Republic of Iraq
Ministry of Higher Education
& Scientific Research
University of Babylon
College of Nursing

Factors Associated with Mortality and Recovery Rates of COVID-19 among Children and Adolescents through the Period 2020-2022

A Thesis Submitted

By

Ameer Kadhem Abed

To the Council College of Nursing, University of Babylon Partial Fulfillment of The Requirements For the Degree of Master in Nursing Sciences

Supervised by:

Prof. Nuhad Mohammed Aldoori, PhD

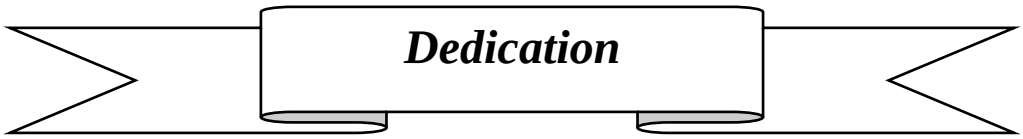
May.2023 AD **Safar.1445 AH**

((يَا أَيُّهَا النَّاسُ قَدْ جَاءَتْكُمْ مَوْعِظَةٌ مِنْ رَبِّكُمْ وَشِفَاءٌ لِمَا فِي الصُّدُورِ وَهُدًى وَرَحْمَةٌ لِلْمُؤْمِنِينَ))

صدَّقَ ٱللّه ،ٱلعَلِيُّ ٱلعَظِيمْ

سورة يونس

الآية 57



I dedicate this achievement to my father, my mother and my wife, their love and effort have accompanied me in this process, without hesitating at any moment of seeing my dreams come true, which are also their dreams.

To my siblings & friends, who have been my support in the difficulties.

To the candle of hope that lit the path of researchers, Dr. Hussein Al-Ibrahimi (Mercy and forgiveness for his soul), we have missed your presence so much, but you are alive in our minds. We ask Allah to make you a companion to his righteous saints in the gardens of bliss.

Ameer Kadhem 2023

Supervisor Certificate

I certify that this thesis, entitled (**Factors Associated with Mortality and Recovery Rates of COVID-19 among Children and Adolescents through the Period 2020-2022**) submitted by **Ameer Kadhem Abed** and prepared under my supervision and guidance at the Department of Pediatric, College of Nursing, University of Babylon as partial fulfillment of requirements for the Degree of Master Sciences in Nursing.

Signature

Supervisor

Ph.D., Pediatric Nursing

Prof. Dr. Nuhad Mohammed Aldoori

College of Nursing

University of Babylon

Date: / /2023

Signature

Asst. Prof. Dr. Wafaa Ahmed Ameen

Head of Department of Pediatric Nursing

College of Nursing

University of Babylon

Date: / / 2023

Committee Certification

We the members of a Thesis Discussion Committee, certify that we have reviewed the thesis (**Factors Associated with Mortality and Recovery Rates of COVID-19 among Children and Adolescents through the Period 2020-2022**) carried out by "Ameer Kadhem Abed" and examined the student in its contents, and what is related to it on / / 2023

We decide that the thesis is accepted as partial fulfillment for awarding the degree of Master in Nursing Sciences with a specialty in pediatric Nursing and the estimate of ( ).

Signature

Member

Asst. Prof. Dr.

Ahmed Abdullah Abed

Date: / / 2023

Signature

Member

Asst. Prof. Dr.

Mohammed Ramadhan AbdAli

Date: / / 2023

Signature

Chairman

Prof. Salma K. Jihad, PhD

Date: / / 2023

Approved by the council of the college of nursing

Signature

Prof. Amean Ageel Yasir, PhD

Dean of the College of Nursing,

University of Babylon

Date: / / 2023

Acknowledgments

Praise to the Almighty Allah, the glorious creator of the universe, for his kindness and mercy, and blessing upon Mohammad the prophet our first master.

I would like to express my sincere thanks to ***Prof. Dr. Ameen Ajeel AlYasiri****, Dean of the College of Nursing, University of Babylon.*

It is a pleasure to express my deep appreciation to my supervisor ***Prof. Dr. Nuhad Mohammed Kassim*** *for her valuable guidance, assistance, cooperation, and motivation throughout the course of my thesis preparation.*

I gratefully acknowledge the endless generosity of the ***experts*** *who kept me on the right track for their time and expertise in reviewing and evaluating the study instrument.*

Thanks, and gratitude is also extended to ***all teachers in my college and experts****, also* ***the employees of isolation units and statistic department*** *for their help, advice, and comments regarding the study.*

Moreover, I would like to thank ***the Babylon Health Directorate*** *and* ***the creditors*** *in this study who helped me in making this thesis possible to be accomplished. Without whom this effort work would never have come to fruition.*

Finally, I pray to Allah (the great and almighty) to bless them al

Abstract

Background: The coronavirus disease is a worldwide universal outbreak occurrence named an ongoing illness as one of the most fatal infectious diseases in the world, which started in December 2019 in the Hubei province in the Chinese. Generally, certain risk factors that increase the incidence of infection include the male gender, age, and any underlying medical conditions such as kidney disease, chronic lung disease, cancer, and other. When children and adolescents are hospitalized, the chance of developing a serious illness from COVID-19 is increased by the existence of underlying medical disorders.

Material and Methods: This study aims to assess factors associated with mortality and recovery rates of COVID-19 among children and adolescents. Descriptive analytic study design was used during the period from 15th October 2022 to 14th May 2023. Data were collected retrospectively by using related medical records, and statistic division, which include (287) patients aged from birth -20 years with COVID-19 infectious in six main hospitals for isolation units such as Marjan medical city, Babil teaching hospital for maternity and children, AL-Imam Sadiq Teaching Hospital, Al -Qassim General Hospital, Al-Noor Children's Hospital, and Ibn Saif Children's Hospital at Babil province and constructed questionnaire for purpose of the study.

Results of the Study: The majority of children and adolescents are between the ages of (1 - 20) years with a mean of age (11.17) years. The study shows more than half (53.3%) are male with 51.6% of patients being from rural areas. The overall majority (83.3%) of the sample was recovered from the particular virus, with statistically significant differences in the COVID-19 mortality rate based on their ages. There is a relationship between the mortality rate of COVID-19 and each of gender, residence, and the duration of hospitalization.

Conclusions and Recommendations: The study concludes that there is a significant effect of COVID-19 on the mortality and recovery rates of children and adolescents. It is recommended to activate the roles of pediatric nurses and other healthcare workers in isolation units should be attentive in providing health care for children and adolescents with COVID-19 or any other pandemics to modify effective management and prevent its transmission between others such as early isolation, and complication prevention whether now or any other pandemic in the future.

List of Contents

List of Figures

List of Tables

List of Abbreviation and Symbols

No.	Item	Meaning
1.	AECB	Acute Exacerbation of Chronic Bronchitis
2.	AKI	Acute Kidney Injury
3.	ARDS	Acute Respiratory Distress Syndrome
4.	*et al*.,	And Others
5.	ARBs	Angiotensin Receptor Blockers
6.	ACE2	Angiotensin-Converting Enzyme 2
7.	Ass.	Assessment
8.	β	Beta
9.	CDC	Centers for Disease Control and Prevention
10.	COPD	Chronic Obstructive Pulmonary Disease
11.	CT	Computed Tomography
12.	CI	Confidence Interval
13.	COVID-19	Coronavirus Disease-2019
14.	R	Correlation Coefficient
15.	CRP	C-Reactive Protein
16.	D.F	Degree Freedom
17.	E.g.,	Exempli Gratia
18.	F	Frequency
19.	HCWs	Healthcare Workers
20.	HCoV-HKU1	Human Coronavirus- HKU1
21.	HCoV-NL63	Human Coronavirus NL63
22.	HCoV-OC43	Human Coronavirus OC43
23.	KD	Kawasaki Disease
24.	LoHS	Length of Hospital Stay

25.	M	Mean
26.	MERS-CoV	Middle Eastern Respiratory Syndrome Coronavirus
27.	IFN-I	Insufficient Class I Interferon
28.	≤	≤ Equal or less than
29.	MIS-C	Multisystem Inflammatory Syndrome in Children
30.	NK cells	Natural Killer Cells
31.	N	Number
32.	OR	Odd Ratio
33.	OC	Organ Culture
34.	PIMS-TS	Pediatric Multisystem Inflammatory Syndrome Temporally Associated with SARS-CoV-2
35.	%	Percentage
36.	PCR	Polymerase Chain Reaction
37.	PMNs	Polymorphonuclear Leukocytes
38.	RAAS	Renin Angiotensin Aldosterone System
39.	RT-PCR	Reverse Transcription Polymerase Chain Reaction
40.	RdRp	RNA-Dependent RNA Polymerase
41.	SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus 2
42.	SARS-HCoV	Severe Acute Respiratory Syndrome-Human Coronavirus
43.	Sig	Significant
44.	+ssRNA	Single-Stranded RNA Virus
45.	SD	Standard Deviation
46.	SPSS	Statistical Package for the Social Sciences
47.	TMPRSS2	Transmembrane Protease Serine 2
48.	IFN-I	Type I Interferon
49.	WHO	World Health Organization
50.	WHCV	WH-Human 1 Coronavirus

List of Appendices

Chapter One

Introduction

Chapter One

Introduction

1.1. Introduction

The coronavirus disease-19 is a worldwide outbreak named an ongoing illness of one of the most fatal types of infectious diseases in the world. Starting in December 2019, a novel coronavirus called "severe acute respiratory syndrome coronavirus 2 (SARS-C oV-2) " was first discovered to be the source of a group of atypical pneumonia cases in the Hubei province in the Chinese city of Wuhan. According to the World Health Organization the virus spread quickly over the world that became a global pandemic known as coronavirus disease 2019 (COVID-19) (WHO, 2020).

The coronavirus is known because of its distinctive characteristic solar corona (crown-like) or spherical appearance when watched under an electron microscope, it was made up of a crown of club-shaped peplomers or spikes on top of an outer layer of lipid. Each spike contains a structural protein-containing-helical single-stranded RNA (Chan *et al*., 2020).

The percentage of confirmed cases among children and adolescents was relatively low in the early stages of the COVID-19 pandemic. It was believed that SARS-CoV-2 rarely impacted children or adolescents (Ladhani *et al*., 2020; Parri *et al*., 2020). Children and adolescents are at risk for COVID-19 infection, according to a study conducted after the high prevalence among patients. However, a high ratio of children and adolescents are either symptomatic or asymptomatic. Therefore, because of the low prevalence of examine in children, the true frequency of infection is understated (Bi *et al*., 2020; Wu and McGoogan, 2020).

Factors associated with the mortality of COVID-19 among children and adolescents are not well described. Generally, risk factors that increase the incidence of infection include the male gender, age, and any underlying medical

conditions such as kidney disease, diabetes mellitus, chronic lung disease, cancer, neurologic problems, cardiovascular disease, and immunosuppression (Tracker, 2021). When children and adolescents are hospitalized, the chance of developing a serious illness from COVID-19 is increased by the existence of underlying medical disorders. In addition, "Multisystem inflammatory syndrome in children" (MIS-C), which primarily affects previously healthy school-aged children, can develop in children who have been infected with the SARS-CoV-2 infection (Ko *et al*., 2021; Shekerdemian *et al*., 2020)

The clinical characteristics of coronavirus patients in general form, vary from mild symptoms in some patients to severe symptoms in others. Mild symptoms include headache, dyspnea, fever, tachypnea, anorexia, diarrhea, vomiting, Loss of taste and smell, cough, sore throat, and fatigue. In some children and adolescents, the virus may cause severe complications, such as renal disorders, gastrointestinal disorders, neurologic disorders, pneumonia, multisystem inflammatory syndrome, and acute respiratory failure, or multi-system organ failure (Alqahtani *et al*., 2020; Feigin *et al*., 2003).

The most risky indicators experienced by children with SARS-CoV-2 include: fever, cough, fatigue, headache, dyspnea, cough, sore throat, diarrhea, vomiting, rhinorrhea, expectoration, and pharyngalgia. Other symptoms such as cyanosis, malaise, restlessness, bad appetite, poor feeding, and reduced activity also present as the disease progresses (Chen *et al*., 2020). Respiratory failure may also be encountered in most severe cases, especially in younger patients, causing unresponsiveness to oxygen therapy, septic shock, metabolic acidosis, impaired renal function, and other health complications (Wang and Zhang, 2020).

Thus, it was discovered that most children and adolescents with severe acute respiratory syndrome coronavirus -2 (SARS-CoV-2) are asymptomatic or just mildly unwell at the beginning of the coronavirus disease 2019 (COVID-19) pandemic. The epidemiologic and clinical features of children and adolescents with

severe acute respiratory infections as well as the actual prevalence of asymptomatic SARS-COV 2 infection are probably underestimated, despite the fact that asymptomatic youngsters are less commonly studied (Dong *et al*., 2020).

Generally, hospitalization and life-threatening outcomes are less likely among children and adolescents with COVID-19 compared to old ages. However, instances of severe illness or post-infectious may develop into multisystem hyperinflammatory syndrome known as "a multisystem inflammatory syndrome in children (MIS-C)" have been reported in several cases of babies with COVID-19 (Biglari *et al*., 2021).

However, mortalities of children and adolescents because of multiple organ failures such as chronic lung failure, heart failure, renal failure, shock, and additionally, male sex, age, history of obesity, hypertension, secondary infection, diabetes mellitus, and malignancy were associated with an increased risk of hospitalization/ fatalities (Huang *et al*., 2020). Despite those consequences – as measures have been taken to prevent the virus from spreading, including maintaining social isolation and a state of lockdown, staying at home and limiting travel, donning a well-fitted face mask, and routinely washing hands with sanitizer or soap and water (Girum *et al*., 2021; Liu *et al*., 2020).

Processes of SARS-CoV-2 infection transmission in children and adolescents. During the COVID-19 emerging phase, the infection starts from the community-wide person-to-person transmission, nearly exclusively in adults. The virus also transmits within the family, particularly to older adults and young children who are more vulnerable to infection if a baby is delivered vaginally to a mother who has a proven infection, a perinatal infection may result (Team, 2020).

The possibility of transmission from a person infected with SARS-CoV-2 who is asymptomatic is less than the risk from a symptomatic person. Therefore, early studies discovered that children's milder manifestations do not contribute significantly to the transmission of the SARS-CoV-2 virus. Yet, a more recent

study raises questions about the possibility that children could spread the infection. (DeBiasi & Delaney, 2021).

Additionally, studies have shown that social isolation strategies such as closing schools have a considerably smaller influence on SARS-CoV-2 transfer as compared to various isolation strategies. In the past months, new variants of COVID-19 have emerged with higher transmissibility and increased impact on morbidity and mortality. The children role and adolescents in transmitting the dynamics of COVID-19 variants to reduce mortality and morbidity among them must be understood (Li *et al*., 2021).

Although there are currently more than 110 million COVID-19 cases worldwide, little information is available regarding the transmission of COVID-19 to newborns by infected pregnant women. There is a lack of knowledge regarding the clinical course and effects of infected neonates, particularly preterm newborns. The COVID-19 infection in preterm infants is an exclusive subgroup of all COVID-19 infections worldwide Considering its distinct difficulties (JHU, 2021).

Several studies have shown that COVID-19 can spread between people through direct touch and nasal droplets in both symptomatic and asymptomatic patients. There is currently no approved vaccination or treatment that can effectively prevent or treat SARS-CoV-2 infections; therefore, certain preventative health actions can assist in resolving primary problems in patients including children with different age groups (Lauer *et al*., 2020; Xiao *et al*., 2020)

1.2. Importance of the Study:

On March 11, 2020, the World Health Organization (WHO) proclaimed the current COVID-19 disease a global pandemic (Cucinotta & Vanelli, 2020) after the initial incidence was confirmed in China's Hubei province in December 2019. Since then, there have been more than 475 million verified COVID-19 cases worldwide, with about 6 million fatalities as of March 24, 2022 (WHO, 2022).

Wuhan City, Hubei Province, reported the first case of atypical unexplained pneumonia in December 2019. The spread of the disease started in the seafood market of Wuhan, China, after which it was diagnosed and named COVID-19 according to WHO. Patients suffer from high fevers (over 39 C°), dry coughs, lethargy, fatigue, and breathing problems (Wu *et al*., 2020; Zhu *et al*., 2020). It quickly spread to other east Asian countries, and then to the middle east and Europe. In severe situations, the disease causes MIS-C, pneumonia, metabolic acidosis, septic shock, and hemorrhage (WHO, 2020).

According to estimates, 7% of children and adolescents with COVID-19 are admitted to hospitals, and 28% to 33% of those children need intensive care (Bailey *et al*., 2021; Preston *et al*., 2021). Although over 2% of COVID-19 cases reported involved people under 20 years, As of April 13, 2021, the US Centers for Disease Control and Prevention (CDC) has received reports of more than 2.8 million cases and 377 fatalities linked to SARS-CoV-2 in the US youth and children less than 18 years (Kim *et al*., 2020).

According to the World Health Organization (WHO) report, coronavirus epidemics (SARS-CoVs) began to spread in south China, Guangdong city, in 2002, producing shortness of breath, high fever, and pneumonia before quick spreading to other parts of the world, whereas MERS-CoV was initially discovered in 2012 in Saudi Arabia (Padron-Regalado, 2020).

There is little information available regarding the clinical state and underlying health complications in pediatric decedent cases due to the low number of SARS-CoV-2-associated deaths among individuals under 20 years of age as compared to adult deaths (Leidman *et al*., 2021). Therefore, the researchers conducted an early study to review the data regarding the demographics, clinical features, and consequences seen in children and adolescents with SARS-CoV-2 who died and recovered in the US between February 12 and July 31, 2020. This

was done due to the pandemic and rising cases and hospitalizations in people under 20 years old (Levin *et al*., 2021).

In Iraq, the first confirmed case of COVID-19 infection was discovered in a student from Iran who arrived in Najaf province on 24 February 2020, then detected four infected from one family in the Kirkuk governorate, who traveled to Iran on February 25. On February 27 in Baghdad, another case involving a patient who had recently visited Iran was noted (Sarhan *et al*., 2020). As of March 12, 2020, there have been 74 confirmed cases and 8 fatalities across Iraq. The confirmed cases jumped to 1415 on 16 April 2020, with 78 fatalities recorded. By 24 May 2020, the number of confirmed cases of COVID-19 reached 4469 and reported 160 deaths, while 2738 patients recovered from the infection (Khalil *et al*., 2020).

All cases were diagnosed in Iraq from the beginning of the COVID-19 pandemic from confirmed cases (2469497) on 25 December 2022, with (25374) mortalities and a recovery percent of 98.9% (2444123) recorded, Iraq is first in the Arab world and 27th globally in terms of the number of confirmed cases. All studies currently aim to publish and adhere to prevention methods and adopt them as the basis for behaviors to prevent the spread of another wave of virus infections (world meter, 2022).

The virus that causes coronavirus disease 2019 (COVID-19) is typically asymptomatic or mild, with recovery expected within 1 to 2 weeks in healthy children under twenty years of age and increases the severity of this infection with factors associated (Ludvigsson, 2020; Zhang *et al*., 2020). According to serologic studies, 50% of children who were confirmed for SARS-CoV-2 report having no symptoms. Although anosmia/ageusia is uncommon in children, it is the best indicator of a positive SARS-CoV-2 test (Suratannon *et al*., 2020).

The expected incubation period ranges from 5 to 14 days, and it may differ from patient to patient depending on their ages and prior infection history (Helmy *et al*., 2020). On March 16, 2020, the illness spread to more than 150 nations and territories. In the previous few months, there's been a significant increase in COVID-19 situations (Lauer *et al*., 2020).

Besides, important elements of COVID-19 management included early diagnosis, prompt isolation, general and effective supportive care, and infection prevention and control (Liu and Liu, 2020). Additionally, receiving a vaccination has been suggested as another step to minimize the impact of COVID-19. As a result, as of March 17, 2022, more than 10.9 billion vaccination doses have been given. However, even though numerous strategies are being used to battle this pandemic, its effects on the entire world are still unknown. The health system's biggest obstacles to controlling the pandemic include viral mutation, the creation of novel varieties and resistance, and ambiguous routes of transmission (Chavda *et al*., 2022).

Finally, early findings from COVID-19 vaccine studies show excellent efficacy and tolerance in young patients. Therefore, the Centers for Disease Control and Prevention (CDC) and other health organizations in the United States have recommended immunization for children aged 12 and older to protect them, but largely to help achieve herd immunity (DeBiasi and Delaney, 2021).

1.3. Statement of the Problem:

Factors Associated with Mortality and Recovery Rates of COVID-19 among Children and Adolescents through the Period 2020-2022

Some children die as a result of communicable diseases, which have a significant impact on society as a whole, this study is conducted on the factors associated with mortality and recovery rates of COVID-19 cases among children and adolescents in the Babylon province to identify the extension of the disease

and effect on children as well as adolescents of all ages and in all countries are seriously suffering from the consequences of the pandemic. COVID-19-related measures are having a profound effect on their health and well-being and for some, the impact will be lifelong. Children and adolescents who have chronic diseases or impaired immune systems are more likely to contract infectious diseases such as COVID-19.

1.4. Objectives of the Study to:

1.4.1. Determining the mortality and recovery rates of COVID-19 among children and adolescents through the period 2020-2022.

1.4.2. Identifying the factors associated with the mortality of COVID-19 among children and adolescents through the period 2020-2022.

1.4.3. Finding out the difference between age groups in terms of mortality and recovery rates.

1.4.4. Identifying if the cause of death, number of chronic diseases, signs and symptoms, risk factors, and complications can predict the mortality rate.

1.5. Hypothesis:

1.5. A. Null hypothesis: there is no significant relationship between factors associated of mortality rate and COVID-19 among children and adolescents of the sample.at $p \leq 0.05$.

1.5. B. Alternative hypothesis: there is a significant relationship between factors associated of mortality rate and COVID-19 among children and adolescents of the sample.at $p \leq 0.05$.

1.6. Definition of Terms:

1.6.1. Factors Associated:

1.6.1. A. Theoretical Definition

Something that increases a person's chances of developing a disease (E medicine health, 2022).

1.6.1. B. Operational Definition

It refers to the factors that increase the risk of COVID-19 mortality among childhood age groups.

1.6.2. Mortality Rate:

1.6.2. A. Theoretical Definition

It is a measurement of the frequency of deaths occurring in a particular population over a certain time (E medicine health, 2022).

1.6.2. B. Operational Definition:

The number of deaths in an area or period due to COVID-19 infection.

1.6.3. Recovery Rate:

1.6.3. A. Theoretical Definition:

The process of becoming well again after an illness or injury (Oxford dictionaries, 2022).

1.6.3. B. Operational Definition:

The ratio of the number of recoveries after COVID-19 infection.

1.6.4. Coronavirus Disease-19:

1.6.4. A. Theoretical Definition:

It is an infectious respiratory disease caused by the SARS-CoV-2 virus (WHO, 2020).

1.6.4. B. Operational Definition:

A highly contagious disease may cause organ failure and be life-threatening in children and adolescents.

Chapter Tow

Review of Literature

Chapter Two

Review of Literature

This chapter provides a summary of nearly all pertinent and available literature on factors associated with mortality and recovery rates of the COVID-19 pandemic among children and adolescents in the following manner:

2.1. COVID-19: General Overview

The coronavirus is an enveloped RNA virus that causes human respiratory diseases, such as "severe acute respiratory syndrome (SARS)", pneumonia, and acute exacerbation of chronic bronchitis (AECB). The SARS-CoV epidemic is one of the notable coronavirus-related human infections that caused great social panic in 2003 (Bian *et al*., 2013). Currently, the world is battling with the suppression of another novel coronavirus called SARS-CoV-2 which was first reported in Wuhan, China in 2019 (Zhu *et al*., 2020).

The SARS-CoV -2 is an original human virus that can infect numerous host species, including children and old people (Fung & Liu, 2019). The causative virus, SARS-CoV-2, was identified as a unique strain of coronaviruses that shares 80% genetic similarity with SARS-CoV from the 2003 SARS outbreak, that on 11 Mar 2020, the WHO declared the outbreak a global pandemic (Anand *et al*., 2020).

Infections with SARS-CoV-2 in children and adolescents often result in less severe illness and fewer fatalities than infections in adults. While a milder course of infection is a good sign, weaker symptoms might have led to less testing. Therefore, leading to fewer situations of SARS-CoV-2 infections in children and adolescents are found. (Liu *et al*., 2020).

Children and adolescents who transmit the disease even if they were mild or asymptomatic may also contribute to transmission in the community. Therefore, Understanding the signs, spread, and dynamics of SARS-CoV-2 transfer in

children and adolescents is important for creating, improving, and developing COVID-19 disease prevention strategies, especially considering that children under the age of 12 are not now eligible for or authorized to receive an immunization (Hoang *et al*., 2020; Morand *et al*., 2020).

Children and adolescents with severe infection and extended COVID-19 symptoms are sometimes led to having post-COVID conditions or post-acute complications of SARS-CoV-2 infection. However, the frequency and features of these conditions are still being studied. Due to insufficient follow-up and the lack of studies with control groups, the prevalence, features, and outcome of persistent symptoms following SARS-CoV-2 disease are still unknown (Buonsenso *et al*., 2021).

In addition, hyperinflammatory syndrome, called pediatric multisystem inflammatory syndrome temporally associated with SARS-CoV-2 (PIMS-TS) in Europe and pediatric multisystem inflammatory syndrome (MIS-C) in the United States, can complicate recovery from COVID-19. The severity of illness caused by new variants of SARS-CoV-2 in children and adolescents, compared to previous strains, is still under investigation (WHO, 2020).

Several elements of the world, governmental, and private economy have also undergone significant impacted as a result of the quickly changing environment due to the COVID-19 pandemic, also there have been documented declines in the travel, airline, agricultural, and money industries. Moreover, governments around the world were forced to drastically reduce both supply and demand in the economy (Nicola *et al*., 2020).

2.2. COVID-19: Historical Overview

The avian infectious bronchitis virus, the first coronavirus to be discovered, was isolated in 1937 and considered as the cause of devastating infections in chickens. In 1965, Tyrrell and Bynoe identified the first human coronavirus from

the nasal cavity and cultivated it on human ciliated embryonic trachea cells in vitro. Since at least 500–800 years ago, coronaviruses have been discovered in humans; they were all first discovered in bats (Yang *et al*., 2020; Su *et al*., 2016; Berry *et al*., 2015).

The first discovery of a human coronavirus was in 1965 when Tyrrell and Bynoe (1965) isolated a virus from a male child's nasal wash from that time and began the evolution of human coronaviruses. The child had typical signs and symptoms of a common cold, and the wash was found to be able to induce colds in challenged intranasal volunteers. The virus, named B814 (after the nasal lavage number), could be grown in the tissues of human embryonic tracheal organs but not in cell lines used at the time to grow other known causative agents of the common cold. However, at that time Tyrrell and Bynoe were unable to develop the agent in tissue culture (Tyrrell and Bynoe, 1966).

At approximately the same time, Hamre and Procknow were successful in growing a virus with specific features in tissue culture by using samples taken from sick medical students with common colds. B814 and the virus that Hamre identified as 229E were both ether sensitive and thus presumably required a lipid coat for infection, but these two viruses were not related to any myxoviruses or paramyxoviruses. (Hamre and Procknow, 1966).

While studying there at the National Institutes of Health in Robert Chanock's lab, (McIntosh *et al*., 1967) reported the recovery of several ether-sensitive agent strains from the human respiratory system using a similar technique to Tyrrell and Bynoe's. These viruses were given the designation Organ culture (OC) to indicate that they had been developed in organ cultures.

In the same period of the above studies, (Almeida and Tyrrell, 1967) when Almeida and Tyrrell employed electron microscopy to examine liquids from organ cultures infected with B814, they discovered particles that matched the chicken infectious bronchitis virus. The membrane-coated, medium-sized (80–150 nm),

pleomorphic particles have widely dispersed club-shaped surface projections on them. The morphology of the 229E agent discovered by Hamre and Procknow2 and the earlier OC viruses discovered by (McIntosh *et al*., 1967) were similar.

