ECONOMIC BURDEN OF CHILDREN WITH CEREBRAL PALSY IN MACHAKOS LEVEL FIVE HOSPITAL

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DEDICATION

I dedicate this achievement to my loving family: My dear husband Dr. Somba, My sons Davis, Dennel and Denzyl. Their endless support, encouragements and sacrifices have been the foundation of my journey. Your unwavering belief in me has fueled my determination to reach this milestone. Thank you for being my constant source of strength and inspiration.

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ABSTRACT

Cerebral Palsy is a condition primarily impacting posture, muscle tone, and movement. Tailored rehabilitation for children with cerebral palsy necessitates access to proficient occupational therapists, breaks from school, and for parents, time away from work to accompany their child to a rehabilitation facility, often incurring financial costs. Machakos Level 5 Hospital receives several patients, including those diagnosed with cerebral palsy from other counties such as Kitui and Kajiado, meaning its capacity is stretched. Therefore, investigating the economic burden of cerebral palsy on the hospital would culminate in an in-depth comprehension of the progress made by the hospital's management. This study examined the economic burden of children with cerebral palsy at Machakos Level 5 Hospital. Its objectives included assessing the prevalence of cerebral palsy in Machakos County, evaluate the economic burden associated with children living with cerebral palsy, determine Machakos Hospital's capacity to manage cerebral palsy, and identify the most effective strategies for Machakos Hospital in managing the economic burden linked to cerebral palsy. This study is anchored in cost-of-illness theory, health production function, and rational choice theory. The study employed an explanatory research design while evaluating various aspects of the study. The study's target population included parents/caregivers and healthcare personnel specializing in treating cerebral palsy at the Machakos Level 5 Hospital, such as nurses, orthopedic surgeons, occupational therapists, physiotherapists, and other therapists. The convenience sampling method was used in the study. Questionnaires were distributed to caregivers and nurses to identify the economic burden of palsy. Semi-structured interviews were utilized for healthcare specialists and administrators. Data and information obtained from the interviews and questionnaires distributed to the participants were subjected to quantitative and qualitative analysis with Statistical Package for Social Sciences and NVIVO. Results were presented using tables and narration. From regression findings, the prevalence of cerebral palsy positively but insignificantly influences the economic burden linked with cerebral palsy. Results also reveal that costs of care positively and significantly influence economic burden linked with cerebral palsy. Further, the findings indicate that managing cerebral palsy negatively and significantly influences the economic burden linked with cerebral palsy. The study concluded that the prevalence and cost of cerebral palsy contribute significantly to the increase in economic burden linked with cerebral palsy. The study further concluded that managing cerebral palsy contributes significantly to a reduction in economic burden linked with cerebral palsy. The hospital management should develop a comprehensive rehabilitation program for children with cerebral palsy. The hospital management should also strengthen collaborations with other healthcare providers and organizations to improve the quality of care for children with cerebral palsy. Policy makers in the health sector should develop policies aimed at reducing cerebral palsy's economic burden. The Machakos County Assembly should review fiscal policies and increase budgetary allocations for treating developmental disabilities such as cerebral palsy.

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LIST OF ABBREVIATIONS

CDC	Centers for Disease Control and Prevention
CHS	Center for Health Solutions
CP	Cerebral Palsy
CPSK	Cerebral Palsy Society of Kenya
HPF	Health Production Function
LBW	Low Birth Weight
LMICs	Low- And Middle-Income Countries
ML5H	Machakos Level 5 Hospital
RCT	Rational Choice Theory
SPSS	Statistical Package for the Social Sciences
UHC	Universal Health Care
US	United States
VLBW	Very Low Birth Weight

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DEFINITION OF TERMS

Cerebral palsy (CP) is a complex neurological disorder that affects movement, posture, and muscle tone.

Cost of care for CP refers to the direct costs of providing medical care and other services to individuals with CP. This includes the cost of doctor visits, hospitalizations, medications, medical equipment, specialized therapies, and providing education and social services to children with CP.

Disorder: The term "disorder" in the context of cerebral palsy emphasizes that the condition involves a disruption of normal motor function and can significantly impact a person's daily life. It also highlights the need for specialized interventions and support to help individuals with cerebral palsy maximize their functional abilities and quality of life.

Economic burden: refers to the financial costs associated with the condition. CP can impose a significant financial burden on individuals, families, and society. This burden can result from various factors, including medical costs, assistive technology, education, caregiver costs, lost productivity, and social services.

Point prevalence: The number of cases of CP in a population at a specific time. This can be expressed as the number of cases per 1000 population or 1000 live births.

