

Financial Analysis of Greek Public Pediatric Hospitals before and After the Advent of the Covid-19 Pandemic

G. Moustakis¹, D. Stasinopoulos¹, A. Flokou¹

1.Hellenic Open University

Corresponding author: D. STASINOPOULOS, Avidou 130 Street, Zografou, Greece, Postal Code 15772,

Abstract:

This paper aims to investigate the cost-effectiveness of the four Greek public pediatric hospitals through a financial analysis of their financial statements for the period 2017-2022. Special emphasis is given to the effects of the Covid-19 pandemic crisis that has hit the country, in order to analyze the challenges and evaluate the management of financial resources during this critical period.

The Covid-19 pandemic caused a significant increase in expenditure due to the emergencies that arose, such as the acquisition of personal protective equipment, the recruitment of additional workers and the strengthening of infrastructure. At the same time, hospitals' revenues decreased due to reduced patient attendance and the postponement of scheduled surgeries. These conditions have forced hospitals to reorganize their resource management, focusing on responding to emergencies and ensuring the prevention of the spread of infections.

Keywords: financial ratios, pediatric hospitals, Covid-19, health indicators

1. Introduction

1.1 Generally

By the end of 2019, before the outbreak of the Covid-19 pandemic, Greece was trying to recover from a severe economic crisis, which had affected almost every aspect of social life. This crisis forced governments to adopt strict policies of fiscal discipline, resulting in significant cuts in public spending and government subsidies. The health sector has been under particular pressure, as hospitals and health facilities have faced great difficulties, which has stimulated the need for optimal management of existing resources. Thus, enhancing the efficiency of hospital units became a key prerequisite for them to continue to operate smoothly and provide high-quality health services without interruptions. The study of the financial data resulting from the financial statements of public pediatric hospitals, the assessment of their efficiency using financial indicators and trend analysis, as well as the investigation of their nursing activity and operating costs, are important tools. These approaches can help address the difficulties that limit the economic growth and sustainability of hospital units by offering important insights and strategies to enhance their operation [9,19].

1.2 Covid-19 and child population

The COVID-19 pandemic started in the city of Wuhan, China, and has had devastating consequences worldwide, with millions of deaths and serious problems in the social, humanitarian, and economic structures of many countries. On March 11, 2020, the World Health Organization (WHO) declared the spread of the SARS-CoV-2 virus, which causes COVID-19 disease, as a pandemic. According to the latest data, 776,947,553 cases and 7,076,993 deaths have been reported worldwide [18].

Humanity was confronted, especially in the early stages, with a serious challenge due to a virus that was transmitted at a rapid pace, was characterized by high mortality rates and presented continuous and multiple mutations, while for a long time there were no effective medical solutions to deal with it. The pandemic stimulated the shortages of health resources and the inadequate preparation for such a crisis. As a key strategy to deal with it, social distancing and isolation were adopted [19].

To control the spread of the virus, many states have implemented strict measures, such as general curfews, social isolation and the temporary closure of businesses, public services and educational institutions [5].

1.3 Pediatric Approach

The impact of the pandemic has affected and continues to significantly affect people of all ages and socioeconomic backgrounds. However, the most serious consequences are observed in vulnerable population groups. In the case of children and adolescents, from 0 to 19 years old, the pandemic has caused long-term effects on both their physical and psychosocial well-being. The full assessment of the extent of these impacts has not yet been completed and it is likely to take several years to fully understand their impact.

The crisis caused by the pandemic has highlighted two main categories of risks: a) general issues affecting all children, regardless of their mental or physical health, and b) specific risks for children facing chronic diseases, who belong to the most vulnerable groups.

According to research, SARS-CoV-2 infection in children tends to be generally less severe. The main reasons for this trend are as follows:

- *Children have less damage to endothelial cells compared to adults, as they usually have no chronic diseases or underlying diseases.*
- *The immune system of children differs from that of adults both in its structure and in the way it responds.*
- *Children's immune systems are more prepared, thanks to the vaccinations they receive during childhood and the frequent infections they face at this stage of their lives.*
- *The presence of other viruses in the mucous membranes of the respiratory tract can prevent the development of the coronavirus through interactions or competition between viruses [7, 16].*

1.4 Child psychological approach

The main psychological and emotional issues that arose during the pandemic are related to economic and social difficulties, feelings of boredom and loneliness, lack of social contacts, fear of contagion, and grief from the loss of loved ones. These conditions have caused problems such as sleep disorders, depression, addictions, anxiety, eating disorders, as well as cases of domestic violence and child abuse [17].

The psychological effects of the pandemic on children appeared to be probably more severe than the physical ones. These were greatly influenced by the family dynamics and the psychological climate in which they grew up. Children and adolescents experienced social isolation, removing from school, their peers and the activities that usually filled their daily lives. They were stressed about their health and that of their loved ones. Tensions with parents were frequent, as the latter faced their own challenges, such as unemployment, pressure from working from home, or supporting children in distance learning. In some cases, these conditions have led to incidents of domestic violence and child abuse. In addition, children and adolescents spent much of their day in front of screens, while their access to health services, both physical and mental, was limited [11].

2. Public Pediatric Hospitals in Greece

2.1 The contribution of public pediatric hospitals to Greek society

Public pediatric hospitals are key pillars of Greek society, with an influence that goes beyond health care, promoting social well-being and cohesion. Their contribution is crucial due to equal access to health services, the protection of children's health, the support of families and the promotion of public health through prevention and vaccination programmes. They also offer care to vulnerable groups, such as low-income families and refugees, while contributing to the training of young health professionals and scientific research. In times of crisis, such as pandemics or natural disasters, they play a central role in protecting children. At the same time, they contribute to social and economic stability, reducing economic costs for families and promoting the development of healthy future citizens. However, they face challenges such as a lack of staff, limited resources, and outdated infrastructure. Strengthening them is essential to improve children's health and promote social progress.