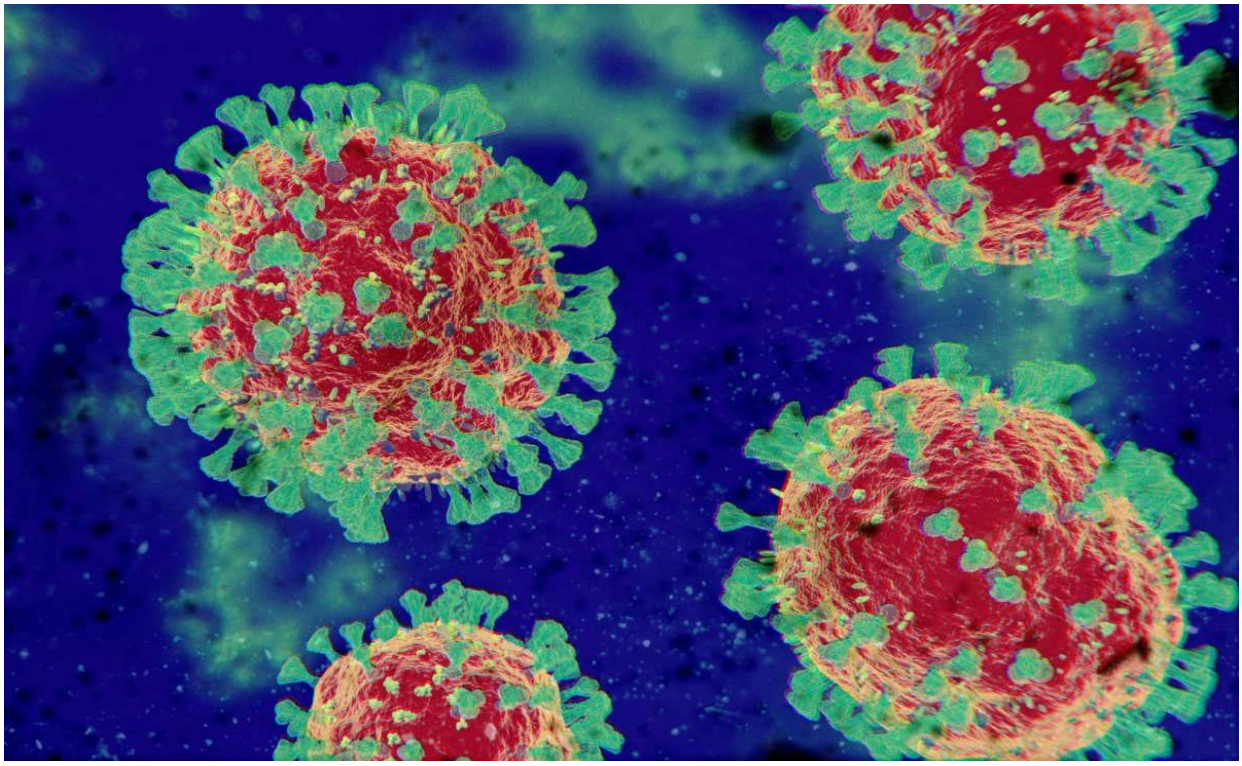


Figure (2-1) Coronavirus (Mao *et al*., 2020).

Tyrrell oversaw a team of virologists working on human strains and a few animal viruses in the late 1967s. These included the transmissible gastroenteritis virus of swine, mouse hepatitis virus, and infectious bronchitis virus, all of which had been shown to have the same morphology as seen under an electron microscope (Witte *et al*., 1968; McIntosh *et al*., 1967). A new type of virus resembling a crown or spherical appeared under an electron microscope. This novel group of viruses was named Coronavirus and was eventually identified as a new genus of viruses (Tyrrell *et al*., 1975).

As a result of ongoing studies utilizing serologic methods, there is a significant amount of knowledge on the epidemiology of new respiratory coronaviruses. It was observed that respiratory coronavirus infections are more common in the spring and winter months than in the summer and fall in temperate

areas. studies showed that during epidemics, coronavirus infections can account for up to 35% of all respiratory viral activity. Overall, 15% of adult common colds were thought to be caused by coronaviruses (McIntosh *et al*., 1970).

There are four human coronaviruses known to cause the common cold or upper respiratory illnesses in humans: 229E, HKU1, NL63, and OC43 (Fung & Liu, 2019). Nevertheless, the recently identified coronaviruses SARS-CoV (2002) and MERS-CoV (2012), which caused severe acute respiratory illnesses and nosocomial outbreaks, fundamentally changed all previously understood methods for combating this virus family. Around the end of 2019, discovered a new coronavirus that is now known as SARS-CoV-2 (2019) suddenly in Wuhan, China. On January 31, 2020, the World Health Organization called the outbreak a public health emergency of global concern. On the 16th of April 2020, approximately 2 million confirmed cases and over 137 thousand mortalities have been reported as a result of the new coronavirus infection COVID-19 (Fung and Liu, 2019).

2.3. Epidemiology of the Pandemic

According to WHO statistics, more than 234,073 laboratory-confirmed Covid-19 cases had been recognized and reported globally, on March 20, 2020. Although the majority of the initial cases were in mainland China, the pandemic there started to slow down in late February, at the same time as other countries started to experience an increase in cases. Beginning on February 25, newer confirmed and suspected many cases of Covid-19 were diagnosed daily in countries other than China's mainland; A week later, the daily mortality rate outside of mainland China started to exceed the rate within the country, and On March 16, 2020, the total of cases outside of mainland China exceeded the number of cases within China. The pandemic center is currently in Europe, and as of March 20, WHO had documented 9,840 mortalities around the world from Covid-19, according to the risk assessment by (WHO, 2020).

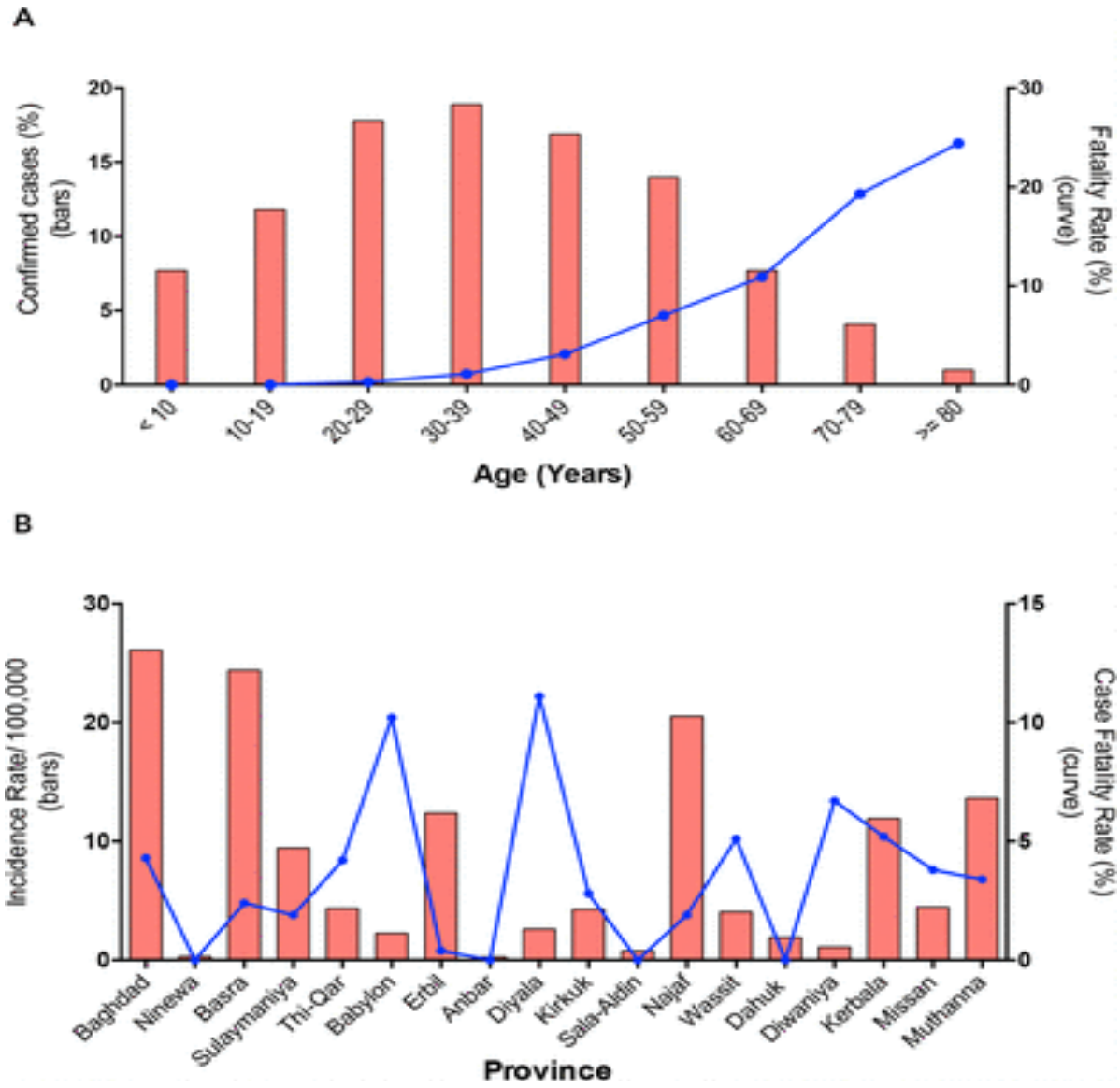


Figure (2-2): Coronavirus disease-19 cases and indicators by province and age (Sarhan *et al*., 2020).

COVID-19 has been found to have higher levels of transmissibility and pandemic risk than the SARS-CoV, as the effective reproductive number of COVID-19 (3.28) is estimated to be higher than the reported effective reproduction number of SARS (1.77) at this early stage. The most crucial factor in determining intrinsic transmissibility is the effective reproduction number, which is model-based and heavily based on the epidemiological setting. Most of the early outbreak data show exponential development (Liu *et al*., 2020).

For the detection of the infection source of COVID-19, China CDC researchers collected 585 environmental samples from the Huanan Seafood Market in Wuhan, Hubei Province, China on 1 January and 12 January 2020. They detected 33 samples containing SARS-CoV-2 and indicated that they originated from wild animals sold in the market (CDC, 2020).

Coronaviruses are a major cause of mild, self-limiting infections of upper respiratory system like the common cold and pneumonia, along with influenza, parainfluenza, RSV, and rhinoviruses (Pillaiyar *et al*., 2020). One-third of cold cases are related to it. Additionally, coronaviruses can also cause gastroenteritis in humans and also several diseases in other animals. SARS-CoV-2, MERS-CoV, and SARS-CoV can all lead to severe acute respiratory illness, multi-organ dysfunction, and/or mortality, unlike the other coronaviruses that are pathogenic in humans. (Berry *et al*., 2015; Su *et al*., 2016).

There is a worldwide problem due to the virus's quick spread and simplicity of transmission. According to researchers, the virus may only be a little risk to an individual's health, but because it is quickly transmitted, it constitutes a serious risk to all humans. The SARS-CoV-2 infection should be carefully monitored to track its future body adaptation, development of viral, infectiousness, pathogenicity, and risk of transmission (Huang *et al*., 2020).

2.4. Transmission of COVID-19

Three factors are necessary for the spread of infectious diseases: the origins of the infection, the transmission routes, and the vulnerable hosts. More SARS-CoV2 epidemiologic traits have been identified as COVID-19 spreads. We compared SARS-CoV 2 transmission characteristics with those of SARS-CoV, MERS-CoV, and other recently published literature. These three coronaviruses have caused three epidemics, all of which have a connection to markets for wild animals. According to definitions, SARS and MERS are zoonotic illnesses that are

spread by intermediary hosts (dromedary camels and palm civets respectively) (Lu *et al*., 2020).

Although the virus is believed to have originated in certain animals, human-to-human transmission is the main method of transmission for SARS-CoV-2 this is also similar to that of SARS-CoV and MERS - CoV. The main transmission of the virus is by direct transmission through droplets from the patient during coughing or sneezing and indirect transmission by touching contaminated surfaces and tools, and then touching your mouth, nose, or eyes. Nevertheless, to control disease in the population, alternative potential transmission routes must be explained or excluded. (WHO, 2020).

2.4.1. Airborne Transmission

The primary routes of virus transmission during the viremic stage of the disease are direct contact with infected individuals or inhalation of airborne respiratory secretions (droplets). When an infected person coughs, sneezes, or talks, a virus that has been released into their respiratory secretions can spread to another person if it comes into contact with their mucous membranes; infection can also happen if someone contacts a contaminated surface and subsequently touches their eyes, nose, or mouth. Normally, droplets don't reach more than two meters (about six feet) (Lai *et al*., 2020).

Additionally, the human conjunctival epithelium can become contaminated by infectious droplets and fluids, which can cause ocular disorders in infected people that can progress to respiratory disease; this mechanism of transmission was observed in Wuhan, China (Lu *et al*., 2020).

2.4.2. Fecal Transmission

Late-stage virus persistence has been detected in anal swabs, serum, and blood, indicating additional shedding processes and the possibility for transfer via the oral-fecal or body fluid routes (Zhang *et al*., 2020).

2.4.3. Environmental Transmission

When susceptible people touch infected surfaces and subsequently touch their mucosa mostly in the mouth, nose, or eyes, the viruses present on those surfaces may become a new source of infection. Uncertainty still exists regarding the frequency and comparative relevance of this form of transmission. In environments with high viral contamination, it might have a higher chance of being a possible source of infection (e.g., in an infected person's home or medical setting). Environmental surfaces in patients' hospital rooms with COVID-19 have been described as being heavily contaminated with SARS-CoV-2. (Yung *et al*., 2020).

2.4.4. Maternal-Fetal Transmission

Another crucial point for transmission is when infected pregnant women transmit the disease to their fetuses intrauterinally or transplacentally. A study conducted on 38 pregnant COVID-19 patients found no evidence of mother-to-fetus transmission of the SARS-CoV-2 virus inside the uterus (Schwartz, 2020). According to studies, the risk of COVID-19 in pregnant women was normal on the fetus, in contrast to that of SARS and MERS. Another study examined the fact that there is no unambiguous proof of vertical transmission (Dashraath *et al*., 2020)

However, there is no evidence of vertical transmission, as demonstrated by the lack of viral discovery in amniotic fluid, cord blood, newborn throat swabs, and breastmilk samples collected from six pregnant women with the confirmed SARS-CoV-2 virus, as well as a systematic review of 35 studies (n = 77 infants of COVID - positive mothers), found no evidence of SARS-CoV-2 transmission (Yang *et al*., 2020).

Both the World Health Organization (WHO) and UNICEF currently advise mothers with suspected or confirmed COVID -19 initiate to the use of masks and adhere to recommendations on hygiene during breastfeeding to prevent transmission of SARS-CoV-2 transmission (Centeno-Tablante *et al*., 2021).

2.5. Structure and Classification of COVID-19:

COVID-19 is an enveloped and spherical particle, when viewed under an electron microscope, it seems to be (like a crown), that is around 120 nm in diameter and composed of a positive-sense single-stranded RNA genome. It belongs to the subfamily Coronavirinae, family Coronaviridae, and order Nidovirales (Chan *et al*., 2020).

Coronaviruses are composed of four main structural proteins, that include the glycoprotein (S) is a key antigen involved in cell fusion and receptor binding, and the another is a glycoprotein (M) is involved in budding and membrane formation, also the M protein has been demonstrated to be essential for virion formation. The viral genome is linked to the essential phosphoprotein nucleocapsid (N) inside the capsid. In addition to the latter type is the protein (E) is an extremely hydrophobic protein that encases the coronavirus's whole structure (Song *et al*., 2019).

The RNA genome of SARS-CoV-2 contains a 50 methyl-guanosine cap, poly (A)-tail, and 29,903 nucleotides according to WH-Human 1 coronavirus (WHCV) (Chan *et al*., 2020).

The family COVID-19 consists of two subgroups, they are Torovirinae, and Coronavirinae, and there are four genera divided in the subfamily Coronavirinae involve: A. Alpha coronavirus involve the human coronavirus NL63 (HCoV-NL63) and human coronavirus-229E (HCoV-229E), B. Beta coronavirus comprise severe acute respiratory syndrome-human coronavirus (SARS-HCoV), human coronavirus OC43 (HCoV-OC43), Middle Eastern respiratory syndrome coronavirus (MERS-CoV), and human coronavirus- HKU1 (HCoV-HKU1), C. Gamma-coronavirus contains viruses found in birds and whales, D. Delta-coronavirus involve the viruses identified from birds and pigs (Chen *et al*., 2020).

Currently two aggressive pathogens they are SARS-CoV and MERS-CoV, in addition to SARS-CoV-2, are all members of the Betacoronavirus family.

SARS-CoV-2 is an encased, positive-sense, single-stranded RNA virus (+ssRNA) (Kramer *et al*., 2006).

Coronaviruses can rapidly adapt to novel hosts during the processes of homologous mutation and evolution in vivo. Additionally, coronaviruses are RNA viruses, they are dependent on the enzyme RNA-dependent RNA polymerase (RdRp) to copy the viral genome. Due to this susceptibility, three conceptual human coronavirus types with the potential for epidemic spread emerged over the course of about two decades: (SARS-CoV-2, SARS-HCoV, and MERS-CoV) (Chen, 2020).

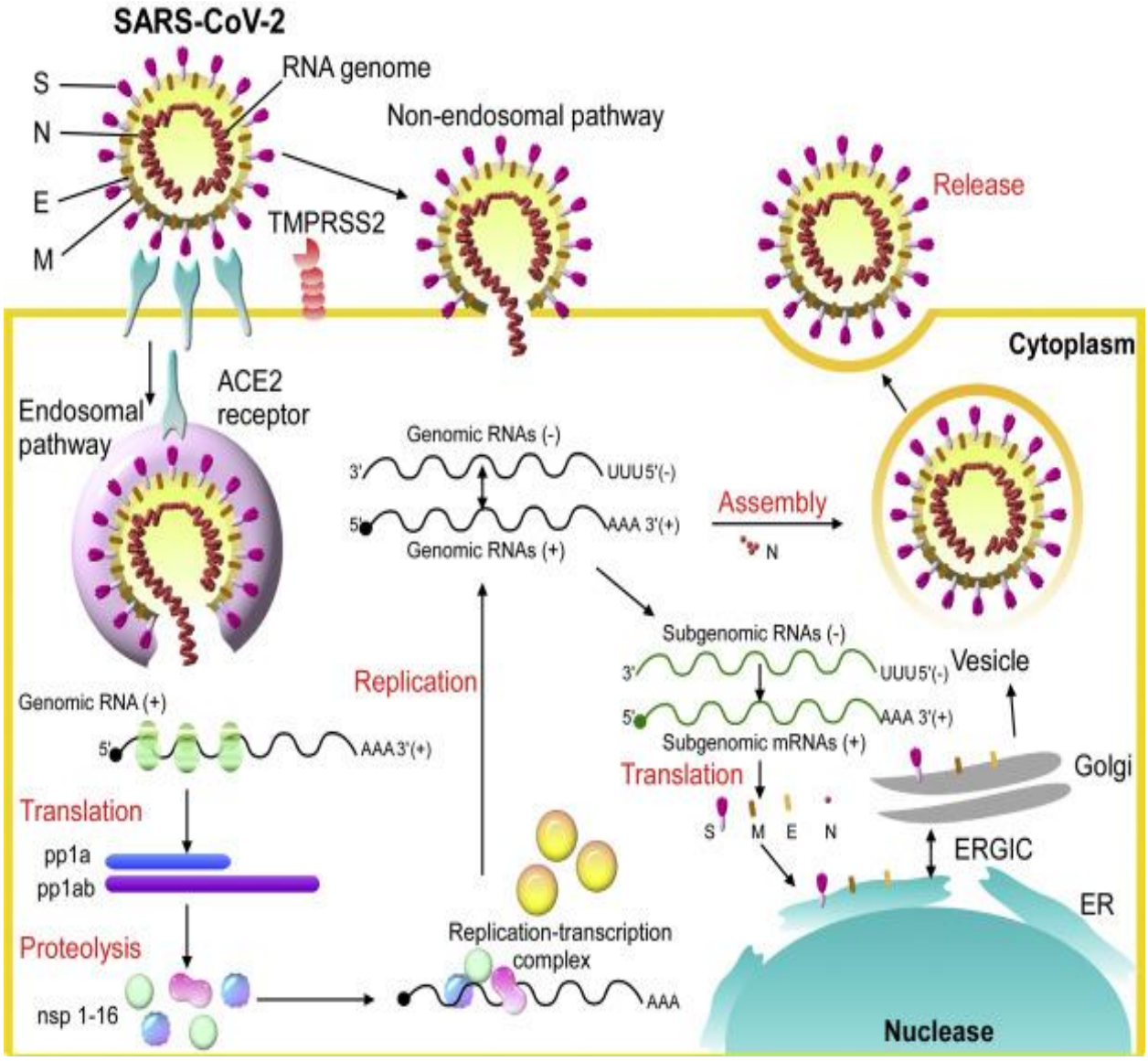


Figure (2-3) The potential life cycle of COVID-19 (Chen, 2020).

2.6. Host Risk Elements linked to Mortality of COVID-19 among Children and Adolescents:

Risk factors are variables that raise the possibility of illness or infection. The following are the most significant host variables for COVID-19 infection:

2.6. 1. Age

Age has been reported as an important factor associated with infection and severity in pediatric COVID-19 patients. SARS-CoV-2 can infect persons of any age; however, it is far less common in children under 20 years old, and it is usually asymptomatic in young people. Aging becomes a risk factor for the condition as COVID-19 rises with older age. (Chen *et al*., 2020).

Middle-aged persons are typically infected in the community, whereas older people are typically infected by hypoxia, dyspnea, and coughing from other sick family members and friends or hospitalization. Children and adolescents who have chronic diseases or impaired immune systems are more likely to contract contagious diseases. (Chan, *et al*., 2020).

Therefore, elderly individuals have a higher rate compared to the mortality rate in children, while the recovery rate is higher in children than in elderly persons. Due to lung function being negatively impacted by aging, and as a result, the acquired immune response takes longer to activate; the virus replication could increase, leading to more pro-inflammatory reactions and raising the chance of mortality. (Guan *et al*., 2020).

2.6.2. Gender

Among the factors associated for COVID-19 is that men are more susceptible to the SARS-CoV-2 virus. According to early pandemic reports from China, almost 60% of COVID-19 patients were men (Huang *et al*., 2020).

According to certain studies, male and female sexes have different hormonal effects on inflammatory processes and have varying degrees of cell receptors that

as the angiotensin- converting enzyme (ACE2), and particles that enable SARS-CoV-2 entry through virus-cell membrane fusion that as transmembrane protease serine 2 (TMPRSS2), and lifestyle habits, such as smoking and isolation non-compliance which may increase male susceptibility to COVID-19 infection (Gao *et al*., 2021).

2.6. 3. Smoking History

According to data, smoking greatly enhances the activation of the coronavirus-binding receptor angiotensin-converting enzyme, which may explain why smokers are exposure to more COVID-19 (Cai, 2020). Moreover, smoking is the primary cause of cardiovascular disease and chronic pulmonary obstructive disease (COPD), which have been identified as independent risk factors in severe COVID-19 patients. (Guan *et al*., 2020).

The primary receptor for the entrance of SARS-CoV-2 into human cells is the angiotensin-converting enzyme-2 (ACE2). This receptor is present on many cells including epithelial cells of the nasopharynx, placenta, lungs, intestine, renal, liver, testis, heart, blood vessels, and central nervous system. Between childhood and maturity, the expression of ACE2 increases in the nasal and lung epithelium (Muus *et al*., 2020; Li *et al*., 2020).

2.6. 4. kidney Disorders

The kidneys help in regulating body processes (homeostasis) through blood filtration, acid balance regulation, water and electrolyte balance, blood hormone levels regulation, as well as waste product elimination. Even though COVID-19 infection is mainly associated with acute respiratory failure and diffuse alveolar damage, it is important to explore the involvement of other body organs as well as the virus may find its way into the blood after infecting the lungs, thereby localizing in the kidney and give rise to renal cells damage (Valizadeh *et al*., 2020).

Coronavirus can enter cells via a mechanism mediated by the angiotensin-converting enzyme II receptors which are predominant in kidney cells. Acute kidney injury (AKI) is also a strong cause of COVID-19-related deaths and is considered an indicator of surviving COVID-19 infection (Valizadeh *et al*., 2020).

Acute kidney injury is one of the most severe complications in COVID-19 patients as SARS-CoV-2 may infect the renal intrinsic cells such as proximal tubular epithelial cells and directly induce renal dysfunction (Huang *et al*., 2020).

Histopathologic studies have suggested that SARS-CoV-2 may be capable of directly infecting the renal tubular epithelium, and renal dysfunction may be a sign of systemic vascular and inflammatory complications. These and other biochemical markers related to renal structure and function may provide prognostic information (Cheng *et al*., 2020).

2.6. 5. Cancer

Cancer is the uncontrolled development of cells as a result of DNA mutations, particularly those that affect the DNA repair genes and proto-oncogenes. Cancer weakens immune cell growth and proliferation owing to malignancy and treatment procedures like chemotherapy, the body will enter an immunosuppressive state, making cancer patients more prone to risk of infection than non-cancerous people. Thus, COVID-19 is more likely to appear in cancer patients than in healthy individuals. Moreover, cancer patients with COVID-19 have a larger risk of developing a crisis condition than people without the cancer (Huang *et al*., 2020; Chen *et al*., 2020).

Generally, due to lowered immunity brought on by their malignant condition and anticancer treatments, cancer patients may experience more severe symptoms of infection than healthy people (Mao *et al*., 2020).

In a countrywide research study across 575 hospitals in 31 Chinese provinces, 24 patients of the 1590 COVID-19 had a history of cancer. This study found that cancer patients had a larger risk of COVID-19 than cancer-free patients

did, as well as a higher chance of severe events and worse outcomes. (Liang *et al*., 2020).

2.6. 6. Cardiovascular Disorders

Children with heart disease are more sensitive to COVID-19, this might be connected to ACE2 expression in vascular fibroblasts and myocytes. The foundation of the virus in cardio-vascular cells can harm them and can cause the invasion of mononuclear inflammatory cells into the heart tissue which will worsen the condition due to the inflammation (Zhou *et al*., 2020). Elevations of troponin and brain natriuretic peptides are linked to cardiac problems, caused by COVID-19 (Rath *et al*., 2020).

The most frequently discovered comorbidities, according to an Italian weekly report of children's and adolescent's deaths from COVID-19, were a respiratory failure, chronic renal failure, cancer, and heart disease, as 31.5%, 72%, 23.5%, and 27.4%, respectively. According to this study, just 2.8% of individuals with no chronic diseases died from COVID-19 (Giorgi Rossi *et al*., 2020).

2.6.7. Diabetic Mellitus

DM is the most prevalent metabolic disorder in the world, the immune system is weakened by diabetes. The prevalence of diabetes is rising globally, particularly in emerging nations. Diabetes increases the incidence of COVID-19, according to researchers (Huang *et al*., 2020; Guan *et al*., 2020).

Diabetic patients are less responsive to treatment and have a higher risk of death (Zhou *et al*., 2020). In diabetes patients, glycosylation of cytokines impairs the activity of cytokines dependent on type I helper T cells because innate immunity is weakened by elevated blood glucose levels. children are more likely to develop COVID-19 because of pulmonary microangiopathy, tissue necrosis brought on by oxidative stress in diabetes, and lung inflammation, just as the case in tuberculosis-prone individuals (Ozma *et al*., 2020).

2.6.8. Hypertension

Hypertension is often a genetic disorder that is made worse by external environmental factors stimuli such as lifestyle, stress, and diet. Blood pressure is elevated according to blood vessel changes with age progress, such as atherosclerosis. Researchers discovered that these people have elevated COVID-19 death rates (Zhou *et al*., 2020).

Because SARS-CoV-2 enters cells through ACE2 receptors. Therefore, the virus was thought to be linked to the renin-angiotensin-aldosterone system (RAAS) via ACE2 (Guan *et al*., 2020). Thus, medication with angiotensin-receptor-blockers (ARBs) such as valsartan may be linked with elevated ACE2 production in COVID-19 susceptibility. It appears that high blood pressure is probable to increase COVID-19 mortality by weakening lung function and reducing oxygen supply (Xu *et al*., 2020).

2.6.9. Multisystem Inflammatory Syndrome

MIS-C is a hyperinflammatory, postinfectious complication of SARS-CoV-2. Characterized by organ failure and symptoms in the cardiovascular, respiratory, nervous, gastrointestinal, and mucocutaneous systems (Holstein, 2021). The US Centers for Disease Control and Prevention (CDC) have received reports of more than 5900 instances of MIS-C, with more than half of the patients needing admission to an intensive care unit and more than one-third having shock (Belay *et al*., 2021).

New MIS-C associated with SARS-CoV2 infection has raised worry according to recent findings. Despite children with COVID-19 tend to be less serious or even asymptomatic than adults, some children do experience a substantial systemic inflammatory response with symptoms that are similar to a serious condition of Kawasaki disease (Verdoni *et al*., 2020).

While MIS-C and KD are similar, but MIS-C differs in some characteristics, including the epidemiology, the age at which symptoms first appear, which affects older children and adolescents, shock, gastrointestinal problems, cardiac dysfunction, and very high inflammatory biomarker levels, and brain natriuretic peptide (Riphagen *et al*., 2020). Patients with MIS-C frequently had low WBC, lymphopenia, platelet counts, and increased ferritin, CRP, ESR, D-dimer, and triglycerides. (Verdoni *et al*., 2020).

2.6. 10. Neurological Disorders

Coronaviruses are not primarily neurotropic virus and their primary target is the respiratory epithelium. The target receptor for attachment to cells and subsequent internalization is the angiotensin-converting enzyme-2 receptor (ACE 2), ACE 2 receptors are found in glial cells in the brain and spinal neurons. The virus's RNA is released in the cytoplasm after entering the cell, where it is subsequently converted and replicated, then the virus is released into circulation after the synthesis of the envelope protein and integration of RNA into it (Baig *et al*., 2020).

