

The Impact of the COVID-19 Pandemic on the Financial and Asset Situation of Polish Infectious Diseases Hospitals

WOJCIECH NARUĆ
Institute of Economics and Finance
University of Szczecin
Szczecin, A. Mickiewicza 64
POLAND
ORCID ID 0000-0002-6932-5933

Abstract: - The aim of the article is to assess the impact of the COVID-19 pandemic on the financial and asset situation of infectious diseases hospitals in Poland after the first year of the pandemic, which began in late 2019. The first significant financial impacts of the pandemic were recorded in the 2020 financial statements. Fulfilling the purpose of the article, the 2020 data were referenced to 2018-2019, i.e., before the spread of the COVID-19 pandemic. The research was conducted on the basis of financial statements obtained from 79 infectious diseases hospitals. The results of the research, apart from its scientific aspect, constitute a rich knowledge base and directions for action for the managers, supervisors and owners of infectious diseases hospitals in Poland, as well as for the state bodies responsible for the proper functioning of the infectious diseases treatment system, especially in the era of the pandemic, which, according to specialists, the world will be facing for several more years. The article addresses a timely topic of interest to a wide range of stakeholders. It is one of the first surveys to attempt to analyze the impact of coronavirus on the financial and asset situation of infectious diseases hospitals in Poland after the first pandemic period, especially since not all financial statements for 2020 of medical entities have yet been approved by ownership bodies. The research sample covered 89.8% of the general population.

Key-Words: - Finance company, financial liquidity, hospital, pandemic, virus, COVID-19 pandemic

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1 Introduction

For less than two years, the world has been facing a pandemic of the infectious disease COVID-19 caused by the coronavirus SARS-CoV-2. The coronavirus of acute respiratory syndrome leads to severe pneumonia in humans, other serious complications and often death. The COVID-19 pandemic has a negative impact not only on the economies of individual countries. The impact of the pandemic can be seen in many areas of the average person's life, such as household finances, domestic violence, psycho-physical problems, isolation resulting from the need to study and work remotely, and restrictions on access to sporting, cultural and religious events. The pandemic also has a significant impact on reduced access to health care services, as well as on the financial and asset situation of hospitals.

The aim of the article is to present the results of the research and evaluation in terms of the impact of the COVID-19 pandemic on the formation of the financial and asset situation of infectious diseases hospitals in Poland after the first year of the

pandemic. The research, covering the years 2018-2020, was carried out on the basis of financial statements obtained from 79 health care entities from the general population group of 88 infectious diseases hospitals involved in the prevention, prevention and suppression of COVID-19 in Poland. The hypothesis was adopted that the financial and asset situation of infectious diseases hospitals deteriorated due to a reduction in the scope of medical services forced by the spread of the COVID-19 pandemic.

The article presents the effects of the pandemic in Poland and worldwide, as well as discusses the basic issues related to the functioning of Polish hospitals during the pandemic. Next, the methodology of the study is presented as well as the results and conclusions of the conducted research concerning the financial and asset situation of hospitals which were obliged to provide health care related to the prevention, counteraction and suppression of COVID-19, and thus to significantly reduce the medical services provided so far.

2 The Effects of the Pandemic in Poland and Worldwide

Pandemic infectious disease COVID-19 (coronavirus disease 2019) caused by SARS-CoV-2 coronavirus (coronavirus of acute respiratory syndrome 2) began in late 2019 in Wuhan city, central China [1]. The first case of the new disease in Poland was reported in March 2020. The emergence of outbreaks with hundreds of sick people outside China, including Europe, caused significant declines in stock markets around the world on 24 February 2020, including a record high over several years [2]. The Warsaw Stock Exchange also experienced its steepest decline in four years [3].

As of 28 August 2021, 214,468,601 coronavirus cases have been reported worldwide [4], of which 28.5% in Europe. Poland with registered 2,887,739 cases of coronavirus in this respect ranks very high both in the world - 16th place out of 175 countries (1.3% of infections) [5] and in Europe - 8th place out of 46 countries (4.7% of infections) [6].

Presenting the number of coronavirus cases of a particular country only against the number of infections of other economies in the world and assessing the country in this respect entails a significant error. This is by not taking into account the proportion of infections in relation to the size of the population of that country. Therefore, it will be obvious that the most populous countries will be the "infamous leaders".

To eliminate this error, the number of coronavirus cases in a country should be presented in relation to the size of the population of that country and only then should it be compared with other economies of the world. By comparing the proportion of confirmed coronavirus cases in the total population of a country, the order of countries in the ranking changes.

The United States, with 38,074,886 coronavirus cases, ranks first in the world with 17.8% of infections, but if we consider the proportion of coronavirus cases in the total population which is 11.6%, it ranks the United States only 13th of all countries in the world. An even more illustrative example is Russia, which with 6,844,049 coronavirus cases ranks first in Europe with 11.2% of infections, but if we consider the share of coronavirus cases in the total population of 4.7%, it ranks only 42nd among 46 European countries. Only Germany, Iceland, Norway and Finland have a lower rate. In the approach considering the total Polish population, Poland ranks lower. With 7.6% of infections calculated against the country's

population, Poland ranks 44th in the world, not 16th as in the previous classification. In Europe it is 25th, not 8th.

As of 28 August 2021, there were 4,470,969 deaths resulting from the coronavirus pandemic, of which 1,221,156 were reported in Europe (27.3% global share) and 75,335 in Poland (17th in the world with 1.7% share and 7th in Europe with 6.2% share) [7]. The highest number of deaths worldwide was recorded in the United States (630,816; 14.1% of deaths worldwide). The highest proportion of global deaths in a country's population was reported in Peru (0.61% of deaths). The highest number of European fatalities was reported in Russia (180,041; 14.7% European share). Hungary had the highest proportion of European fatalities (0.31% of deaths) [8].