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CHAPTER ONE
INTRODUCTION

1.0 Introduction

This chapter offers an in-depth exploration of the economic burden associated with cerebral palsy, detailing its prevalence, and proposing strategies for effective management. It further includes the problem statement, study objectives, the significance of the study, as well as the scope, and operational definitions of key terms.

1.1 Background to the Study

The economic burden encompasses the comprehensive financial impact on families and the healthcare system due to the costs associated with medical care, therapies, assistive devices, special education, and lost income from caregiving responsibilities. This includes direct costs, such as medical expenses, transportation, and rehabilitation, and indirect costs, such as lost wages, reduced work hours, and decreased productivity. The economic burden often extends beyond the immediate family, affecting community resources and healthcare infrastructure.

Cerebral palsy is a group of lifelong movement and posture disorders that arise from abnormal brain development or damage to the developing brain, typically before, during, or shortly after birth. It primarily affects a person's ability to control their muscles, leading to challenges in movement, coordination, and balance. Symptoms can range from mild to severe and may include spasticity, muscle weakness, involuntary movements, and difficulties with speech, swallowing, and fine motor skills. CP often requires multidisciplinary care, including physical, occupational, and speech therapy (Sadowska, Sarecka-Hujar & Kopyta, 2020).

1.1.1 Prevalence of Cerebral Palsy

Cerebral Palsy (CP) is a disorder that mainly affects posture, muscle tone, and movement (Sadowska, Sarecka-Hujar & Kopyta, 2020). In many cases, damage occurs in the brain before a baby is born. During pre-school years or infancy, signs and symptoms of this condition appear. During those stages, children can exhibit several signs and symptoms:

unsteady walking, involuntary movements, abnormal posture, the rigidity of the trunk and limbs, abnormal reflexes, and impaired mobility (Stavsky et al., 2021). Further, swallowing can be a significant problem for children or persons suffering from this condition. Other signs and symptoms can include muscle stiffness and eye muscle imbalance. Although some people suffering from CP exhibit average or near-normal intelligence, others exhibit intellectual difficulties and problems (Potharaju, 2016).

Recent population-based studies globally indicate that cerebral palsy (CP) affects between 1 to nearly 4 per 1,000 live births or per 1,000 children (CDC, 2020). In developed Western countries, the prevalence is estimated at approximately 2–2.5 per 1,000 children (Abdel Malek, S., Rosenbaum & Gorter, 2020). In the United States, CP affects about three live births out of every thousand. Notably, the proportion of severe CP cases is particularly high in low- and middle-income countries (LMICs) (Jahan et al., 2021). Additionally, the study found that CP prevalence was higher in boys (3.7 per 1,000 live births) than in girls (2.8 per 1,000 live births). These findings provide important information for healthcare professionals, policymakers, and families affected by CP. Understanding the prevalence of CP can help with early diagnosis and intervention and develop public health programs to prevent CP and improve outcomes for those affected by the disorder.

A study by Sara et. al, (2024) on cerebral palsy (CP) in extremely preterm infants highlights the prevalence and severity of CP among children born extremely preterm, specifically, those born before 27 weeks of gestation. The research, conducted at 25 centers of the Eunice Kennedy Shriver National Institute of Child Health and Human Development Neonatal Research Network, focused on evaluating changes in CP prevalence over time and its associations with other developmental domains, functional impairment, medical morbidities, and resource use among 2-year-old children who were born extremely preterm. The findings revealed that the rate of CP among surviving children born extremely preterm increased from 2008 to 2019. Among the children studied, 53.7% had normal neurologic examinations, 18.8% had CP, and the rest had abnormal neurologic examinations not classified as CP. The study also showed that cognitive development was significantly linked to the severity of CP. Children with CP were more likely to have multiple medical comorbidities, neurosensory problems, and poor growth at follow-up emphasizing the

increasing rate of CP among surviving extremely preterm infants and the strong associations between neurodevelopmental and medical comorbidities with all severity levels of CP at 18-26 months corrected age.

Murugasen et. al (2024) argued that Cerebral palsy (CP) is a common neurological condition in African children, with a reported prevalence ranging from 0.8 to 10 per 1000 children. The etiology of CP in Africa differs from high-income countries, with perinatal risk factors like birth asphyxia, neonatal infections, and prematurity being more common. Up to 26% of African children with CP have no identifiable risk factor. African children with CP often have severe functional impairments, with 41% in one study classified in the most severe motor impairment category. Comorbidities are common, including epilepsy (77%), cognitive impairment (84%), and visual impairment (46%). Premature mortality is high, approximately 25 times that of the general population, mainly due to infections. Access to care and education for African children with CP is inadequate. However, various interventions have demonstrated functional improvements, highlighting the potential for better outcomes with appropriate management. Larger African studies on validated and effective interventions are needed to improve the care of children with CP on the continent. CP in Africa has a different epidemiology and outcomes compared to high-income countries, with more severe impairments, higher mortality, and inadequate access to care. Addressing these disparities requires further research and investment in services for children with disabilities in Africa.