COVID-19 causes neurological damage presumably through two mechanisms: immune-mediated CNS injury and hypoxic brain damage. The severity of COVID-19 can lead to systematic hypoxia which may be causing severe brain damage. The contributory factors include hypercarbia, hypoxia, peripheral vasodilatation, anaerobic metabolic, and an accumulation of toxic substances. They may cause brain edema and neuronal swelling, which ultimately cause neurological impairment (Sheng & Shao, 2020).

The most common neurological symptoms and consequences of COVID-19 are headache and vertigo, followed by encephalopathy and delirium. Among the consequences noted are Guillian barre syndrome, cerebral-vascular accident, and acute transverse myelitis, acute encephalitis. The most prevalent peripheral symptoms were hyposmia and hypogeusia (Mao *et al*., 2020).

2.6. 11. Asthma

The most frequent cause of asthma attacks in both children and adolescents is viral respiratory infections. However, extensive epidemiological investigations of the COVID-19 virus in the Chinese failed to link asthma to the development of serious COVID-19-related disorders (Liu *et al*., 2020).

Exposure to controlled allergens and respiratory allergies are both linked to substantial decreases in ACE2 expression, which was lowest among individuals with significant levels of allergies and asthma may be due to these individuals' insufficient class I interferon (IFN-I) responses, as ACE2 is presented in human airway epithelial that is an interferon-induced gene cell (Ziegler *et al*., 2020).

Children have a healthier airway tract because children are less exposed to smoking and environmental toxins compared to adults, which makes their respiratory epithelial cells more resistant to COVID-19 (Tsabouri *et al*., 2021).

In addition, Children are shielded from SARS-CoV-2 due to ACE2 is a little less developed at younger ages, which possibly explains why and also lessens expression levels of the ACE2 receptor in the nasal epithelium in children this may potentially lead to reduced sensitivity to infection and serious of the disease (Bunyavanich *et al*., ; 2020Yonker *et al*., 2020).

2.6.12. Vitamin-D Deficiency

Respiratory tract infections are more likely to develop when vitamin D levels are low because vitamin D has anti-inflammatory and antioxidant characteristics. (Giménez *et al*., 2020). In addition, mechanisms for Vitamin-D may defend against respiratory viruses by lowering the production of pro-inflammatory cytokines which may increase viral death and maintain the integrity of tight junctions, which prevent immune cells from penetrating the lungs (Martineau *et al*., 2017).

Chronic kidney disease, Obesity, and being of black or Asian ancestry are risk factors for serious COVID-19, and these risk factors overlap, suggesting that taking vitamin D supplements may be useful in the prevention or treatment of COVID-19 (Giménez *et al*., 2020).

In many countries, vitamin-D is routinely supplemented in infants younger than 1 year of age and in some countries even up to the age of 3 years. Furthermore, vitamin-D levels are lower in older age groups, especially in men, in whom supplementation is less frequent (Laird *et al*., 2020).

2.6.13. Some Host Risk Factors

Additional factors may raise the risk of COVID-19 infection by impairing immunological function, cardiac function, lung function, circulation, waste product elimination, and more. It is possible to mention the following factors: COPD, Septicemia, malnutrition, immunodeficiency, specific genotypes of interleukins and interferons, autoimmune diseases such as multiple sclerosis, and systemic lupus erythematosus, and chronic liver disease (Wang *et al*., 2020).

2.7. Environmental Risk Factors Associated with COVID-19:

2.7.1. Crowding Setting

The presence of unprotected individuals in groups where there is a chance of an infected person appears to be the most crucial factor in the transmission of SARS-CoV-2. Therefore, a person's presence in public transportation, such as subways, buses, airplanes, and trains if social distance is not maintained, will be a risk factor for virus. Moreover, being in crowded settings such as markets, temples, sporting events, and other crowded locations can raise the chance of contamination (Wang *et al*., 2020).

2.7.2. Occupational Risks

Is an occupational disease, the first people to contract COVID-19 were those who frequented or worked at Wuhan's seafood and wet animal markets. Owing to

the virus's capacity for rapid dissemination and patient referral to medical facilities, the most sensitive people to getting the disease are healthcare workers (Yang *et al*., 2020).

Healthcare workers (HCWs) are at risk of acquiring SARS-CoV-2 despite using some safety measures, and the less attention they pay to safety procedures, the greater the likelihood that they will contract the virus. The most crucial of these procedures, tracheal intubation, has the potential to create aerosols and droplets, making it a potential source of contamination (Huang *et al*., 2020).

Other contaminant procedures include the manipulation of oxygen masks in COVID-19 patients as well as non-invasive ventilation, manual ventilation, tracheotomy, airway suction, and cardiac resuscitation. Other hazardous occupations in cities include those of cleaners who risk contamination during the disposal of contaminated waste and taxi and bus drivers who run the risk of coming into touch with asymptomatic individuals (Tran *et al*., 2012).

2.7.3. Low Education

People who lack suitable training in the prevention field of infection will unintentionally spread the virus since proper and adequate training is a crucial aspect in severing the transmission chain. For example, uneducated people who attempt to disperse disinfectants throughout the population may harm social occasions, or healthcare workers who were with patients and were wearing personal protective equipment, such as gloves, masks, and gowns, went to the hospital's administrative centers and contaminated the area. Because the virus remains on the equipment for a long time, they also present a risk of infecting others (Van Doremalen *et al*., 2020)

2.7.4. Poor Ventilation

As long as there is no specific vaccination or medication for this virus, asymptomatic individuals can spread the infection, and this means that others can

get sick in places with poor air conditioning. There should therefore always be airflow wherever there is a crowd of people, and good ventilation is necessary for offices, clinics, hospitals, and other such establishments. (Lai *et al*., 2020).

2.7.5. Animal Contact

The intermediate host serves as a conduit for the virus' transmission from bat to human (Lu *et al*., 2020). It can infect other animals and is found in human wastes. It is possible to assess how many animals that have come into touch with humans are infected by checking the antibodies present in dogs, cats, cattle, monkeys, and sheep. These animals could be able to spread disease to people and veterinarians who come into contact with them most frequently by acting as reservoirs for bats (Sohrabi *et al*., 2020).

2.8. Viral risk Factors Associated with COVID-19:

Determining viral factors associated aids target strategies for quick detection and treatment.

2.8.1. Communicability

The main virus reservoir includes the number of infected individuals, and the mode of transmission is an important aspect of virus transmission. COVID-19 is highly transmissible and its basic reproduction number (R0) is 3.28. It infects a large number of humans by surviving in aerosols (Liu *et al*., 2020; Van Doremalen *et al*., 2020).

In addition, when a cluster of sick and asymptomatic infected individuals comes into touch with family members, friends, and companions, the virus can spread quickly among them (Chan *et al*., 2020). During the incubation stage, the virus is also transmitted. Additionally, it lingers for a long time on steel, medical gloves, and glass. (Li *et al*., 2020).

2.8.2. Evolution of Viruses

The mortality and recovery rates of COVID-19 changes from one country to another (WHO, 2020). By examining the Mutations in these regions can be seen by looking at the sequence of distinct, separated strains in various places. Open reading frames and RNA-dependent-RNA polymerase (RdRp) have higher levels. The changes impact virus virulence, treatment resistance, immunological responses, virus reproduction, transmission, immune responses, and virus adaptability to new hosts (Pachetti *et al*., 2020).

In addition, there will be a risk of new strain invasion and potential harm to children and adolescents with the introduction of new strains as a result of mutation. It may transmit to previously infected individuals because their lungs are damaged, increasing the likelihood that the illness will be severe and result in death and delaying the development of a vaccine that will protect against all strains (Wang *et al*., 2020).

2.8.3. Viral load

The lower respiratory tract cells as well as the epithelial cells of the mouth and tongue are home to SARS-CoV-2 and its receptor ACE2, which these cells multiply. The virus has shed for a considerable amount of time, even up to 36 days (Benvenuto *et al*., 2020).

Asymptomatic patients have similar viral loads to symptomatic patients, but asymptomatic individuals have a number that is roughly four times greater than symptomatic persons. Consequently, they have the potential to infect a large number of people. (Zhou *et al*., 2020).

The innate immune response is heightened by entering the body with a large number of viruses. This may result in a cytokine storm and severe inflammation that put the patient's life at risk (Lai *et al*., 2020).

2.9. SARS-CoV-2 Exposure Severity in Pediatric Patients:

Viral load influences COVID-19 severity, indicate that the reduced viral exposure intensity may be another factor resulting in a less serious disease. Children may be less susceptible to SARS-CoV-2 exposure than adults who typically go shopping, work, travel, diseases, immunity, smoking history, and nosocomial exposure. Most children or adolescents who are infected typically exhibit modest clinical symptoms and have a favorable diagnosis. After the disease begins, children often recover within 1-2 weeks. (Lu *et al*., 2020).

Children have a stronger adaptive and innate immune response, which is the first-line defense against SARS-CoV- 2, with a higher number of Natural killer cells also known as NK cells. Another crucial factor is learned immunity, which involves the epigenetic modification of the innate immune cells (particularly NK cells) in response to specific stimuli, such as pathogens and vaccines (Netea *et al*., 2020). Children have higher levels of bacterial and viral colonization than adults, particularly mostly in the nasopharynx, where microbial competition and interactions may limit the spread of SARS-CoV-2 (Gonzalez *et al*., 2018).

Comorbidities that have been linked to severe COVID-19 in adults are less common in children and adolescents, such as COPD, diabetes, obesity, chronic kidney disease, hypertension, heart, and lung disease (Mannheim *et al*., 2020). Children with persistent lung problems (particularly asthma), heart disease, and immunosuppression require hospitalization more frequently than previously healthy children, although no clear risk factors have been established in this age group. Interestingly, COVID-19 has a considerably smaller impact on children than adults, including those with serious medical illnesses who are receiving immunosuppressive or cancer treatment (Zachariah *et al*., 2020).

2.10. Factors Associated among COVID-19 Patients at Length of Hospital Stay

The duration of hospital stay for COVID-19 patients depends on the clinical status of the patients, regional guidelines, and hospital capacity (Z. Wu & McGoogan, 2020). Predicting the prevalence of the illness and estimating the duration of patient stays in hospitals are necessary for analyzing the effect of COVID-19 on the capacity of the hospitals (Vekaria *et al*., 2021).

In Iraq, hospitalized COVID-19 patients are majority affected by cancer, D.M, hypertension, and heart disease as well as the main risk factors for an elevated length of hospital stay (LoHS) and a higher risk of death are age, higher D-dimer readings, chronic kidney disease, radiographic indications of pneumonia, and other chronic conditions. (Alwafi et al., 2021).

The criteria for patient discharge were the absence of fever for at least 3 days, substantial improvement in both lungs on chest CT, clinical remission of respiratory symptoms, and two throat-swab samples negative for viral RNA obtained at least 24 h apart (Zhang *et al*., 2020).

2.11. Clinical Manifestation

All patients aged with COVID-19 have been reported. There are many levels of infection severity, from asymptomatic illness to serious disease. Five categories of symptoms and signs were used to categorize the clinical severity of COVID-19, including: without symptoms, mild, moderate, intensity, and critical (Wu and McGoogan, 2020; Fang *et al*., 2020).

This clinical categorization is significant since it provides information about COVID-19 mortality and prognosis:

- **Asymptomatic Infection:** Without any clinical signs and symptoms with a positive SARS-CoV-2 PCR test. In addition, children and newborns who are asymptomatic in particular may play a significant part in the transmitted virus.

- **Mild:** Clinical signs and symptoms at this level such as fever, headache, coughing, anorexia, fatigue, loss of taste and smell, nausea and vomiting, diarrhea, sore throat, rhinorrhea, and sneezing.
- **Moderate:** With Pneumonia, frequent fever, coughing, and fatigue; some people may wheeze, but there is no overt hypoxemia as seen by shortness of breath.
- **Severe:** Dyspnea, tachypnea, central cyanosis, oxygen saturation below 92%, and other hypoxemia-related symptoms occur rapidly, usually within a week.
- **Critical:** children or adolescents at this level such as respiratory failure or acute respiratory distress syndrome (ARDS), shock, or multiple organ dysfunction.

Children with mild symptoms were reported to recover after 1 week while severe cases were reported to experience progressive respiratory failure due to alveolar damage from the virus, which may lead to death (Li *et al*., 2020).

2.12. Diagnosis of the COVID-19

Different diagnostic procedures have been used to determine COVID-19 infections, including the diagnostic RT-PCR procedure for the early detection of the positive nucleic acid of COVID-19 infection from secretions of respiratory by using oropharyngeal or nasopharyngeal swabs, but was initially beset by a high percentage of unclear results (Hui *et al*., 2020).

Patients whose reverse transcription polymerase chain reaction (RT-PCR) results for Covid-19 are positive should have imaging tests performed to determine lung damage in its earliest stages (Li *et al*., 2020). Non-contrast-enhanced CT imaging is crucial at this stage of diagnosis for identifying multifocal patchy ground glass opacities, bilateral, which are findings of a chest CT scan for characteristics of Covid-19 infection (Xu *et al*., 2020).

In pediatric care, rectal and stool swabs are crucial samples for COVID-19, particularly when dealing with patients who mostly demonstrate gastrointestinal signs and symptoms (Wang *et al*., 2020).

Between 24 hours and 14 days following delivery, samples from the babies' rectal swabs and respiratory tracts should be tested for SARS-CoV-2 nucleic acids. Any positive finding should be communicated right away, and more testing should be done to inform clinical therapy, particularly to determine whether observation or home isolation is possible. Before the qualified neonate is discharged, the COVID-19 status of every household member must be verified for home management (LI & SHI, 2020).

Healthy term newborns should remain for at least 7 days; however, if both 24 hours and days 5-7 nucleic acid results are negative, the feeding pattern is normal, and overall conditions are good and remain stable, home isolation and observation may be a possibility. Preterm babies and any term infants who have birth suffocation or other illnesses should always be kept in one room and given the appropriate care (Society of Pediatrics and Board, 2020).

By utilizing pulse oximetry to quickly identify hypoxemia, the clinical development, and vital signs would be constantly followed during the diagnostic process. According to the conditions, tests for CRP, PCT, CBC, arterial blood gas, coagulation function, biochemical index (electrolyte, myocardial kinase, renal function, liver enzyme, and pancreatic enzyme), and urinary sample will be conducted. Following the clinical course, a chest radiological exam will be performed. Chest radiological examination will be determined based on the clinical course (National Health Commission, 2020).

2.13. Complications of the COVID-19

Despite the precise mechanisms that cause the long-term problems of COVID-19 infection are still unclear, they may involve direct viral tissue destruction; Angiotensin converting enzyme-2 (ACE2) receptor that entrance of

the SARS-CoV-2 is located in several tissues across the body. This allows the virus to enter target cells by activating its spike protein by transmembrane serine protease-2 (TMPRSS2) (Gupta *et al*., 2020; Hoffmann *et al*., 2020)

In addition, these receptors exist in nasal goblet cells, epithelial cells, pancreatic b cells, renal podocytes, and gastrointestinal epithelial cells, indicating that direct tissue destruction may be a main mode of SARS-CoV-2 infection presentation, which may also play a role in its long-term consequences (Qi *et al*., 2020; Ziegler *et al*., 2020).

Children are infected with COVID-19 at a lesser rate than adults, and their symptoms are typically mild to moderate during the acute stage (Nikolopoulou & Maltezou, 2021). However, complications and impacts of infection can include pneumonia, gastrointestinal disorders, and multisystem inflammatory syndrome in children (MIS-C), which is characterized by fever and multiple organ dysfunction in the weeks following SARS-CoV-2 infection and other complications (CDC, 2020; WHO, 2020).

The most common long-term complications of COVID-19 include multisystem inflammatory syndrome, renal failure or injury, cardiovascular complications involving Myocarditis, heart failure, and arrhythmias. Respiratory complications include respiratory failure, ARDS, pneumonia, Cystic fibrosis, PFT abnormalities, and oxygen dependence. Neuropsychiatric complications involve Brain Fog syndrome, Brain damage, anxiety or depression, and posttraumatic stress disorder. Gastrointestinal complications include abdominal pain with diarrhea and vomiting. Hematological complications are associated with a higher risk of thrombotic complications, especially in patients who are critically ill (Hoste *et al*., 2021; Feldstein *et al*., 2020).

Endocrine complications include diabetes mellitus besides iatrogenic hyperglycemia from steroid use in treat COVID-19, proposed mechanisms for hyperglycemia following COVID-19 infection include insulin resistance as a result

of the inflammatory state, and insulin secretory deficits from impaired b cells—either due to direct viral damage or indirect effects (Singh *et al*., 2020; Unnikrishnan & Misra, 2021).

2.14. Principles of Clinical Management and Treatment

Principles in clinical management include early diagnosis, early isolation, early identification, and early treatment of the suspect or confirmed patients are the main principles for the management of those who are risky (Shi *et al*., 2020).

There is no medication approved for treatment of SARS, MERS, Covid-19 and any other coronavirus infection currently (Li *et al*., 2020). The mainstay of treatment for patients with severe COVID-19 infection is early diagnosis, supportive care, isolation, and others (Yang *et al* ., 2020).

Treatment and management of COVID-19 cases that are severe and critical: Adequate support for organ function, aggressive repair of impaired oxygenation, and avoiding complications are the basic principles.

A. Respiratory Support: For COVID-19 patients with severe hypoxia, ARDS must respiratory support provide by either non-invasive mechanical ventilation or a high-flow nasal cannula. Invasive mechanical ventilation must be started if it is thought to be ineffective due to consequences such as recurrent apnea, cardiac arrest, or ineffective breathing needing resuscitation. It is frequently necessary to administer Analgesia, sedation, and muscle relaxant. To minimize airborne transmission following intubating process, tertiary infection prevention and control measures must be implemented. In addition, methods for enhancing the security of health workers while doing emergency airway care have been described (Cheung *et al*., 2020).

B. Circulation Support: To ensure early detection of septic shock, carefully monitor vital signs such as awareness level, capillary refilling time, the color of skin, blood volume, and important metrics such as urine output and lactate level. If

fluid treatment does not restore enough perfusion, vasopressors should be administered promptly. In children with ARDS, it's critical to strictly control fluid intake to treat the capillary leak syndrome and create a negative fluid balance while maintaining constant cardiac and renal function. Through the duration of the treatment, hemodynamic status must be regularly checked (Peng *et al*., 2020).

C. Corticosteroid Drugs: In children and adolescents with severe COVID-19, such as MERS and SARS, corticosteroids have been administered. Many studies were conducted since the recovery study first reported its encouraging findings in July 2020 have shown that corticosteroid therapy is beneficial in reducing death in critically ill COVID-19 patients (Horby *et al*., 2020).

Corticosteroid drugs (e.g., dexamethasone) decrease inflammation by suppressing migration of polymorphonuclear leukocytes (PMNs) and reducing capillary permeability; stabilize cell and lysosomal membranes, increase surfactant synthesis, increase serum vitamin A concentration, and inhibit prostaglandin and proinflammatory cytokines; suppresses lymphocyte proliferation through direct cytolysis, inhibits mitosis, breaks down granulocyte aggregates, and improves pulmonary microcirculation to increase oxygenation (Bergman *et al*., 2021).

D. Optimal empiric antibiotics: To prevent the growth of secondary bacteria, antibiotics should only be given when a coinfection is significantly suspected or confirmed by a thorough microbiological evaluation (WHO, 2020).

E. Antiviral agents: the most common antiviral drug used for COVID-19 infection are Remdesivir and favipiravir drugs which show broad-spectrum-antiviral-activity against different RNA viruses that inhibit RNA-directed RNA polymerase of different RNA viruses, prophylactic administration of remdesivir and favipiravir to inhibit the development of the symptomatic disease of COVID-19 infection and enhancing respiratory function and lowering the viral load (Li *et al*., 2020).

F. Convalescent plasma transfusion: In severe or critically ill patients with rapid illness progression, plasma from COVID-19 convalescent individuals who have elevated neutralizing SARS-CoV-2 antibody titers has been utilized as adaptive immunotherapy (Duan *et al*., 2020).

The Chinese National Health Commission encouraged recovering patients to donate blood to treat the COVID-19 virus. Within two weeks of recovery, convalescent plasma should be obtained to guarantee a high neutralizing antibody titer. The clinical utility of plasma through convalescence is limited by the difficulty of getting it. Convalescent plasma therapy's effectiveness and safety in treating COVID-19-infected patients must be further assessed in well-designed clinical trials (Zhu *et al*., 2020).

G. Vaccine: In September 2020, the World Health Organization stated that COVID -19 vaccinations would be released, vaccination against the coronavirus illness 2019 is a critical part of the comprehensive response of public health and might provide the best opportunity to put an end to the pandemic (Kaur & Gupta, 2020).

Emergency use approvals were given for the mRNA vaccine Pfizer BioNTech on December 31, 2020, and the adenoviral vector vaccines ChAdOx1 nCoV-19 (AstraZeneca-Oxford) on February 15, 2021 (BIO, 2021).

According to researchers, the effectiveness of vaccines produced by Pfizer and AstraZeneca is 70%, and 95% respectively (Voysey *et al*., 2021). While Sinopharm's inactivated SARS-CoV-2 vaccine, BBIBP-CorV, has a seroconversion rate of 92% to 100%, it is safe and efficacious. Compared to the other two, its T-cell responses following vaccination are minimal, which reason for its low efficiency (Zhang *et al*., 2021).

Most vaccinations are made to promote the production of antibodies that neutralize the coat protein. These antibodies inhibit the virus from entering the body by blocking the human ACE-2 receptor. Seven different vaccines are used

worldwide: the Pfizer vaccination, the Sinopharm vaccine, the AstraZeneca vaccine, the Moderna vaccine, the Johnson & Johnson vaccine, the Novavax vaccine, and the Sputnik-V vaccine, (Yingzhu Li *et al*., 2021).

Three vaccines available in Iraq were used (Pfizer, Sinopharm, and AstraZeneca Vaccine). scientifically proven its effectiveness in reducing the mortality of Covid-19 (Almufty *et al*., 2021).

2.15. Nursing Process for Reducing Mortality of COVID-19 among Children:

Defined as a systematic method for giving care that applies the essential ideas of critical analysis, client-centered treatment strategies, goal-oriented tasks, recommendations for evidence-based practice, and nursing intuition. Each nurse should have strengthened their expertise and skill with this approach. A nursing procedure is a process that allows nursing procedures to be described in a clear, systematic, and logical manner (Basit, 2020).

It involves gathering information about the patient, identifying the issue and making a diagnosis, establishing plans to address it, and assessing the effectiveness of the suggested solutions (Akın-Korhan *et al*., 2013). Protecting the public's health and managing care in the event of disease are two of nurses' most important responsibilities throughout the COVID-19 pandemic stage (Çakmak & İnkaya, 2020). All aspects of life and the requirement for holistic care for people as physiological, biological, cultural, social, and spiritual dimensions should be included in the nursing care provided to those with COVID-19 diagnoses, which is gainful in close relationships with each other, this important aspect in the recovery of COVID-19 infection (Gök-Metin, 2020).

2.15.1. Nursing Diagnosis

1. Impaired gas exchange is related to an alteration in the balance of oxygen.
2. Ineffective breathing pattern related to alteration in mechanical ventilation.
3. Altered body temperature related to inflammation process.
4. Deficient knowledge related to unfamiliarity with disease transmission information.
5. Imbalanced nutrition: less than body requirements related to insufficient dietary intake.
6. Disruption of sleep pattern related to the anxiety of COVID-19 infection.
7. Risk for infection related to failure to avoid pathogens secondary to exposure to COVID-19.
8. Risk for fluid volume deficiency related to frequent loss of fluids. (González-Aguña *et al*., 2021; Nurseslabs, 2021).

2.15.2. Nursing intervention:

A crucial step in the nursing process, nursing interventions are evidence-based actions, provided by nurses based on clinical expertise and judgment for providing treatment and care to improve patient outcomes (Ackley *et al*., 2019).

- **Monitor vital signs.**

  Monitor the patient's temperature; the infection usually begins with a high temperature; monitor the respiratory rate of the patient as shortness of breath is another common symptom of COVID-19 (Nurseslabs, 2021).

- **Monitor oxygenation and ventilation status.**

  Monitor SpO2, encouraged coughing and deep breathing exercises while observing all respiratory precautions, and give oxygen administration as needed, as well as to increase oxygenation, nurses frequently advised patients to change into different positions (Swanson *et al*., 2020).

- **Maintain respiratory isolation.**

Keep tissues at the patient's bedside; dispose of secretions properly; instruct the patient to cover mouth when coughing or sneezing; use masks, and advise those entering the room to wear masks as well; place respiratory stickers on a chart, linens, and so on (Nurseslabs, 2021).

- **Evaluate of level anxiety.**

Hypoxia and the sensation of not being able to breathe are frightening and may worsen hypoxia (Swanson *et al*., 2020).

- **Enforce strict hand hygiene.**

Teach the patient and folks to wash hands after coughing to reduce or prevent the transmission of the virus (Swanson *et al*., 2020).

- **Educate the patient and People.**

Provide information on disease transmission, diagnostic testing, disease process, complications, and protection from the virus (Nurseslabs, 2021).

- **Monitoring the fluid intake and nutrition**

Supporting the patient's fluid intake, determining fluids lost by vomiting, diarrhea, and hyperthermia, and assessing the patient's skin turgor, encouraging to take a daily diet rich in antioxidants, vitamins, vitamin D, omega 3, and zin (Swanson *et al*., 2020).

2.16. Prevention and control strategies to reduce mortality of COVID-19 among children.

The COVID-19 control and prevention guideline, released by the World Health Organization (WHO) on February 27, 2020, offers ways to stop the disease; in addition, close contact and drops are the two main ways it spreads. Typically, hand washing with disinfection is the most efficient preventive measure that the community recommends; avoiding touching the mouth, nose, and eyes with the

hands; when sneezing or coughing, using a towel or elbow; employing a medical mask, particularly if respiratory problems are present, and taking disposal into consideration, as well as also maintain your social distance from the person exhibiting symptoms about one meter (WHO, 2020).

Specifically for children, the WHO released a COVID-19 prevention guideline on March 19, 2020, which is divided into five sections: A. Implementing normal precautions to all patients, B. Early discovery, and early isolation of suspected cases C- putting additional empiric safety measures in place (droplets and contact precautions, and, where needed, air safety measures) D- COVID-19 newborns are not permitted to have visitors, E- Avoid breastfeeding from COVID-19 mothers until recovery (WHO, 2020).

2.17. The evolution and current status of COVID-19

When COVID-19 was first identified, it was thought to be a respiratory condition that manifested on chest scans as distinctive ground glass opacities. Since then, it has been clear that the illness also affects blood vessels, resulting in specific vascular features such as endothelial damage, angiogenesis, and extensive thrombosis (Ackermann *et al*., 2020). Therefore, should be SARS-CoV-2 regarded as more than a respiratory virus, according to the findings. More research using autopsies has revealed many other extrapulmonary symptoms affecting the gastrointestinal, renal, cardiovascular, and neurological systems. (Gupta *et al*., 2020).

The World Health Organization reported over 88 million laboratory-confirmed COVID-19 illnesses as of January 12th, 2021, and over 1.8 million fatalities (WHO, 2020). The number of COVID-19 cases that national authorities have recorded should be interpreted with caution. Numerous factors contribute to the creation of these figures, as explained by (Nicola *et al*., 2020).

Nearly two years into the coronavirus pandemic, a new variant of Coronavirus appeared. Despite the widespread accessibility of efficient vaccines

and new therapeutics, the number of cases is once again outpacing capacity, particularly among patients who are largely unvaccinated or who are medically vulnerable. The majority of these severe cases are attributable to the Delta variant, which has dominated since May 2021. The most prevalent SARS-CoV-2 variation is the Omicron virus, which has recently been found and is rapidly replacing Delta. The current pandemic is heavily influenced by the poor adoption of the COVID-19 vaccine and the appearance of the SARS-CoV-2 Omicron strain (Del Rio *et al*., 2021).

2.18. Studies Related

First study: Study by (Rajabkhah *et al*., 2020) a Meta-Analysis study conducted in Iran " COVID-19 prevention in children and newborns " A review: the primary goal of this study was to analyze the available data and offer a plan for preventing COVID-19 in children. Children should be protected from COVID-19 by following these precautionary measures, including early identification, early isolation, personal hygiene, especially hand hygiene, avoiding touching the face (in particular eyes, nose, and mouth), eliminating potential environmental infections, Children and infants should be protected from COVID-19 by maintaining a proper balance of electrolytes and fluids in the body and ensuring enough oxygenation during a pandemic. Children and infants should also have their immune systems strengthened and their mental health should be protected.