The COVID-19 pandemic has a negative impact not only on the economies of individual countries. The impact of the pandemic can be seen in many areas of the average person's life, such as worsening household finances, increased domestic violence, psycho-physical problems resulting from enforced isolation from others, the need to work and study remotely affecting the quality of work and learning, reduced access to sporting, cultural and religious events, reduced cross-border passenger traffic reducing tourist services, or reduced access to health services and services for people with disabilities. The impact of the pandemic was particularly severe on disadvantaged families, causing interruptions in children's education, eating disorders, childcare problems and the resulting economic costs for families who could not work [9].

3 The Operation of Hospitals in Poland during A Pandemic

The rapidly developing threat caused by the SARS-CoV-2 virus has forced the state administrative bodies to take practical measures. The Law of 2 March 2020 on special solutions related to the prevention, counteraction and suppression of COVID-19, other infectious diseases and crisis situations caused by them was quickly adopted [10]. The Act defined the rules and procedures for preventing and combating SARS-CoV-2 infection and the spread of a contagious disease in humans caused by this virus, the tasks of public administration bodies in preventing and fighting infection or a contagious disease, the rights and obligations, of healthcare providers, as well as healthcare recipients and other persons residing on the territory of the Republic of Poland in preventing

and combating infection or a contagious disease, and the terms of covering the costs of the tasks. Pursuant to the provisions of the Act, healthcare services performed in connection with counteracting COVID-19 are to be provided by healthcare entities or doctors and dentists entered on a list drawn up by the locally competent director of the provincial branch of the National Health Fund (NFZ) in agreement with the competent province governor. These services are to be financed by the NFZ with funds from the COVID-19 Prevention Fund and the state budget from a part at the disposal of the Minister of Health.

Based on the Act of 2 March 2020, the President of the NFZ issued an order on 8 March 2020 on the reporting rules and conditions for settlement of healthcare services related to the prevention, counteraction and suppression of COVID-19 [11]. A catalogue of billing products related to the services in question was made available in an annex to the Order, including a flat fee for standby services, a fee for a stay related to the prevention and counteracting of SARS-CoV-2 infection, a fee for hospitalization related to COVID-19 treatment, and a flat fee for standby for sanitary transport and for transport. The flat fees introduced – particularly during the first period of the pandemic – significantly improved the liquidity of hospitals involved in the prevention, counteraction and suppression of COVID-19.

The Act of 2 March 2020 and its subsequent amendments created a legal basis for the temporary reorganization of the healthcare system. The changes were implemented on the basis of decrees of the Council of Ministers, regulations of the Minister of Health, as well as announcements of the Minister of Health and the NFZ.

According to the information presented on 16 June 2020 at the meeting of the Senate Health Committee by the Secretary of State of the Ministry of Health Waldemar Kraska, the first patient with COVID-19 appeared in Poland on 4 March 2020. A few days later, the Minister of Health, Łukasz Szumowski, decided on the establishment of the so-called single-name hospitals to limit the spread of coronavirus [12]. This was a period when in Western European countries, several thousand people were infected with the coronavirus every day, and over one thousand patients died within 24 hours. One-name hospitals were supposed to protect Polish patients infected with the coronavirus [13]. The Minister of Health instructed the province governors to prepare and select such hospitals. A total of 21 units have been designated by the provincial governors as single-name hospitals.

These hospitals were obliged to admit patients infected with the virus, treat patients with COVID-19, as well as other conditions in patients suspected of being infected, infected with the virus and patients with COVID-19.

On 12 March 2020 – on the basis of the Act of 2 March 2020 [14] – the provincial governors obliged hospitals other than single-named hospitals to suspend scheduled admissions and surgical procedures, except for patients with an immediate threat to life, prohibit patient visits and suspend visits by medical and sales representatives to hospitals and hospital outpatient clinics [15]. Communications from the National Health Fund have also led to a reduction in hospital activities. On 15 March 2020, the NFZ recommended hospitals to reduce to the minimum necessary or temporarily suspend the provision of services performed on a scheduled basis or in accordance with an approved treatment plan. This primarily concerned planned hospital stays for diagnostics, therapeutic and surgical procedures as well as outpatient specialist care services [16].

Besides single-named hospitals, COVID-19-infected patients were also treated in infectious diseases hospitals or hospitals with infectious and observation-infectious diseases wards, which had 2,995 beds dedicated to coronavirus patients by mid-2020. After a three-month period of operation, most of the single-named hospitals were restored to their previous tasks in accordance with their statutory operations. According to information presented on the website of the Republic of Poland Service, as of 17 August 2021, there are 88 infectious disease hospitals in Poland admitting patients infected with coronavirus [17]. Many of them operate under a hybrid model.

The COVID-19 pandemic has intensified the problems that Polish hospitals have been facing for many years. The situation in hospitals during the pandemic became apparent in the form of a lack of free hospital beds for patients with covid and those suffering from other diseases, a lack of medical equipment (e.g. respirators), an insufficient number of intensive care units and staff capable of treating the most seriously ill patients, a shortage of personal protective equipment, i.e. overalls or masks, and staff shortages.

The consequence of the unpreparedness of health services in the fight against a pandemic is also the problems of patients suffering from other diseases or ailments in accessing adequate health services. Hospitals have problems providing healthcare to people in an emergency state, particularly in the case of cardiac, hypertension and

dental problems, as well as people with chronic diseases and oncological ailments and those requiring immediate rehabilitation, for example after a car accident. The organizational chaos in the operation of public health services is exacerbated by the cancellation of scheduled appointments and surgeries. Failure to prepare the health service to deal with a pandemic may not only pose a real threat to human life and health but may also result in a deterioration of financial liquidity and an increase in hospitals' debts.

The pandemic has changed the functioning, priorities and strategies of hospitals. In the first phase of the epidemic, hospitals in order to keep medical staff and motivate them to work often paid salary top-ups from their own resources, which significantly burdened their budgets and contributed to increased liabilities. In addition, throughout 2020, hospitals incurred increased overtime costs for medical and non-medical staff due to high sickness absence related to quarantine and isolation, as well as costs related to the state of the epidemic.