2.2 Presentation of the Greek Public Pediatric Hospitals

2.2.1 General Children's Hospital "Agia Sophia"

The hospital was founded in Athens in 1896 on the initiative of Princess Sophia and a group of women, with the aim of treating children. The plot was granted by the Holy Monastery of Petraki and the hospital began its operation in 1900 with 16 beds. Its purpose was to care for children up to 10 years old, offering free

services to the needy and with payment to the well-off, while promoting the training of women as nurses. The hospital made a significant contribution to medical care, especially in critical historical periods such as the Asia Minor Catastrophe and the German-Italian Occupation. In the 1980s, it was transformed into a Legal Entity under Public Law and was incorporated into the National Health Service. Today, as the Regional General Children's Hospital "Agia Sophia", it provides primary and secondary care to children up to 14 years old, promotes medical research and the training of doctors and health personnel, belonging to the 1st Health District.

2.2.2 General Children's Hospital "Panagiotis and Aglaia Kyriakou"

The Children's Hospital "P.A. Kyriakou" was founded in 1933 with a donation from Aglaia Panagiotou Kyriakou, responding to the need for specialized pediatric care. It was founded in 1934 and completed in 1938. During World War II, it was temporarily transferred due to the conquest of its facilities by the Germans. After the liberation, its reconstruction began, with the addition of new departments and services, such as the Department of Cardiology and Neuropsychiatry, the Second Pediatric University Clinic and the Higher School of Sister Nurses. In the 1970s-1980s, it expanded with new departments, such as the Neonatal Unit and the Poison Center, and joined the NHS. Since 1990, it has continued to modernize, offering high-quality pediatric care and education. It belongs to the 1st Health District.

2.2.3 General Hospital "Penteli Children's Hospital"

The General Children's Hospital of Penteli is located in Palaia Penteli and has easy access via public transport. It was founded in 1940 on land granted by the Holy Monastery of Penteli to PIKPA and was transformed into a pediatric hospital in 1981, acquiring its current name in 1990. It belongs to the 1st Health Region (H.P.E.) and provides extensive medical services in the fields of Internal Medicine, Surgery, Child Psychiatry, Laboratories and Nursing Care. In addition, it has an Administrative and Technical Service for the management of its operations. The aim of the Hospital is to provide high quality pediatric care and the efficient management of its services.

2.2.4 General Children's Hospital of Patras "Karamandaneio"

The General Children's Hospital of Patras "Karamandaneio" was founded in 1937 by Ioannis Karamandanis, in memory of his son, Bebis. Initially, it was housed in his home in Patras, while during the Second World War he was requisitioned by the Red Cross, which expanded its facilities. In 1968 it was converted into a Legal Entity under Public Law and in 1983 it joined the National Health Service. Faced with spatial planning problems, it was transferred in 1988 to the Prevantory of Patras, where it continues its operation. It belongs to the 6th Ministry of Pediatrics and is the only public pediatric hospital outside of Attica, serving Western Greece and the surrounding areas. It provides primary and secondary pediatric care, health professional training, and collaborates with other hospitals to improve pediatric care. It has additional satellite units, such as the Department of Child Psychiatry and the Center for Physical and Medical Rehabilitation (KEFIAP).

3. Financial Analysis

3.1 The concept of financial analysis

Financial analysis is a tool for evaluating the financial situation and course of action of a company, based on financial data such as the balance sheet and the profit and loss statement. Its aim is to measure critical parameters, such as capital structure, inventory and liability management, providing useful information to both internal and external stakeholders. Especially for public hospitals, is important for decision-making by the Administrations, the Health Districts and the Ministry of Health. The analysis can be layered, comparing companies in the same industry, or timeless, looking at the evolution of a business over time. The basic techniques include horizontal and vertical analysis, as well as the use of indicators, which will be applied in this paper [13].

3.2 Financial Statements

Financial statements are reports that reflect the financial position of an enterprise, providing information on its financial results, financial position and cash flows. The main financial statements include the balance sheet, the statement of profit and loss for the year, the statement of cash flow and the table of profit and loss [6]. The balance sheet reflects the assets (assets), sources of funding (liabilities) and the net position of the

company. The statement of profit and loss records the income, expenses and final result (profit or loss) of a period [12].

In the field of public health, Presidential Decree 146/2003 imposed standardized accounting, establishing the double-entry system and obliging public hospitals and Health Districts to prepare standardized financial statements, including the balance sheet, the statement of profit and loss and other relevant reports.

3.3 Ratios

Indicators express the relationship between a business's financial figures, providing a quick insight into its financial situation and helping to identify strengths and weaknesses. In public hospitals, although profit is not pursued, indicators are used to make decisions and strategize.

Their usefulness is greater when used comparatively, either with previous uses of the same business or with others in the same industry. Although they do not reveal the causes or solutions to financial problems, they do help evaluate performance. The main categories of indicators include:

- Liquidity (ability to cover short-term liabilities),
- Activity (asset management efficiency),
- Efficiency (productivity and profitability),
- Capital Structure and Sustainability (Financial Structure),
- Investment (return on investment),
- Operating costs (operating costs of the enterprise).

4. Financial Analysis of Pediatric Hospitals with Indicators

4.1 Liquidity Ratios

Liquidity ratios assess an enterprise's ability to cover its short-term liabilities by looking at the ratio of current assets to short-term liabilities. However, because these figures can change in a short period of time, liquidity ratios only provide information on the short-term viability of the business. In addition, they do not take into account the quality or composition of current assets.