The prevalence of cerebral palsy (CP) in Africa varies across countries. In Nigeria, Lagunju, Oyinlade, and Famosaya (2016) estimated a prevalence of 3.5 per 1,000 children. South Africa has a notably high prevalence, with as many as 10 cases per 1,000 births. In Uganda, Kakooza-Mwesige et al. (2017) found a prevalence of 2.7 per 1,000 children. Ngassa (2018) established a prevalence of 17.77 per 1,000 live births in Tanzania. In Kenya, the prevalence is three in every hundred children (Cerebral Palsy Society of Kenya [CPSK], 2020), while the overall burden of CP in Africa is estimated at 2-2.5 cases per 1,000 live births.

1.1.2 Economic Burden of Cerebral Palsy

Cerebral palsy can adversely affect the entire body, or its effects can be one body side or one limb. Since a brain disorder that causes this condition may not change with time, age does not cause the worsening of symptoms (Gmmash, Effgen & Goldey, 2020). However, it remains essential to note that such a brain disorder is responsible for urinary incontinence, mental health conditions, oral diseases, abnormal pain and touch perceptions, seizures, and hearing, and seeing difficulties. Bearing that there is no permanent cure for the condition, treatment is predominantly about managing CP and ensuring that children can learn (new) skills. Medical interventions, including surgery, are vital in managing this condition (Hayles et al., 2015).

Cerebral palsy (CP), along with its associated conditions, symptoms, and treatment options, represents a significant economic burden on families, healthcare organizations, a country's healthcare system, and the overall economy (Tonmukayakul et al., 2018). This burden encompasses direct medical expenses, rehabilitation costs, long-term care expenses, special education costs, and other related expenses, as well as the indirect costs of lost productivity and income for parents (Bian et al., 2022). Mothers of children with CP often experience poorer mental and physical health outcomes compared to mothers of typically developing children (Shih et al., 2018). Providing individualized rehabilitation for children with CP necessitates access to skilled occupational therapists, time away from school for the child, and for parents, time away from work to attend rehabilitation sessions, all of which incur financial costs (Comans et al., 2017).

Globally, the costs associated with treating this condition are high. For example, in the United States, where children are enrolled in the Medicaid scheme, the economic burden is high for children with intellectual disabilities and CP (Potharaju, 2016). The costs for children suffering from CP in the US are estimated to be US $ 16,721, a value ten times higher than treatment costs for 'typical children,' which is estimated to be US $ 1,674 (Hayles et al., (2015). In Canada, the direct healthcare costs for children aged 1-4 years with cerebral palsy were approximately $11,700 in 2010 Canadian dollars, compared to about $600 for those without the condition (Bian et al., 2020). Meanwhile, in China, the average economic burden per case of CP in Changzhou was approximately 4,188,500 yuan. This

included a direct medical burden of 205,800 yuan and an indirect economic burden of 3,982,700 yuan (Bian et al., 2020).

In Australia, a study aimed to quantify the health care resource use (HCRU) and associated costs for young children with cerebral palsy (CP), as well as identify factors that influence these costs (Easton et. al, 2024). Data was collected prospectively over several years as part of a longitudinal study of children with CP born in Queensland, Australia between 2006-2009. The researchers administered questionnaires to the participants' caregivers at six different time points to gather information about the children's use of health care services, sociodemographic characteristics, and disease severity. Costs were calculated using data from Medicare, hospital records, and market prices. Statistical modeling was then used to determine which factors were associated with higher CP-related health care expenditures. A total of 794 questionnaires were completed by 222 children, with each child participating in an average of 3.6 questionnaires. Physiotherapy was found to be the most commonly accessed allied health therapy, utilized by 94% of the participants. A significant proportion of the children (45%) had been admitted to the hospital at least once during the study period.From the perspective of the health care system, the average annual cost per child with CP was estimated to be A$24,950. The analysis revealed that children with more severe motor impairments, as measured by the Gross Motor Function Classification System, incurred significantly higher costs. Similarly, children with a greater number of comorbidities also had higher health care expenditures.