Second study: In a descriptive study conducted in India by (Mohanty *et al*., 2020) on age Patterns of Premature Mortality under varying scenarios of COVID-19 Infection. This study aimed to understand the age pattern of mortality under varying scenarios of community infection. This concluded COVID-19 has a visible impact on mortality with loss of productive life years in born age. The sustained effort at containing the transmission at each administrative unit is recommended to arrest mortality owing to the COVID-19 pandemic. The following general measures are additionally recommended to reduce transmission of infection and

premature mortality: • Avoid breastfeeding from COVID-19 mothers until recovery, • Strict hand washing and disinfecting procedures, maintaining preventive care appointments for newborns and infants as well as younger children in need of vaccinations, • No visitors are permitted for COVID-19 before recovery date of the virus, • Continuous monitoring of breathing, oxygen saturation, heart rate, temperature, blood pressure, blood sugar, and gastrointestinal symptoms, • Feeding program: in mothers who are healthy.

Third study: "Comparative Analysis of Pediatric COVID-19 Infection in Southeast Asia, South Asia, Japan, and China" conducted by (Wong *et al*., 2021), the aim was to determine risk factors for severe COVID-19 disease among children in the region, resulted in no significant differences between the clinical manifestation and fundamental laboratory parameters of SARS-CoV-2 infection among children from seven Asian nations Mortality was 2.3%, with all deaths coming from Pakistan and India, and the overall asymptomatic rate was around 40%. In our analysis, no instances of MIS-C were found.

Fourth study: In a retrospective study conducted in Egypt by (Afify *et al*., 2021) titled Risk factors associated with length of hospital stay in children and adolescents with coronavirus disease 2019 the main aim was to evaluate the period of hospital stay among children with COVID-19 and examine potential risk factors. It concluded that children with fever, cough, and ground-glass opacity in radiographs were associated with longer LOS.

Fifth study: Deaths in Children and Adolescents Associated With COVID-19 and MIS-C in the United States, a title conducted by (McCormick *et al*., 2021). It aims to explain the demographics, clinical features, and hospital experience of people under 20 who have died from serious acute respiratory syndrome linked with coronavirus 2. According to their findings, their median age was 17, and the majority of the deceased were men (63%), non-Hispanic Black people (19%), and Hispanic people (45%) with a median age of 17. The most common results conditions were obesity (42%), asthma (29%), and developmental problems

(22%). Common consequences include acute respiratory failure (82%), and Mechanical ventilation (75%). The age, sex, race, and/or ethnicity of the sixteen (14%) decedents who fit the criteria for multisystem inflammatory syndrome in children were similar to those of decedents without MIS-C; 11 of the 16 (69%) had at least one underlying disease.

Sixth study: An analytical study in Brazil conducted by (Oliveira *et al*., 2021) on " Clinical features and factors associated to mortality in COVID-19-positive children and adolescents hospitalized". The major goal of this study is to describe the clinical characteristics of children and adolescents who have been admitted to the hospital with a laboratory-confirmed SARS-CoV-2 infection and to assess the risk factors related to COVID-19 mortalities. They concluded that pre-existing medical issues, Indigenous ethnicity, age, and disadvantaged geopolitical regions were all connected with COVID-19 death. In Brazil, the burden of COVID-19 may be increased in more susceptible and economically backward children and adolescents due to health care disparities, poverty, and comorbidities.

Chapter Three

Methodology

Chapter Three

Methodology

This chapter outlines the methods that were considered as a means of achieving the selected study's objectives.

3.1. Design of the Study

A descriptive-analytical study design is used for the assessment of the factors associated with the mortality and recovery rate of COVID-19 among children and adolescents. Additionally, proceedings that had previously happened, which led to mortality and recovery at isolation units in hospitals of Babylon province from 15th October 2022 to 14th May 2023.

3.2. Arrangements for Study Accomplishment

Formal administrative achievement was necessary before data collection, and they were secured for the project as shown in Appendix (A).

1. Following the first seminar presentation and the University of Babylon council's approval, official authorization is obtained from Higher Studies Committee in the College of Nursing at the University of Babylon.
2. Scientific research and ethical committee at the College of Nursing, which includes five advanced academic titles, approved the research, and it was sent to Health Directorate for collection, according to the study plan.
3. Official permission has been received from the "Ministry of Health" /Babylon health directorate / Training and Development Center.
4. An administrative agreement was accomplished from the Marjan medical city, Babil Teaching Hospital for Maternity and Children / Al-Imam Sadiq Teaching Hospital, Al -Qassim General Hospital, Al-Noor Children's Hospital, Ibn Saif Children's Hospital to use medical records and death certifications of statistic division for children and adolescents.

3.3. Setting of the Study

A study was conducted through utilizing secondary data (mortality and recovery records) in Babylon province among children and adolescents in the isolation units of the hospital over 2020 to the end of the year 2022, to complete and realize the intended research problem such as Marjan medical city, Babil teaching hospital for maternity and children, AL-Imam Sadiq Teaching Hospital, Al -Qassim General Hospital, Al-Noor Children's Hospital, Ibn Saif Children's Hospital. As six centers were selected according to the availability of the sample size for conducting the study (Appendix A).

3.4. Sample of the Study

The study sample was selected non-probability (convenience) sample, consisting of 287 COVID-19 from both genders aged from birth – 20 years who were collected from records of patients in isolation units and the statistic department who had been medically diagnosed with COVID-19 in the six main isolation units of COVID-19 at Babylon Province, during the period from 16th March to 15th April 2023.

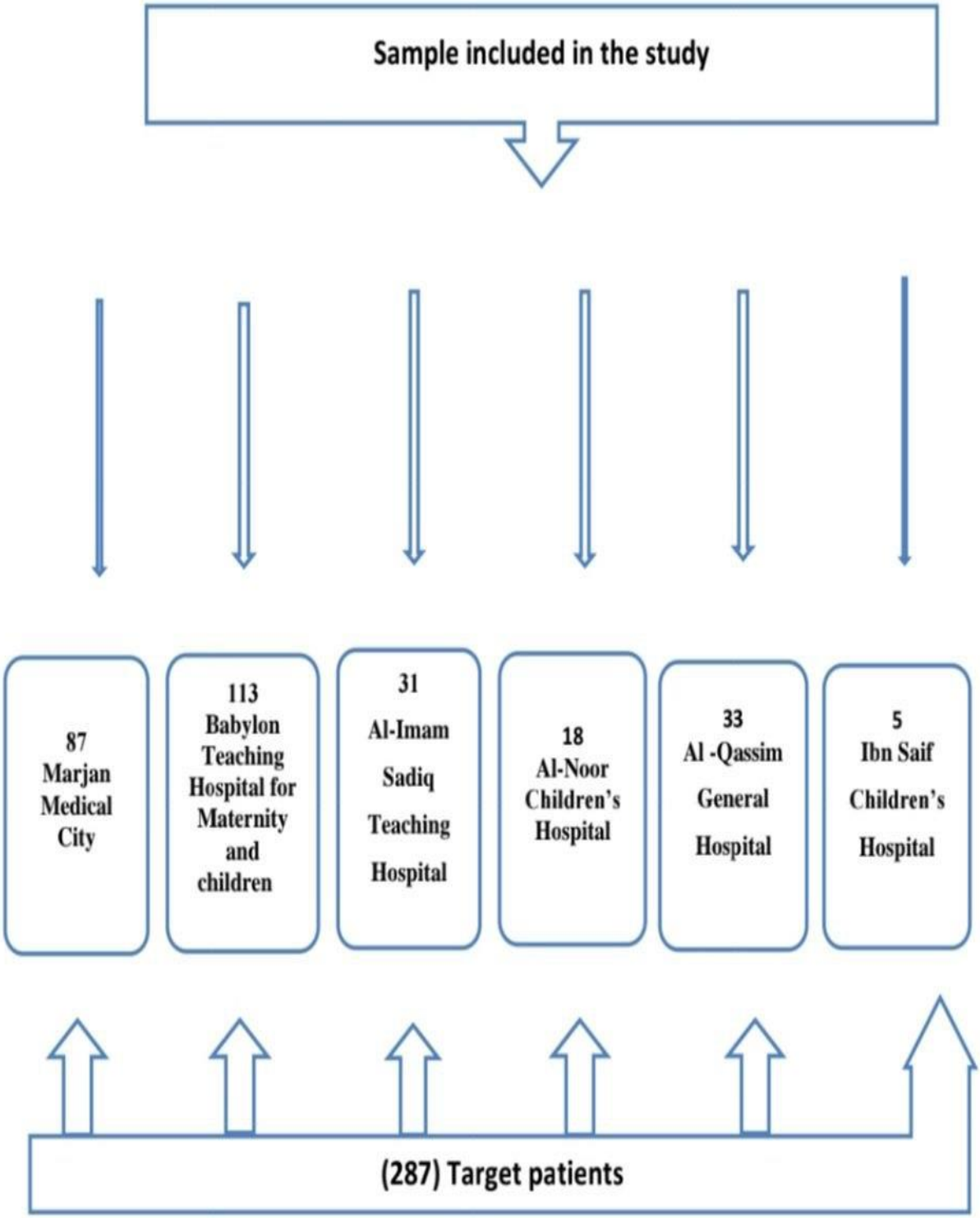


Figure (3.1) Distribution of the Numbers of COVID-19 cases among the Hospitals in Babylon province.

3.5. The Instrument of the Study

The study instrument is created by the researcher for data collection in order to meet the study's objectives after a thorough analysis of the related literature.

The questionnaire is categorized into three sections designed to cover all aspects of the study as shown in Appendix (B).

Section I: Socio-Demographic Characteristics of Children and Adolescents

This section shows the socio-demographic data sheet consisting of items classified as children and adolescents information including age, gender, and the residence of the family (urban or rural).

Section II: Factors Associated with Mortality and Recovery rates

It contains multiple items about disease information such as Duration of hospitalization (less than a week, more than a week), Smoking history, whether the affected child complains of chronic diseases, and Number of chronic diseases.

Section III: Intensity of Exposure to COVID-19 in Pediatric Patients

It consists of the Signs and symptoms of COVID-19 among children and adolescents that include symptomatic (categorized into 13 types: hypoxia, fever, headache, tachypnoea, and others). Factors associated with the intensity of exposure to COVID-19 among pediatric patients (consist of 14 types: renal failure, cancer, diabetic Mellitus, pneumonia, and others). Causes of the mortality rate of COVID-19 (composed of 9 types: COVID-19, renal failure with COVID-19, cancer with COVID-19, pneumonia with COVID-19, and others). Complications of the disease (classified into 8 types: respiratory disorders, renal disorders, cardiovascular disorders, nervous system disorders, multisystem inflammatory syndrome, pneumonia, and diabetes mellitus). Another item is the status of discharge (dead and recovery).

3.6. Validity of the Study Instrument

Achievement of the relevancy, adequacy, and clarity of the questionnaire, through a preparatory copy of the questionnaire, is drawn up and submitted to **(22)** experts with more than ten years of experience. (10) members of faculty in the nursing college at Babylon University, (5) in the nursing college at Baghdad University, (1) member faculty in the nursing college at Kufa University, (2) members of faculty in the nursing college at Karbala University, and (2) members faculty in nursing college at AL-Mustaqbal University College, (1) member faculty in nursing college at Kufa University lastly, (1) in a nursing college of at Thi-Qar university. Suggestions and comments by the experts were taken into account, as presented in Appendix (C).

3.7. Pilot Study

The tool was first presented to a group of (20) children and adolescents who were diagnosed with the COVID-19 pandemic at isolation units and statistic department in Babylon Province hospitals from 16th March to 15th April 2023, which were excluded from the original study sample.

It's done for a variety of reasons, including:

1. The sampling clearance and competence recognition.
2. Determining the nature of the difficulties that the researcher may face during the study.
3. Ensure that the instrument and its content are appropriate for the situation and identify the required modifications.
4. Estimating the time needed for data collection.
5. The boundaries detection, which might be countless throughout the data collection.
6. Determining the feasibility of the main study.

The Findings Demonstrated that:

1. The questionnaire items were understood and clear as well.
2. Minor changes are made to a few items.
3. The time required to complete the instrument for data collection is between (20-30 min).

3.8. Reliability of the Questionnaire

The certainty that the outcome will be essentially the same if the study tools are used repeatedly on the same people at various times is referred to as reliability. It was then used by the researcher on a randomly chosen exploratory sample of 20 medical records, which made up 10% of the initial sample gathered by the two researchers. (a researcher and a well-trained person). utilizing the test's inter-item reliability coefficient correlation, The coefficients below.

Table 3-1: The Reliability of the Questionnaire under Examination (*n=20*)

Inter-retort Reliability		
Co-observer	Correlation	Ass.
Inter-retort/ Inter-observer	r= .533**	Reliable

This table was statistically created to display the study instrument's reliability coefficient. The calculated outcome demonstrates that the researcher is qualified to evaluate during the collection of the original study samples underlying the study phenomenon, according to its availability in the same group at any point in the future.

3.9. Collection of the Data

Data was collected retrospectively from secondary data of medical records, and statistics division by using a questionnaire (tool) prepared in English through the period from 16th March to 15th April 2023, after carrying out the essential steps that should be incorporated into the study design, such as the following:

1. Identifying the information to be collected via the questionnaire based on the records and documentation.
2. Choose the questionnaire's approach and design.
3. Offering the instrument of the study to the supervisor with a group of experts for their opinion on how it was created and to make any necessary changes in light of their input.
4. Distributing the questionnaire to experts for their suggestions and observations, which will be used to develop the questionnaire and make adjustments depending on their findings.
5. Ending from the writing of the questionnaire, printing it, giving it a final read-through, and using it for collecting data.

3.10. Methods of Analysis

In order to generate the results from the statistical analysis of the data collected from the sample of the study, to statistically evaluate and deal with this data, the researcher used Microsoft Excel (2010) and the SPSS-24 programs, to determine the correlations between the variables and, using a series of statistical tests, to determine the research's final findings.

3.10.1. Descriptive Statistic

A variety of mathematical and statistical techniques are used in descriptive statistics to quantitatively represent the key characteristics of data using tables and charts. To make it easier for the person receiving them to recognize and comprehend their content, descriptive statistics aim to display and describe the facts that must be arranged, processed, summarized, and classed as well as present them in an understandable manner. Utilizing, the analysis was conducted:

A. Statistical tables "Frequencies (No.) and Percent (%)"

B. Standard Deviation test ±*SD*.

C. Mean (M)

3.10.2. Inferential Analysis

1. **Item correlation matrix reliability:** It is used to examine the homogeneity of items to form a questionnaire.
2. **Analysis of Variance (ANOVA):** It is used to equality of means is used (variance test when the mean parameter varies).
3. **Odd ratio:** Is used to determine the probability of an event's result when there are two possible outcomes and a likely causal influence.
4. **Linear regression:** It helps researchers understand the type and degree of relationship between the dependent variable and the number of different independent variables.

11. Difficulties of the Study

The researcher faced certain barriers and difficulties in applying the empirical phase of this study mainly:

1. Missing medical records and difficult-to-handle paper documents affects the back extension in study retrospectives.
2. The researcher was unable to increase the number of the sample due to poor electronic documentation.
3. Past medical history (PMH) for the patient usually, there are deficiencies in medical records and statistics division to identifying factors associated with disease for help in answering questionnaire directly and accurately.
4. Some COVID-19 patients were discharged on their own between the ages of children and adolescents, which caused difficulty in collecting data and the obstacles they faced during the infection.

Chapter Four

Results of the Study

Chapter Four

Results of the Study

The results of the data analysis are presented systematically in figures and tables and are in accordance with the following study objectives:

Table 4-1. Distribution of Study Sample by their Socio-Demographic Characteristics (N =287)

Variables	Classification	No.	%
Age /years	< 5 years	76	26.5
	5-10 years	44	15.3
	11-15 years	47	16.4
	16-20 years	120	41.8
	Mean ± SD= 11.17 ± 7.10		
Gender	Male	153	53.3
	Female	134	46.7
	Total	**287**	
Residents	Urban	148	51.6
	Rural	139	48.4
	Total	**287**	
Hospitalization	< Week	195	67.9
	> Week	92	32.1
	Total	**287**	
Occurrence of death and its cause	COVID-19 only	9	3.1
	COVID-19 with Respiratory failure	8	2.8
	COVID-19 with Kidney failure	10	3.5
	COVID-19 with Pneumonia	6	2.1
	COVID-19 with Cancer	5	1.8
	COVID-19 with Bronchial asthma	1	0.3
	COVID-19 with MIS-C	4	1.4
	COVID-19 with Congenital heart disease	3	1.0
	COVID-19 with Congenital hydrocephaly	2	0.7
	Total	**48**	
Smoking Status	Yes	55	19.2
	No	232	80.8
	Total	**287**	
Chronic comorbidity	Yes	95	33.1
	No	192	66.9
	Total	**287**	
Number of Chronic Diseases	None	196	68.3
	One	89	31.0
	More than one	2	.7
	Total	**287**	

Signs and Symptoms	Hypoxia, dyspnea, fatigue	22	7.7
	Hypoxia, tachypnea, fever	10	3.5
	Hypoxia, dyspnea, fever	13	4.5
	Hypoxia, irregular heartbeat, dyspnea	3	1.0
	Dyspnea & fever	66	23.0
	Cough, fever, headache, loss of taste and smell	101	35.2
	Fever, Nausea and vomiting, diarrhea, anorexia	72	25.1
	Total	**287**	
Risk factors	None	192	66.9
	Kidney failure	12	4.2
	Pneumonia	18	6.3
	Bronchial asthma	11	3.8
	Cancer	8	2.8
	Septicemia	4	1.4
	Multisystem inflammatory syndrome	5	1.8
	Congenital Hydrocephaly	4	1.4
	Bronchitis	11	3.8
	Diabetic mellitus	7	2.4
	Viral fever	6	2.1
	Congenital heart disease	4	1.4
	Hepatitis	3	1.0
	Systemic Lupus Erythematosus	2	0.7
	Total	**287**	
Complication	None	168	58.5
	Respiratory disorders	26	9.1
	Renal disorders	9	3.1
	Gastrointestinal disorders	59	20.6
	Cardiovascular disorders	3	1.0
	Nervous system disorders	6	2.1
	Pneumonia	14	4.9
	Multisystem inflammatory syndrome	2	.7
	Total	**287**	
Health Outcome	Recovery	239	83.3
	Death	48	16.7
	Total	**287**	

No= Number; %= Percentage

The outcomes depict the characteristics of children and adolescents who contracted COVID-19 within the past three years. The average age was 11.17 years with a standard deviation of ±7.10 years. The age bracket of 16-20 years exhibited the highest prevalence at 41.8%.

In relation to gender distribution, males accounted for more than half at 53.3%, while females comprised the remaining 46.7%.

The distribution between urban and rural populations showed a slight similarity, with urban constituting 51.6% and rural comprising 48.4%.

Regarding hospitalization, the majority of COVID-19-infected children spent less than a week in the hospital (67.9%), whereas a smaller percentage stayed for more than a week (32.1%).

In terms of fatalities, while most cases lacked identifiable causes of death in the related findings as per medical records, kidney failure emerged as the leading cause of mortality among individuals under 20, accounting for 3.5% of cases.

Among the participants in this study, a significant portion were non-smokers (80.8%) in comparison to smokers (19.2%).

The examined samples revealed that a higher proportion had no associated chronic comorbidities (66.9%) compared to those with associated conditions (33.1%).

The results indicate that 68.3% of the individuals did not have chronic ailments. Common symptoms included cough, fever, headache, and loss of taste and smell (35.2%). Furthermore, a noteworthy 83.3% made a recovery, contrasting with the 16.7% who unfortunately died from the disease.

Table 4-2. Distribution of Recovery and Mortality Rates of COVID-19 for the Last Three Years (N =287)

Years	Number of cases	Number of Recoveries	Number of Mortality	Recovery Rate (%)	Mortality Rate (%)
2020	50	46	4	92%	8%
2021	130	102	28	78.5%	21.5%
2022	107	91	16	85%	15%
Total	287	239	48	83.3%	16.7%

*Recovery rate = (No. of recovery / No. of incidence) * 100*

*Mortality rate = (No. of death / No. of Recovery) *100*

The data presented in the table indicates that the COVID-19 recovery rate reached its peak in 2020 but hit its lowest point in 2021. Conversely, the mortality rate exhibited an opposite trend, with its highest point coinciding with the lowest recovery rate.

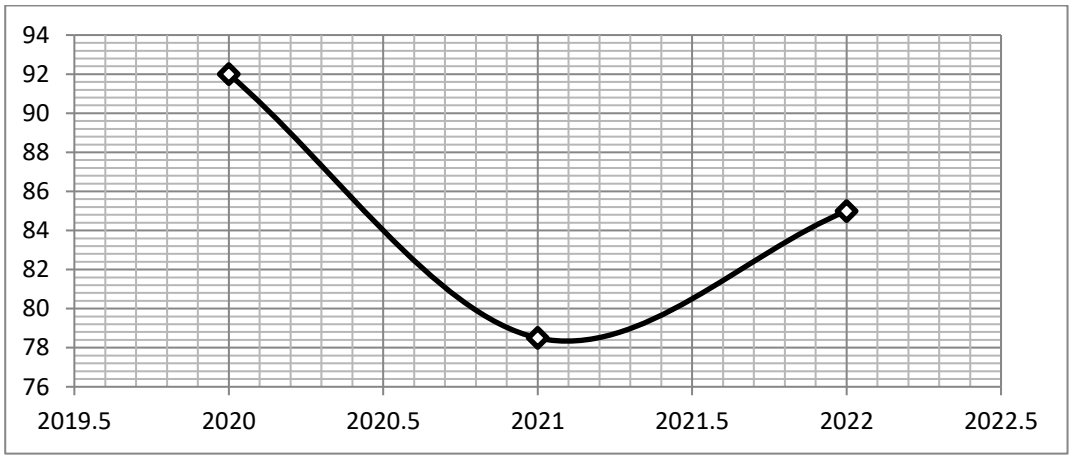


Fig. 4-1. Recovery Rate of COVID-19

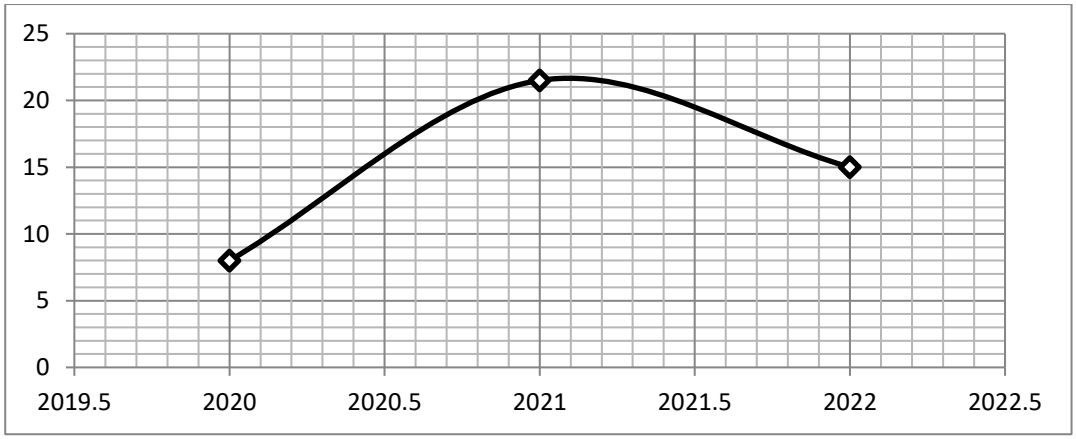


Fig. 4-2. Mortality Rate of COVID-19

Table 4-3: Statistical Differences in Mortality Rate of COVID-19 between Groups of Age (N =287)

Age	Source of variance	Sum of Squares	d.f	Mean Square	*F-statistic*	*Sig.*
Health Outcome	Between Groups	3.361	3	1.120	8.661	.000
	Within Groups	36.611	283	.129		
	Total	39.972	286			

.

The analysis of variance revealed noteworthy disparities in the COVID-19 mortality rate among children and adolescents, based on their age (F= 8.661; p=.000). As the age of the examined population increased, the likelihood of mortality also increased, and conversely, as depicted in Figure 4-3.

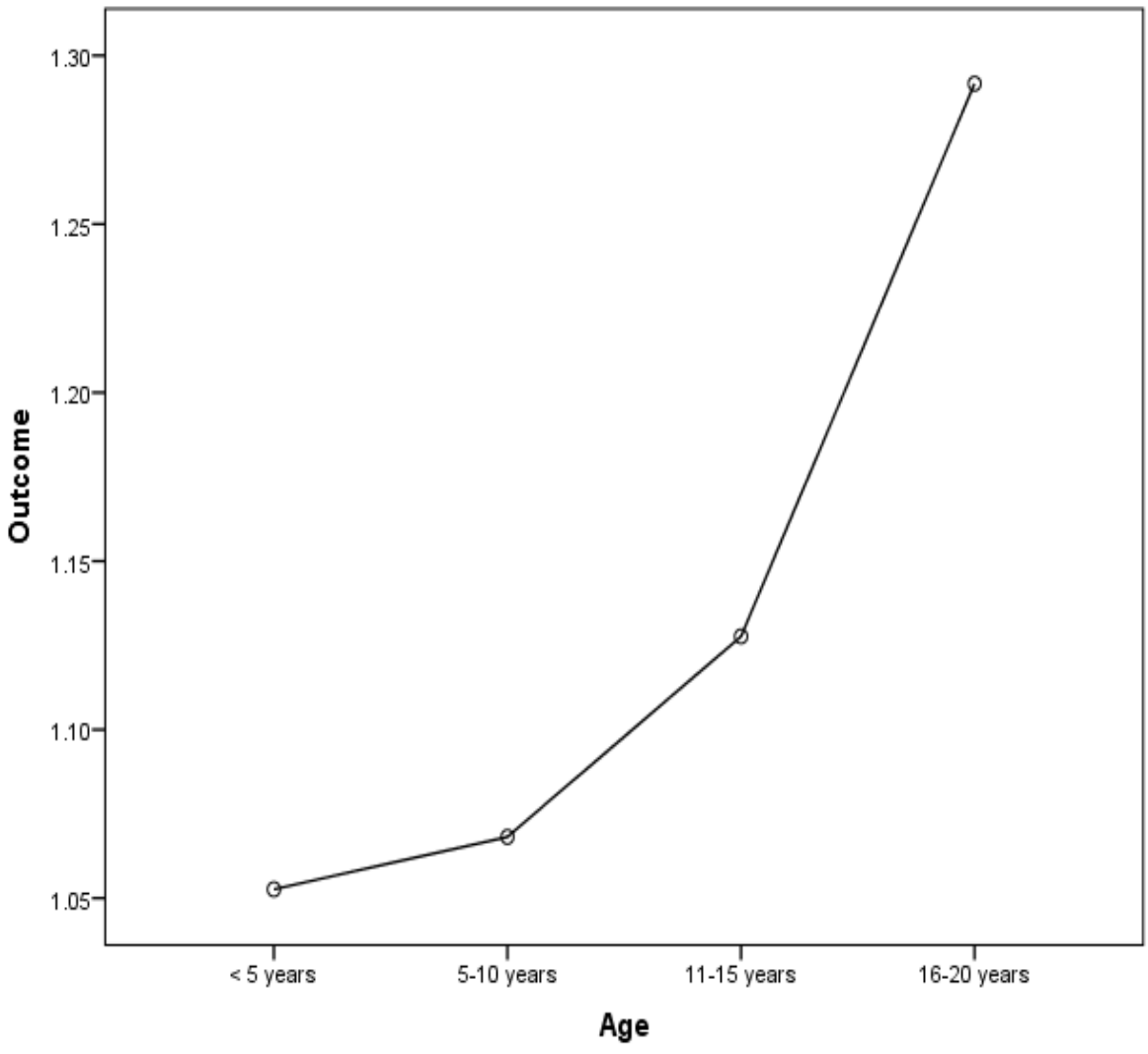


Fig. 4-3. Mortality Rate of COVID-19 between Groups of Age

Table 4-4: Relationship between Health Outcome of COVID-19 and Participants' Gender (N =287)

Gender		Health Outcome		Total	Odds Ratio for Gender (Male / Female)
		Recovery	Death		
Male	Count	128	25	153	1.061
	% within Gender	83.7%	16.3%	100.0%	
Female	Count	111	23	134	
	% within Gender	82.8%	17.2%	100.0%	
Total	Count	239	48	287	
	% within Gender	83.3%	16.7%	100.0%	

From a pool of 287 samples, among them, 128 of the recovery cases were males while 111 were females. An association exists between the COVID-19 mortality rate and gender [with an odds ratio (OR) of 1.061 and a 95% confidence interval (CI)], indicating that males have a higher likelihood of dying from the virus compared to females.