One of the measures which were supposed to help hospitals maintain short-term financial liquidity was the introduction of a mechanism consisting in the payment to a medical institution of a part of the funds for services provided outside the lump sum (financed separately) contracted with the NFZ for 2020 in the amount of 1/12 of the contract, despite the non-performance or partial performance by it of services under that contract. The right to the so-called 1/12 of the contract was given to hospitals which, due to the COVID-19 outbreak, could not fulfil their contract with the NFZ. Hospitals which made use of this mechanism were obliged to settle the services for 2020 by the end of June 2021 [18]. Based on the provisions of the Regulation of the Minister of Health of 4 September 2020 [19] the settlement period was extended until the end of December 2021 [20]. Due to the risk of reimbursement of unperformed services in 2020 outside the lump sum, hospitals have set up adequate provisions for liabilities during 2020.

Complementing the considerations on the functioning of hospitals in Poland during the pandemic, it is difficult not to draw attention to one very important aspect. The pandemic has significantly affected the financial and asset situation of hospitals involved in preventing, counteracting and fighting COVID-19. Hospitals have obtained non-refundable financial assistance for this purpose from many sources, which they have not received on such a scale before. The aid took various forms, such as:

- grants from the European Social Fund and the Provincial Labour Office,
- grants from Provincial Governors and Marshals,
- grants from EU funds,
- reimbursement of the costs related to COVID-10 by the NFZ,
- grants to cover expenditure to fight the pandemic from the state budget and from local government units,
- cancellation of debts or their parts by hospital owners,
- targeted donations to fight the pandemic, including personal protective equipment donated by businesses and individuals.

Through various forms of non-refundable aid, hospitals acquired laboratory equipment, diagnostic equipment, medical equipment that was intended for the treatment and diagnosis of patients infected with the SARS-CoV-2 virus. Thanks to grants and donations, hospitals became prepared in terms of sanitary requirements to handle and treat COVID-19 patients and were able to provide their own staff with personal protective equipment.

Donors have been encouraged to provide assistance by the changes in the tax legislation that have been introduced under the Act of 31 March 2020 amending the Act on Special Solutions for the Prevention, Counteracting and Fighting of COVID-19, Other Communicable Diseases and Crisis Situations Caused by Them and some other acts [21]. Under the provisions of this Act, taxpayers were able to deduct donations made between 01 January 2020 and 30 September 2020 to counter COVID-19 to the entities designated in the Act on preferential terms than the previous legislation allowed. For a donation made until 30 April 2020, an amount equivalent to 200% of the value of the donation was deductible. Donations made in May 2020 enabled an amount equivalent to 150% of the value of the donation to be deducted. On the other hand, donations made between 01 June and 30 September 2020 allowed a deduction of an amount equivalent to the value of the donation.

4 Methodology and Research Sample

The analysis of selected economic values was performed using statistical methods aimed at summarizing the obtained data set and drawing basic conclusions about the general population. The survey covered all infectious diseases hospitals in Poland dealing with prevention, counteraction and suppression of COVID-19 [22]. The general population group consisted of 88 hospitals. Financial statements, which were the source of

research material for the general population, were obtained from the National Court Register (KRS) in the on-line version [23] or directly from medical entities.

As of 1 October 2018, every financial statement in Poland must be drawn up in electronic form and bear a qualified electronic signature or a signature confirmed by a trusted profile. In addition, financial statements of entities entered in the Register of Entrepreneurs of the National Court Register must be compiled in the logical structure and format made available in the Public Information Bulletin on the website of the Ministry of Finance. When an entity is registered with the National Court Register, it generally files with the competent court register, inter alia, the annual financial statements and the audit report [24]. A special situation applies to Autonomous Public Health Care Institutions (SPZOZ) conducting economic activity, even if they are not entered in the register of entrepreneurs. They must also file their financial documents in electronic form.

Part of the general population, despite the regulations in force in Poland, does not submit their financial statements to the KRS Register of Entrepreneurs in the online version. In the case of such entities, emails were sent asking for unpublished financial statements. Four hospitals did not agree to submit financial statements for 2020 (one entity from each of Lubelskie, Małopolskie, Zachodniopomorskie and Kujawsko-Pomorskie Provinces). Five hospitals did not respond to the message received asking them to send the financial report for 2020 (two from the Mazowieckie Province and one from each of the Podlaskie, Wielkopolskie and Małopolskie Provinces). The messages were sent with a copy to the ownership bodies of the hospitals. This may mean that there is a lack of control by owners and the relevant state authorities over compliance with and enforcement of the law on the drawing up and publication of financial statements. This is an issue that could be covered by separate academic research.

As a result of the survey conducted on a general population group of 88 hospitals, it was possible to obtain financial statements for 2018-2020 from 79 entities. These entities will be referred to as the "research sample" in the further part of this article.

In order to ensure that the characteristics of the general population are adequately reflected, a minimum sample size has been established. Its value is influenced by the size of the general population, the assumed confidence level of the estimate determined by taking a certain value of the confidence coefficient, as well as the assumed

absolute precision of the estimate. To determine the minimum size of the research sample n , under the assumptions that:

- a size of the selected general population is $N=88$,
- the value of a standardized random variable with normal distribution $N(0.1)$ takes the level $\mu_\alpha=1.96$ [25],
- the accuracy of the estimate (maximum error) was set at $d=3.55\%$,

the following formula was used [26]:

$$n_{\min} = \frac{\mu_\alpha^2 \times N}{\mu_\alpha^2 + 4 \times (N-1) \times d^2} \quad (1)$$

The calculation based on the formula presented above resulted in a minimum sample size of $n_{\min}=79.00$. This means that under the assumptions made, the survey should be carried out on the basis of the financial statements of at least 79 business entities. From the perspective of assessing the minimum sample number, the research sample size of $n=79$ allows the results of the study to be used to make inferences with a translation to the entire general population ($N=88$). The analyzed research sample represented 89.8% of the general population.

When analyzing the results of hospitals, it should be borne in mind that they are not profit-oriented entities. The key objective of entities providing services fully or more than 98 per cent financed by NZF is to meet the needs of the country's inhabitants in the area of health care in a sustainable and continuous manner, while ensuring sustainable development in three basic areas: medical, economic and social. This guarantees a constant improvement in the quality of health and life of residents. Infectious diseases hospitals provide health services financed from public funds to insured persons and others entitled to medical services on the basis of separate regulations free of charge, for partial payment or for full payment.

