough, shortness of breath). Testing was allowed for people coming in their personal cars. Travel on foot was not allowed. Test swabs were taken in special testing points set up near the Latvian Infectology Centre and analysed at the Centre (Uz “Covid-19" analīžu nodošanu jāpiesakās; drīkst braukt tikai ar privāto auto, 2020).

On 14 March 2020 the first testing point representing the private sector was opened — E. Gulbja laboratory in Rīga, which performed COVID-19 testing on site and conducted the analyses. Soon many other points of testing in Rīga performed by the private sector were opened, including one at the Rīga International Airport. The first testing points outside Rīga were opened on 23 March 2020. They were set up in Valmiera, Jēkabpils, Daugavpils, Liepāja, Kuldīga, and Ventspils. They were accessible by car and on foot (Nodrošinās papildus iespējas valsts apmaksātu analīžu veikšanai “Covid-19" noteikšanai, 2020).

OBTAINING DATA FOR ANALYSIS

The main topic of this article is centred around the analysis and comparison of the acquired data about performed COVID-19 testing in Latvia during the first wave of the COVID-19 pandemic in 2020. One of the main reasons why Latvia was the focus of this study is the data provided by the COVID-19 Data Repository by Centre for Systems Science and Engineering (CSSE) at John Hopkins University, which showed that by 1 June 2020, Latvia had the 3rd lowest mortality rate in Europe due to COVID-19 — 1.3 per 100,000 of the population. The mortality rate in Estonia differed by a noticeable margin with 5.2 deaths per 100,000 of the population, which was about the median in Europe. The other Baltic neighbour, Lithuania, had 2.5 deaths per 100,000 of the population, which placed them 10th in Europe, ranking in between Latvia and Estonia Moreover, the interest even increased when in June 2020 the mass media reported Latvia as ahead of the curve, with low positive case numbers in the first wave of the pandemic. As stated in the media, the success was based on a number of factors, which included digital solutions that were developed in partnership with the private sector (Latvia promotes itself as “Ahead of the curve” on COVID-19 response, 2020).

The research was conducted in three steps. Firstly, a systematic review was conducted of all available information in publications about COVID-19, its rise in the world, spread, and how the countries adapted. It included scientific publications from known online repositories like PubMed, ResearchGate, and others and countries national news coverage archives. Secondly, there was data acquisition, and analysis. This paper is based on gathered data from the Latvian National Health Service of Latvia regarding all COVID-19 testing performed in 2020 in both countries using the PCR detection method. Only naso-pharyngeal swab testing data was included. Thirdly, based on the acquired data, conclusions were drawn and discussed in the discussion part.

The testing data were examined by testing date, starting from 26 February 2020. Numbers of performed tests were divided further into total tests performed per day by the public sector and private sector, and positive test result by the public and private sector.

The data were further analysed and compared using statistical methods provided by IBM SPSSv27. The statistical analysis of the acquired data of both Latvia and Estonia was performed. Comparisons were made using the independent samples Mann Whitney U test.

ANALYSIS OF THE OBTAINED DATA ON THE HEALTH SYSTEM DURING THE CRISIS

In Latvia, the gathered data showed that the first two positive cases were confirmed on 2 March 2020. All of the tests were collected by emergency medical services and sent, at first, abroad to be tested, but later when the necessary technology became available, in Latvia by the private sector (Fig. 1).

Up until 11 March 2020 (when the next positive case was confirmed), there were 194 COVID-19 PCR tests performed. Up until that point, all of the test analyses were performed by E. Gulbja laboratorija, which represents the private sector. After that, positive cases turned up almost every day with some exceptions.

The first double-digit numbers were reached on 23 March 2020 with ten cases. By 15 March 2020, there were 426 COVID-19 PCR tests performed, of which 426 (100%) were performed by the private sector and 0 (0%) of the tests were performed by the public sector.

The main laboratory analysis and confirmation of COVID-19 presence in patient samples was done by E. Gulbja laboratorija. Starting from 13 March 2020, the private Centrālā Laboratorija also started analysing samples for presence of COVID-19.

The first three-digit numbers of positive cases occurred only in the later part of the year, on 8 October 2020 with 170 positive cases. By that time 125,593 tests were done by E. Gulbja laboratorija, 119,122 by Centrālā Laboratorija, and

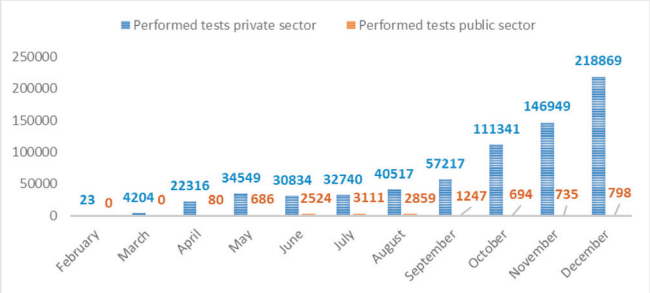

Fig. 1. COVID-19 performed tests by each sector in Latvia in 2020.

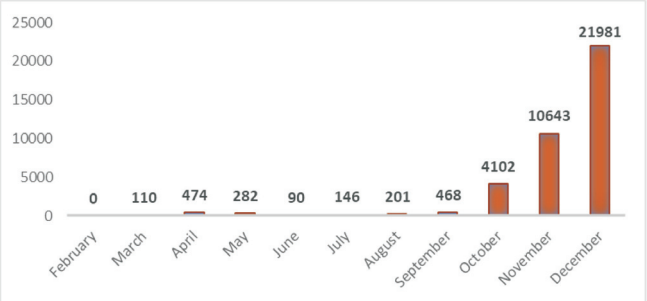

Fig. 2. COVID-19 positive cases in Latvia in 2020.