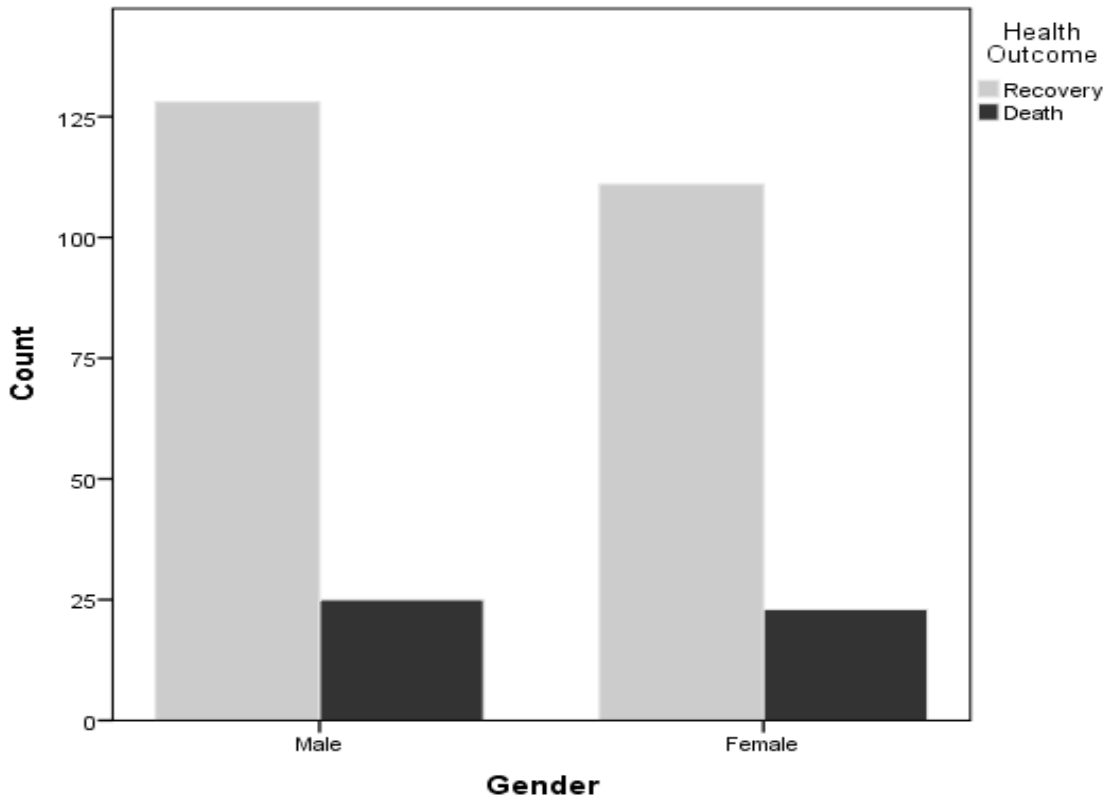


Fig. 4-4. Health Outcome of COVID-19 and Participants' Gender

Table 4-5: Relationship between Health Outcome of COVID-19 and Participants' Residence (N =287)

Residents		Health Outcome		Total	Odds Ratio for Residence (Urban / Rural)
		Recovery	Death		
Urban	Count	130	18	148	1.988
	% within Residence	87.8%	12.2%	100.0%	
Rural	Count	109	30	139	
	% within Residence	78.4%	21.6%	100.0%	
Total	Count	239	48	287	
	% within Residence	83.3%	16.7%	100.0%	

The urban residency was reclaimed, indicating 87.8% representation, whereas 78.4% hailed from rural areas. Among the urban populace, 12.2% succumbed, while the rural demographic accounted for 21.6% of the fatalities. A discernible connection exists in COVID-19 mortality rates based on residency [odds ratio (OR) = 1.988; confidence interval (CI) = 95%], highlighting a higher likelihood of mortality among rural residents compared to their urban counterparts over the preceding three years.

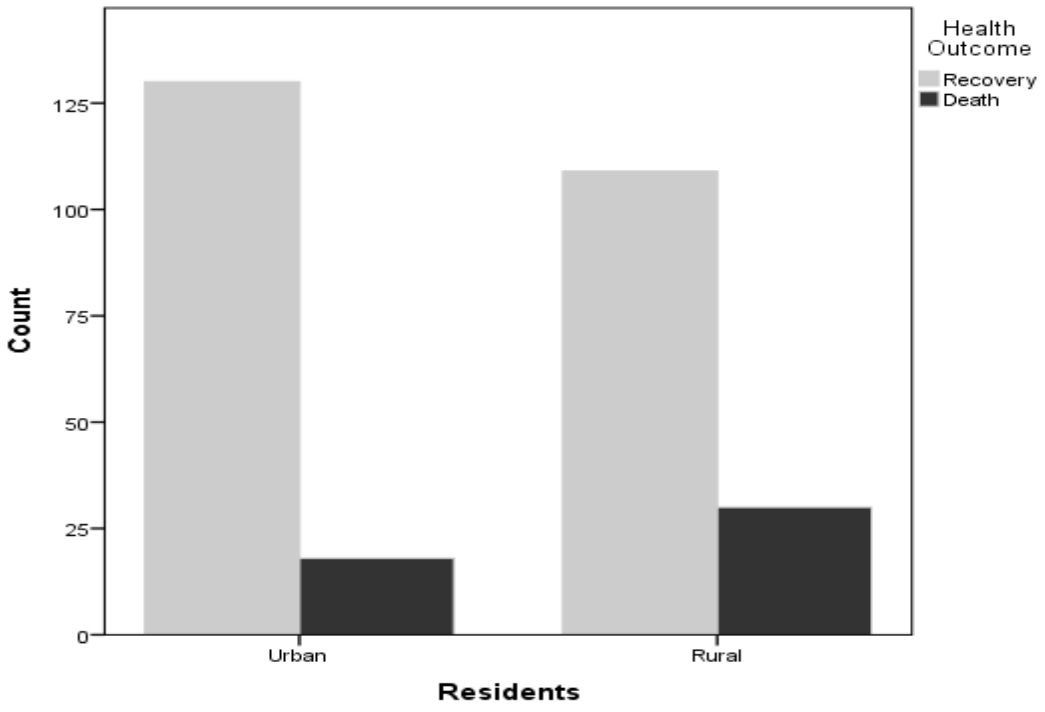


Fig. 4-5. Health Outcome of COVID-19 and Participants Residents

Table 4-6: Relationship between Health Outcome of COVID-19 and Participant's Duration of Hospitalization (N =287)

Duration of Hospitalization		Health Outcome		Total	Odds Ratio for Hospitalization (< or > Week)
		Recovery	Death		
< Week	Count	171	24	195	2.515
	% within Hospitalization	87.7%	12.3%	100.0%	
> Week	Count	68	24	92	
	% within Hospitalization	73.9%	26.1%	100.0%	
Total	Count	239	48	287	
	% within Hospitalization	83.3%	16.7%	100.0%	

People who spent less than a week in the hospital showed a recovery rate of 87.7%, whereas 12.3% did not survive. Among those hospitalized for over a week, 73.9% recovered, while 26.1% passed away. The data indicates a connection between COVID-19 mortality and hospital stay duration, with a calculated odds ratio of 2.515 at a 95% confidence interval. This suggests that individuals hospitalized for less than a week have a higher likelihood of recovery compared to those hospitalized for more than a week.

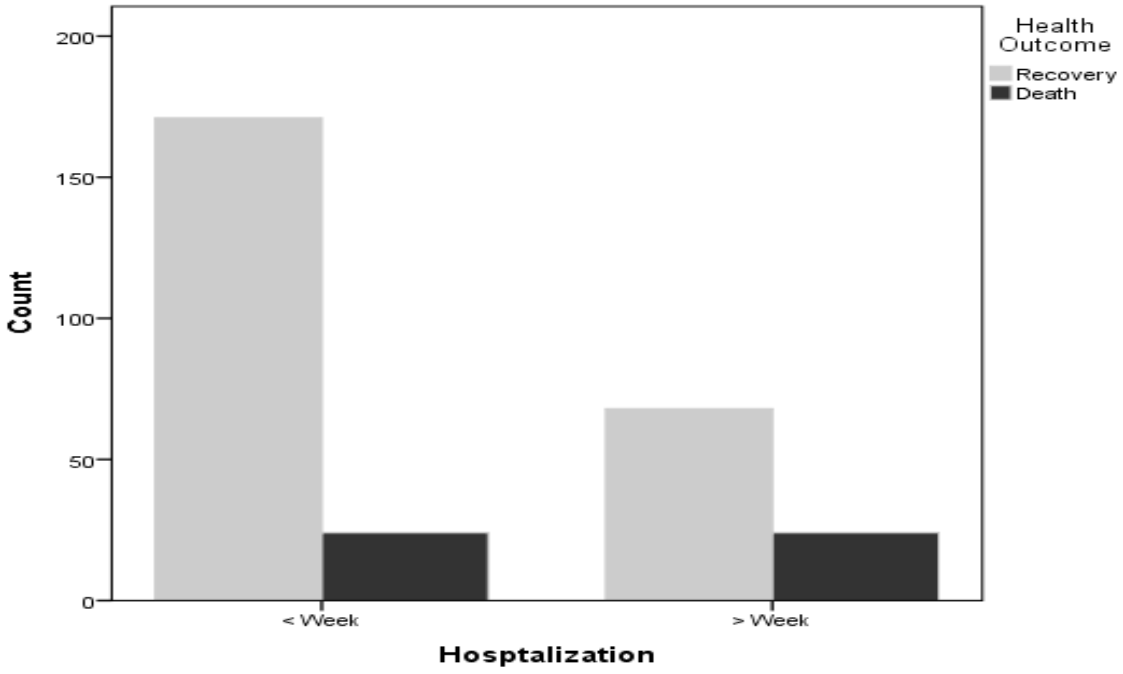


Fig. 4-6. Health Outcome of COVID-19 and Participants' Hospitalization

Table 4-7: Relationship between the Health Outcome of COVID-19 and Smoking (N =287)

Smoking		Health Outcome		Total	Odds Ratio for Smoking (Yes / No)
		Recovery	Death		
Yes	Count	46	9	55	1.033
	% within Smoking	83.6%	16.4%	100.0%	
No	Count	193	39	232	
	% within Smoking	83.2%	16.8%	100.0%	
Total	Count	239	48	287	
	% within Smoking	83.3%	16.7%	100.0%	

Among the smokers, 83.6% experienced recovery, and the remaining 16.4% succumbed to the illness. On the other hand, non-smokers constituted 83.2% of the recovered individuals, while the mortality rate for this group was 16.8%. An evident connection exists in terms of the COVID-19 mortality rate based on smoking status, with an odds ratio (OR) of 1.033 and a 95% confidence interval (CI). This indicates that smokers have a higher likelihood of recovering compared to non-smokers in this context.

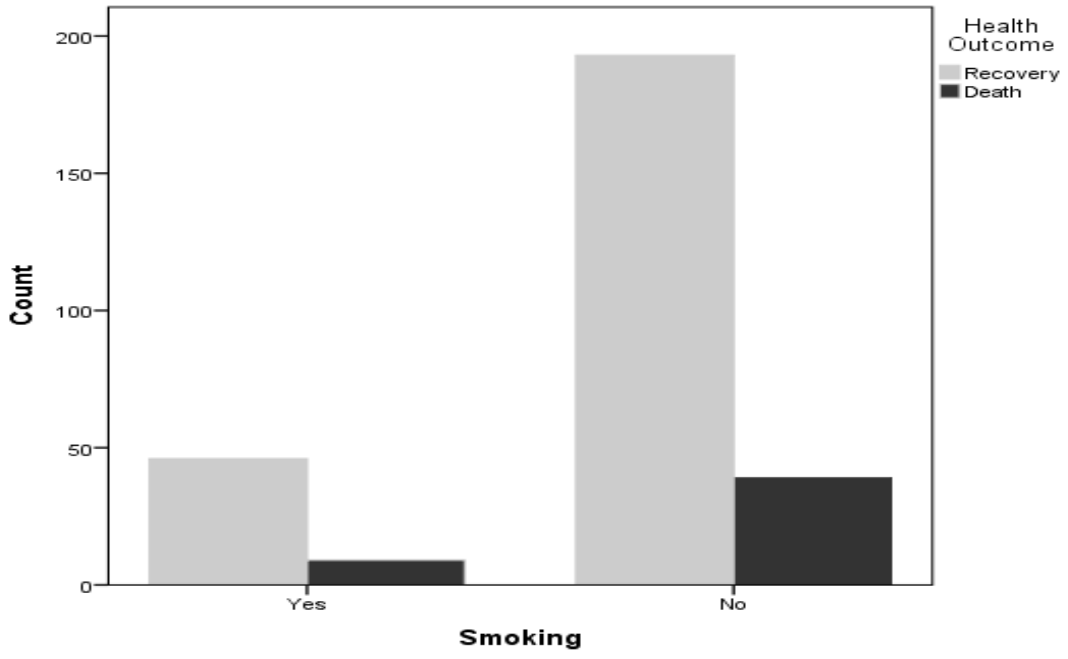


Fig. 4-7. Health Outcome of COVID-19 and Participants' Smoking Status

Table 4-8: Relationship between Health Outcome of COVID-19 and Participants' Associated Chronic Comorbidities (N =287)

Chronic Comorbidities		Health Outcome		Total	Odds Ratio for Comorbidities (Yes / No)
		Recovery	Death		
Yes	Count	67	28	95	.278
	% within Chronic	70.5%	29.5%	100.0%	
No	Count	172	20	192	
	% within Chronic	89.6%	10.4%	100.0%	
Total	Count	239	48	287	
	% within Chronic	83.3%	16.7%	100.0%	

The study revealed that among individuals with associated chronic comorbidities, 70.5% successfully recovered while 29.5% unfortunately passed away. In comparison, for those with non-associated chronic comorbidities, 89.6% experienced recovery while 10.4% succumbed to the illness. The analysis indicated that there is no significant correlation between the mortality rate of COVID-19 and the presence of chronic comorbidities [with an odds ratio (OR) of 0.278 and a 95% confidence interval (CI)].

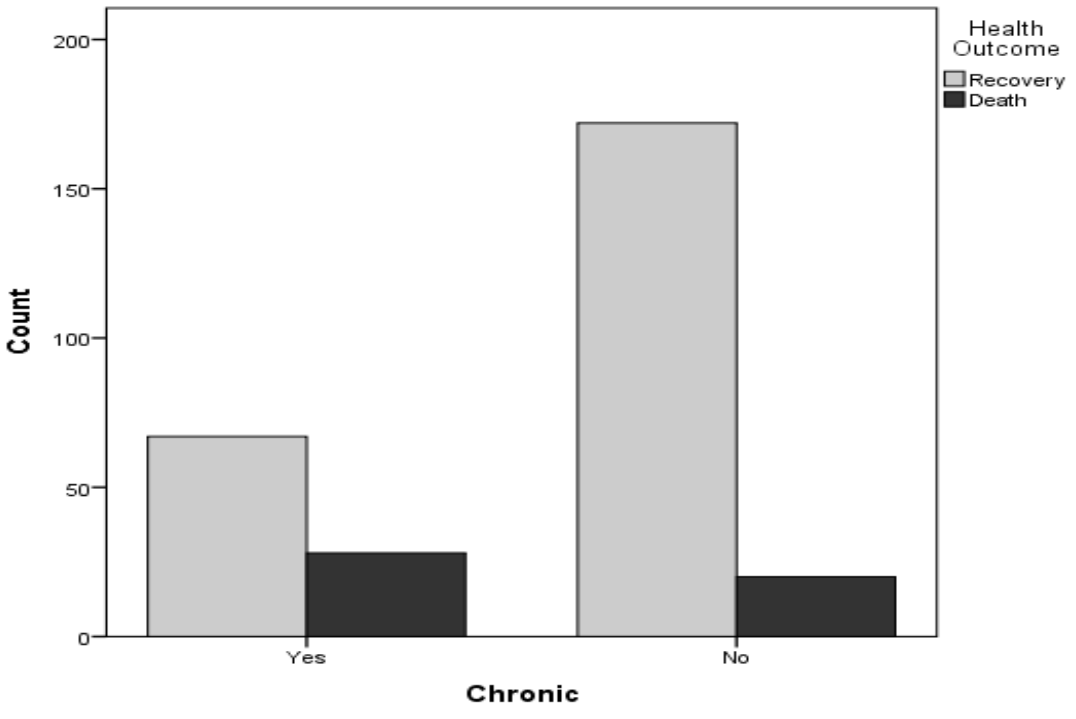


Fig. 4-8. Health Outcome of COVID-19 and Participant's chronic comorbidities

Table 4-9. Liner Regression among the Study Variables in Predict the Health Outcome (N =287)

Variables	Unstandardized Coefficients		Standardized Coefficients	t	*Sig.*
	B	Std. Error	Beta		
Causes of Death	-.017-	.009	-.134-	-2.037-	.043
Number of Chronic Diseases	-.063-	.030	-.081-	-2.114-	.035
Signs & Symptoms	-.206-	.007	-.953-	-30.957-	.000
Risk Factors	.012	.009	.088	1.309	.192
Complications	-.007-	.007	-.034-	-.991-	.323

Dependent Variable: Health Outcome

The results have substantiated that the linear regression analysis demonstrates a relationship between the predictive factors and the health outcome of COVID-19 toward children and adolescents. These factors include the causes of death (β= -.134; p= .043), the count of chronic diseases (β= -.081; p= .035), and the presence of signs and symptoms (β= -.953; p= .000).

Chapter Five

Discussion of the Study Results

Chapter five

Discussion

This chapter includes the discussion and interpretation of the study's findings, which are directed toward the achievement of its objectives and supported by related articles.

5.1. The Socio-Demographic Characteristics of the Study Sample

The current study is shown in table (4-1) indicates that most of the age groups are between 16-20 years; was the highest recorded two fifth with a mean age is (11.17), and more than half were male. These results are consistent with the findings of (Siebach *et al*., 2021), a retrospective study conducted in the USA, that was carried out on 400 children and adolescents with COVID-19, which showed a majority of the age group is 14_20 years with a high percentage prevalence, although (Afify *et al*., 2021), is a retrospective study was conducted in Egypt specified that males more than half compared to female with an average age were (13.07). The researcher's view concerning the male personality, which is more social than the female, and it is difficult to control his mixing with children of his age, in addition to the suffering of the parents in applying isolation, not leaving the house, and keeping him away from his friends.

Afify *et al*., (2021) also revealed that those living in urban areas more than half affected by COVID-19 than those living in rural areas. From the researcher's point of view, at the beginning of the spread of the virus, there was underestimation and lack of awareness, the lack of commitment to preventive measures and social distancing, as well as, the high population density and the large area in relation to the urban areas, which led to an increase in the number of infections in these areas.

A study that was done by (Alwafi *et al*., 2021) that conducted in Saudi Arabia, which is a retrospective study on 250 patients among children and

adolescents. which shows the length of hospital stay is less than one week more than half compared to more than one week according to factors associated, age, and complications of the virus. Although a study was done by (Thai *et al*., 2020) on 134 hospitalized patients from Vietnam which concluded that COVID-19 made older patients more likely to stay for longer lengths of time, as opposed to pediatric patients who were less likely to stay in the hospital. While, COVID-19 children of the existing study were stay for less than one week more than two-thirds as compared with those who stayed for more than one week; Which can be a facilitator in healing and leaving the hospital, the reason may be the lack of risk factors, delayed health awareness, adherence to preventive and therapeutic measures, and social isolation. All of these factors help in the process of prevention and recovery from the deadly disease.

Regarding risk factors, it was found that kidney failure is one of the most frequent cause of mortality among children and adolescents under the age of 20 years in the contemporary study, but medical records indicate that there is rarely a known cause of death in most cases. These findings agree with the result of (Cheng *et al*., 2020), China study showed that children with chronic kidney disease occurred in (5.1%) showed that children and adolescents with kidney failure had markedly increased death risk in the hospital. From the researcher's point of view, the reason is the lack of immune response in patients with kidney failure, and also the virus affects the functioning of the kidneys, which exposed them to complicated infections and mortality from the disease. This led to the severity of the condition and is considered an indicator to death of COVID-19 patients with kidney failure.

The most typical signs and symptoms were one-third with cough, fever, headache, and loss of taste and smell, with more than half no suffering of risk factors and complications. This result is similar to the finding in a study conducted by (Boechat *et al*., 2021), in Brazil, that indicated in most typical signs and symptoms in children include shortness of breath, coughing, and fever, as well as

children and adolescents, has less clinical effects from SARS-CoV-2 disease than on adults.

Concerning the studied total sample, the ratio of the recovery rate was the majority compared with those who are dead. This result agrees with the finding of a study conducted by (Macedo *et al*., 2021) in Portugal on 288 patients among children, which showed the mortality rate of COVID-19 patients was 17.1% and the recovery rate was (82.9%).

5.2. The Recovery and Mortality Rates of COVID-19 for the Last Three Years

The present study in table (4.2) illustrated that the recovery rate for COVID-19 was highest in 2020 and lowest in 2021, but the number of incidences of COVID-19 was highest during 2021 year in Babylon province, which can be interpreted as the emergence of new strains of the Coronavirus, such as Delta and Omicron, and these strains of the virus are characterized by the speed of transmission from one person to another. In addition, people did not adhere to preventive measures and social distancing, especially during 2021, or may be due to the differences that occurred in the results of the studies in terms of adherence to preventive methods, or only by taking vitamins and supporting the immune system; which may lead to widespread of infections among people. These results are in line with the finding of (Alahmari *et al*., 2021), who showed findings in Makkah province through 2020 and 2021, the recovery rate of the virus is the most as compared to the mortality rate among pediatric patients.

Furthermore, the study was done by (Jabbar & Aladi, 2022), in Iraq cities retrospectively through 2022, that found Baghdad province is the highest mortality rate (8.5%) compared to other cities flows in Basara province then Babylon, while found Mosel province had the lowest mortality and highest recovery rates in the population (0.12%) (99.88%) respectively, compared with other cities in this study.

5.3. The Mortality Rate of COVID-19 between Groups of Age

Regarding table (4.3) that displays the results of the analysis of variance revealed noteworthy disparities in the COVID-19 mortality rate among children and adolescents, based on their age (F= 8.661; p=.000). The likelihood of mortality increases with age in the population and vice versa. These findings are consistent with those of a retrospective study that was done by (Butt *et al*., 2022), who found results (P=.001) [odds ratio (OR)= 0.12; CI= 95%], and concluded that ages under 6 years have the more severe disease due to factors including a weaker immune response or an unclear structure of the upper respiratory tract in young infants, while found their ages 6–12 years were related to significantly decreased probabilities of either moderate or severe/critical disease compared with the probability of mortality with those increasing their ages 14 to 20 years and this indicates that the severity of the disease increases with old age and children under 6 years. This rationalized to pediatric infected with COVID-19, age has been reported as a significant factor linked with infection and severity, and SARS-CoV-2 can infect persons of any age.

5.4. The Health Outcome of COVID-19 and Participants' Gender

In the findings of the current study table (4.4), it was found that the cases of recovery were 128 among men, while women were 111 among the 287 samples. Males are more likely than females to pass away at one time, and this association between gender and COVID-19 mortality is present [odds ratio (OR)= 1.061; CI= 95%]. This result is consistent with (McCormick *et al*., 2021), which was conducted on 112 SARS-CoV-2 patients, a retrospective case study of SARS-CoV-2-related mortality and recovery in the US among people under 20 between February 12 and July 31, 2020, which showed most were male as compared to females among mortality and recovery rates.

In another study conducted in China, by (Panahi *et al*., 2020), A total of 2228 newborns, children, and adolescents were studied. According to the study's

findings, there were no differences between male and female children who had COVID-19 infections. It also summarized that most children had COVID-19 infections because of a familial cluster or a history of close touch.

The researcher's point of view is that males are more social than women due to their working conditions, lifestyles, and females are keen to adhere to preventive measures more than males, in addition to that, parents suffer from isolating their children from relatives and others, and this makes men more vulnerable to infection with the Coronavirus.

5.5. The Health Outcome of COVID-19 and Participants' Residence

Regarding table (4.5), the majority of urban residents were recovered, compared to those who dead, while more than two-thirds of rural residents were recovered as compared to rural residents who ended their lives. These findings are compared to results from India, which was done by (Bhadra *et al*., 2021), which showed approximately 55% of patients who lived in urban areas had a considerably higher death risk than patients from rural areas (45%). Another study was conducted in Iraq, by (Al-Ani *et al*., 2022), on 101 patients in Irbil province, which shows findings those who lived in urban areas had more incidence of COVID-19 disease about 71% compared to persons who lived in rural regions.

From the researcher’s point of view, the cause is due to non-compliance with social isolation and prevention measures, as well as credibility toward COVID-19 disease, and larger regions with higher population density, people who live in cities with large populations are more likely to come into close contact with one another, which makes infection spread more quickly, these factors played a significant role in the spread of COVID-19 among urban areas.

5.6. The Health Outcome of COVID-19 and Participants' Duration of Hospitalization

In regarding table (4.6), the majority of children who stayed less than a week in the hospital were recovered as compared to those who lost their lives. While children who stayed more than a week in the hospital were more than two-thirds to recover as compared to those who died. The data indicates a connection between COVID-19 mortality and hospital stay duration, with a calculated odds ratio of 2.515 at a 95% confidence interval, as those who are less than one week hospitalized are more likely to recover than those who are more than one week hospitalized. These results are confirmed by the findings of (Liu *et al*., 2020), on 99 patients participated among children and adolescents, where it was found the duration of hospital stay in COVID-19 patients was more than one week with lymphopenia (OR: 0.10; p = 0.027), and pneumonia (OR: 3.58; p= 0.048),. They depict in their study, the effects of virus-induced cytopathy and inflammatory response in addition to viral evasion of host immune responses, and use the corticosteroids drugs to patients with COVID-19, they play critical roles in disease severity and length of hospital stay

A cross-sectional retrospective study was done by (Thiruvengadam *et al*., 2021) on 730 COVID-19 patients in South India, which confirmed the occurrence of the median duration of hospital stay was less than a week between children and more than a week for older ages. The most significant factors that affected the duration of stay in the hospital were a history of more than two comorbidities, oxygen saturation, and specific laboratory markers like ferritin, D-dimer, and neutrophil-lymphocyte ratio.

From the researcher’s point of view, the reason is due to the patient’s delay in admission to the hospital and taking care to recover from the virus and adhering to preventive measures, as well as those who have chronic diseases with psychological disorders and fear from the disease and hospitalization that

worsened their condition; all these factors lead to a prolonged hospital stay and severity of the situation with increase mortality rate.

5.7. The Health Outcome of COVID-19 and Smoking

Concerning table (4.7), smokers represented the majority of those who recovered than those who are non-smokers. An evident connection exists in terms of the COVID-19 mortality rate based on smoking status [odds ratio (OR)=1.033; CI= 95%], as smokers are more likely to recover than those who are no smokers at one time. This result agrees with the finding of a study done retrospectively by (Gallus, 2022), in Milano, Italia, which concluded that after more than a year of the pandemic, in the middle of 2021, there were still a lot of questions about how nicotine or tobacco use affected the incidence, severity, and death of COVID-19. Numerous case series revealed a low proportion of smokers among COVID-19 patients. The following results were reached after an update of the scientific literature on the relationship between cigarette use and COVID-19 in this study: The different features of smokers versus non-smokers can be used to explain the apparent lower risk of COVID-19 incidence for smokers compared to non-smokers. But smoking during infection may lead to an exacerbation of the patient's condition.

The researcher believes that smoking during infection with the coronavirus or any respiratory infection increases the severity and seriousness of the condition, but previously smoked patients found that their recovery rate is more than what was expected because the lungs are full of nicotine, which impedes the movement of the virus between its parts, so they have a greater recovery rate.

5.8. The Health Outcome of COVID-19 and Participants' Associated Chronic Comorbidities

According to table (4.7), indicated that more than two-thirds of associated chronic comorbidities were recovered as compared to children who lost their lives, while the majority of non-associated chronic comorbidities were recovered as compared to those who died. There is no relationship in the mortality rate of COVID-19 according to chronic comorbidities [odds ratio (OR)=0.278; CI= 95%].

Similar results in descriptive-analytical study design were done by (Zimmermann & Curtis, 2021), on 300 patients in Switzerland, who showed that children are less likely than adults to have comorbid conditions such as diabetes, obesity, hypertension, chronic lung, renal, and heart disease. These conditions have also been linked to severe COVID-19 in adults. The reason may be due to differences in factors between children and adults, the most important of which are alterations in clotting function and an increase in endothelial damage that is age-related, "Angiotensin-converting enzyme 2 receptors and transmembrane serine protease 2" decreases with age, innate and adaptive immune system differences, the protective side effects of live vaccinations and increased melatonin levels.

Besides a retrospective cohort study on all patients who were less than 20 years old in the U.S was done by (Fisler *et al*., 2020), where shows the first study on COVID-19-positive critically unwell children described 48 patients who were hospitalized to 14 "pediatric intensive care units" (PICU) in the United States. Two children died and more than 80% of the patients who recovered from the virus had a chronic disease.

5.9. Factors Associated with the Study Variables in Predict the Health Outcome

Results in table (4.7), indicated that the COVID-19 health outcome for children and adolescents is predicted by the causes of mortality (= -.134; p=.043), the number of chronic diseases (= -.081; p=.035), and signs and symptoms (= -.953; p=.000). These findings were supported by (L S Shekerdemian *et al*., 2020), who found that most children and adolescents are accompanied by more than one chronic disease, such as obesity, growth disorders, asthma, and kidney diseases that affect their health outcome. Most of the clinical manifestations included fever, dyspnea, hypoxia, and fatigue.