4.1.1 General or Current Ratio Indicator

This indicator assesses the financial performance of an enterprise, showing its ability to repay direct financial liabilities with its current assets. It is calculated as the ratio of current assets (available, inventories, receivables) to short-term liabilities [3].

$$\text{General Liquidity Ratio} = \text{Outstanding Assets} / \text{Short-Term Liabilities}$$

Table 1: General Liquidity Index

YEAR	HAGIA SOPHIA	AGLAIA KYRIAKOU	PAIDON PENTELI	KARAMANDANEIO
2017	5.97	7.85	10.20	10.63
2018	7.85	8.61	14.51	14.92
2019	6.78	5.71	9.61	13.92
2020	6.32	5.85	3.04	23.41
2021	5.27	4.25	19.46	10.03
2022	5.68	4.11	6.21	7.80

4.1.2 Quick Ratio

The Specific Liquidity Ratio assesses the ability of an enterprise to cover its short-term liabilities with immediately liquid assets. It is calculated as the current assets, excluding reserves, to short-term liabilities [1].

$$\text{Special Liquidity Ratio} = (\text{Current Assets} - \text{Reserves}) / \text{Short-Term Liabilities}$$

Table 2: Direct/ Special Liquidity Indicator

YEAR	HAGIA SOPHIA	AGLAIA KYRIAKOU	PAIDON PENTELI	KARAMANDANEIO
2017	5.79	7.77	9.98	10.42
2018	7.72	8.51	14.19	14.74
2019	6.55	5.60	9.15	13.66
2020	6.18	5.74	2.96	23.11
2021	5.15	4.18	19.16	9.89
2022	5.55	4.03	6.02	7.61

4.1.3 Cash Ratio

The cash liquidity ratio assesses the ability of an enterprise to cover its overdue liabilities with cash on hand. It is calculated as the ratio of cash to short-term liabilities. However, its usefulness is limited, as firms maintain low cash to cover current liabilities. A value of around 0.5 is considered acceptable [15].

$$\text{Cash Liquidity Ratio} = \text{Cash/Short-Term Liabilities}$$

Table 3: **Cash Liquidity Index**

YEAR	HAGIA SOPHIA	AGLAIA KYRIAKOU	PAIDON PENTELI	KARAMANDANEIO
2017	0.35	1.85	2.39	3.42
2018	0.45	1.78	1.77	3.50
2019	0.50	1.14	1.41	3.74
2020	0.36	0.78	0.35	4.37
2021	0.13	0.34	1.61	1.17
2022	0.21	0.09	0.14	0.73

The examination of the General and Special Liquidity indicators shows that all hospitals have sufficient resources to cover their short-term liabilities. Throughout the period under review, both indicators remain at levels significantly higher than the unit, with "Karamandaneio" recording the highest average compared to the rest of the hospitals. Of particular importance is the fact that this hospital showed a significant increase in these indicators in 2020, the year of the beginning of the pandemic. Correspondingly, "Penteli Children's Hospital" recorded a significant increase in both General and Special Liquidity in 2021, a period during which the pandemic crisis was in progress.

The analysis of the General and Special Liquidity indicators reveals that all hospitals have sufficient funds available to cover their short-term liabilities. Throughout the period under review, the two indicators are maintained at levels significantly higher than the unit, with "Karamandaneio" showing the highest average in both General and Special Liquidity compared to the rest of the hospitals. The case of "Karamandaneio" is noteworthy, which in 2020, with the onset of the pandemic, recorded a significant increase in these indicators. Correspondingly, "Penteli Children's Hospital" showed a marked improvement in General and Special Liquidity in 2021, during the pandemic crisis. It is evident that the pandemic affected hospitals with different intensity and temporal development.

4.2 Activity Ratios

These indicators assess a company's effectiveness in managing and utilizing its assets, such as suppliers, inventories and receivables. They aim to measure the company's productivity and ability to use available resources efficiently in order to achieve sales. In addition, they help to estimate the degree to which assets have been converted into cash, providing valuable information for administrative decision-making [19].

4.2.1 Receivables turnover ratio and Average Collection Duration (in Days)

The Receivables Collection Speed Index (ATEA) measures the frequency with which a business converts its receivables into cash within a financial year. It is calculated as the ratio of net sales to the average of receivables at the beginning and end of the financial year, providing information on the effectiveness of the business in managing its receivables. It captures the company's policy towards customers and its ability to

collect debts [3]. A high price indicates effective collection management, boosting liquidity and reducing the need for borrowing, while a low price may indicate delays in collections or a loose credit policy.

Receivables Collection Speed Index = Net Sales / Average Receivables

The Average Collection Period is calculated by dividing the 365 days of the year by the ATEA index and indicates the average number of days that occur from the time of sale to the collection of the corresponding claim.

$$\text{Average Collection Period} = 365 / \text{Debt Collection Speed Index}$$

Table 4: Debt Collection Speed Index

YEAR	HAGIA SOPHIA	AGLAIA KYRIAKOU	PAIDON PENTELI	KARAMANDANEIO
2017	0.68	0.47	0.41	0.40
2018	0.36	0.39	0.38	0.48
2019	0.47	0.39	0.39	0.41
2020	0.48	0.36	0.70	0.33
2021	0.49	0.29	0.38	0.25
2022	0.36	0.36	0.27	0.26
<i>AVERAGE</i>	<i>0.47</i>	<i>0.38</i>	<i>0.42</i>	<i>0.35</i>

Table 5: Indicator Average Duration of Collection in Days

YEAR	HAGIA SOPHIA	AGLAIA KYRIAKOU	PAIDON PENTELI	KARAMANDANEIO
2017	535.08	781.36	880.85	923.98
2018	1,023.03	925.06	950.69	760.22
2019	774.22	937.80	935.12	885.78
2020	761.29	1,004.90	523.70	1,105.17
2021	752.45	1,244.82	969.88	1,464.97
2022	1,006.39	1,027.60	1,338.57	1,406.21
<i>AVERAGE</i>	<i>808.74</i>	<i>986.92</i>	<i>933.14</i>	<i>1,091.06</i>

Hospitals face difficulties in the timely collection of their claims, as the corresponding indicators show, both before and after the pandemic. The "Agia Sophia" hospital has the lowest average collection time (808.84 days or 27 months), while the "Karamandaneio" has the highest (1091.06 days or 36 months).