Total assets in the first year of the coronavirus pandemic (in 2020) of the research sample amounted to PLN 14.1 billion (an average of PLN 178.8 million per unit) and increased by PLN 2.1 billion, or 17.8%, in relation to the previous year of non-pandemic hospital operation. The increase in assets was driven by improved net financial results in 2020, cancellations of hospitals' liabilities by their owners and significant proceeds from donations and grants allocated in connection with the coronavirus pandemic. These funds were used to purchase materials and make in-kind investments.

Total net revenues from sales of products in the first year of the coronavirus pandemic research sample amounted to PLN 15.6 billion (an average of PLN 197.1 million per unit) and increased by PLN

2.1 billion, or 15.2%, in relation to the previous year of operation of hospitals in non-pandemic conditions. In the last three years, these units generated revenues of PLN 40.6 billion.

The increased revenues translated into an improvement in the results generated from the core operating activities, i.e. EBIT and EBITDA in 2020 compared to the previous period. The total EBIT of the research sample in 2020 was negative at PLN -1.0 billion and was higher than the previous period by PLN 83.7 million or 7.5%. Over the last three years, these units have incurred an EBIT loss of PLN 3.1 billion. The total EBITDA of the research sample in 2020 was also negative at PLN -191.5 million and was higher than the previous period by PLN 196.1 million or 50.6%. Over the last three years, these units have incurred an EBITDA loss of PLN 880.1 million.

After considering other operating activities and financing activities, the research sample recorded a net profit of PLN 30.1 million in the first year of the pandemic. This is a significant improvement in the net profit of the infectious hospitals in relation to the two previous accounting periods in which these units operated in a non-pandemic environment. For 2019, the increase was PLN 446.4 million and for 2018 PLN 485.2 million. The improvement in net financial results is primarily due to high other operating revenue, which resulted from the accounting for donations and grants allocated to COVID-19 related material purchases, as well as the settlement of donations and grants intended for COVID-19 related investment projects in the form of depreciation.

When analyzing the structure of the research sample in terms of the results obtained on the basic operating activity, it can be noted that it varies. However, a positive change is noticeable. 17.7% of the research sample achieved a positive EBIT in 2020, which only 8.9% of hospitals managed to achieve in the previous period. In the research sample group with a negative EBIT in 2020 27.8% of the units generated positive EBITDA thanks to the material investments made in previous years, which represents a slight improvement compared to 2019. A significant part of the research sample (34.2%) made a loss at all levels of activity in 2020, which, despite a significant improvement compared to 2019 (then 69.6%), confirms the very poor financial condition of infectious disease hospitals affecting the diminishing equity, which is still negative for 44.3%. The above is also confirmed by the negative working capital of the research sample, which for 2020 amounted to PLN -398.6 million (in

2019 the level of working capital was at a much lower level and amounted to PLN 1.25 billion).

Despite the apparent improvement in the financial results of the research sample, debt has been rising steadily over the last 3 years. The total debt of the analyzed hospitals in 2020 amounted to less than PLN 6 billion (on average PLN 75.6 million per unit) and was higher by PLN 516.7 million in relation to 2019 and by PLN 1.6 billion in relation to 2018. This situation was influenced by both the increase in long-term liabilities (increase by PLN 129.1 million and PLN 401.9 million, respectively) and short-term liabilities (increase by PLN 387.6 million and PLN 1.2 billion, respectively).

5 Asset's Situation of Infectious Diseases Hospitals

The analysis of the assets situation of the research sample was carried out on the basis of basic economic figures presented in the financial statements of the infectious disease hospitals for the years 2018, 2019 and 2020. In the research, the values of assets and equity were taken into account and the financial ratios of return on total assets (ROA) and return on equity (ROE) were used. Fulfilling the aim of the article, the analysis of the assets situation of infectious disease hospitals was carried out with a view to assessing the changes in individual financial figures that occurred in the first year of the pandemic in relation to 2019.

The research sample, due to the specificity of the activities, problems with correct calculation of medical services by the National Health Fund and losses incurred at the EBITDA level - with few exceptions - has low equity. In many cases (46.4% on average), these entities have shown negative equity in the last three years. A positive message is the noticeable doubling of median equity at the turn of the period just before the pandemic and the first year of the pandemic.

The analysis of the distribution of basic statistics observations in terms of the equity formation of the research sample in 2020 shows that in 50% of cases its level is in the range from -24.1 million to 36.2 million PLN, with a median of 4.9 million PLN (Fig. 1). Compared to 2019, in the first pandemic period, an increase in the value of the top quartile and a decrease in the value of the bottom quartile is noticeable, causing the spread of equity values for 50% of the observed hospitals to be larger in 2020 than in the previous period.

The level of equity of the units and the financial results obtained translated into a low return on equity (ROE), with an arithmetic mean of 7.06% in the first year of the pandemic and a median of 5.85% in 2020.

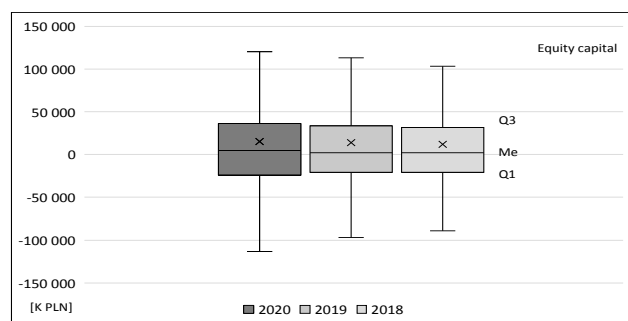


Fig.: 1. Basic descriptive statistics for the equity of the study sample (n=79)

Source: Own study.