At the end of the study, the researcher found that the sample has many social and physiologic health problems that can be due to life-threatening diseases among patients. The study did find also an association between the mortality rate of COVID-19 infection with gender, smokers, residence, and the length of stay in the hospital. In addition, COVID-19 disease is expected to be more prevalent in the elderly compared to children.

Chapter Six

Conclusions and Recommendations

Chapter Six

Conclusion and Recommendations

This chapter includes the conclusions drawn from the analysis and discussion of the research's findings. The recommendations are based on the findings of the study.

6. 1. Conclusion:

Based on the analysis and discussion of the study's findings, the following conclusions are drawn.

1. The COVID-19 recovery rate peaked in 2020 but declined in 2021, while the mortality rate followed the opposite pattern.
2. Age significantly influences COVID-19 mortality among children and adolescents, with older individuals facing a higher mortality risk.
3. Gender plays a role in COVID-19 mortality, with males having a higher likelihood of succumbing to the virus than females.
4. Urban residents had a lower COVID-19 mortality rate compared to rural residents, suggesting a disparity between the two populations.
5. Hospital stays duration impacts COVID-19 mortality, with shorter stays associated with higher recovery likelihood.
6. Smokers exhibited a higher likelihood of COVID-19 recovery compared to non-smokers.
7. The presence of chronic comorbidities does not show a significant correlation with COVID-19 mortality.
8. Linear regression analysis highlights on relationship between predictive factors and health outcomes of COVID-19 toward children and adolescents,

which including causes of death, chronic disease count, and the presence of clinical manifestations.

6.2 Recommendations:

According to the early stated conclusion, the present study can recommend that:

1. Healthcare professionals specializing in pediatric care, along with other medical staff in isolation, should pay careful attention to delivering healthcare to youngsters and adolescents with COVID-19. This approach aims to adapt effective management strategies and prevent the virus from spreading to others.
2. In order to mitigate the severity and gravity of the illness, it is advisable to separate children, particularly infants, who have contracted the coronavirus, from their family units.
3. Empower nurses and other healthcare practitioners to play an active role in assisting families, addressing their necessities, and attending to the well-being of their children. This involves alleviating fear and anxiety surrounding the virus to facilitate a positive recovery outcome, especially among children with chronic conditions.
4. Disseminate essential health information and recommended practices to prevent the transmission of the virus and diminish the occurrence of fatalities.
5. Adhere to the guidelines provided by the Ministry of Health concerning timely vaccination, and follow local directives pertaining to immunization.
6. It is advisable to direct further research endeavors toward evaluating the factors influencing mortality and recovery rates across distinct age brackets. This inquiry should encompass a more expansive sample, potentially spanning all provinces within the country.

References

References

1- المصادر العربية:

القران الكريم / سورة يونس/ الآية 57

2- المصادر الأجنبية:

Ackermann, M., Verleden, S. E., Kuehnel, M., Haverich, A., Welte, T., Laenger, F., ... & Jonigk, D. (2020). Pulmonary vascular endothelialitis, thrombosis, and angiogenesis in Covid-19. *New England Journal of Medicine*, *383*(2), 120-128.

Ackley, B. J., Ladwig, G. B., Makic, M. B. F., Martinez-Kratz, M. R., & Zanotti, M. (2019). *Nursing diagnosis handbook E-book: An evidence-based guide to planning care*. Elsevier Health Sciences.

Afify, S., Rabea, M., Darwish, A. K. Z., Arafa, A., Khalil, M., Heiba, A., ... & Eysa, B. (2021). Risk factors associated with length of hospital stay in children and adolescents with coronavirus disease 2019 in Egypt. *Journal of Medicine in Scientific Research*, *4*(3), 266.

Akın-Korhan E., Hakverdioğu-Yönt G., Ak B., Erdemir F. (2013). Analysis of Turkish validity and reliability of perception of nursing diagnosis. *Journal of Research and Development in Nursing*, 15(3), 13–25. https://dergipark.org.tr/tr/download/article-file/985888 (Original Work Published in Turkish).

Alahmari, A. A., Khan, A. A., Elganainy, A., Almohammadi, E. L., Hakawi, A. M., Assiri, A. M., & Jokhdar, H. A. (2021). Epidemiological and clinical features of COVID-19 patients in Saudi Arabia. *Journal of Infection and Public Health*, *14*(4), 437-443.

Almeida, J. D., & Tyrrell, D. A. J. (1967). The morphology of three previously uncharacterized human respiratory viruses that grow in organ culture. *Journal of General Virology*, *1*(2), 175–178.

Almufty, H. B., Mohammed, S. A., Abdullah, A. M., & Merza, M. A. (2021). Potential adverse effects of COVID19 vaccines among Iraqi population; a comparison between the three available vaccines in Iraq; a retrospective cross-sectional study. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, *15*(5), 102207.

Alqahtani, A. M., AlMalki, Z. S., Alalweet, R. M., Almazrou, S. H., Alanazi, A. S., Alanazi, M. A., AlShehri, A. A., & AlGhamdi, S. (2020). Assessing the severity of illness in patients with coronavirus disease in Saudi Arabia: a retrospective descriptive cross-sectional study. Frontiers in Public Health, 8, 593256.

Alwafi, H., Naser, A. Y., Qanash, S., Brinji, A. S., Ghazawi, M. A., Alotaibi, B., ... & Shabrawishi, M. (2021). Predictors of length of hospital stay, mortality, and outcomes among hospitalised COVID-19 patients in Saudi Arabia: a cross-sectional study. *Journal of multidisciplinary healthcare*, 839-852.

Anand, K. B., Karade, S., Sen, S., & Gupta, R. M. (2020). SARS-CoV-2: camazotz's curse. *Medical Journal Armed Forces India*, *76*(2), 136–141.

Baig, A. M., Khaleeq, A., Ali, U., & Syeda, H. (2020). Evidence of the COVID-19 virus targeting the CNS: tissue distribution, host–virus interaction, and proposed neurotropic mechanisms. *ACS chemical neuroscience*, *11*(7), 995-998.

Bailey, L. C., Razzaghi, H., Burrows, E. K., Bunnell, H. T., Camacho, P. E. F., Christakis, D. A., Eckrich, D., Kitzmiller, M., Lin, S. M., & Magnusen, B. C. (2021). Assessment of 135 794 pediatric patients tested for severe acute respiratory syndrome coronavirus 2 across the United States. *JAMA Pediatrics*, *175*(2), 176–184.

Basit G. (2020). Guide to care: Nursing process. *Journal of General Health*, 2(2), 77–90. https://dergipark.org.tr/tr/download/article-file/1065951 (Original

Work Published in Turkish).

Belay, E. D., Abrams, J., Oster, M. E., Giovanni, J., Pierce, T., Meng, L., ... & Godfred-Cato, S. (2021). Trends in geographic and temporal distribution of US children with multisystem inflammatory syndrome during the COVID-19 pandemic. *JAMA pediatrics*, *175*(8), 837-845.

Benvenuto, D., Giovanetti, M., Ciccozzi, A., Spoto, S., Angeletti, S., & Ciccozzi, M. (2020). The 2019-new coronavirus epidemic: evidence for virus evolution. *Journal of medical virology*, *92*(4), 455-459.

Bergman, S., Cennimo, D. J., Miller, M. M., & Olsen, K. M. (2021). COVID-19 treatment: investigational drugs and other therapies. *Medscape*, 1-49.

Berry, M., Gamieldien, J., & Fielding, B. C. (2015). Identification of new respiratory viruses in the new millennium. *Viruses*, *7*(3), 996–1019.

Bhadra, A., Mukherjee, A., & Sarkar, K. (2021). Impact of population density on Covid-19 infected and mortality rate in India. *Modeling earth systems and environment*, *7*, 623-629.

Bi, Q., Wu, Y., Mei, S., Ye, C., Zou, X., Zhang, Z., Liu, X., Wei, L., Truelove, S., & Zhang, T. (2020). Epidemiology and transmission of COVID-19 in 391 cases and 1286 of their close contacts in Shenzhen. *China: A Retrospective Cohort Study*, *4*.

Bian, Y., Zhou, J., & Liao, M. (2013). Research progress of coronavirus nonstructural proteins. *Chin J Anim Infect Dis*, *21*, 67–74.

Biglari, H. N., Sinaei, R., Pezeshki, S., & Hasani, F. K. (2021). Acute transverse myelitis of childhood due to novel coronavirus disease 2019: The first pediatric case report and review of the literature. *Iranian Journal of Child Neurology*, *15*(1), 107.

BIO, S. (2021). Status of COVID-19 Vaccines within WHO EUL/PQ evaluation

process. *Assessment. Status of COVID-19 Vaccines within WHO EUL/PQ Evaluation Process*.

Bixler, D. (2020). SARS-CoV-2–associated deaths among persons aged 21 years—United States, February 12–July 31, 2020. *MMWR. Morbidity and Mortality Weekly Report*, *69*.

Boechat, J. L., Wandalsen, G. F., Kuschnir, F. C., & Delgado, L. (2021). COVID-19 and pediatric asthma: clinical and management challenges. *International journal of environmental research and public health*, *18*(3), 1093.

Bunyavanich, S., Do, A., & Vicencio, A. (2020). Nasal gene expression of angiotensin-converting enzyme 2 in children and adults. *Jama*, *323*(23), 2427-2429.

Buonsenso, D., Munblit, D., De Rose, C., Sinatti, D., Ricchiuto, A., Carfi, A., & Valentini, P. (2021). Preliminary evidence on long COVID in children. *Acta Paediatrica (Oslo, Norway: 1992)*, *110*(7), 2208.

Burrell, C. J., Howard, C. R., & Murphy, F. A. (2016). *Fenner and White's medical virology*. Academic Press.

Butt, A. A., Dargham, S. R., Chemaitelly, H., Al Khal, A., Tang, P., Hasan, M. R., ... & Abu-Raddad, L. J. (2022). Severity of illness in persons infected with the SARS-CoV-2 delta variant vs beta variant in Qatar. *JAMA internal medicine*, *182*(2), 197-205.

Cai, G. (2020). Bulk and single-cell transcriptomics identify tobacco-use disparity in lung gene expression of ACE2, the receptor of 2019-nCov. *MedRxiv*, 2020-02.

Çakmak B., İnkaya B. (2020). Effects of COVID-19 pandemic from nursing perspective and management recommendations. *Turkish Journal of Health Sciencesand,Research*,3(2),4251. https://dergipark.org.tr/tr/pub/tusbad/issue/5

8783/794459 (OriginalWorkPublished in Turkish).

Centeno-Tablante, E., Medina-Rivera, M., Finkelstein, J. L., Rayco-Solon, P., Garcia-Casal, M. N., Rogers, L., Ghezzi-Kopel, K., Ridwan, P., Peña-Rosas, J. P., & Mehta, S. (2021). Transmission of SARS-CoV-2 through breast milk and breastfeeding: a living systematic review. *Annals of the New York Academy of Sciences*, *1484*(1), 32–54.

Centers for Disease Control and Prevention. (2020). Multisystem inflammatory syndrome in children (MIS-C) associated with coronavirus disease 2019 (COVID-19). *CDC Health Alert Network*.

Chan, J. F. W., Kok, K. H., Zhu, Z., Chu, H., To, K. K. W., Yuan, S., & Yuen, K. Y. (2020). Genomic characterization of the 2019 novel human-pathogenic coronavirus isolated from a patient with atypical pneumonia after visiting Wuhan. *Emerging microbes & infections*, *9*(1), 221-236.

Chan, J. F. W., Yuan, S., Kok, K. H., To, K. K. W., Chu, H., Yang, J., ... & Yuen, K. Y. (2020). A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *The lancet*, *395*(10223), 514-523.

Chavda, V. P., Patel, A. B., & Vaghasiya, D. D. (2022). SARS-CoV-2 variants and vulnerability at the global level. *Journal of medical virology*, *94*(7), 2986-3005.

Chen, J. (2020). Pathogenicity and transmissibility of 2019-nCoV—a quick overview and comparison with other emerging viruses. *Microbes and infection*, *22*(2), 69-71.

Chen, N., Zhou, M., Dong, X., Qu, J., Gong, F., Han, Y., ... & Zhang, L. (2020). Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *The lancet*, *395*(10223), 507-513.

Chen, Y., Liu, Q., & Guo, D. (2020). Emerging coronaviruses: genome structure, replication, and pathogenesis. *Journal of medical virology*, *92*(4), 418-423.

Chen, Z.-M., Fu, J.-F., Shu, Q., Chen, Y.-H., Hua, C.-Z., Li, F.-B., Lin, R., Tang, L.-F., Wang, T.-L., & Wang, W. (2020). Diagnosis and treatment recommendations for pediatric respiratory infection caused by the 2019 novel coronavirus. *World Journal of Pediatrics*, *16*(3), 240–246.

Cheng, Y., Luo, R., Wang, K., Zhang, M., Wang, Z., Dong, L., ... & Xu, G. (2020). Kidney disease is associated with in-hospital death of patients with COVID-19. *Kidney international*, *97*(5), 829-838.

Cheung, J. C. H., Ho, L. T., Cheng, J. V., Cham, E. Y. K., & Lam, K. N. (2020). Staff safety during emergency airway management for COVID-19 in Hong Kong. *The Lancet Respiratory Medicine*, *8*(4), e19.

Chinese Center for Disease Control and Prevention. (2020). 585 environmental samples from the South China Seafood Market in Wuhan, Hubei Province, China.

Cucinotta, D., & Vanelli, M. (2020). WHO declares COVID-19 a pandemic. *Acta Bio Medica: Atenei Parmensis*, *91*(1), 157.

Dashraath, P., Wong, J. L. J., Lim, M. X. K., Lim, L. M., Li, S., Biswas, A., Choolani, M., Mattar, C., & Su, L. L. (2020). Coronavirus disease 2019 (COVID-19) pandemic and pregnancy. *American Journal of Obstetrics and Gynecology*, *222*(6), 521–531.

DeBiasi, R. L., & Delaney, M. (2021). Symptomatic and asymptomatic viral shedding in pediatric patients infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2): under the surface. *Jama Pediatrics*, *175*(1), 16–18.

Del Rio, C., Malani, P. N., & Omer, S. B. (2021). Confronting the delta variant of

SARS-CoV-2, summer 2021. *Jama*, *326*(11), 1001-1002.

Dong, Y., Mo, X., Hu, Y., Qi, X., Jiang, F., Jiang, Z., & Tong, S. (2020). Epidemiology of COVID-19 among children in China. *Pediatrics*, *145*(6).

Duan, K., Liu, B., Li, C., Zhang, H., Yu, T., Qu, J., ... & Yang, X. (2020). Effectiveness of convalescent plasma therapy in severe COVID-19 patients. *Proceedings of the National Academy of Sciences*, *117*(17), 9490-9496.

EMedicineHealth,2022. Medical Definition of Risk factor. Available at: https://www.emedicinehealth.com/script/main/art.asp?articlekey=5377 2022.

Fang, F., Chen, Y., Zhao, D., Liu, T., Huang, Y., Qiu, L., ... & Chinese Pediatric Society and the Editorial Committee of the Chinese Journal of Pediatrics. (2020). Recommendations for the diagnosis, prevention, and control of coronavirus disease-19 in children—the Chinese perspectives. *Frontiers in Pediatrics*, *8*, 553394.

Feldstein, L. R., Rose, E. B., Horwitz, S. M., Collins, J. P., Newhams, M. M., Son, M. B. F., ... & Randolph, A. G. (2020). Multisystem inflammatory syndrome in US children and adolescents. *New England Journal of Medicine*, *383*(4), 334-346.

Fisler, G., Izard, S. M., Shah, S., Lewis, D., Kainth, M. K., Hagmann, S. H., ... & Taylor, M. D. (2020). Characteristics and risk factors associated with critical illness in pediatric COVID-19. *Annals of Intensive Care*, *10*(1), 1-8.

Fung, T. S., & Liu, D. X. (2019). Human coronavirus: host-pathogen interaction. *Annu Rev Microbiol*, *73*(1), 529–557.

Gallus, S. (2022). Update on the relationship between smoking and COVID-19. *Tabaccologia*, *20*(2), 26-30.

Gao, Y. D., Ding, M., Dong, X., Zhang, J. J., Kursat Azkur, A., Azkur, D., ... &

Akdis, C. A. (2021). Risk factors for severe and critically ill COVID-19 patients: a review. *Allergy*, *76*(2), 428-455.

Giménez, V. M. M., Inserra, F., Tajer, C. D., Mariani, J., Ferder, L., Reiter, R. J., & Manucha, W. (2020). Lungs as target of COVID-19 infection: Protective common molecular mechanisms of vitamin D and melatonin as a new potential synergistic treatment. *Life sciences*, *254*, 117808.

Giorgi Rossi, P., Marino, M., Formisano, D., Venturelli, F., Vicentini, M., Grilli, R., & Reggio Emilia COVID-19 Working Group. (2020). Characteristics and outcomes of a cohort of COVID-19 patients in the Province of Reggio Emilia, Italy. *PloS one*, *15*(8), e0238281.

Girum, T., Lentiro, K., Geremew, M., Migora, B., Shewamare, S., & Shimbre, M. S. (2021). Optimal strategies for COVID-19 prevention from global evidence achieved through social distancing, stay at home, travel restriction and lockdown: a systematic review. *Archives of Public Health*, *79*(1), 1–18.

Gök-Metin Z. (2020). Physiopathology of COVID-19 and holistic nursing approach. *Journal of Hacettepe University Faculty of Nursing*, 7(Special Volume), 15–24. https://doi.org/10.31125/hunhemsire.775658

Gonzalez, A. J., Ijezie, E. C., Balemba, O. B., & Miura, T. A. (2018). Attenuation of influenza A virus disease severity by viral coinfection in a mouse model. *Journal of virology*, *92*(23), e00881-18.

González-Aguña A., Jiménez-Rodríguez M. L., Fernández-Batalla M., Herrero-Jaén S., Monsalvo-San Macario E., Real-Martínez V., Santamaría-García J. M.; V. R. (2021). Nursing diagnoses for coronavirus disease, COVID-19: Identification by taxonomic triangulation. *International Journal of Nursing Knowledge*, 32, 108–116. https://doi.org/10.1111/2047-3095.12301

Guan, W. J., Ni, Z. Y., Hu, Y., Liang, W. H., Ou, C. Q., He, J. X., ... & Zhong, N. S. (2020). Clinical characteristics of coronavirus disease 2019 in China. *New*

England journal of medicine, *382*(18), 1708-1720.

Guan, W. J., Ni, Z. Y., Hu, Y., Liang, W. H., Ou, C. Q., He, J. X., ... & Zhong, N. S. (2020). Clinical characteristics of coronavirus disease 2019 in China. *New England journal of medicine*, *382*(18), 1708-1720.

Gupta, A., Madhavan, M. V., Sehgal, K., Nair, N., Mahajan, S., Sehrawat, T. S., ... & Landry, D. W. (2020). Extrapulmonary manifestations of COVID-19. *Nature medicine*, *26*(7), 1017-1032.

Gupta, A., Madhavan, M. V., Sehgal, K., Nair, N., Mahajan, S., Sehrawat, T. S., ... & Landry, D. W. (2020). Extrapulmonary manifestations of COVID-19. *Nature medicine*, *26*(7), 1017-1032.

Hamre, D., & Procknow, J. J. (1966). A new virus isolated from the human respiratory tract. *Proceedings of the Society for Experimental Biology and Medicine*, *121*(1), 190–193.

Helmy, Y. A., Fawzy, M., Elaswad, A., Sobieh, A., Kenney, S. P., & Shehata, A. A. (2020). The COVID-19 pandemic: a comprehensive review of taxonomy, genetics, epidemiology, diagnosis, treatment, and control. *Journal of Clinical Medicine*, *9*(4), 1225.

Hoang, A., Chorath, K., Moreira, A., Evans, M., Burmeister-Morton, F., Burmeister, F., Naqvi, R., Petershack, M., & Moreira, A. (2020). COVID-19 in 7780 pediatric patients: a systematic review. *EClinicalMedicine*, *24*, 100433.

Hoffmann, M., Kleine-Weber, H., Schroeder, S., Krüger, N., Herrler, T., Erichsen, S., ... & Pöhlmann, S. (2020). SARS-CoV-2 cell entry depends on ACE2 and TMPRSS2 and is blocked by a clinically proven protease inhibitor. *cell*, *181*(2), 271-280.

Holstein, B. (2021). Multisystem inflammatory syndrome in children. *The Journal*

for Nurse Practitioners, *17*(8), 941-945.

Horby, P., Lim, W. S., Emberson, J., Mafham, M., Bell, J., Linsell, L., ... & RECOVERY Collaborative Group. (2020). Effect of dexamethasone in hospitalized patients with COVID-19–preliminary report. *MedRxiv*, 2020-06.

Hoste, L., Van Paemel, R., & Haerynck, F. (2021). Multisystem inflammatory syndrome in children related to COVID-19: a systematic review. *European journal of pediatrics*, *180*(7), 2019-2034.

Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y., Zhang, L., Fan, G., Xu, J., & Gu, X. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet*, *395*(10223), 497–506.

Huang, D., Lian, X., Song, F., Ma, H., Lian, Z., Liang, Y., Qin, T., Chen, W., & Wang, S. (2020). Clinical features of severe patients infected with 2019 novel coronavirus: a systematic review and meta-analysis. *Annals of Translational Medicine*, *8*(9).

Hui, D. S., Azhar, E. I., Madani, T. A., Ntoumi, F., Kock, R., Dar, O., ... & Petersen, E. (2020). The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health—The latest 2019 novel coronavirus outbreak in Wuhan, China. *International journal of infectious diseases*, *91*, 264-266.

Jabbar, S. I., & Aladi, A. Q. (2022, October). Interpretation of the case fatality rates of covid-19 in Iraq. In *AIP Conference Proceedings* (Vol. 2398, No. 1, p. 050015). AIP Publishing LLC.

Johns Hopkins University. COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU. (2021). Johns Hopkins University Corona Virus Resource Center.

Kaur, S. P., & Gupta, V. (2020). COVID-19 Vaccine: A comprehensive status report. *Virus research*, *288*, 198114.

Khalil, N. S., Al-Yuzbaki, D. B., & Tawfeeq, R. S. (2020). COVID-19 knowledge, attitude and practice among medical undergraduate students in Baghdad City. *EurAsian Journal of BioSciences*, *14*(2), 4179–4186.

Kim, L., Whitaker, M., O'Halloran, A., Kambhampati, A., Chai, S. J., & Reingold, A. (2020). COVID-NET Surveillance Team Hospitalization rates and characteristics of children aged< 18 years hospitalized with laboratory-confirmed COVID-19-COVID-NET, 14 States, March 1-July 25, 2020. *MMWR Morb Mortal Wkly Rep*, *69*(32), 1081–1088.

Ko, J. Y., Danielson, M. L., Town, M., Derado, G., Greenlund, K. J., Kirley, P. D., Alden, N. B., Yousey-Hindes, K., Anderson, E. J., & Ryan, P. A. (2021). Risk factors for coronavirus disease 2019 (COVID-19)–associated hospitalization: COVID-19–associated hospitalization surveillance network and behavioral risk factor surveillance system.*Clinical Infectious Diseases*,*72*(11),e695–e703.

Kramer, A., Schwebke, I., & Kampf, G. (2006). How long do nosocomial pathogens persist on inanimate surfaces? A systematic review. *BMC infectious diseases*, *6*(1), 1-8.

Ladhani, S. N., Amin-Chowdhury, Z., Davies, H. G., Aiano, F., Hayden, I., Lacy, J., Sinnathamby, M., De Lusignan, S., Demirjian, A., & Whittaker, H. (2020). COVID-19 in children: analysis of the first pandemic peak in England. *Archives of Disease in Childhood*, *105*(12), 1180–1185.

Lai, C. C., Liu, Y. H., Wang, C. Y., Wang, Y. H., Hsueh, S. C., Yen, M. Y., ... & Hsueh, P. R. (2020). Asymptomatic carrier state, acute respiratory disease, and pneumonia due to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2): Facts and myths. *Journal of Microbiology, Immunology and Infection*, *53*(3), 404-412.

Lai, C.-C., Shih, T.-P., Ko, W.-C., Tang, H.-J., & Hsueh, P.-R. (2020). Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus

disease-2019 (COVID-19): The epidemic and the challenges. *International Journal of Antimicrobial Agents*, *55*(3), 105924.

Laird, E., Rhodes, J., & Kenny, R. A. (2020). Vitamin D and inflammation: potential implications for severity of Covid-19. *Ir Med J*, *113*(5), 81.

Lauer, S. A., Grantz, K. H., Bi, Q., Jones, F. K., Zheng, Q., Meredith, H. R., Azman, A. S., Reich, N. G., & Lessler, J. (2020). The incubation period of coronavirus disease 2019 (COVID-19) from publicly reported confirmed cases: estimation and application. *Annals of Internal Medicine*, *172*(9), 577–582.

Leidman, E., Duca, L. M., Omura, J. D., Proia, K., Stephens, J. W., & Sauber-Schatz, E. K. (2021). COVID-19 trends among persons aged 0–24 years—United States, March 1–December 12, 2020. *Morbidity and Mortality Weekly Report*, *70*(3), 88.

Levin, Z., Choyke, K., Georgiou, A., Sen, S., & Karaca-Mandic, P. (2021). Trends in pediatric hospitalizations for coronavirus disease 2019. *JAMA Pediatrics*, *175*(4), 415–417.

LI, F., & SHI, Y. (2020). Summary of consensus documents: prevention and control of the 2019 novel conoravirus infection in newborn infants. *Chongqing Medicine*, E020-E020.

Li, F., Li, Y.-Y., Liu, M.-J., Fang, L.-Q., Dean, N. E., Wong, G. W. K., Yang, X.-B., Longini, I., Halloran, M. E., & Wang, H.-J. (2021). Household transmission of SARS-CoV-2 and risk factors for susceptibility and infectivity in Wuhan: a retrospective observational study. *The Lancet Infectious Diseases*, *21*(5), 617–628.

Li, G., & De Clercq, E. (2020). Therapeutic options for the 2019 novel coronavirus (2019-nCoV). *Nature reviews Drug discovery*, *19*(3), 149-150.

Li, L., Yang, Z., Dang, Z., Meng, C., Huang, J., Meng, H., ... & Shao, Y. (2020). Propagation analysis and prediction of the COVID-19. *Infectious Disease Modelling*, *5*, 282-292.

Li, T., Wei, C., Li, W., Hongwei, F., & Shi, J. (2020). Beijing Union Medical College Hospital on" pneumonia of novel coronavirus infection" diagnosis and treatment proposal (V2. 0). *Med J Peking Union Med Coll Hosp*, *9*, 29.

Li, Y., Tenchov, R., Smoot, J., Liu, C., Watkins, S., & Zhou, Q. (2021). A comprehensive review of the global efforts on COVID-19 vaccine development. *ACS Central Science*, *7*(4), 512-533.

Li, Y., Zhou, W., Yang, L., & You, R. (2020). Physiological and pathological regulation of ACE2, the SARS-CoV-2 receptor. *Pharmacological research*, *157*, 104833.

Liang, W., Guan, W., Chen, R., Wang, W., Li, J., Xu, K., ... & He, J. (2020). Cancer patients in SARS-CoV-2 infection: a nationwide analysis in China. *The lancet oncology*, *21*(3), 335-337.

Liu, J., & Liu, S. (2020). *The management of coronavirus disease 2019 (COVID-19) J Med Virol. 2020 Sep; 92 (9): 1484–1490. doi: 10.1002/jmv. 25965*. Epub.

Liu, L., Wei, Q., Lin, Q., Fang, J., Wang, H., Kwok, H., ... & Chen, Z. (2019). Anti–spike IgG causes severe acute lung injury by skewing macrophage responses during acute SARS-CoV infection. *JCI insight*, *4*(4).

Liu, R., Holik, A. Z., Su, S., Jansz, N., Chen, K., Leong, H. S., ... & Ritchie, M. E. (2020). Why weight? Modelling sample and observational level variability improves power in RNA-seq analyses. *Nucleic acids research*, *43*(15), e97-e97.

Liu, T., Hu, J., Kang, M., Lin, L., Zhong, H., Xiao, J., ... & Ma, W. (2020).

Transmission dynamics of 2019 novel coronavirus (2019-nCoV).

Liu, W., Zhang, Q. I., Chen, J., Xiang, R., Song, H., Shu, S., Chen, L., Liang, L., Zhou, J., & You, L. (2020). Detection of Covid-19 in children in early January 2020 in Wuhan, China. *New England Journal of Medicine*, *382*(14), 1370–1371.

Liu, X., Zhou, H., Zhou, Y., Wu, X., Zhao, Y., Lu, Y., ... & Wang, Y. (2020). Risk factors associated with disease severity and length of hospital stay in COVID-19 patients. *Journal of Infection*, *81*(1), e95-e97.

Liu, Y., Gayle, A. A., Wilder-Smith, A., & Rocklöv, J. (2020). The reproductive number of COVID-19 is higher compared to SARS coronavirus. *Journal of travel medicine*.