A study aimed to explore the socio-economic challenges experienced by parents of children with cerebral palsy at Ekiti State University Teaching Hospital in Ado-Ekiti, Ekiti State, Nigeria (Oladuni, et. al., 2024). The study adopted a descriptive cross-sectional design among 68 participants who are mostly married women and parents of children with cerebral palsy. The data was collected using a self-administered questionnaire, and descriptive data analysis was used to analyze the data. The respondents were aged between 11–20 to 31–40. The study found that nearly 80% of the respondents indicated that children with cerebral palsy are a burden to them and face difficulties communicating with their children. Furthermore, 78.4% of the respondents indicated that their child's situation affects their mental health. There was no association between monthly income and the perception of

children with CP as a burden. In conclusion, caring for children with cerebral palsy is challenging and has a significant negative impact on family, social, and financial resources, particularly in resource-poor countries like Nigeria with little or no social support system.

1.1.3 Managing Cerebral Palsy

Effectively managing cerebral palsy (CP) necessitates a holistic approach involving a multidisciplinary team of healthcare professionals collaborating to deliver optimal care for patients. Early diagnosis and treatment, medication, physical therapy, occupational therapy, speech therapy, surgery, and the use of assistive devices all play crucial roles in managing the condition and enhancing outcomes for children with CP. While evaluating what it takes to manage cerebral palsy, Ibrahim, Mariana, Manaf, and Wong (2010) sought to address the gap in knowledge and practice regarding the management of cerebral palsy (CP) patients. The authors highlighted the challenges CP patients and their families face, such as the lack of accessibility to healthcare services and the high cost of treatment. The paper also emphasized the need for a comprehensive, interdisciplinary CP management approach involving various healthcare professionals.

Early diagnosis and treatment are critical for managing CP, as research has shown that early intervention can lead to better outcomes for children with the condition (Novak & Morgan, 2015). A team of healthcare professionals, including pediatricians, neurologists, and physical therapists, can work together to diagnose and treat the condition as early as possible. Medication can also help manage the symptoms of CP. Muscle relaxants, anticonvulsants, and botulinum toxin injections can help reduce muscle stiffness and spasticity, as well as control seizures (Novak & Morgan, 2015).

Physical therapy is an important part of managing CP, as it can help improve muscle strength, flexibility, and coordination (O'Sullivan & Schmitz, 2014). Occupational therapy can also help children with CP develop skills that will allow them to be more independent in their daily lives, such as dressing, feeding, and grooming (Novak & Morgan, 2015). Speech therapy is another critical intervention for managing CP, as many children struggle with speech and communication. Speech therapists can work with patients to improve their communication skills (Novak & Morgan, 2015). In some cases, surgery may be necessary to

manage the symptoms of CP. Orthopedic surgery and selective dorsal rhizotomy are two surgical procedures that can help improve mobility and reduce spasticity (Novak & Morgan, 2015). Finally, assistive devices such as wheelchairs, braces, and communication aids can help patients with CP live more independently (Novak & Morgan, 2015).

1.2 Statement of the Problem

The evidence presented underscores the profound economic and social burdens imposed by a diagnosis of cerebral palsy on individuals, families, and society at large (Amankwah et al., 2020). Cerebral palsy, a lifelong condition that affects movement and coordination, necessitates extensive medical care, therapies, and support services, all of which contribute to significant financial strain.

A study by Oskoui et al. (2013) estimated the lifetime costs associated with cerebral palsy in Canada to be CAD 1.5 million per person. This comprehensive figure includes various expenses related to medical care, specialized equipment, and home modifications. Notably, the study revealed that direct healthcare costs accounted for only 10% of the total expenses. The remaining 90% were attributed to indirect costs, such as productivity losses due to the inability of individuals with cerebral palsy to participate fully in the workforce and the substantial caregiver burden experienced by family members. This highlights the extensive hidden costs that extend beyond immediate medical expenses, reflecting the pervasive impact of cerebral palsy on family dynamics and economic stability. The systematic review by Shih et al. (2018) aimed to summarize the economic burden of cerebral palsy (CP) by evaluating the costs of interventions and the methodologies used in economic evaluations of CP. The authors found that costs are typically reported either as the cost per person with CP or as the annual cost for a target population, with indirect costs such as productivity loss being the largest cost driver. This highlights the significant financial impact of CP and the need for further research and investment in effective interventions to improve outcomes and reduce the economic burden associated with this condition.

In a separate study, Yang et al. (2020) investigated the economic impact of cerebral palsy in China. The findings revealed that the average annual cost per person with cerebral palsy was CNY 28,618 (approximately USD 4,195). Extrapolated to the national level, the total

economic burden of cerebral palsy in China reached CNY 11.4 billion (approximately USD 1.7 billion) per year. The study also highlighted significant barriers to accessing care, particularly the lack of insurance coverage for certain essential treatment options. This gap in coverage exacerbates the financial strain on families, limiting their ability to afford necessary therapies and interventions, which are critical for improving the quality of life of individuals with cerebral palsy.