The majority of the research sample (62.0%) has a positive ROE, which ultimately contributed to its high averaged level. It should be noted that as a result of the bailouts and recapitalization of hospitals, as well as the cancellation of part of their debts, the average ROE improved compared to the pre-pandemic year, when it was at an average level of -16.47%. The number of entities making a negative ROE also decreased from 40.5% in 2019 to 38.0% in 2020 (Table 1).

Table 1. Return on equity and return on assets of the research sample (n=79)

Description	Share of the research sample		
	2020	2019	2018
ROE > 0%	62.0%	59.5%	55.7%
ROE < 0%	38.0%	40.5%	44.3%
ROA > 0%	45.6%	34.2%	29.1%
ROA < 0%	54.4%	65.8%	70.9%

Source: Own study.

The analysis of the observation distribution of basic statistics on total assets formation of the research sample in 2020 shows that in 50% of cases its level is in the range of PLN 69.8 million to PLN 186.9 million with the median at the level of PLN 120.3 million. This distribution over the last three years has been shifting in the desired direction indicating an increase in the value of assets of the surveyed hospitals.

The average return on total assets (ROA) shows an increasing trend. This means that not only are these entities more likely to incur a lower loss or earn a higher profit, but they are also increasing the assets involved in their operations. The average returns on assets of the research sample remained

negative throughout the study period with a positive trend towards 2019 and 2020. In the pre-pandemic year, ROA averaged -3.44% per entity, while in the first year of the pandemic it was close to 0%, at -0.55%. In 2020, 45.6% of the research sample achieved a positive ROA. It should be noted that the number of entities achieving a negative ROA decreased from 65.8% in 2019 to 54.4% in 2020. The reasons for the research sample obtaining such low ROA ratios are the identical as those stated for ROE.

6 Financial Situation of Infectious Diseases Hospitals

The analysis of the financial situation of the research sample was carried out on the basis of basic economic figures presented in the financial statements of infectious diseases hospitals for the years 2018, 2019 and 2020. In the research the figures of: net sales revenues, EBIT and EBITDA results, net financial results, total liabilities (including long-term liabilities) were taken into account. The interpretation of the obtained results was also carried out using the figures of constant and working capital and financial indicators regarding return on sales (ROS) and EBIT margin and EBITDA margin. In fulfilling the purpose of the article, the analysis of the assets situation of infectious diseases hospitals was carried out in order to assess the changes in individual financial figures that occurred in the first year of the pandemic in relation to 2019.

In connection with the pandemic, in the analyzed hospitals there were orderly limitations of the existing medical activities to the necessary minimum or temporary suspension of medical services performed as planned or in accordance with the adopted treatment plan, such as diagnostics and diagnostic, therapeutic and surgical procedures or services in the field of outpatient specialist care. These hospitals were to provide health care related to the prevention, counteraction and eradication of COVID-19 in place of their previous services. During the first period of the pandemic, hospital managers feared that these changes would significantly reduce revenues and increase operating costs, thereby exacerbating the already disastrous financial situation of the medical units and increasing debt.

In fact, the change in the scope of medical services provided did not substantially affect the trend of annual growth in revenues from sales of core business products, which was maintained in the

first year of the pandemic. All entities – except one hospital – recorded an increase in revenues from product sales in 2020 compared to 2019. This sole case resulted in the minimum value of revenues dropping to PLN 11.9 million in 2020.

Despite recording a significant increase in revenues from product sales (on average by PLN 25.9 million per unit), the return on sales (ROS) ratio of the research sample – primarily due to improved net financial results – improved significantly in 2020 compared to the previous period (Table 2). In the first year of the pandemic, 65.8% of the research sample achieved an ROS ratio above 0%, which is more than double that of the previous year. The ROS ratio for 50% of the surveyed hospitals in 2020 was in the range of -3.3% to 3.4%. In 2019, the range was -8.2% to 0.1%. The average ROS ratio per entity in 2020 became positive for the first time in several years and was 0.8%.

Table 2. Return on sales of the research sample (n=79)

Description	Share of the research sample		
	2020	2019	2018
Maximum value	20.1%	15.3%	9.2%
Upper quartile (Q3)	-1.3%	-3.5%	-4.6%
Median (Me)	0.6%	-3.3%	-2.7%
Lower quartile (Q1)	-9.3%	-10.8%	-10.8%
Minimum value	-23.7%	-26.6%	-21.2%
Arithmetic mean (\bar{x})	0.8%	-4.4%	-42.0%
ROS > 0	65.8%	30.4%	27.8%
ROS < 0	34.2%	69.6%	72.2%

Source: Own study.

Analyzing the EBIT result for the last three years, significant variation can be observed. The range is from PLN 77.7 million in 2018 to PLN 167.9 million in 2020 and increases year on year. This is also confirmed by the standard deviation, which was PLN 24.2 million in the first year of the pandemic. In 2020, the entire research sample incurred a loss on core operations of PLN 1.03 billion. This was a better result than in the last year before the pandemic by PLN 83.7 million, however, worse than that obtained in 2018 by PLN 91.7 million.

Table 3. EBIT margin of the research sample (n=79)

Description	Share of the research sample		
	2020	2019	2018
Maximum value	19.0%	2.0%	2.2%
Upper quartile (Q3)	-1.3%	-3.5%	-4.6%
Median (Me)	-5.3%	-6.9%	-7.2%
Lower quartile (Q1)	-9.3%	-10.8%	-10.8%
Minimum value	-25.4%	-33.6%	-31.6%
Arithmetic mean (\bar{x})	-5.4%	-7.7%	-8.0%

EBIT margin > 0%	17.7%	8.9%	3.8%
EBIT margin < 0%	82.3%	91.1%	96.2%
Average level of EBIT margin			
EBIT margin > 0%	5.96%	1.19%	1.64%
EBIT margin < 0%	-7.82%	-8.56%	-8.43%

Source: Own study.