Lu, R., Zhao, X., Li, J., Niu, P., Yang, B., Wu, H., ... & Tan, W. (2020). Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. *The lancet*, *395*(10224), 565-574.

Lu, X., Zhang, L., Du, H., Zhang, J., Li, Y. Y., Qu, J., ... & Wong, G. W. (2020). SARS-CoV-2 infection in children. *New England Journal of Medicine*, *382*(17), 1663-1665.

Ludvigsson, J. F. (2020). Systematic review of COVID-19 in children shows milder cases and a better prognosis than adults. *Acta Paediatrica*, *109*(6), 1088–1095.

Mannheim, J., Gretsch, S., Layden, J. E., & Fricchione, M. J. (2020). Characteristics of hospitalized pediatric COVID-19 cases—Chicago, Illinois, March–April 2020 [manuscript published online ahead of print 1 June 2020]. *J Pediatric Infect Dis Soc*.

Mao, L., Jin, H., Wang, M., Hu, Y., Chen, S., He, Q., ... & Hu, B. (2020). Neurologic manifestations of hospitalized patients with coronavirus disease

2019 in Wuhan, China. *JAMA neurology*, *77*(6), 683-690.

Mao, X. Y., & Jin, W. L. (2020). The COVID-19 pandemic: consideration for brain infection. *Neuroscience*, *437*, 130.

Mao, R., Liang, J., Shen, J., Ghosh, S., Zhu, L. R., Yang, H., ... & Chen, M. H. (2020). Implications of COVID-19 for patients with pre-existing digestive diseases. *The lancet Gastroenterology & hepatology*, *5*(5), 425-427.

Martineau, A. R., Jolliffe, D. A., Hooper, R. L., Greenberg, L., Aloia, J. F., Bergman, P., ... & Camargo, C. A. (2017). Vitamin D supplementation to prevent acute respiratory tract infections: systematic review and meta-analysis of individual participant data. *bmj*, *356*.

McCormick, D. W., Richardson, L. C., Young, P. R., Viens, L. J., Gould, C. V., Kimball, A., ... & Koumans, E. H. (2021). Deaths in children and adolescents associated with COVID-19 and MIS-C in the United States. *Pediatrics*, *148*(5).

McIntosh, K., Becker, W. B., & Chanock, R. M. (1967). Growth in suckling-mouse brain of" IBV-like" viruses from patients with upper respiratory tract disease. *Proceedings of the National Academy of Sciences*, *58*(6), 2268–2273.

McIntosh, K., Dees, J. H., Becker, W. B., Kapikian, A. Z., & Chanock, R. M. (1967). Recovery in tracheal organ cultures of novel viruses from patients with respiratory disease. *Proceedings of the National Academy of Sciences*, *57*(4), 933–940.

McIntosh, K., Kapikian, A. Z., Turner, H. C., Hartley, J. W., Parrott, R. H., & Chanock, R. M. (1970). Seroepidemiologic studies of coronavirus infection in adults and children. *American Journal of Epidemiology*, *91*(6), 585–592.

Morand, A., Fabre, A., Minodier, P., Boutin, A., Vanel, N., Bosdure, E., & Fournier, P. E. (2020). COVID-19 virus and children: what do we know? In

Archives de pediatrie (Vol. 27, Issue 3, pp. 117–118). Elsevier.

Muus, C., Luecken, M. D., Eraslan, G., Waghray, A., Heimberg, G., Sikkema, L., ... & Human Cell Atlas Lung Biological Network. (2020). Integrated analyses of single-cell atlases reveal age, gender, and smoking status associations with cell type-specific expression of mediators of SARS-CoV-2 viral entry and highlights inflammatory programs in putative target cells. *BioRxiv*, 2020-04.

National Health Commission & National Administration of Traditional Chinese Medicine. (2020). Diagnosis and treatment protocol for novel coronavirus pneumonia (Trial Version 7). *Chinese Medical Journal*, *133*(09), 1087-1095.

Netea, M. G., Domínguez-Andrés, J., Barreiro, L. B., Chavakis, T., Divangahi, M., Fuchs, E., ... & Latz, E. (2020). Defining trained immunity and its role in health and disease. *Nature Reviews Immunology*, *20*(6), 375-388.

Nicola, M., Alsafi, Z., Sohrabi, C., Kerwan, A., Al-Jabir, A., Iosifidis, C., Agha, M., & Agha, R. (2020). The socio-economic implications of the coronavirus pandemic (COVID-19): A review. *International Journal of Surgery*, *78*, 185–193.

Nicola, M., Sohrabi, C., Mathew, G., Kerwan, A., Al-Jabir, A., Griffin, M., ... & Agha, R. (2020). Health policy and leadership models during the COVID-19 pandemic: A review. *International journal of surgery*, *81*, 122-129.

Nikolopoulou, G. B., & Maltezou, H. C. (2021). COVID-19 in children: where do we stand?. *Archives of medical research*.

Nurseslabs. (2021). *Nursing care plan for Coronavirus Disease 2019*. https://nurseslabs.com/coronavirus-disease-covid-19/

Oliveira, E. A., Colosimo, E. A., e Silva, A. C. S., Mak, R. H., Martelli, D. B., Silva, L. R., ... & Oliveira, M. C. L. (2021). Clinical characteristics and risk factors for death among hospitalised children and adolescents with COVID-19

in Brazil: an analysis of a nationwide database. *The Lancet Child & Adolescent Health*, *5*(8), 559-568.

Oxford Dictionaries.Available at: https://en. oxford dictionaries. com/ definition /cause 2022.

Ozma, M. A., Rashedi, J., Poor, B. M., Vegari, A., Asgharzadeh, V., Kafil, H. S., ... & Asgharzadeh, M. (2020). Tuberculosis and diabetes mellitus in Northwest of Iran. *Infectious Disorders-Drug Targets (Formerly Current Drug Targets-Infectious Disorders)*, *20*(5), 667-671.

Pachetti, M., Marini, B., Benedetti, F., Giudici, F., Mauro, E., Storici, P., ... & Ippodrino, R. (2020). Emerging SARS-CoV-2 mutation hot spots include a novel RNA-dependent-RNA polymerase variant. *Journal of translational medicine*, *18*(1), 1-9.

Panahi, L., Amiri, M., & Pouy, S. (2020). Clinical characteristics of COVID-19 infection in newborns and pediatrics: a systematic review. *Archives of academic emergency medicine*, *8*(1).

Parri, N., Lenge, M., & Buonsenso, D. (2020). Children with Covid-19 in pediatric emergency departments in Italy. *New England Journal of Medicine*, *383*(2), 187–190.

Peng, J., Wang, X., Yang, M. H., Wang, M. J., & Zheng, X. R. (2020). Management plan for prevention and control of novel coronavirus pneumonia among children in Xiangya Hospital of Central South University. *Zhongguo dang dai er ke za zhi= Chinese journal of contemporary pediatrics*, *22*(2), 100-105.

Pillaiyar, T., Meenakshisundaram, S., & Manickam, M. (2020). Recent discovery and development of inhibitors targeting coronaviruses. *Drug Discovery Today*, *25*(4), 668–688.

Preston, L. E., Chevinsky, J. R., Kompaniyets, L., Lavery, A. M., Kimball, A., Boehmer, T. K., & Goodman, A. B. (2021). Characteristics and disease severity of US children and adolescents diagnosed with COVID-19. *JAMA Network Open*, *4*(4), e215298–e215298.

Qi, F., Qian, S., Zhang, S., & Zhang, Z. (2020). Single cell RNA sequencing of 13 human tissues identifies cell types and receptors of human coronaviruses. *Biochemical and biophysical research communications*, *526*(1), 135-140.

Rajabkhah, K., Soodejani, M. T., Mahmudimanesh, M., Gheshlaghi, L. A., & Tabatabaei, S. M. (2020). Prevention of COVID-19 in children and neonates: A review. *Archives of Preventive Medicine*, *5*(1), 026-030.Mohanty, S. K., Sahoo, U., Mishra, U. S., & Dubey, M. (2020). Age Pattern of Premature Mortality under varying scenarios of COVID-19 Infection in India. *medRxiv*.

Rath, D., Petersen-Uribe, Á., Avdiu, A., Witzel, K., Jaeger, P., Zdanyte, M., ... & Gawaz, M. P. (2020). Impaired cardiac function is associated with mortality in patients with acute COVID-19 infection. *Clinical Research in Cardiology*, *109*(12), 1491-1499.

Riphagen, S., Gomez, X., Gonzalez-Martinez, C., Wilkinson, N., & Theocharis, P. (2020). Hyperinflammatory shock in children during COVID-19 pandemic. *The Lancet*, *395*(10237), 1607-1608.

Sarhan, A. R., Flaih, M. H., Hussein, T. A., & Hussein, K. R. (2020). Novel coronavirus (COVID-19) outbreak in Iraq: The first wave and future scenario. *medRxiv*, 2020-06.

Schwartz, D. A. (2020). An analysis of 38 pregnant women with COVID-19, their newborn infants, and maternal-fetal transmission of SARS-CoV-2: maternal coronavirus infections and pregnancy outcomes. *Archives of Pathology & Laboratory Medicine*, *144*(7), 799–805.

Shekerdemian, L. S., Mahmood, N. R., Wolfe, K. K., Riggs, B. J., Ross, C. E., McKiernan, C. A., ... & Burns, J. P. (2020). International COVID-19 PICU Collaborative. Characteristics and outcomes of children with coronavirus disease 2019 (COVID-19) infection admitted to US and Canadian pediatric intensive care units. *JAMA Pediatr*, *174*(9), 868-873.

Sheng, J., & Shao, A. (2020). The epidemiological and clinical features of COVID-19 and lessons from this global infectious public health event. *Trends in Microbiology*, *16*(4), 210–222.

Shi, Y., Wang, X., Liu, G., Zhu, Q., Wang, J., Yu, H., ... & Huang, G. (2020). A quickly, effectively screening process of novel corona virus disease 2019 (COVID-19) in children in Shanghai, China. *Annals of translational medicine*, *8*(5).

Siebach, M. K., Piedimonte, G., & Ley, S. H. (2021). COVID-19 in childhood: Transmission, clinical presentation, complications and risk factors. *Pediatric pulmonology*, *56*(6), 1342-1356.

Singh, A. K., Gupta, R., Ghosh, A., & Misra, A. (2020). Diabetes in COVID-19: Prevalence, pathophysiology, prognosis and practical considerations. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, *14*(4), 303-310.

Society of Pediatrics, C. M. A., & Board, E. (2020). Recommendations for the diagnosis, prevention and control of the 2019 novel coronavirus infection in children (first interim edition). *Zhonghua er ke za zhi= Chinese journal of pediatrics*, *58*(3), 169-174.

Sohrabi, C., Alsafi, Z., O'neill, N., Khan, M., Kerwan, A., Al-Jabir, A., .. & Agha, R. (2020). World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19). *International journal of surgery*, *76*, 71-76.

Song, Z., Xu, Y., Bao, L., Zhang, L., Yu, P., Qu, Y., ... & Qin, C. (2019). From

SARS to MERS, thrusting coronaviruses into the spotlight. *viruses*, *11*(1), 59.

Su, S., Wong, G., Shi, W., Liu, J., Lai, A. C. K., Zhou, J., Liu, W., Bi, Y., & Gao, G. F. (2016). Epidemiology, genetic recombination, and pathogenesis of coronaviruses. *Trends in Microbiology*, *24*(6), 490–502.

Suratannon, N., Dik, W. A., Chatchatee, P., & van Hagen, P. M. (2020). COVID-19 in children: Heterogeneity within the disease and hypothetical pathogenesis. *Asian Pacific Journal of Allergy and Immunology*, *38*(3), 170–177.

Swanson, E., Mantovani, V. M., Wagner, C., Moorhead, S., Lopez, K. D., Macieira, T. G. R., & Abe, N. (2020). NANDA-I, NOC, and NIC linkages to SARS-CoV-2 (COVID-19): Part 2. Individual response. *International Journal of Nursing Knowledge*, 32(1), 68–83.

Team, E. (2020). The epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19)—China, 2020. *China CDC weekly*, *2*(8), 113.

Thai, P. Q., Son, D. T., Van, H. T. H., Minh, L. N., Hung, L. X., Van Toan, N., ... & Khoa, N. T. (2020). Factors associated with the duration of hospitalisation among COVID-19 patients in Vietnam: A survival analysis. *Epidemiology & Infection*, *148*.

Thiruvengadam, G., Lakshmi, M., & Ramanujam, R. (2021). A study of factors affecting the length of hospital stay of COVID-19 patients by Cox-proportional hazard model in a South Indian tertiary care hospital. *Journal of primary care & community health*, *12*, 21501327211000231.

Tracker, C. D. C. C. D. (2021). *United States COVID-19 cases, deaths, and laboratory testing (NAATs) by state, territory,and jurisdiction*. *Accessed August*, *5*.

Tran, K., Cimon, K., Severn, M., Pessoa-Silva, C. L., & Conly, J. (2012). Aerosol generating procedures and risk of transmission of acute respiratory infections to healthcare workers: a systematic review. *PloS one*, *7*(4), e35797.

Tsabouri, S., Makis, A., Kosmeri, C., & Siomou, E. (2021). Risk factors for severity in children with coronavirus disease 2019: a comprehensive literature review. *Pediatric Clinics*, *68*(1), 321-338.

Tyrrell, D A J, & Bynoe, M. L. (1966). Cultivation of viruses from a high proportion of patients with colds. *Lancet*, 76–77.

Tyrrell, David A J, Almeida, J. D., Cunningham, C. H., Dowdle, W. R., Hofstad, M. S., McIntosh, K., Tajima, M., Zakstelskaya, L. Y., Easterday, B. C., & Kapikian, A. (1975). Coronaviridae. *Intervirology*, *5*(1–2), 76.

Valizadeh, R., Baradaran, A., Mirzazadeh, A., & Bhaskar, L. V. K. S. (2020). Coronavirus-nephropathy; renal involvement in COVID-19. *J Renal Inj Prev*, *9*(2), e18.

Van Doremalen, N., Bushmaker, T., Morris, D. H., Holbrook, M. G., Gamble, A., Williamson, B. N., ... & Munster, V. J. (2020). Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. *New England journal of medicine*, *382*(16), 1564-1567.

Vekaria, B., Overton, C., Wiśniowski, A., Ahmad, S., Aparicio-Castro, A., Curran-Sebastian, J., ... & Elliot, M. J. (2021). Hospital length of stay for COVID-19 patients: Data-driven methods for forward planning. *BMC Infectious Diseases*, *21*(1), 1-15.

Verdoni, L., Mazza, A., Gervasoni, A., Martelli, L., Ruggeri, M., Ciuffreda, M., ... & D'Antiga, L. (2020). An outbreak of severe Kawasaki-like disease at the Italian epicentre of the SARS-CoV-2 epidemic: an observational cohort study. *The Lancet*, *395*(10239), 1771-1778.

Voysey, M., Clemens, S. A. C., Madhi, S. A., Weckx, L. Y., Folegatti, P. M., Aley, P. K., ... & Bijker, E. (2021). Safety and efficacy of the ChAdOx1 nCoV-19 vaccine (AZD1222) against SARS-CoV-2: an interim analysis of four randomised controlled trials in Brazil, South Africa, and the UK. *The Lancet*, *397*(10269), 99-111.

Wang, C., Liu, Z., Chen, Z., Huang, X., Xu, M., He, T., & Zhang, Z. (2020). The establishment of reference sequence for SARS-CoV-2 and variation analysis. *Journal of medical virology*, *92*(6), 667-674.

Wang, F.-S., & Zhang, C. (2020). What to do next to control the 2019-nCoV epidemic? *The Lancet*, *395*(10222), 391–393.

Wang, P., Lu, J. A., Jin, Y., Zhu, M., Wang, L., & Chen, S. (2020). Statistical and network analysis of 1212 COVID-19 patients in Henan, China. *International Journal of Infectious Diseases*, *95*, 391-398.

Wang, W., Xu, Y., Gao, R., Lu, R., Han, K., Wu, G., & Tan, W. (2020). Detection of SARS-CoV-2 in different types of clinical specimens. *Jama*, *323*(18), 1843-1844.

Witte, K. H., Tajima, M., & Easterday, B. C. (1968). Morphologic characteristics and nucleic acid type of transmissible gastroenteritis virus of pigs. *Archiv Für Die Gesamte Virusforschung*, *23*(1), 53–70.

Wong, J. J. M., Abbas, Q., Chuah, S. L., Malisie, R. F., Pon, K. M., Katsuta, T., ... & PACCOVRA Investigators of the PACCMAN Research Group. (2021). Comparative analysis of pediatric COVID-19 infection in Southeast Asia, south Asia, Japan, and China. *The American journal of tropical medicine and hygiene*, *105*(2), 413.

World Health Organization. (2020). Coronavirus disease (COVID-19): weekly epidemiological update, 7 September 2020.

World Health Organization. (2020). Coronavirus disease 2019 (COVID-19): situation report, 73.

World Health Organization. (2020). Declares novel coronavirus (2019-nCoV) sixth public health emergency of international concern. *Euro surveillance: bulletin Europeen sur les maladies transmissibles= European communicable disease bulletin*, *25*(5).

World Health Organization. (2020). Naming the coronavirus disease (COVID-19) and the virus that causes it. *Brazilian Journal of Implantology and Health Sciences*, *2*(3).

World Health Organization. (2020). *Clinical management of severe acute respiratory infection when novel coronavirus (nCoV) infection is suspected: interim guidance, 25 January 2020* (No. WHO/nCoV/Clinical/2020.2). World Health Organization.

World Health Organization. (2020). *Infection prevention and control during health care when COVID-19 is suspected: interim guidance, 19 March 2020* (No. WHO/2019-nCoV/IPC/2020.3). World Health Organization.

World Health Organization. (2020). *Modes of transmission of virus causing COVID-19: implications for IPC precaution recommendations: scientific brief, 29 March 2020* (No. WHO/2019-nCoV/Sci_ Brief/Transmission modes/2020.2). World Health Organization.

World Health Organization. (2020). *Multisystem inflammatory syndrome in children and adolescents with COVID-19: scientific brief, 15 May 2020* (No. WHO/2019-nCoV/Sci_Brief/Multisystem_Syndrome_Children/2020.1). World Health Organization.

World Health Organization. (2020). *Rational use of personal protective equipment for coronavirus disease (COVID-19): interim guidance, 27 February 2020* (No.WHO/2019-nCov/IPCPPE_use/2020.1). World Health Organization.

World Health Organization. (2020). *WHO COVID-19 case definition* (No. WHO/2019-nCoV/Surveillance_Case_Definition/2020.1). World Health Organization.

World Health Organization. (2022). World Health Organization (WHO) Coronavirus (COVID-19) Dashboard (2022). *World Health Organization, URL: https://covid19. who. int/.(Accessed: 28 February 2022)*.

Worldometer. (2020). *"Coronavirus Cases"*, Available at: www.worldometers.info/coronavirus/

Wu, F., Zhao, S., Yu, B., Chen, Y.-M., Wang, W., Song, Z.-G., Hu, Y., Tao, Z.-W., Tian, J.-H., & Pei, Y.-Y. (2020). A new coronavirus associated with human respiratory disease in China. *Nature*, *579*(7798), 265–269.

Wu, Z., & McGoogan, J. M. (2020). Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72 314 cases from the Chinese Center for Disease Control and Prevention. *jama*, *323*(13), 1239-1242.

Xiao, Z., Xie, X., Guo, W., Luo, Z., Liao, J., Wen, F., Zhou, Q., Han, L., & Zheng, T. (2020). Examining the incubation period distributions of COVID-19 on Chinese patients with different travel histories. *The Journal of Infection in Developing Countries*, *14*(04), 323–327.

Xu, H., Zhong, L., Deng, J., Peng, J., Dan, H., Zeng, X., ... & Chen, Q. (2020). High expression of ACE2 receptor of 2019-nCoV on the epithelial cells of oral mucosa. *International journal of oral science*, *12*(1), 1-5.

Xu, X., Chen, P., Wang, J., Feng, J., Zhou, H., Li, X., ... & Hao, P. (2020). Evolution of the novel coronavirus from the ongoing Wuhan outbreak and modeling of its spike protein for risk of human transmission. *Science China Life Sciences*, *63*(3), 457-460.

Yang, L., Liu, J., Zhang, R., Li, M., Li, Z., Zhou, X., ... & Lei, Y. (2020). Epidemiological and clinical features of 200 hospitalized patients with coronavirus disease 2019 outside Wuhan, China: a descriptive study. *Journal of Clinical Virology*, *129*, 104475.

Yang, Y., Peng, F., Wang, R., Guan, K., Jiang, T., Xu, G., Sun, J., & Chang, C. (2020). The deadly coronaviruses: The 2003 SARS pandemic and the 2020 novel coronavirus epidemic in China. *Journal of Autoimmunity*, *109*, 102434.

Yonker, L. M., Neilan, A. M., Bartsch, Y., Patel, A. B., Regan, J., Arya, P., ... & Fasano, A. (2020). Pediatric severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2): clinical presentation, infectivity, and immune responses. *The Journal of pediatrics*, *227*, 45-52.

Yung, C. F., Kam, K. Q., Wong, M. S., Maiwald, M., Tan, Y. K., Tan, B. H., & Thoon, K. C. (2020). Environment and personal protective equipment tests for SARS-CoV-2 in the isolation room of an infant with infection. *Annals of internal medicine*, *173*(3), 240-242.

Zachariah, P., Johnson, C. L., Halabi, K. C., Ahn, D., Sen, A. I., Fischer, A., ... & Lakhaney, D. (2020). Epidemiology, clinical features, and disease severity in patients with coronavirus disease 2019 (COVID-19) in a children's hospital in New York City, New York. *JAMA pediatrics*, *174*(10), e202430-e202430.

Zhang, L., Peres, T. G., Silva, M. V. F., & Camargos, P. (2020). What we know so far about Coronavirus Disease 2019 in children: A meta-analysis of 551 laboratory-confirmed cases. *Pediatric Pulmonology*, *55*(8), 2115–2127.

Zhang, W., Du, R.-H., Li, B., Zheng, X.-S., Yang, X.-L., Hu, B., Wang, Y.-Y., Xiao, G.-F., Yan, B., & Shi, Z.-L. (2020). Molecular and serological investigation of 2019-nCoV infected patients: implication of multiple shedding routes. *Emerging Microbes & Infections*, *9*(1), 386–389.

Zhang, Y., Zeng, G., Pan, H., Li, C., Hu, Y., Chu, K., ... & Zhu, F. (2021). Safety,

tolerability, and immunogenicity of an inactivated SARS-CoV-2 vaccine in healthy adults aged 18–59 years: a randomised, double-blind, placebo-controlled, phase 1/2 clinical trial. *The Lancet infectious diseases*, *21*(2), 181-192.

Zhang, Z., Yao, W., Wang, Y., Long, C., & Fu, X. (2020). Wuhan and Hubei COVID-19 mortality analysis reveals the critical role of timely supply of medical resources. *Journal of Infection*, *81*(1), 147-178.

Zhou, F., Yu, T., Du, R., Fan, G., Liu, Y., Liu, Z., ... & Cao, B. (2020). Clinical course and risk factors for mortality in patients with COVID-19 in Wuhan, China: a retrospective cohort study. *The lancet*, *395*(10229), 1054-1062.

Zhu, M., Hu, K., & Zhu, Z. (2020). Use of convalescent plasma in COVID-19 patients in China. *Transfusion Clinique et Biologique*, *27*(3), 168.

Zhu, N., Zhang, D., Wang, W., Li, X., Yang, B., Song, J., Zhao, X., Huang, B., Shi, W., & Lu, R. (2020). A novel coronavirus from patients with pneumonia in China, 2019. *New England Journal of Medicine*.

Ziegler, C. G., Allon, S. J., Nyquist, S. K., Mbano, I. M., Miao, V. N., Tzouanas, C. N., ... & Zhang, K. (2020). SARS-CoV-2 receptor ACE2 is an interferon-stimulated gene in human airway epithelial cells and is detected in specific cell subsets across tissues. *Cell*, *181*(5), 1016-1035.

Zimmermann, P., & Curtis, N. (2021). Why is COVID-19 less severe in children? A review of the proposed mechanisms underlying the age-related difference in severity of SARS-CoV-2 infections. *Archives of disease in childhood*, *106*(5), 429-439.

Appendices

Appendix (A)

Administrative Arrangements

University of Babylon
College of Nursing
Research Ethics Committee

جـــامـــعة بـــابـــل
كـــلية التمريـــض
لجنة اخلاقيات البحث العلمي

Issue No:

Date: 8 / 2 /2023

Approval Letter

To, امير كاظم عبد

The Research Ethics committee at the **University of Babylon, College of Nursing** has reviewed and discussed your application to conduct the research study entitled **" Factors associated with Mortality and Recovery rate of COVID-19 among Children and Adolescents through the period 2020-2022"**

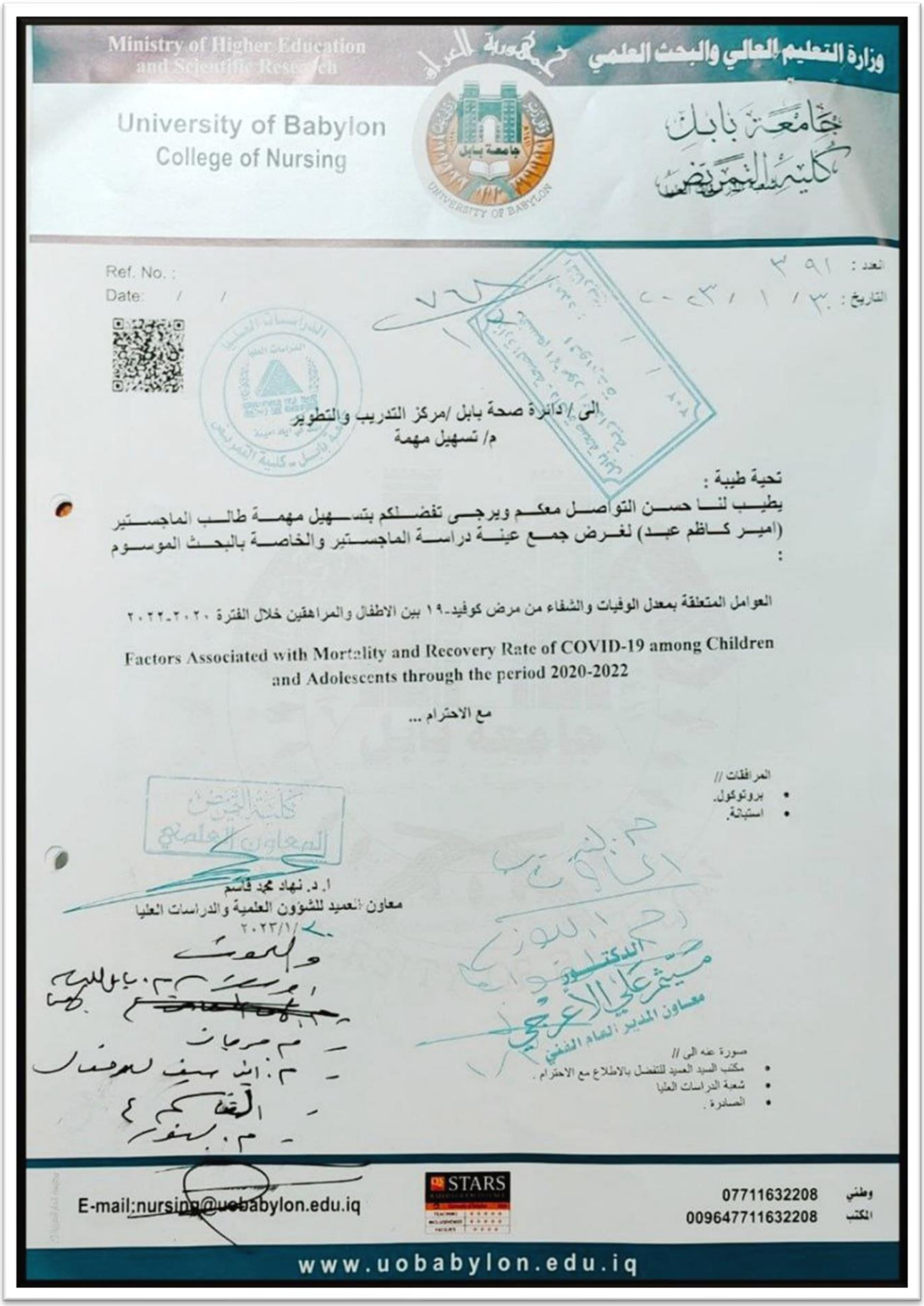
The Following documents have been reviewed and approved:

1. Research protocol
2. Research instrument/s
3. Participant informed consent

Committee Decision:

The committee approves the study to be conducted in the presented form. The Research Ethics committee expects to be informed about any changes occurring during the study, any revision in the protocol and participant informed consent.