19 by NMS Laboratorija. There were 257,264 tests performed, of which 12,530 (4.8%) were performed by the public sector and 244,734 (95.2%) by the private sector (Fig. 2).

HEALTH SYSTEM CHALLENGES IN TIMES OF CRISIS

Latvia is a small country, and it does not have sufficient laboratory capacity in the public sector to handle high numbers of COVID-19 testing every year. For that reason, Latvia resorted to testing of COVID-19 to be conducted mostly by the private sector. This continued for the whole duration of the pandemic. The public sector conducted about ~1–2% of all testing during the pandemic.

Every month about ~97–99% of all testing was performed by the private sector, and the remainder performed by the public sector. In Latvia, private sector laboratories have a widespread network of affiliates across the whole country, which allows for great logistic solutions, fast large quantity test processing and delivering precise results of large quantities of tests quickly so that positive cases can be isolated rapidly.

Testing patterns showed that Latvia seemed to rely more on the private sector to organise the testing process with all the resources available to them and it seemed to pay off at first. It must be noted that other aspects may have contributed to the results, so more in depth research is necessary. Estonia also conducted the testing process similarly, but the public sector was far more involved than in Latvia, which might have caused the testing process to be slower at first and

might have allowed the disease to spread more inside the country.

As stated in the results, in the beginning of the pandemic, each country took a different approach. Latvia implemented testing handled by the private sector immediately, but Estonia started with testing handled by the public sector, gradually giving it to the private sector.

Firstly, higher numbers of confirmed cases in March 2020 were in Latvia. In April and May, higher numbers of confirmed cases were seen in Estonia. The number of performed tests in both sectors together in these three months was higher in Estonia, suggesting that testing patterns might have not played a vital role in the very beginning of the pandemic, but increased as the virus spread.

Nevertheless, Latvia declared itself as "Ahead of the curve" with multiple measures that were implemented early to restrict the spread of the virus. Latvia had the lowest number of infected citizens per capita in Europe and one of the lowest mortality rates (Wei *et al*., 2021; Zrelovs *et al*., 2021). Rapidly rising COVID-19 case numbers in March in Latvia prompted a quick response from the government with quick implementation of measures, one of which was implementation of large quantities of testing conducted by the private sector. Usually, new innovations in the public sector take time to be successfully implemented. Thus, this could have been one of the key elements of these successful findings. In Estonia, the death rate per 100,000 citizens was almost three times higher than in Latvia and almost two times than in Lithuania. Lack of quick wide-spread testing implementation could be one of the key factors to catch out all patients who are positive for COVID-19, but with no or little symptoms and could be a potential threat to spread the virus uncontrollably among the risk groups.

The main limitation for this study was that Lithuania had recorded only the overall COVID-19 testing results, not separating the data in private and public sectors. Also, none of the governing institutions, including Statistics Lithuania (NIS), Ministry of Health of the Republic of Lithuania and National Public Health Surveillance Laboratory of Lithuania had recorded any information about what part of the overall testing was performed by each sector.

Therefore, this lack of available data prevented a study including all three of the Baltic states.

CONCLUSIONS

Public–private partnerships are an essential component in the management of crises like the COVID-19 pandemic. Both Latvian and Estonian governments were willing to implement these partnerships to manage the pandemic in their own countries.

The role of PPP in small countries like Latvia and Estonia can play a crucial role in the development of the pandemic within each country. A smaller population allows testing mechanisms to be handled thoroughly by the private sector, allowing the government and the public sector to concentrate on other more important tasks in crisis management. With that considered, PPP collaboration can decrease the spread of the disease by quickly catching and isolating all of the positive cases, not allowing them to infect others including people from risk groups, which can lower overall mortality in the country.

To broaden the spectrum, in order to assess each country side by side, a proposition to develop a database of the information of all the testing information performed in the Baltic countries should be considered. Such a database could teach us how to react in similar future situations in the near or distant future and analyse the possible causes and mistakes made in the past.

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COVID-19 TESTĒŠANA LATVIJĀ: PUBLISKO–PRIVĀTO PARTNERĪBU ANALĪZE

Publiskā–privātā partnerība ir sadarbība starp diviem lieliem valsts pārvaldes sektoriem. Tā tiek saukta arī par *win-win* jeb savstarpēji izdevīgu partnerību, jo abas puses sadarbojoties spēj sekmīgi sasniegt nospraustos mērķus. 2019. gada decembrī Ķīnā tika ziņots par pirmajiem saslimšanas gadījumiem ar Covid-19. Vīruss ātri izplatījās Ķīnā, sasniedzot Latviju 2020. gada martā. Šajā pētījumā tika analizēta publiskās–privātās partnerības loma, organizējot efektīvu Covid-19 testēšanu Latvijā. Līdz 2020. gada 1. jūnijam Latvijā bija trešā zemākā mirstība Eiropā, kuras cēlonis bija Covid-19. Pētījums iekļauj sistēmisko pārskatu, datu ieguvi, datu analīzi un secinājumu izdarīšanu, balstoties uz iegūtajiem datiem, kā arī diskusijas sadaļu. Dažādos Covid-19 pandēmijas "pirmā viļņa" posmos Latvijā privātais sektors pieņēma un analizēja vairāk nekā 95% no visiem kopā veiktajiem testiem. Balstoties uz iegūtajiem rezultātiem, varētu būt vairāki faktori, kas Latviju padarīja par veiksmes stāstu Covid-19 pandēmijas "pirmā viļņa laikā". Viens no tiem varētu būt paļaušanās uz privāto sektoru testēšanas pārvaldīšanai un organizēšanai, kas sākotnēji deva pozitīvus rezultātus.