Analysis of the data presented in Table 3 shows that in 2020 82.3% of the research sample had a negative EBIT result and thus an EBIT margin. Compared to the previous year, the percentage of hospitals characterized by a negative margin has decreased. It should be noted that in both 2019 and 2018 this percentage was above 90%. In the research sample group with an EBIT margin <0%, the average margin level in 2020 was -7.82% and was slightly higher than in 2019, i.e. by 0.74 p.p. Conversely, in the research sample group with an EBIT margin >0%, the average margin level in 2020 was 5.96% and was significantly higher than in 2019, i.e. by 4.78% p.p. The analysis of the distribution of observations of the basic statistics regarding the development of EBIT between 2018 and 2020 confirms the present observations (Fig. 2).

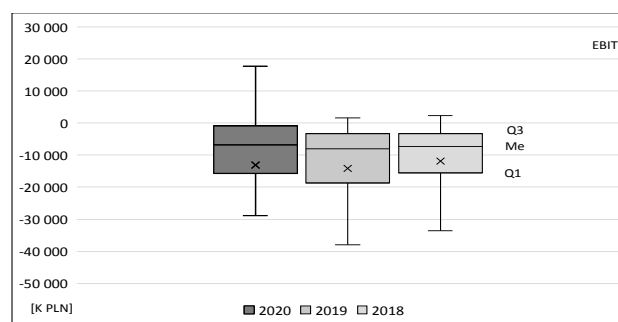


Fig. 2: Basic descriptive statistics for EBIT of the study sample (n=79)

Source: Own study.

Less differentiation can be seen in the case of EBITDA result. In this case, the range is from PLN 48.1 million in 2018 to PLN 96.3 million in 2020. It increases from year to year. This is also confirmed by the standard deviation, which was PLN 15.1 million in the first year of the pandemic compared to PLN 10.5 million (2019) and PLN 8.1 million (2018) in previous periods. In 2020, the entire research sample continues to suffer an EBITDA loss of PLN 191.5 million. This is a better result than in the last year before the pandemic by PLN 196.1 million. The proportion of hospitals making a loss on EBITDA and EBITDA margin remains significant. In 2020, there were 54.4% of entities with an EBITDA margin <0% (Table 4). In previous periods, the percentage was much higher at 65.8% in 2019 and 70.9% in 2018. In the research sample

group with an EBITDA margin <0%, the average margin level was -5.21% in 2020 and was slightly higher than in 2019, i.e. by 0.41 p.p. In turn, in the research sample group with EBITDA margin >0%, the average margin level in 2020 was 5.53%, higher than in 2019, i.e. by 2.57% p.p. The analysis of the distribution of observations of the basic statistics regarding the development of EBITDA in 2018-2020 also confirms the present observations (Fig. 3).

Table 4. EBITDA margin of the research sample (n=79)

Description	Share of the research sample		
	2020	2019	2018
Maximum value	22.5%	6.6%	6.9%
Upper quartile (Q3)	3.0%	1.1%	0.4%
Median (Me)	-0.4%	-2.0%	-2.3%
Lower quartile (Q1)	-4.1%	-5.7%	-5.5%
Minimum value	-21.3%	-19.0%	-16.7%
Arithmetic mean (\bar{x})	-0.3%	-2.7%	-2.8%
EBITDA margin > 0%	45.6%	34.2%	29.1%
EBITDA margin < 0%	54.4%	65.8%	70.9%
Average level of EBITDA margin			
EBITDA margin > 0%	5.53%	2.96%	2.77%
EBITDA margin < 0%	-5.21%	-5.61%	-5.13%

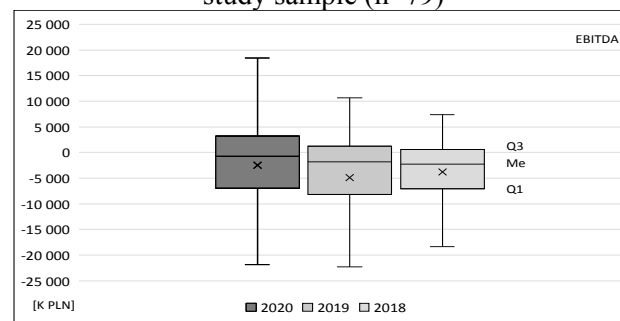
Source: Own study.

At the level of net financial result, the situation is more favorable than in the case of results covering core operating activities. When analyzing the distribution of net financial results for 2020, it can be seen that hospitals focus more often on profitability than on deficit. This is evidenced by basic descriptive statistics such as Q3 quartile and median. In 2020, the entire research sample generates a net profit of PLN 30.1 million. This result is many times better than in the last year before the pandemic, in which infectious disease hospitals incurred a loss of PLN 416.3 million. Also, the median in 2020 is characterized by an added value of PLN 907 thousand. Such a significant improvement in the net financial result in the first year of the pandemic was influenced by other operating revenues, the increase of which, compared to previous periods, was due to the settlement of donations and grants intended for the implementation of investment projects and the purchase of current means for the prevention, counteraction and suppression of COVID-19. It should be noted that these funds would not have been transferred to the infectious disease hospitals if the coronavirus had not appeared.

When analyzing the basic descriptive statistics of the net financial result of the research sample for 2019, it is important to note the exceptionally large

range (PLN 171.6 million), influenced by the maximum value of PLN 120.4 million, practically not reached by any hospitals in Poland. In fact, one business event related to the sale of real properties worth PLN 283.2 million by one hospital distorted the data and may have led to an inappropriate conclusion. This transaction was booked on the other operating revenues side, so it was not visible at the level of EBIT and EBITDA results. After adjusting for the elimination of the one-off event, the range returned to a similar level obtained in the first year of the pandemic and in the years prior to 2019 and reached a size of PLN 62.4 million, against PLN 77.9 million in the first year of the pandemic.

Fig.3: Basic descriptive statistics for EBITDA of the study sample (n=79)



Source: Own study.

Summarizing the consideration of the financial results obtained in the last three years by the research sample, it should be noted that the losses on the core activities EBIT and EBITDA in the period preceding the pandemic, i.e. in 2019, deepened in relation to 2018 (by a total of PLN 175.5 million at the EBIT level and PLN 86.6 million at the EBITDA level). The opposite trend can be observed for the first year of the pandemic. In 2020, the EBIT result was improved by the entire research sample by PLN 83.7 million (EBIT) and PLN 196.1 million (EBITDA).