Prof. Dr. Shatha Saadi Mohammed
Chair Committee
College of Nursing
Research Ethical Committee
8 / 2/2023



وزارة التعليم العالي والبحث العلمي
Ministry of Higher Education and Scientific Research
جمهورية العراق
جامعة بابل
University of Babylon
كلية التمريض
College of Nursing

العدد : ٣٩١
التاريخ : ٣٠ / ١ / ٢٠٢٣

Ref. No. :
Date: / /

الى / دائرة صحة بابل /مركز التدريب والتطوير
م/ تسهيل مهمة

تحية طيبة :

يطيب لنا حسن التواصل معكم ويرجى تفضلكم بتسهيل مهمة طالب الماجستير (امير كاظم عبد) لغرض جمع عينة دراسة الماجستير والخاصة بالبحث الموسوم :

العوامل المتعلقة بمعدل الوفيات والشفاء من مرض كوفيد-١٩ بين الاطفال والمراهقين خلال الفترة ٢٠٢٠-٢٠٢٢

Factors Associated with Mortality and Recovery Rate of COVID-19 among Children and Adolescents through the period 2020-2022

مع الاحترام ...

المرافقات //
- بروتوكول.
- استبانة.

ا. د. نهاد مجد قاسم
معاون العميد للشؤون العلمية والدراسات العليا
٢٠٢٣/١/

الدكتور
مثير رعي الاعرجي
معاون المدير العام الفني

صورة عنه الى //
- مكتب السيد العميد للتفضل بالاطلاع مع الاحترام.
- شعبة الدراسات العليا
- الصادرة.

E-mail:nursing@uobabylon.edu.iq
وطني 07711632208
المكتب 009647711632208
www.uobabylon.edu.iq

جمهورية العراق

Ministry Of Health Babylon Health Directorate Email:- Babel_Healthmoh@yahoo.com لأجل عراق اخضر مستدام ..سنعمل معا لترشيد استهلاك الطاقة الكهربائية والمحافظة على البيئة من التلوث		وزارة الصحة دائرة صحة محافظة بابـــل المديـــر العـــام مركـــز التدريب والتنمية البشرية وحدة أدارة البحوث العدد : ١٠٤ التاريخ: ٢٠/ ١ /٢٠٢٣

إلى/ مستشفى بابل التعليمي للنسائية والأطفال
مستشفى مرجان التعليمي
مستشفى النور للأطفال
مستشفى القاسم العام
مستشفى ابن سيف للاطفال

م// تسهيل مهمة

تحية طيبة ...

أشـارة إلـى كتـاب جامعـة بابـل/ كليـه التمـريض / الدراسـات العليـا ذي العـدد ٣٩١ في ٢٠٢٣/١/٣٠

نرفـق لكـم ربطـا اسـتمارات المـوافقة المبدئيـة لمشـروع البحـث العائـد للباحـث طالـب الدراسات العليا / ماجستير (أمير كاظم عبد)

للتفضـل بـالاطلاع وتسـهيل مهمـة المومـا أليـه مـن خـلال توقيـع وختـم استمارات أجـراء البحـث المرفقـة فـي مؤسسـاتكم وحسـب الضـوابط والإمكانـات لاستحصـال الموافقـة المبدئيـة ليتسـنى لنـا أجـراء الـلازم علـى أن لا تتحمـل مؤسسـاتكم أيـة تبعـات ماديـة وقانونية .... مع الاحترام

المرفقات :
استمارة عدد /٢
١- تسليم التمريض المستلم
١- الاحصاء

وزارة الصحة
دائرة صحة بابل
مركز التدريب والتنمية البشرية

الدكتور
محمد عبد الله عجرش
مدير مركز التدريب والتنمية البشرية
٢٠٢٣/ /

نسخة منه إلى:
- مركز التدريب والتنمية البشرية / وحدة أدارة البحوث مع الأوليات ...

سونران ١/٣٠

جمهورية العراق

وزارة الصحة دائرة صحة محافظة بابـــل المديـــر العـــام مركـــز التدريب والتنمية البشرية وحدة أدارة البحوث العدد : ١٠٤ التاريخ: ٢٠/ ١ /٢٠٢٣		Ministry Of Health Babylon Health Directorate Email:- Babel_Healthmoh@yahoo.com لأجل عراق اخضر مستدام ..سنعمل معا لترشيد استهلاك الطاقة الكهربائية والمحافظة على البيئة من التلوث

إلى/ مستشفى بابل التعليمي للنسائية والأطفال
مستشفى مرجان التعليمي
مستشفى النور للأطفال
مستشفى القاسم العام
مستشفى ابن سيف للاطفال

مستشفى مرجان للأمراض الباطنية والقلبية التخصصي (الواردة) العدد: ١١٨ التاريخ ٢٠/١/٢٠٢٣

م// تسهيل مهمة

تحية طيبة

أشارة إلى كتاب جامعة بابل/ كليه التمريض / الدراسات العليا ذي العدد ٣٩١ في ٢٠٢٣/١/٣٠

نرفق لكم ربطا استمارات الموافقة المبدئية لمشروع البحث العائد للباحث طالب الدراسات العليا / ماجستير (أمير كاظم عبد)

للتفضل بالاطلاع وتسهيل مهمة الموما أليه من خلال توقيع وختم استمارات أجراء البحث المرفقة في مؤسساتكم وحسب الضوابط والإمكانات لاستحصال الموافقة المبدئية ليتسنى لنا أجراء اللازم على أن لا تتحمل مؤسساتكم أية تبعات مادية وقانونية .... مع الاحترام

المرفقات :
استمارة عدد ٢/

وزارة الصحة
دائرة صحة بابل
مركز التدريب والتنمية البشرية

الدكتور
محمد عبد الله عجرش
مدير مركز التدريب والتنمية البشرية
/ /٢٠٢٣

نسخة منه إلى :
- مركز التدريب والتنمية البشرية / وحدة ادارة البحوث مع الأوليات ...

الطبيب الاختصاصي منتى محمد السويدي مدير القسم الفني

سونران ١/٣٠

جمهورية العراق

وزارة الصحة
دائرة صحة محافظة بابـــل
المديـــر العـــام
مركـــز التدريب والتنمية البشرية
وحدة أدارة البحوث

Ministry Of Health
Babylon Health Directorate
Email:-
Babel_Healthmoh@yahoo.com

لأجل عراق اخضر مستدام ..سنعمل معا لترشيد استهلاك الطاقة الكهربائية والمحافظة على البيئة من التلوث

العدد : ١٠٤

التاريخ: ٢٠ / ١ /٢٠٢٣

الى/ مستشفى بابل التعليمي للنسائية والأطفال
مستشفى مرجان التعليمي
مستشفى النور للأطفال
مستشفى القاسم العام
مستشفى ابن سيف للاطفال

م// تسهيل مهمة

تحية طيبة ...

أشـارة إلـى كتـاب جامعـة بابـل/ كليـه التمـريض / الدراسـات العليـا ذي العـدد ٣٩١ في ٢٠٢٣/١/٣٠

نرفـق لكـم ربطـا اسـتمارات المـوافقة المبدئيـة لمشـروع البحـث العائـد للباحـث طالـب الدراسات العليا / ماجستير (أمير كاظم عبد)

للتفضـل بـالاطلاع وتسـهيل مهمـة المومـا أليـه مـن خـلال توقيـع وخـتم اسـتمارات أجـراء البحـث المرفقـة فـي مؤسسـاتكم وحسـب الضـوابط والإمكانـات لاستحصـال الموافقـة المبدئيـة ليتسـنى لنـا أجـراء الـلازم علـى أن لا تتحمـل مؤسسـاتكم أيـة تبعـات ماديـة وقانونية .... مع الاحترام

المرفقات :
استمارة عدد /٢

وزارة الصحة
دائرة صحة بابل
مركز التدريب والتنمية البشرية

الدكتور
محمد عبد الله عجرش
مدير مركز التدريب والتنمية البشرية
/ /٢٠٢٣

نسخة منه إلى:
- مركز التدريب والتنمية البشرية / وحدة أدارة البحوث مع الأوليات ...

سونران ١/٣٠

جمهورية العراق

وزارة الصحة
دائرة صحة محافظة بابـــل
المديـــر العـــام
مركـــز التدريب والتنمية البشرية
وحدة أدارة البحوث

Ministry Of Health
Babylon Health Directorate
Email:-
Babel_Healthmoh@yahoo.com

لأجل عراق اخضر مستدام ..سنعمل معا لترشيد استهلاك الطاقة الكهربائية والمحافظة على البيئة من التلوث

العدد : ١٥٤

التاريخ: ٢/ ١ /٢٠٢٣

إلى/ مستشفى بابل التعليمي للنسائية والأطفال
مستشفى مرجان التعليمي
مستشفى النور للأطفال
مستشفى القاسم العام
مستشفى ابن سيف للاطفال

م// تسهيل مهمة

تحية طيبة ...

أشارة إلى كتاب جامعة بابل/ كليه التمريض / الدراسات العليا ذي العدد ٣٩١ في ٢٠٢٣/١/٣٠

نرفق لكم ربطا استمارات الموافقة المبدئية لمشروع البحث العائد للباحث طالب الدراسات العليا / ماجستير (أمير كاظم عبد)

للتفضل بالاطلاع وتسهيل مهمة المومأ أليه من خلال توقيع وختم استمارات أجراء البحث المرفقة في مؤسساتكم وحسب الضوابط والإمكانات لاستحصال الموافقة المبدئية ليتسنى لنا أجراء اللازم على أن لا تتحمل مؤسساتكم أية تبعات مادية وقانونية .... مع الاحترام

وزارة الصحة
دائرة صحة بابل
مركز التدريب والتنمية البشرية

المرفقات :
استمارة عدد /٢

الدكتور
محمد عبد الله عجرش
مدير مركز التدريب والتنمية البشرية
/ / ٢٠٢٣

نسخة منه إلى:
- مركز التدريب والتنمية البشرية / وحدة أدارة البحوث مع الأوليات ...

سونران ١/٣٠

جمهورية العـــراق

Ministry Of Health Babylon Health Directorate Email:- Babel_Healthmoh@yahoo.com Tel:282628 or 282621		وزارة الصحة والبيئة دائرة صحة محافظة بابـــل المديـــر العـــام مركـز التدريب والتنمية البشرية لجنة البحوث

استمارة رقم :-٠٣ /٢٠٢١

رقم القرار :- ٤٧
تاريخ القرار :- ١٥/ ٢ /٢٠٢٣

قرار لجنة البحوث

تحية طيبة ...

درست لجنة البحوث في دائرة صحة بابل مشروع البحث ذي الرقم (١٨ ٠/٢٠٢٣/ بابل)
المعنـون (العوامل المتعلقة بمعدل الوفيات والشفاء من مرضى كوفيد -١٩ بين الاطفال والمراهقين خلال الفترة ٢٠٢٠-٢٠٢٢) ،
والمقـدم من الباحث(أمير كاظم عبد) إلى وحدة أدارة البحوث والمعرفي مركز التدريب والتنمية البشرية في دائرة صحة بابل بتاريخ ٢٠٢٣/٢/٨ وقررت :

قبول مشروع البحث أعلاه كونه مستوفيا للمعايير المعتمدة في وزارة الصحة والخاصة بتنفيذ البحوث ولا مانع من تنفيذه في مؤسسات الدائرة .

مـــــع الاحتـــرام

الـدكتور
محمد عبد الله عجرش
رئيس لجنة البحوث
/ /٢٠٢٣

وزارة الصحة
دائرة صحة بابل
مركز التدريب والتنمية البشرية
لجنة البحوث

نسخة منه إلى :
- مكتب المدير العام / مركز التدريب والتنمية البشرية / وحدة إدارة البحوث ... مع الأوليات.

Appendix (B)

Questionnaire

استبانة الخبراء والمحكمين

حضرة الدكتور\ة..... المحترم\ة

نظرا للمكانة العلمية المرموقة لديكم يرجى التفضل بالمساهمة في تقييم الاستبانة المستخدمة في الرسالة الموسومة

العوامل المتعلقة بمعدل الوفيات والشفاء من مرض كوفيد-19 بين الأطفال والمراهقين خلال الفترة 2020-2022

Factors associated with Mortality and Recovery rates of COVID-19 among Children and Adolescents through the period 2020-2022

Objectives of the study

1. To determine the mortality and recovery rates of COVID-19 among children and adolescents through the period 2020-2022.

2. To identify the factors associated with the mortality of COVID-19 among children and adolescents through the period 2020-2022.

3. To find out the difference between age groups in terms of mortality and recovery rates.

4. To identify if the cause of death, number of chronic diseases, signs and symptoms, risk factors, and complications can predict the mortality rate.

.

ولكم فائق الشكر والاحترام.

اسم الخبير: .....

اللقب العلمي: .....

عدد سنوات الخبرة: .....

مكان العمل: .....

التاريخ: .....

التوقيع: .....

الباحث

طالب الماجستير
أمير كاظم عبد
كلية التمريض – جامعة بابل
فرع تمريض صحة الطفل

English Questionnaire

Part 1: Sociodemographic Characteristics of Children and Adolescents:

1.1 Age: ☐

1.2 Gender:

A. Male ☐

B. Female ☐

1.3 Residence:

A. Urban ☐

B. Rural ☐

Part 2: Factors Associated with Mortality and Recovery Rates:

2.1 Duration of Hospitalization:

A. less than week ☐

B. More than Week ☐

2.2 Smoking History:

A. Yes ☐

B. No ☐

2.3 Did the affected Child Complain of Chronic Diseases:

A. Yes ☐

B. No ☐

2.3 Number of Chronic Diseases:

A. None ☐

B. 1 ☐

C. >1 ☐

Part 3: Intensity of Exposure to COVID-19 in Pediatric Patients

A. Clinical manifestations of COVID-19 among Children and Adolescents:

1. Hypoxia ☐
2. dyspnea ☐
3. Fever ☐
4. Tachypnea ☐
5. Headache ☐
6. Fatigue ☐
7. Cough ☐
8. Diarrhea ☐
9. Nausea and Vomiting ☐
10. Sore Throat ☐

11. Irregular Heartbeats ☐
12. Loss of Taste and Smell ☐
13. Anorexia ☐

B. Factors associated with the Intensity of Exposure to COVID-19 among Pediatric Patients:

1. None ☐
2. Renal failure ☐
3. Septicemia ☐
4. Cancer ☐
5. Bronchial Asthma ☐
6. Systemic Lupus Erythematosus ☐
7. Congenital Heart Disease ☐
8. Multisystem Inflammatory Syndrome ☐
9. Pneumonia ☐
10. Diabetic Mellitus ☐
11. Congenital Hydrocephaly ☐
12. Bronchitis ☐
13. Hepatitis ☐
14. Viral Fever ☐

C. Causes of Mortality rate of COVID-19 among Children and Adolescents:

1. COVID-19 ☐
2. COVID-19 with Respiratory Failure ☐
3. COVID-19 with Renal failure ☐
4. COVID-19 with Pneumonia ☐
5. COVID-19 with Multisystem Inflammatory Syndrome ☐
6. COVID-19 with Congenital Heart Disease ☐
7. Cancer with COVID-19 ☐
8. Bronchial Asthma with COVID-19 ☐
9. Congenital Hydrocephalus ☐

D. Complications of the Disease:

1. None ☐
2. Respiratory Disorders ☐
3. Renal Disorders ☐
4. Cardiovascular Disorders ☐
5. Nervous system Disorders ☐
6. Gastrointestinal Disorders ☐
7. Multisystem inflammatory syndrome ☐
8. Pneumonia ☐

E. Status on Discharge:

A. Recovery ☐

B. Dead ☐

Arabic Questionnaire

الجزء الاول:- الخصائص الديموغرافية والاجتماعية للأطفال والمراهقين:

1.1 العمر: ☐

1.2 الجنس:

أ. ذكر ☐

ب. انثى ☐

1.3 السكن:

أ. حضر ☐

ب. ريف ☐

الجزء الثاني: - العوامل المتعلقة بمعدل الوفيات والشفاء:

2.1 مدة البقاء في المستشفى:

أ. اقل من أسبوع ☐

ب. أكثر من أسبوع ☐

2.2 تأريخ التدخين:

أ. نعم ☐

ب. كلا ☐

2.3 هل يعاني الطفل من امراض مزمنة:

1- نعم ☐

2- كلا ☐

2.4 عدد الأمراض المزمنة:

أ. لا يوجد ☐

ب. واحد ☐

ت. أكثر من واحد ☐

الجزء الثالث: ـ شدة الإصابة بعد التعرض لمرض كوفيد-١٩ بين مرضى الأطفال

أ. العلامات السريرية لمرض كوفيد- ١٩ بين الأطفال والمراهقين:

1. لا يوجد ☐
2. نقص الاوكسجين ☐
3. ضيق نفس ☐
4. سرعة التنفس ☐
5. ارتفاع درجة الحرارة ☐
6. صداع ☐
7. ارهاق ☐
8. سعال ☐
9. اسهال ☐
10. تقيء وغثيان ☐

11.عدم انتظام ضربات القلب

12. فقدان الشم والتذوق

13. فقدان الشهية

ب. عوامل الخطورة المتعلقة بشدة الإصابة بعد التعرض لمرض كوفيد بين مرضى الأطفال:-

1. لا يوجد
2. الفشل الكلوي
3. تسمم الدم
4. السرطان
5. ربو قصبي
6. داء الذائبة الاحمراري
7. تشوهات القلب الولادي
8. داء السكري
9. متلازمة التهاب الأجهزة المتعددة
10. ذات الرئة
11. استسقاء الدماغ
12. التهاب القصبات
13. التهاب الكبد الفيروسي
14. حمى الفايروسية

ت. اسباب معدل الوفيات لمرض كوفيد-١٩ بين الأطفال والمراهقين:

1. كوفيد-19
2. الإصابة بكوفيد- ١٩مع فشل الجهاز التنفسي
3. الإصابة بكوفيد -١٩مع الفشل كلوي
4. الإصابة بكوفيد -١٩مع ذات الرئة
5. الإصابة بكوفيد-١٩ مع السرطان
6. الإصابة بكوفيد-١٩مع ربو قصبي
7. الإصابة بكوفيد-١٩مع استسقاء الدماغي
8. الإصابة بكوفيد-١٩مع متلازمة الالتهاب الأجهزة المتعددة
9. تشوه القلب الولادية مع الإصابة بكوفيد -١٩

ث. المضاعفات المرضية بعد الإصابة:

1. لا يوجد
2. اضطرابات الجهاز التنفسي
3. اضطرابات الكلوية
4. متلازمة التهاب الأجهزة المتعددة
5. ذات الرئة
6. اضطرابات القلب الوعائية
7. اضطرابات الجهاز العصبي
8. اضطرابات الجهاز الهضمي

ج. الحالة عند الخروج: -

أ. متوفي ☐

ب. متحسنا ☐

Appendix (C)

قائمة خبراء التحكيم:

ت	اسم الخبير	الاختصاص	اللقب العلمي	مكان العمل	سنوات الخدمة
1	د. أمين عجيل ياسر	تمريض صحة الاسرة والمجتمع	أستاذ	جامعة بابل/ كلية التمريض	38
2	د. سلمى كاظم جهاد	تمريض صحة المجتمع والاسرة	أستاذ	جامعة بابل / كلية التمريض	37
3	د. عفيفة رضا عزيز	تمريض صحة الطفل والمراهق	أستاذ	جامعة بغداد / كلية التمريض	41
4	د. سعدية هادي حميدي	تمريض صحة الام والوليد	أستاذ	كلية المستقبل الجامعة	42
5	د. عبد المهدي عبد الرضا	تمريض الصحة النفسية والعقلية	أستاذ	جامعة بابل / كلية التمريض	44
6	د. هالة سعدي عبد الواحد	تمريض صحة المجتمع	أستاذ	جامعة بغداد / كلية التمريض	29
7	د. ختام مطشر	تمريض الاطفال	أستاذ	جامعة بغداد / كلية التمريض	26
8	د. سحر أدهم	تمريض البالغين	أستاذ	جامعة بابل / كلية التمريض	34
9	د. شذى سعدي حسن	تمريض البالغين	أستاذ	جامعة بابل / كلية التمريض	24
10	د. خميس بندر عبيد	تمريض الاطفال	أستاذ	جامعة كربلاء / كلية التمريض	24
11	د. ندى خزعل كاظم	دكتوراه احياء مجهرية	أستاذ	جامعة بابل / كلية التمريض	17

12	ماهر خضير هاشم	اللغة العربية	أستاذ مساعد	جامعة بابل / كلية التمريض	17
13	د. جنان أكبر عاشور	تمريض صحة المجتمع	أستاذ مساعد	جامعة كركوك/ كلية التمريض	32
14	د. محمد باقر حسن آل دخيل	تمريض الاطفال	أستاذ مساعد	جامعة الكوفة / كلية التمريض	18
15	د. عذراء حسين شوق	تمريض الاطفال	أستاذ مساعد	جامعة بغداد / كلية التمريض	17
16	د. اسراء حرجان محسن	دكتوراه احياء مجهرية	أستاذ مساعد	جامعة بابل / كلية التمريض	17
17	د. وفاء احمد امين	تمريض صحة الام والوليد	أستاذ مساعد	جامعة بابل / كلية التمريض	32
18	د. زيد وحيد عاجل	تمريض الاطفال	أستاذ مساعد	جامعة بغداد / كلية التمريض	14
19	د. احمد عبد الله عبد الحسيناوي	تمريض الاطفال	أستاذ مساعد	جامعة ذي قار / كلية التمريض	13
20	د. زكي صباح مصيحب	تمريض الاطفال	مدرس	جامعة كربلاء / كلية التمريض	3
21	د. مصطفى علي غازي	تمريض الاطفال	مدرس	كلية المستقبل الجامعة	6
22	د. محمد طالب عبد حمادي	تمريض الاطفال	مدرس	جامعة بابل / كلية التمريض	10

Appendix (D)

Linguistic Approval

Ministry of Higher Education and Scientific Research

وزارة التعليم العالي والبحث العلمي

جمهورية العراق

University of Babylon
College of Nursing

جامعة بابل
كلية التمريض

العدد : ٣٠٠٠
التاريخ : ٣/ ٥ /٢٠٢٣

Ref. No. :
Date: / /

الى / جامعة بابل – كلية التربية الاساسية –قسم اللغة الانكليزية
م/ مقوم لغوي

تحية طيبة :

يرجى التفضل بتقويم رسالة الماجستير للطالب (امير كاظم عبد) والموسومة ب

العوامل المتعلقة بمعدل الوفيات والشفاء من مرض كوفيد-١٩ بين الاطفال والمراهقين خلال الفترة ٢٠٢٠-٢٠٢٢

Factors Associated with Mortality and Recovery Rate of COVID-19 among Children and Adolescents through the period 2020-2022.

... مع الاحترام ...

ا. د. نهاد محمد قاسم
معاون العميد للشوون العلمية والدراسات العليا
٢٠٢٣/٥/٢

نسخة منه الى//
-مكتب السيد العميد... للتفضل بالاطلاع مع الاحترام.
-مكتب السيد معاون العميد للشوون العلمية...للتفضل بالاطلاع مع الاحترام.
- شعبة الدراسات العليا مع الاوليات.

E-mail:nursing@uobabylon.edu.iq

STARS

وطني 07711632208
المكتب 009647711632208

www.uobabylon.edu.iq

Ministry of Higher Education and Scientific Research
University of Babylon
College of Basic Education

وزارة التعليم العالي والبحث العلمي
جامعة بابل
كلية التربية الاساسية

Ref. No.:
Date: / /

العدد : ٨٧٩٢
التاريخ: ٢٠٢٣/٦/٤

جامعة بابل / كلية التمريض
الواردة
العدد/ ١٤٦٥
التاريخ ٦/٤

كلية التربية الاساسية
شعبة الموارد البشرية
الصادرة

الى/جامعة بابل/كلية التمريض

م/ تقويم لغوي

نهديكم اطيب التحيات ...

كتابكم ذو العدد ٢٠٩٠ في ٢٠٢٣/٥/٢٩ نعيد اليكم رسالة الماجستير للطالب (امير كاظم عبد) الموسومة بـ (العوامل المتعلقة بمعدل الوفيات والشفاء من مرض كوفيد١٩ بين الاطفال والمراهقين خلال الفترة (٢٠٢٠ – ٢٠٢٢)) بعد تقويمها لغوياً واسلوبياً من قبل (م. حياة حسن كاظم) وهي صالحه للمناقشة بعد الاخذ بالملاحظات المثبتة على متنها .

... مع الاحترام...

المرفقات //

- رسالة ماجستير
- اقرار المقوم اللغوي

أ. د. فراس سليم حياوي
معاون العميد للشؤون العلمية
٢٠٢٣/٦/ ٤

نسخة منه الى //

- مكتب السيد العميد المحترم ...للتفضل بالاطلاع مع الاحترام.
- م.حياة حسن كاظم.. للعلم لطفاً.
- الشؤون العلمية
- الصادرة

نادية

العراق - بابل - جامعة بابل
بدالة الجامعة ٠٠٩٦٤٧٢٣٠٠٣٥٧٤٤
مكتب العميد ١١٨٤
المعاون العلمي ١١٨٨
المعاون الاداري ١١٨٩
وطني ٠٧٢٣٠٠٣٥٧٤٤
امنية ٠٧٦٠١٢٨٨٥٦٦
basic@uobabylon.edu.iq

الملخص

الخلفية العلمية للدراسة: مرض فيروس كورونا هو تفشي عالمي يُطلق عليه اسم المرض المستمر باعتباره أحد أكثر الأمراض المعدية فتكًا في العالم، والذي بدأ في ديسمبر ٢٠١٩ في مقاطعة هوبي في الصين. بشكل عام، بعض عوامل الخطر التي تزيد من حدوث العدوى تشمل جنس الذكر والعمر وأي حالات طبية كامنة مثل أمراض الكلى وأمراض الرئة المزمنة والسرطان وغيرها. عندما يتم إدخال الأطفال والمراهقين إلى المستشفى، تزداد فرصة الإصابة بمرض خطير من كوفيد-١٩ بسبب وجود اضطرابات طبية اساسية.

تهدف هذه الدراسة إلى تقييم العوامل المتعلقة بمعدلات الوفيات والشفاء من كوفيد-١٩ بين الأطفال والمراهقين. تم استخدام تصميم الدراسة الوصفية التحليلية خلال الفترة من ١٥ تشرين الاول ٢٠٢٢ إلى ١٤ ايار ٢٠٢٣. تم جمع البيانات بأثر رجعي باستخدام السجلات الطبية ذات الصلة، والقسم الإحصائي، والتي تضمنت (٢٨٧) مريضا تتراوح أعمارهم من الولادة الى ٢٠عامًا كمصابين بفيروس كورونا في ستة مستشفيات رئيسية لوحدات العزل مثل مدينة مرجان الطبية، مستشفى بابل التعليمي للولادة والأطفال، مستشفى الامام الصادق التعليمي، مستشفى القاسم العام، مستشفى النور للأطفال، مستشفى ابن سيف للأطفال في محافظة بابل وتم بناء استبيان لغرض الدراسة.

نتائج الدراسة: غالبية الأطفال والمراهقين تتراوح أعمارهم بين (١–٢٠) سنة بمتوسط عمر (١١.١٧) سنة. واظهرت الدراسة أن أكثر من نصف المرضى (٥٣.٣ %) هم من الذكور، وأن ٥١.٦ % من المرضى هم من المناطق الريفية. تم تعافي الغالبية العظمى (٨٣.٣ %) من العينة من الفيروس، مع وجود فروق ذات دلالة إحصائية في معدل وفيات كوفيد-١٩ بناءً على أعمارهم. هناك علاقة بين معدل وفيات فيروس كورونا المستجد (كوفيد-١٩) وكل من الجنس والإقامة ومدة الإقامة في المستشفى.

الاستنتاجات والتوصيات: خلصت الدراسة إلى أن هناك تأثير كبير لفيروس كارونا-١٩على معدلات الوفيات والشفاء بين الأطفال والمراهقين. يوصى بتفعيل أدوار ممرضات الأطفال وغيرهم من العاملين في مجال الرعاية الصحية في وحدات العزل الذين يجب أن يهتموا بتقديم الرعاية الصحية للأطفال والمراهقين المصابين بمرض كارونا-١٩ أو أي أوبئة أخرى لتعديل الإدارة الفعالة ومنع انتقاله بين الآخرين مثل العزل المبكر، والوقاية من المضاعفات سواء الآن أو أي جائحة آخر في المستقبل.

.

جمهورية العراق

وزارة التعليم العالي والبحث العلمي

جامعة بابل/ كلية التمريض

العوامل المتعلقة بمعدلات الوفيات والشفاء من مرض كوفيد-١٩ بين الأطفال والمراهقين خلال الفترة ٢٠٢٠ - ٢٠٢٢

رسالة مقدمة من قبل الطالب

أمير كاظم عبد

الى جامعة بابل / كلية التمريض / تمريض صحة الطفل

وهي جزء من متطلبات نيل درجة الماجستير

في علوم التمريض

بأشراف

أ.د نهاد محمد قاسم

ايار ٢٠٢٣ ميلادية **صفر ١٤٤٥ هجرية**