Healthcare organizations and providers incur costs in purchasing equipment and paying specialists-costs passed to parents, caregivers, and healthcare insurance companies. For instance, insurance companies in Kenya decline to cover some treatment options for this condition, meaning that parents and caregivers must rely on non-governmental organizations and well-wishers to manage CP. A study by Wanjiku et al. (2019) estimated the cost of treatment for cerebral palsy in Kenya. The study found that the average cost of treatment per person with cerebral palsy was USD 2,055 per year and that the main cost drivers were medication, physiotherapy, and assistive devices. The study also identified the lack of insurance coverage and limited availability of specialized care as major barriers to accessing treatment.

There needs to be more research on the economic burden of cerebral palsy in Kenya and Africa, and most of the available studies have focused on the cost of treatment and care rather than the broader economic impact on healthcare institutions (Chanie et. al, 2024; Wanjiku et. al, 2019, Donald et. al, 2014). Therefore, investigating the economic burden of CP on the hospital would culminate in an in-depth comprehension of the progress made by the hospital's management, including the County Government, in scaling down the magnitude of the economic burden associated with treating and managing CP. Further, it would be essential to assess the cost of treating CP patients at the facility, methods of payment, the impact of insurance schemes such as NHIF (National Hospital Insurance Fund) or private insurance on economic burden; specifically, why such insurance schemes are reluctant to cover some treatment options for children suffering from CP. Investigating the subject would also illustrate the costs of purchasing medical equipment required for treating CP.

1.3 Research Objectives

1.3.1 General Objective

To assess the economic burden of children with cerebral palsy in Machakos Level 5 Hospital.

1.3.2 Specific Objectives

i. To assess the prevalence of cerebral palsy in Machakos Level Five Hospital
ii. To determine the direct medical costs associated with treating and managing cerebral palsy patients at Machakos Level Five Hospital.
iii. To determine Machakos Hospital's capacity to manage cerebral palsy.

1.4 Research Questions

i. What is the prevalence of cerebral palsy in Machakos County?
ii. What is the cost associated with children living with cerebral palsy?
iii. What is Machakos Hospital's capacity to manage cerebral palsy?

1.5 Scope of the Study

Concept Scope: The study aimed to assess the economic burden of caring for children with cerebral palsy at Machakos Level 5 Hospital (ML5H) in 2022. This included an analysis of various cost components such as hospital administration, primary care, rehabilitation, healthcare personnel salaries, equipment, facility improvements, and public awareness campaigns.

Context: Machakos Level 5 Hospital, located in Machakos County, Kenya, serves as a critical healthcare facility for the region. Cerebral palsy, a prevalent condition within the county, imposes significant economic challenges on the healthcare system. The study sought to capture the multifaceted economic impact on the hospital and community resources, reflecting the broader financial strain on healthcare infrastructure and families.

Methodological Scope: The study gathered insights from a range of healthcare personnel at ML5H, including pediatricians, orthopedic surgeons, physiotherapists, and occupational

therapists. It employed a comprehensive data collection approach, incorporating hospital records, interviews with healthcare providers, and financial documents from the Machakos County Government. The methodology involved quantifying costs related to hospital administration, primary care, rehabilitation, healthcare personnel salaries, equipment, facility improvements, and public awareness efforts. Data were analyzed to provide a detailed understanding of the economic burden associated with managing cerebral palsy in this specific regional context.

1.6 Significance of the Study

Policy Implications

The findings from this study provide essential insights for policymakers. The recommendations include cost-effective approaches to managing cerebral palsy (CP) in Machakos, which could be implemented in other counties across Kenya. By quantifying the costs associated with CP, the study helps prioritize investments in healthcare and social support systems. It informs the development of policies aimed at reducing the economic burden of CP. For healthcare leaders and officials in the Machakos health department, the study highlights the significant economic burden associated with CP and offers strategies to mitigate these costs. Furthermore, the Machakos County Assembly may find the study useful for reviewing fiscal policies and increasing budgetary allocations for treating developmental disabilities such as cerebral palsy.

Sector-Specific Insights

The study's findings are particularly relevant to healthcare personnel specializing in CP treatment, including orthopedic surgeons, occupational therapists, physiotherapists, and other therapists. These professionals can benefit from the recommendations on cost-effective, multidisciplinary approaches to managing CP in Machakos. By focusing on the economic aspects, the study aids healthcare leaders and emergency services in understanding and addressing the financial challenges posed by CP. The insights provided can drive improvements in healthcare delivery, resource allocation, and the development of specialized programs for CP management.