4.2.2 Trade creditors to purchases ratio and Average Duration of Payment of Obligations (in Days)

The Short-Term Debt Payment Speed Index (ATEBY) measures a company's ability to cover its short-term liabilities through the cost of sales. It is evaluated in conjunction with the ATEA and the nature of the business. If the index is higher than the ATEA, it may indicate low liquidity and difficulty in repaying liabilities. If it is lower, the business can benefit from favorable payment terms. The goal is to repay on time without losing the possibility of profitable investments. It is calculated as the quotient of the cost of sales to the average of short-term liabilities (at the beginning and end of the financial year) [19].

Short-Term Debt Payment Speed Index = Cost Sold/Average Short-Term Debt

The Average Maturity of Short-Term Liabilities is calculated from the quotient of 365 (days of the year) with ATEBY. This reason expresses the period of time in (days) required to pay the obligations of the organization

$$\text{Average Payment Duration Short. Liabilities} = 365 / \text{Short-Term Debt Payment Speed Index}$$

Table 6: Short-Term Liability Speed Indicator

YEAR	HAGIA	AGLAIA	PAIDON	KARAMANDANEIO
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	SOPHIA	KYRIAKOU	PENTELI	
2017	4.03	5.32	7.71	9.50
2018	3.50	5.50	9.38	7.96
2019	3.80	5.33	10.61	8.81
2020	4.53	4.49	5.36	13.04
2021	3.44	3.40	4.74	9.13
2022	2.62	2.64	4.98	5.60
<i>AVERAGE</i>	<i>3.65</i>	<i>4.45</i>	<i>7.13</i>	<i>9.01</i>

Table 7: Indicator Average repayment period of short-term liabilities (days)

YEAR	HAGIA SOPHIA	AGLAIA KYRIAKOU	PAIDON PENTELI	KARAMANDANEIO
2017	90.48	68.61	47.32	38.41
2018	104.36	66.33	38.91	45.88
2019	96.10	68.43	34.40	41.42
2020	80.52	81.21	68.09	27.99
2021	105.96	107.42	77.07	39.97
2022	139.30	138.48	73.24	65.20
<i>AVERAGE</i>	<i>102.79</i>	<i>88.41</i>	<i>56.50</i>	<i>43.14</i>

The analysis shows that the four public pediatric hospitals pay their obligations much faster than they collect their claims. "Agia Sophia" pays in 102.79 days, but collects in 808.74 days, while "Aglia Kyriakou" pays in 88.41 and 984.63 days respectively. "Penteli Children's" covers its obligations in 56.50 days, but collects in 933.14, and "Karamandaneio" in 43.14, with its claims being collected in 1091.06 days. This difference shows a significant delay in collections. This imbalance reflects broader economic difficulties, mainly due to delays in hospitalization payments by EOPYY. The pandemic has had a negative impact on the financial stability of hospitals, as between 2020 and 2022 the time required to repay their short-term liabilities increased. This development proves that the pandemic has created additional financial challenges, negatively affecting the liquidity and overall financial management of hospitals.

4.2.3 Inventories turnover ratio and Average Duration of Inventory Stay in (in Days)

The Traffic Speed Index shows how quickly a business replenishes its inventories, i.e. how many times in a accounting period it buys and consumes its available products. It is calculated by dividing the cost of goods sold by the average of stocks at the beginning and end of the year. This indicator is important for evaluating efficiency in managing inventories and making the best use of the company 's facilities[15].

Inventory Circulation Speed Index = Cost of Sold/ Average Inventory

The Average Inventory Length of Stay indicates the amount of time (in days) required to sell or use a business's inventory. In hospitals, inventory management is critical, as prolonged storage increases costs and the risk of deterioration, while too fast consumption can lead to shortages. The index is calculated by dividing 365 days by the Inventory Velocity Circulation Index.

Average Duration of Stock Hold=365/ Stock Circulation Speed Index

Table 8: Stock Traffic Velocity Indicator

YEAR	HAGIA SOPHIA	AGLAIA KYRIAKOU	PAIDON PENTELI	KARAMANDANEIO
2017	26.31	55.13	32.82	54.98
2018	22.61	60.59	35.56	41.47
2019	22.23	51.52	26.80	41.73
2020	25.49	42.61	33.82	47.33
2021	26.89	40.75	38.39	47.68
2022	21.20	34.66	23.54	34.02

<i>AVERAGE</i>	24.12	47.54	31.82	44.54
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Table 9: Indicator Average length of stay of stocks

YEAR	HAGIA SOPHIA	AGLAIA KYRIAKOU	PAIDON PENTELI	KARAMANDANEIO
2017	13.87	6.62	11.12	6.64
2018	16.14	6.02	10.26	8.80
2019	16.42	7.09	13.62	8.75
2020	14.32	8.57	10.79	7.71
2021	13.58	8.96	9.51	7.65
2022	17.21	10.53	15.50	10.73
<i>AVERAGE</i>	15.26	7.96	11.80	8.38

The average retention time of stocks in hospitals ranges from 7.96 to 15.26 days. In 2020, due to the pandemic, there was a decrease in the length of time stocks stay in most hospitals, with the most intense in "Penteli Children's Hospital", due to the increased demand for medical equipment. On the contrary, in "Aglaiia Kyriakou" there was a slight increase, probably due to different management methods or special needs of the hospital.