A similar trend can be observed on the net financial result side. The net financial result of the entire research sample for 2019 worsened by PLN 38.7 million compared to 2018, while for 2020 it improved by PLN 446.4 million. After eliminating from the set of observations the maximum value associated with a one-off significant event that occurred in a single hospital, the net financial result of the research sample of n=79₁ for 2019 deteriorated by PLN 96.1 million compared to 2018, while for 2020 it improved by PLN 564.8 million. The problems arising from the coronavirus outbreak in terms of significant reorganization of services

provided and incurring additional operational costs associated with it did not adversely affect the financial performance of the hospitals, both at the operational level and at the level covering all areas of their functioning.

The situation is different when it comes to liabilities. The improvement in results has not stopped the unfavorable trend which has been observed in the Polish health care system for many years, and which consists in the increasing indebtedness of medical institutions. Hospitals in Poland, including infectious disease hospitals, have been underfunded for many years. The valuation of medical services in most cases does not include the total cost of all activities which need to be performed in order to provide such a service at a minimum level of profitability.

The debt of the research sample at the end of the first year of the pandemic is less than PLN 6 billion. It has been increasing in recent years. In 2019, in relation to the previous year, it increased by PLN 1.1 billion, and in 2020, in relation to 2019, by PLN 516.7 million. The growth rate of the debt of infectious disease hospitals in 2020 is half that of the previous year. The range in subsequent years widens and this is mainly due to the increase in the maximum value reaching PLN 1.1 billion in 2020. At the end of 2020, the debt of only one of the hospitals amounted to PLN 1.1 billion, of which 71.2% were short-term liabilities.

After excluding the maximum value and adjusting the size of the liabilities covering the research sample of $n=79_{-1}$, a significant reduction of the range becomes noticeable and the maximum value is at the level of half, i.e. PLN 506.4 million (Table 5).

Table 5. Total liabilities of the research sample in thousand PLN ($n=79_{-1}$)

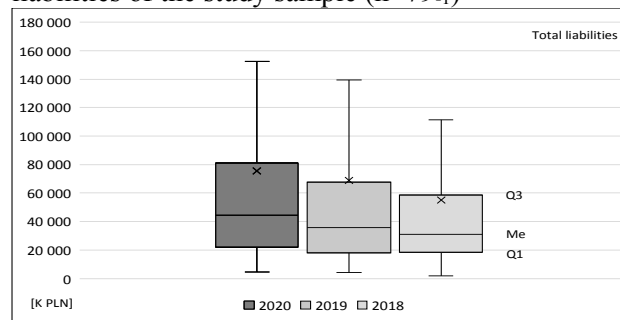
Description	Value		
	2020	2019	2018
Total	4 896 138	4 464 016	3 971 844
Maximum value	506 392	486 332	422 103
Upper quartile (Q3)	79 457	66 134	57 715
Median (Me)	44 228	34 637	31 025
Lower quartile (Q1)	21 897	18 077	18 015
Minimum value	4 485	4 021	1 992
Arithmetic mean (\bar{x})	62 771	57 231	50 921
Standard deviation	76 213	76 449	66 702

Source: Own study.

The arithmetic means for 2018-2020 is close to the upper quartile, as a result of the significant debt of the 25% most indebted infectious disease hospitals

(Fig. 4). At the end of 2020, the total liabilities of the most indebted hospitals amounted to PLN 2.9 billion, accounting for 58.8% of the total liabilities of the research sample $n=79_{-1}$. At the end of 2019, the total liabilities of the most indebted hospitals were lower and amounted to PLN 2.7 billion, which accounted for 61.5% of the total liabilities of the research sample $n=79_{-1}$.

Fig. 4: Basic descriptive statistics for total liabilities of the study sample ($n=79_{-1}$)



Source: Own study.

Based on the analysis of basic statistical characteristics, it can be seen that the fixed capital of infectious diseases hospitals in 2020 has improved with respect to the previous two periods. This is evidenced not only by changes in the total fixed capital of the research sample $n=79$, but also by changes in the arithmetic mean and median (Table 6). Both the median (2.4 million increase) and arithmetic mean (3.1 million increase) improved in 2020 compared to 2019. The situation is similar for hospitals characterized by negative fixed capital. In 2019, these entities accounted for 34.2% of the research sample and 31.6% in the first year of the pandemic.

Table 6. Fixed capital of the research sample in thousand PLN ($n=79$)

Description	Value		
	2020	2019	2018
Total	2 916 785	2 669 101	2 236 627
Maximum value	1 036 511	976 899	241 639
Upper quartile (Q3)	39 556	35 628	42 450
Median (Me)	12 926	10 573	10 957
Lower quartile (Q1)	-5 729	-5 048	-6 299
Minimum value	-446 144	-442 567	-160 414
Arithmetic mean (\bar{x})	36 921	33 786	28 312
Standard deviation	140 421	133 611	65 595
Positive fixed capital	68.4%	65.8%	65.8%
Negative fixed capital	31.6%	34.2%	34.2%

Source: Own study.

Working capital is linked to fixed capital. From the point of view of working capital, the situation of healthcare entities is less favorable than it was with respect to fixed capital (Table 7). In 2020, as many as 51.3% of hospitals had negative working capital. The median and arithmetic mean is negative. However, the situation has improved compared to 2019 and 2018, in which 66.7% of entities had negative working capital.

Table 7. Working capital of the research sample in thousand PLN (n=79)

Description	Value		
	2020	2019	2018
Total	-398 613	-1 250 245	-646 676
Maximum value	82 028	62 198	70 781
Upper quartile (Q3)	11 249	3 798	7 304
Median (Me)	-1 145	-6 853	-7 582
Lower quartile (Q1)	-14 076	-19 063	-18 479
Minimum value	-478 281	-477 006	-162 650
Arithmetic mean (\bar{x})	-5 110	-16 029	-8 291
Standard deviation	59 995	61 225	32 421
Positive fixed capital	48.7%	33.3%	33.3%
Negative fixed capital	51.3%	66.7%	66.7%

Source: Own study.