Theoretical Contributions

From a theoretical perspective, the study contributes to the academic discourse in healthcare management. It sheds light on the economic impact of cerebral palsy on healthcare organizations and providers, emphasizing the importance of effective resource allocation. This includes the purchase of equipment and the recruitment and retention of specialists. The study underscores the need for interdisciplinary collaboration, illustrating how different medical fields must work together to provide comprehensive care for children with cerebral palsy. For academia, especially students in healthcare management, nursing, therapy, physiotherapy, pediatrics, and orthopedics, the report serves as a valuable resource. It offers a deeper understanding of the challenges associated with CP and the economic burden it places on individuals, families, and society, thus fostering a holistic approach to healthcare education and practice.

1.7 Chapter Summary

Overall, this chapter serves to introduce and provide background to the research topic, outline the research objectives and questions, describe the scope and limitations of the study, and provide an overview of the significance of the study. The next chapter present the literature review of the study.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter provides a literature review focusing on the economic burden associated with children diagnosed with cerebral palsy. It encompasses theoretical perspectives, an empirical overview, and a conceptual framework.

2.2 Theoretical Review

This study is anchored in cost-of-illness theory, and health production function.

2.2.1 Cost-Of-Illness Theory

The Cost-of-Illness theory was first proposed by researchers David E. Bloom and Mark V. Pauly. (Bloom & Pauly, 1993). It is an economic analysis that estimates a population's total economic burden of a disease or health condition. It assesses the economic impact of the disease in terms of direct medical costs, such as doctor visits and medication, as well as indirect costs, such as lost productivity and income due to disability. Cost-of-illness theory measures the economic burden of a given health condition to inform public health policies and interventions (Jo, 2014; Igberaese & Iseghohi, 2017).

The cost-of-illness theory can be applied to this study that assesses the economic burden of children with cerebral palsy by accounting for both direct and indirect costs associated with the condition. Direct costs refer to expenses incurred from seeking medical treatment and caring for individuals with cerebral palsy. These costs may include medical services, rehabilitation, assistive technology, and prescription drugs. Indirect costs refer to the value of lost productivity due to the condition. For example, a caregiver may have to quit their job to care for a child with cerebral palsy, which can result in lost income. This category can also include the cost of lost productivity due to premature death (Bian et al., 2020; Tonmukayakul et al., 2018). By considering both direct and indirect costs, the cost-of-illness theory provides a comprehensive understanding of the economic burden of cerebral palsy on individuals, families, and society as a whole. This information can inform policy decisions

and resource allocation to improve access to care and support services for children with cerebral palsy.

The cost of illness (COI) theory is a widely used tool for estimating the economic burden of a particular disease or health condition. However, the COI theory has been subject to several critiques and limitations that have been highlighted by researchers over the years. One of the primary critiques of the COI theory is its limited scope, as it only considers the direct and indirect costs of a particular disease or health condition and does not take into account the broader social and economic impacts of the disease, such as lost productivity and reduced quality of life (Jo, 2014). Another critique of the COI theory is its lack of standardization, as different studies may use different methodologies, data sources, and assumptions, making it difficult to compare the results across studies (Bian et al., 2020). Additionally, the COI theory may not be applicable to all diseases or health conditions, particularly those with complex and varied symptoms or those that are difficult to diagnose (Igberaese & Iseghohi, 2017).

Being a theory on health economics, this theory will help explain objective two and three on economic burden and the strategies towards managing Cerebral Palsy. This theory assesses the economic impact by considering both direct medical costs—such as doctor visits, medication, and hospitalizations—and indirect costs, including lost productivity and income due to disability (Jo, 2014; Igberaese & Iseghohi, 2017). The primary aim of the COI theory is to measure the economic burden of a health condition to inform public health policies and interventions, which would be geared toward managing cerebral palsy.

2.2.2 Health Production Function

The Health Production Function (HPF) was first proposed by researchers Robert H. Haveman and Barbara Wolfe. The Health Production Function (HPF) model is a concept that describes the relationship between health and economic production. It is a framework used in economics to understand how various factors, such as economic production, public policies, social and environmental conditions, and healthcare services, influence health outcomes within a population. The HPF model allows for the analysis of both direct medical costs, like doctor visits and medication, and indirect costs, such as lost productivity due to

illness or disability. By considering these factors, the HPF provides a comprehensive view of the economic impact of health conditions on a population and can be applied to evaluate public health policies, healthcare systems, and the effects of economic development on health outcomes. (Feldstein, 2012). The HPF helps explain how these factors can influence health outcomes. The model has been used to evaluate public health policies, healthcare systems, and the effects of economic development on health (Folland et al., 2016).