4.2.4 Total asset turnover ratio

The index assesses the effectiveness of an enterprise in using its assets to achieve sales. It is calculated as the ratio of net sales to the average of total assets. Enterprises with high capital requirements typically have lower index values, while those based on working instruments show higher prices. A high value indicates efficient use of assets; while a low may indicate excessive or inefficient assets. The index is useful for comparing companies in the same sector [3].

$$\text{Asset Circulation Velocity Index} = \text{Net Sales} / \text{Average Total Assets}$$

Table 10: Asset Velocity Index

YEAR	HAGIA SOPHIA	AGLAIA KYRIAKOU	PAIDON PENTELI	KARAMANDANEIO
2017	0.38	0.21	0.15	0.16
2018	0.25	0.19	0.16	0.20
2019	0.34	0.19	0.17	0.18
2020	0.31	0.18	0.27	0.15
2021	0.34	0.17	0.18	0.13
2022	0.28	0.23	0.15	0.14
<i>AVERAGE</i>	0.32	0.19	0.18	0.16

The analysis of the traffic velocity index of assets in the four hospitals shows stability before and after the pandemic, with small fluctuations. Hospitals are not intensively utilizing their assets for sales, while the pandemic has not brought about significant changes in the index, indicating that they have maintained similar methods of managing resources even in times of crisis.

Owner's of equity turnover ratio

The Equity Utilization Index measures the return on investment in achieving profits. It is calculated as the ratio of net sales to the average equity. A high value indicates that the business achieves high sales with low equity, which can contribute to an increase in profits [10,19].

$$\text{Equity Movement Speed Index} = \text{Net Sales} / \text{Average Equity}$$

Table 11: Equity Movement Speed Indicator

YEAR	HAGIA SOPHIA	AGLAIA KYRIAKOU	PAIDON PENTELI	KARAMANDANEIO
2017	0.46	0.23	0.16	0.17
2018	0.30	0.22	0.17	0.21
2019	0.40	0.21	0.18	0.19
2020	0.37	0.21	0.31	0.16
2021	0.40	0.20	0.20	0.13
2022	0.34	0.28	0.17	0.15
<i>AVERAGE</i>	<i>0.38</i>	<i>0.23</i>	<i>0.20</i>	<i>0.17</i>

The equity turnover rate remains low both before and after the pandemic for all hospitals examined. "Agia Sophia" records the highest value (0.38) and "Karamandaneio" the lowest (0.17), showing the difficulty of hospitals to effectively utilize their own funds to increase revenues.

Fixed asset turnover ratio

The fixed assets turnover index measures the profitability of fixed assets in relation to sales. It is calculated as the ratio of net sales to the average of fixed assets [15]. A high value indicates effective utilization of assets, while a low one may indicate either inefficient use or overinvestment in them [3].

$$\text{Fixed Capital Movement Speed Index} = \text{Net Sales} / \text{Average Fixed Assets}$$

Table 12: Fixed Asset Circulation Speed Index

YEAR	HAGIA SOPHIA	AGLAIA KYRIAKOU	PAIDON PENTELI	KARAMANDANEIO
2017	8.16	0.52	0.32	0.39
2018	9.47	0.56	0.38	0.51
2019	16.63	0.54	0.37	0.47
2020	15.76	0.49	0.66	0.38
2021	19.59	0.50	0.55	0.33
2022	20.74	0.79	0.54	0.37
<i>AVERAGE</i>	<i>15.06</i>	<i>0.57</i>	<i>0.47</i>	<i>0.41</i>

The traffic speed index of fixed assets in "Agia Sophia" shows a continuous increase, with values ranging from 8.16 to 20.74. On the contrary, the rest of the hospitals show very low prices, close to zero, indicating difficulty in the efficient utilization of their fixed assets.

4.3 Efficiency Indicators

The profitability of a business refers to its ability to generate profits through the effective management of its assets. Maintaining profitability boosts the value of shares and shareholder dividends, contributing to the long-term viability of the business, which is influenced by management's strategic decisions.

4.3.1 Gross Profit Margin Indicator

The gross profit index evaluates the profitability and profitability of a business, calculated as the quotient of gross profit to total sales [1]. It expresses the percentage of profit remaining after deducting the cost of what was sold. A high price indicates effective cost management, a favorable supply of raw materials or a successful pricing policy. The index increases with an increase in prices or a decrease in costs, while it decreases with opposite trends [3].

$$\text{Gross Profit Margin Indicator} = (\text{Gross Profit}) * 100$$

Table 13: Gross Profit Margin Indicator

YEAR	HAGIA	AGLAIA	PAIDON	KARAMANDANEIO
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	SOPHIA	KYRIAKOU	PENTELI	
2017	-33.93	-132.25	-165.33	-119.34
2018	-52.55	-128.99	-152.90	-85.36
2019	-19.13	-159.44	-173.66	-101.51
2020	-59.75	-172.29	-110.90	-194.39
2021	-33.38	-179.36	-130.14	-212.62
2022	-39.02	-95.50	-115.17	-181.37
<i>AVERAGE</i>	<i>-39.63</i>	<i>-144.64</i>	<i>-141.35</i>	<i>-149.10</i>

All hospitals show negative gross profit margins, both before and after the pandemic, which shows that the cost of their services exceeds revenues. This demonstrates difficulties in managing resources and covering operating costs.

4.3.2 Gross Profit Margin Indicator

The Net Profit Margin Indicator assesses the financial health of a business by measuring the percentage of net profit after covering all expenses and taxes in relation to total sales. It is calculated as the quotient of net profit to total sales [1]. A high index indicates resilience to economic difficulties, but its interpretation must also take into account other factors, such as loans and competition. For a comprehensive analysis, it is compared to the gross profit margin ratio [3].