7 Conclusion

The COVID-19 pandemic has intensified the problems that Polish hospitals have been facing for many years and has influenced a change in their functioning. It shifted the priorities and strategies of hospitals. The situation in Polish hospitals during the pandemic was evident in the lack of vacancies for COVID patients and those suffering from other diseases, the lack of medical equipment, the insufficient number of intensive care units and medical staff capable of treating the most seriously ill patients, or the shortage of personal protective equipment. The organizational chaos in the functioning of the public health service was exacerbated by the cancellation of scheduled appointments and surgeries. The failure to prepare the health service to deal with the pandemic was not only a real threat to human life and health. Although it did not significantly affect the deterioration of financial liquidity, it caused a further increase in the debt of hospitals.

The aim of the article was to present the results of research and assessment in terms of the impact of COVID-19 pandemic on the financial and asset situation of infectious hospitals in Poland after the first year of the pandemic. The survey conducted using statistical methods covered all infectious

diseases hospitals in Poland involved in prevention, counteraction and suppression of COVID-19. The general population group consisted of 88 hospitals. Assuming an estimation accuracy (maximum error) of $d=3.55\%$, a minimum study sample of $n=79$ was defined. The research material was obtained exactly from 79 infectious disease hospitals, which allowed, from the point of view of assessing the minimum sample size, to use the results of the study for inference with translation to the entire general population ($N=88$). The research sample analyzed represented 89.8% of the general population. The research hypothesis was adopted that the financial and assets situation of infectious diseases hospitals has deteriorated due to the reduction in the scope of medical services forced by the spread of the COVID-19 pandemic. The hypothesis was confirmed only in the area concerning the indebtedness of hospitals. It was not confirmed in the area of assets and financial results achieved.

Compared to 2019, after the first year of the pandemic, the hospitals recorded improvements in profitability ratios (ROS, ROA, ROE), EBIT and EBITDA margins, as well as in core operating activities (EBIT, EBITDA) and net financial results. Problems resulting from the outbreak of the coronavirus involving significant reorganization of services provided and incurring additional operating costs did not adversely affect the financial results of hospitals, both at the operational level and at the level covering all areas of their functioning.

The units maintained the rate of growth in revenues from product sales from previous years. In 2020, the entire research sample incurred a loss on basic operating activities of PLN 1.03 billion, however, this was a better result than in the last year before the pandemic by PLN 83.7 million. Compared to the previous year, the percentage of hospitals with a negative EBIT margin also decreased. In 2020, the entire research sample suffered a loss on EBITDA of PLN 191.5 million. However, this result is better than in the last year before the pandemic by PLN 196.1 million. The percentage of hospitals making a loss on EBITDA and EBITDA margin is still significant. The percentage of entities with an EBITDA margin $<0\%$ in 2020 was 54.4% and was lower than in 2019 and 2018. In 2020, the entire research sample generated a net profit of PLN 30.1 million. This was many times better than in the last year before the pandemic, in which infectious disease hospitals incurred a loss of PLN 416.3 million.

The fixed capital of infectious disease hospitals also improved in 2020 with reference to the previous two periods. The situation is similar for

hospitals characterized by negative fixed capital. In 2019, these entities accounted for 34.2% of the research sample and 31.6% in the first year of the pandemic. In 2020, as many as 51.3% of hospitals were characterized by negative working capital. The median and arithmetic mean was negative. However, the situation improved compared to 2019 and 2018, in which 66.7% of entities had negative working capital.

The improvement in financial results has not, however, stopped the unfavorable trend noticeable for many years in the Polish health care system, consisting in the increasing indebtedness of medical institutions. Hospitals in Poland, including infectious disease hospitals, have been underfunded for many years. The pricing of medical services in most cases does not include the total cost of all the activities that need to be performed to provide such a service at a minimum level of profitability. The debt of the research sample at the end of the first year of the pandemic amounted to less than PLN 6 billion. It has shown a systematic increase in recent years. In 2019, in relation to the previous year, it increased by PLN 1.1 billion, and in 2020, in relation to 2019, by PLN 516.7 million. The rate of increase in the debt of infectious disease hospitals in 2020 is half that of the previous year.

To sum up, a key question arises: why, in spite of the coronavirus and the need to reduce the medical services provided to date, has the number of infectious disease hospitals whose results in particular types of activity have improved increased? This is primarily due to the fact that the units appointed to prevent, counteract and fight COVID-19 mainly closed wards bringing the greatest losses to hospitals, and in these places created new, as it turned out profitable so-called COVID wards. The profitability of the functioning of the research sample was influenced not only by well-priced services related to the prevention, counteraction and suppression of COVID-19 (including very profitable standby lump sums for hospitals), but also by various grants for medical equipment related to this new type of service provided.

One of the measures that were supposed to help hospitals maintain short-term financial liquidity was the introduction of a mechanism consisting in the payment to a medical facility of a part of the funds for services provided outside the lump sum (financed separately) contracted with the NFZ for 2020 in the amount of 1/12 of the contract, despite the non-performance or partial performance by the facility of services under this contract. The right to the so-called 1/12th contract was given to hospitals

that could not fulfil the contract with the National Health Fund due to the COVID-19 outbreak. Hospitals that used this mechanism were obliged to settle the services for 2020 by the end of June 2021. Under the provisions of the Regulation of the Minister of Health of 4 September 2020, the settlement period was extended to the end of December 2021. Due to the risk of reimbursement of unperformed services in 2020 outside the lump sum, hospitals set up adequate provisions for liabilities during 2020.

The issue of settlement of services for 2020 in the financial statements for 2021, detailed examination of the revenues structure, including a decrease in existing services and an increase in the services related to coronavirus, as well as a thorough analysis of additional revenues due to coronavirus are issues that can be taken into account in further studies related to the impact of coronavirus on the financial and assets situation of infectious diseases hospitals in Poland. However, the financial results obtained by the general population allow us to look with greater optimism at the next wave of coronavirus, which is already present practically worldwide.

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