Drawing the Health Production Function (HPF), in this study, will be used to assess the prevalence and economic burden of children with cerebral palsy which are objective one and two of this study. The HPF model considers direct medical costs, such as doctor visits and medication, and indirect costs, such as lost productivity and income due to disability (Grossman, 2017). By considering these factors, the HPF can provide a more comprehensive picture of the economic impact of the disease on a population. By applying the HPF, this study can better understand the costs and benefits of different healthcare services and interventions and inform policy decisions to improve access to care and support services for children with cerebral palsy in a developing country. The results of this study can be used to prioritize investments in healthcare and social support systems and help decision-makers allocate resources effectively to reduce the economic burden of this condition.

2.2 Empirical Literature

2.2.1 Prevalence of Cerebral Palsy

Durkin et al. (2016) conducted a comprehensive study reporting the prevalence of cerebral palsy (CP) in a consistent surveillance area for the years 2006, 2008, and 2010, demonstrating initial progress towards the CP public health objective. The prevalence of CP in 2010 was 2.9 per 1000, showing a decline from 3.5 in the same surveillance area in 2006. Among CP cases with no documented post-neonatal etiology, 49.1% were born with low birth weight (LBW) in 2010, compared to 54.3% in 2006. Additionally, in 2010, 28.1% were born with very low birth weight (VLBW, <1500 g), down from 35.4% in 2006. Although not statistically significant, the relative risks for associations between CP and both LBW and VLBW declined during the study period.

Maenner et al. (2016) used data from parent reports from two nationally representative surveys conducted in the United States, the 2011–2012 National Survey of Children's Health (NSCH) and the 2011–2013 National Health Interview Survey (NHIS), to estimate the prevalence of cerebral palsy (CP) and intellectual disability (ID) in children ages 2–17. In the NSCH and NHIS, the prevalence of CP was 2.6 and 2.9 per 1000, respectively. In the NSCH, ID prevalence was 12.2, while in the NHIS, it was 12.1. For both illnesses, almost all of the sociodemographic groupings that were studied showed consistency in the prevalence estimates from the NSCH and NHIS.

A study by McGuire et al. (2019) looked at the prevalence, demographics, and long-term trends for blindness, intellectual impairment (ID), cerebral palsy (CP), and moderate to severe hearing loss (MSHL). The prevalence estimates for CP, ID, MSHL, and blindness per 1000 children aged 3–17 years were 3.2, 11.1, 6.4, and 1.6, respectively. The prevalence of disabilities was higher in children with low birth weight, from homes with lower parental education, incomes ≤200% of the federal poverty threshold, and public insurance. The frequency of ID was higher in older children, and the prevalence of CP and ID was considerably higher in boys. Over time, only ID showed a noticeably increasing tendency.

The goal of McConnel et al. (2021) was to describe the clinical traits and prevalence of adults with cerebral palsy (CP) in a specific geographic area of the United Kingdom. They discovered that the prevalence of CP in adulthood was comparable to other prevalent neurological disorders like Parkinson's disease and multiple sclerosis. 1218 CP patients between the ages of 19 and 39 were included in the study; 46 of them passed away as adults. In 1000 people, there were 2.38 cases of CP. Most of the victims could walk and had spastic CP. Most adults who passed away had wheelchair-using bilateral spastic cerebral palsy.

A comprehensive long-term longitudinal study conducted in Taiwan sought to determine the age at which term-born and preterm children with varying birthweights were diagnosed with cerebral palsy (CP), as well as to estimate and compare the prevalence of CP among these groups. The study spanned 12 years and involved a detailed retrospective data review, highlighting significant differences in CP prevalence based on birthweight categories and gestational age. The findings revealed that preterm children with extremely low birth weight (ELBW) had the highest prevalence of CP, with 147.3 cases per 1000 neonatal survivors.

This group was followed by preterm children with very low birth weight (VLBW), who had a prevalence of 97.2 cases per 1000 neonatal survivors. Preterm children with low birth weight (LBW) had a significantly lower prevalence, at 27.7 cases per 1000 neonatal survivors. In contrast, term-born children had the lowest prevalence of CP, with only 2.5 cases per 1000 neonatal survivors (Wang et al., 2021).

Salih's (2020) identified the prevalence and risk factors for cerebral palsy (CP) in children from Sudan. In a pediatric referral hospital in Khartoum, Sudan, this retrospective hospital-based study was carried out over a period of three years. 49 (45.4%) and 59 (54.6%) of the 108 CP patients who were enrolled were female. The most prevalent type of CP was spastic quadriplegic. Lower social classes made up the majority of instances. There were 45 (41.7%), 31 (28.7%), 23 (21.3%), and 9 (8.3%) instances of prenatal, antenatal, and unclassified CP, respectively.