Net Profit Margin Indicator= (Net Profit for Use/Total Sales)*100

Table 14: Net Profit Margin Indicator

YEAR	HAGIA SOPHIA	AGLAIA KYRIAKOU	PAIDON PENTELI	KARAMANDANEIO
2017	26.40	4.77	14.04	17.16
2018	15.13	15.59	24.47	20.76
2019	23.37	7.17	-25.52	5.87
2020	18.06	0.36	13.93	-3.22
2021	33.09	-10.46	10.44	-31.97
2022	13.28	12.23	-12.51	-37.02
<i>AVERAGE</i>	<i>21.56</i>	<i>4.94</i>	<i>4.14</i>	<i>-4.74</i>

The Net Profit Margin Ratio shows differentiated performance between hospitals. "Agia Sophia" records the highest value (21.56), while the rest of the hospitals have lower or negative values, with "Karamandaneio" maintaining a negative index since 2020. Most hospitals recorded a decline in 2020 due to the pandemic, except for "Penteli Children's Hospital", which recorded an increase, with an average index of 4.14.

4.3.3 Return on Equity ROE

The Return on Equity Ratio measures the effectiveness of the utilization of shareholders' capital, calculated as the quotient of net return to equity [1]. Although it usually indicates the profitability of a business, in public hospitals its evaluation must also take into account their social role. A high price indicates efficient capital management, while a comparison with other companies in the sector can provide useful conclusions [3].

Return on Equity Ratio= (Net Profit for the Year/Total Equity)*100

Table 15: Equity Return Indicator

YEAR	HAGIA SOPHIA	AGLAIA KYRIAKOU	PAIDON PENTELI	KARAMANDANEIO
2017	10.04	1.05	2.20	3.02
2018	4.03	3.17	4.18	4.23

2019	11.02	1.69	-4.96	1.18
2020	6.06	0.07	3.97	-0.49
2021	12.03	-2.07	1.84	-4.31
2022	4.06	3.29	-2.02	-5.60
<i>AVERAGE</i>	<i>7.87</i>	<i>1.20</i>	<i>0.87</i>	<i>-0.33</i>

The Equity Efficiency Index at "Agia Sophia" recorded the highest prices, while the other hospitals recorded low or even negative prices, especially the "Karamandaneio". Everything, except for "Penteli Children's", showed a decline in 2020 due to the pandemic, while "Penteli Children's" showed an increase.

4.4 Capital Structure and Sustainability Indicators

A company's liabilities include the funds required to carry out its operations and investment plans. These funds can come either from own resources, defined as equity, or from third-party creditors, in which case they are referred to as foreign capital. The long-term viability of a company depends to a large extent on its capital structure; that is, by how it finances its investments and activities [1].

Ratio of owner's equity to total liabilities

The Debt Burden Ratio assesses the degree of dependence of a company on foreign capital. It is calculated as the ratio of Equity to total liabilities (Financial Analysis of Accounting Statements, 2008). A price higher than a unit indicates low borrowing and increased security for lenders, while a price below a unit indicates a high dependence on foreign capital and increased financial risk [19].

Equity to Foreign Capital Ratio = Total Equity/ Foreign Capital

Table 16: Equity to Foreign Capital Ratio

YEAR	HAGIA SOPHIA	AGLAIA KYRIAKOU	PAIDON PENTELI	KARAMANDANEIO
2017	7.37	8.04	18.30	17.65
2018	7.97	8.51	25.33	23.09
2019	8.12	6.37	18.83	22.74
2020	7.45	6.30	5.60	36.83
2021	5.76	4.44	30.56	15.48
2022	5.49	4.06	9.26	11.48
<i>AVERAGE</i>	<i>7.03</i>	<i>6.29</i>	<i>17.98</i>	<i>21.21</i>

Public pediatric hospitals rely mainly on equity rather than external borrowing, as evidenced by the high equity to foreign capital ratio. "Karamandaneio" records the highest average value (21.21), while overall hospitals do not face sustainability risks.

5. Nursing Activity Analysis

5.1 Number of patients examined in regular outpatient clinics

Table 17: Number of patients examined patients in outpatient clinics

YEAR	HAGIA SOPHIA	AGLAIA KYRIAKOU	PAIDON PENTELI	KARAMANDANEIO
2017	64.750	75.453	51.403	27.251
2018	68.369	79.174	49.723	26.874
2019	69.910	79.064	43.493	20.300
2020	48.240	58.191	23.543	16.011
2021	47.189	74.271	21.425	19.548
2022	41.967	68.150	19.832	24.449
<i>AVERAGE</i>	<i>56.738</i>	<i>72.384</i>	<i>34.903</i>	<i>22.406</i>

During the pandemic, the number of visits to regular outpatient clinics (TEIs) decreased significantly due to the suspension of operation and concern about the transmission of the virus. The decrease continued until 2022, with the exceptions of the "Aglaiia Kyriakou" and "Karamandaneio" hospitals, where there was an increase in visits in 2021 and 2022.

5.2 Number of people examined in the Emergency Department (ED)

Table 18: Number of examined patients in the Emergency Department

YEAR	HAGIA SOPHIA	AGLAIA KYRIAKOU	PAIDON PENTELI	KARAMANDANEIO
2017	94.296	71.752	61.541	23.196
2018	92.175	73.834	62.213	23.747
2019	90.088	73.016	64.144	22.821
2020	49.897	43.490	38.105	14.536
2021	52.841	48.722	26.736	17.138
2022	72.390	64.902	40.467	24.008
<i>AVERAGE</i>	<i>75.281</i>	<i>62.619</i>	<i>48.868</i>	<i>20.908</i>

In 2020, there was a decrease in the number of people examined in the Emergency Departments (ED) due to the fear of infection. However, in 2021 and 2022 an increase in cases was recorded, indicating a gradual return to normality.

5.3 Number of examinees in the All-Day Liturgy (former Afternoon Clinics)

The All-Day Operation incorporates the services of the former afternoon clinics, offering increased availability of appointments and better utilization of medical staff and infrastructure. It extends over a longer period of time during the day and allows specialized examinations and minor interventions to be performed. The cost of the services is determined by the Ministry of Health and is borne by the patient, although some insurance funds may cover part of the cost. Its operation is regulated by the laws of Law 2889/2001, Law 4238/2014 and Law 4999/2022.

Table 19: Number of examined patients in the All-Day Liturgy

YEAR	HAGIA SOPHIA	AGLAIA KYRIAKOU	PAIDON PENTELI	KARAMANDANEIO
2017	10.366	8.957	7.276	3.081
2018	10.424	9.161	6.278	3.114
2019	9.973	8.375	6.291	921
2020	5.058	5.781	4.480	559
2021	5.751	9.010	4.436	679
2022	6.416	11.682	7.535	994
<i>AVERAGE</i>	<i>7.998</i>	<i>8.828</i>	<i>6.049</i>	<i>1.558</i>

The all-day operation of hospitals recorded a decrease in the number of examinees in 2020 due to postponements and patient hesitancy. However, in 2021 and 2022 an increase was recorded, indicating a gradual return to normality.

5.4 Number of Hospitalized Patients

Table 20: Number of hospitalized patients

YEAR	HAGIA SOPHIA	AGLAIA KYRIAKOU	PAIDON PENTELI	KARAMANDANEIO
2017	58.381	17.853	8.815	6505

2018	56.765	18.247	8.354	6741
2019	52.945	17.691	8.195	6401
2020	48.660	16.021	5.871	5034
2021	51.325	18.031	5.954	4212
2022	52.009	18.651	8.110	5028
<i>AVERAGE</i>	<i>53.348</i>	<i>17.749</i>	<i>7.550</i>	<i>5.654</i>

The number of hospitalized patients has been decreasing since 2017, with the largest drop in 2020. Since 2021, there has been an increase, except for "Karamandaneio", where the rise begins in 2022. Despite the recovery, 2017 levels have not yet been reached.

5.5 Hospitalization Days

Table 21: Hospitalization Days

YEAR	HAGIA SOPHIA	AGLAIA KYRIAKOU	PAIDON PENTELI	KARAMANDANEIO
2017	152.150	55.486	20.908	14.473
2018	155.042	57.962	19.868	14.780
2019	152.220	57.347	21.063	14.685
2020	123.702	52.498	13.053	10.679
2021	119.958	54.080	13.041	9.445
2022	128.685	62.484	18.958	12.168
<i>AVERAGE</i>	<i>138.626</i>	<i>56.643</i>	<i>17.815</i>	<i>12.705</i>

Hospitalization days decreased significantly in 2020, without a corresponding increase despite the increase in hospitalizations in pediatric hospitals in Attica in 2021.

5.6 Nursing Activity Indicators

5.6.1 Average Duration of Hospitalization

The Average Length of Hospitalization (NII) is an indicator of the efficiency and quality of health services, calculated as the ratio of total hospitalization days to the number of patients [8]. Low NII may indicate efficient management and reduced costs, while high NII may indicate either complex incidents or management problems. An efficient hospital reduces hospitalization time without affecting the quality of care.

Average length of hospitalization= number of days of hospitalization/ number of hospitalized patients

Table 22: Average Length of Hospitalization

YEAR	HAGIA SOPHIA	AGLAIA KYRIAKOU	PAIDON PENTELI	KARAMANDANEIO
2017	2.61	3.11	2.37	2.22
2018	2.73	3.18	2.38	2.19
2019	2.88	3.24	2.57	2.29
2020	2.54	3.28	2.22	2.12
2021	2.34	3.00	2.19	2.24
2022	2.47	3.35	2.34	2.42
<i>AVERAGE</i>	<i>2.59</i>	<i>3.19</i>	<i>2.35</i>	<i>2.25</i>

The average length of hospitalization decreased in all hospitals except "Aglaia Kyriakou", where it increased. "Karamandaneio" has the lowest average length of hospitalization, probably due to greater efficiency or management of milder cases.

5.6.2 Average annual bed occupancy

The average bed occupancy shows the percentage of occupied beds compared to those available on an annual basis. High occupancy indicates efficient use of resources but can lead to hospital overload and reduced quality of care. Low occupancy can mean reduced demand or redundant beds. Ideally, a rate of around 85% is considered optimal (OECD, 2021). The index is calculated as the ratio of the total days of hospitalization to the product of beds and days of the year, expressed as a percentage [8].

$$\text{Average Annual Bed Occupancy} = [(\text{Hospitalization Days}) / (\text{Number of Beds} * 365)] * 100$$

Table 23: Average Annual Bed Occupancy

YEAR	HAGIA SOPHIA	AGLAIA KYRIAKOU	PAIDON PENTELI	KARAMANDANEIO
2017	61.94%	40.97%	38.19%	44.06%
2018	63.12%	42.80%	36.29%	44.99%
2019	61.97%	42.35%	38.99%	44.70%
2020	45.68%	38.25%	23.84%	35.25%
2021	52.08%	31.26%	23.82%	26.68%
2022	55.79%	46.14%	32.87%	34.37%
<i>AVERAGE</i>	<i>56.76%</i>	<i>40.30%</i>	<i>32.33%</i>	<i>38.34%</i>

In 2020, all four hospitals ("Penteli Children's Hospital", "Karamandaneio", "Aglaia Kyriakou" and "Agia Sophia") recorded a significant decrease in occupancy. The hospitals "Penteli Children's Hospital", "Karamandaneio" and "Aglaia Kyriakou" had lower occupancy rates, underlining the need to improve their effectiveness and efficiency. On the contrary, "Agia Sophia" performed better in terms of occupancy, although its operation needs to be further strengthened.

Incident Complexity and Severity Index (Roemer)

The Roemer Index adjusts the average length of hospitalization to the bed occupancy rate, without taking into account other factors such as bed availability or patient profile. It is calculated through the relationship described by Aletras et al. (2002) and helps to understand the severity of cases, allowing for objective comparisons between hospitals.

$$RCI_i = \frac{OCC_i}{OCC_d} \times ALOS_i$$

RCI_i is the Roemer index of hospital i , OCC_i is the occupancy for i hospital, OCC_d is the average occupancy of the four hospitals under consideration and $ALOS_i$ is the average length of hospitalization for i hospital.

Table 24: Roemer Index

YEAR	HAGIA SOPHIA	AGLAIA KYRIAKOU	PAIDON PENTELI	KARAMANDANEIO
2017	3.85	3.04	2.16	2.34
2018	4.11	3.24	2.06	2.35
2019	4.25	3.27	2.39	2.45
2020	2.77	2.99	1.26	1.78
2021	2.90	2.24	1.24	1.43
2022	3.29	3.69	1.83	1.98
<i>AVERAGE</i>	<i>3.53</i>	<i>3.08</i>	<i>1.82</i>	<i>2.05</i>

As far as the Roemer index is concerned, the two pediatric hospitals in Athens have higher averages compared to "Penteli Children's Hospital" and "Karamandaneio". This is likely due to the handling of more serious cases by the capital's hospitals. In addition, during the pandemic, in 2020 and 2021, the values of the

Roemer index in these hospitals were noticeably higher, indicating that they took over the bulk of the most demanding cases.

6. Conclusions

The study analyzes the financial situation of public pediatric hospitals in Greece during the period 2017-2022, focusing on the Covid-19 pandemic, just as the country was emerging from the economic crisis. The need for efficient management of resources is stressed, as well as the importance of financial analysis to ensure the sustainability and quality of the health services provided. Through indicators, the effectiveness of administrative decisions and the adaptability of hospitals to new challenges are assessed.

The analysis of the General and Special Liquidity indicators shows that all hospitals examined had sufficient funds to cover their short-term liabilities during the period 2017-2022. "Karamandaneio" presented the highest averages in both indices, with a notable increase in 2020, at the beginning of the pandemic. Correspondingly, "Penteli Children's Hospital" recorded a significant increase in 2021. The data shows that the pandemic affected the liquidity of hospitals in a different way and at a different pace.

The analysis of the activity indicators shows that public paediatric hospitals face difficulties in the timely collection of their claims, with long delays, mainly attributed to EOPYY payments. At the same time, they repay their short-term obligations much faster than they receive. The pandemic has had a negative impact on liquidity, increasing the time for the repayment of liabilities.

The circulation speed of stocks decreased in some hospitals in 2020 due to increased demand for medical supplies. However, asset and equity velocity indicators remained stable, suggesting that the pandemic did not significantly affect asset management. "Agia Sophia" showed the highest utilization of fixed assets, while the rest of the hospitals showed low performance in this sector.

The profitability analysis of pediatric hospitals shows that they all showed negative gross profit margins, indicating that operating costs exceed their revenues. The net profit margin index showed better prices, with "Agia Sophia" recording the highest, while "Karamandaneio" had consistently negative prices from 2020 onwards.

The return on equity index declined in 2020 due to the pandemic crisis, except for the "Penteli Children's Hospital", which recorded an increase, probably due to different management strategies. These data highlight the need for improved crisis management and adaptation of the operational strategy of paediatric hospitals to respond more effectively to health crises such as the pandemic.

An analysis of the capital structure of public paediatric hospitals shows that they rely mainly on equity and not on external borrowing. The high equity to foreign capital ratio confirms that their income comes from domestic resources, with the "Karamandaneio" recording the highest average value (21.21). This suggests that hospitals are not at risk of sustainability.

During the pandemic, the number of visits to regular outpatient clinics (TEIs) and Emergency Departments (EDs) decreased significantly in 2020 due to the temporary suspension of the operation of some clinics and the fear of transmission of the virus. The decrease continued until 2022, with exceptions such as "Aglaia Kyriakou" and "Karamandaneio", where visits increased in 2021 and 2022. A similar decline was recorded in the all-day operation of hospitals in 2020, but since 2021 a gradual return to normality has been recorded. This development underlines the importance of flexibility and innovation in crisis management.

The number of hospitalized patients and hospitalization days have decreased since 2017, with the largest decrease in 2020 due to the pandemic. Since 2021, there has been an increase in most hospitals, except for "Karamandaneio", where the increase began in 2022. However, no hospitals have returned to 2017 levels. The average length of hospitalization decreased everywhere in 2020, except for "Aglaia Kyriakou". "Karamandaneio" records the lowest average duration of hospitalization, probably due to the management of cases of lower severity.

Hospitalization days decreased significantly in 2020 due to the pandemic. Although the number of patients hospitalized in Attica's pediatric hospitals increased in 2021, there was no corresponding increase in hospitalization days. The average length of hospitalization decreased everywhere except for "Aglaia Kyriakou". "Karamandaneio" records the lowest average duration of hospitalization, probably due to higher efficiency or treatment of cases of lower severity.

Hospital occupancy decreased significantly in 2020. The hospitals "Penteli Children's Hospital", "Karamandaneio" and "Aglaiia Kyriakou" recorded low indicators, indicating the need to improve their efficiency. "Agia Sophia" had better occupancy, but there remains room for further improvement.

Pediatric hospitals in Athens record higher averages on the Roemer index compared to "Penteli Children's Hospital" and "Karamandaneio", probably due to the management of more serious cases. In addition, during the pandemic (2020-2021), the Roemer index showed noticeably higher values in the two largest hospitals in the capital, which suggests that they took over the main volume of the most demanding cases.

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