2.2.2 Cost Associated with Cerebral Palsy

To summarize systematic research on the illness burden associated with cerebral palsy (CP), including the effects on the community, the healthcare system, and caregivers, a systematic review was carried out. The references for the literature came from the Cochrane Library's Ovid Medline, Embase, CINHAL, PsyInfo, Econlit, Health Economic Evaluation Database (HEED), and NHS Economic Evaluation Database (NHS EED). Twenty-two papers were included in the review; they ranged in complexity from simple lifetime estimates to snapshot cost descriptions, in studies that were incidence-based or prevalence-based, and in their inclusion or exclusion of non-medical expenditures. Tonmukayakul et al. (2018) observed a strong positive correlation between the severity of CP and expenditure, with families and the welfare system bearing major costs to support school and community engagement.

To inform future research, Shih et al. (2018) carried out a systematic evaluation of economic studies on CP in a study that was comparable to this one. Eighteen publications met the requirements for cost studies, two for partial economic evaluations, and thirteen for full evaluations. Seven of these featured modeling simulations, and six involved complete economic evaluations in addition to clinical investigations or randomized controlled trials. Magnesium sulfate was a cost-effective and health-promoting treatment for imminent

preterm birth, and this was a strong economic justification. Stronger proof for long-term effects is required, but intrathecal baclofen therapy and botulinum toxin injection appear to be cost-effective based on current studies. Although they are less expensive, web-based and lifestyle therapies call for more thorough outcome monitoring.

Pulgar et al. (2019) examined the prevalence of CP, management practices, and expenses in a study carried out in the USA. The most popular forms of treatment for children receiving treatment were oral baclofen (13.5%), botulinum toxin (9.4%), orthotics (29.9%), and physical therapy (37.1%). Compared to children in the general database population, the annualized Medicaid costs for children with cerebral palsy were greater ($22,383 vs. $1,358). Costs for children in the CP population who were probably non-ambulatory were higher than those for children who were probably ambulatory ($43,687 vs. $10,368, respectively).

In order to ascertain the overall cost of care for cerebral paretic patients between the ages of 0 and 18 and to evaluate its influence on the national budget, Fejes, Varga, and Hollódy (2019) carried out a study in Hungary. They discovered that the most frequent factors among the risk groups were perinatal asphyxia (19.47%), low birth weight (29.64%), and early delivery (30.97%). Cerebral palsy (CP) affected 2.1% of the population; the most common types were two-sided (59.7%) and one-sided (19.0%) spastic pareses. Two-sided spastic paresis, which accounts for 42.5% of cases with Gross Motor Function Classification System (GMFCS) 3-5 degrees, was the most severe kind. Furthermore, 27% of patients had incontinence, 46% had mental involvement, and 22.0% of patients had epilepsy. Up until the age of 18, the average cost of care for a single child with cerebral palsy was 73 million HUF, or €251,724. Families lost out on 27.36 million HUF (€94,345) in income, and they also lost out on 14.46 million HUF (€49,862) in taxes and health care contributions. Moreover, CP families received 1.83% of direct medical costs, 0.88% of the entire health and social budget, and 0.525% of the GDP.

The goal of Amankwah et al. (2020) was to provide model-based estimations and projections about the economic and health effects of cerebral palsy (CP) in Canada for the next 20 years (2011–2031). The crude incidence rate of CP overall was predicted to stay constant, while the number of newly diagnosed cases was predicted to increase from about

1800 in 2011 to about 2200 in 2031. It was also projected that by 2031, there will be over 94,000 individuals with the illness, up from over 75,000 in 2011. For children ages 1-4 with CP, the direct health care expenditures (in constant 2010 Canadian dollars) were around $11,700, while for those without the disease, the costs were approximately $600. Additionally, people with CP tended to have longer periods of poorer health-related quality of life.

In Malaysia, Kamaralzaman et al. (2018) studied the financial strain on parents of children with cerebral palsy. They employed a cost-of-illness methodology that took into account direct medical expenses, direct non-medical expenses, indirect costs associated with development, and other costs. Seventy-four parents either printed or answered the questionnaires online. At RM14,715.49, direct healthcare incurred the largest cost, followed by RM10,146.07 for development, RM2,674.00 for direct non-healthcare, and RM2,175.20 for indirect expenditures. A child with cerebral palsy required finance for a total of RM29,710.76 a year, which put a heavy financial burden on their parents.

In order to investigate the financial strain on parents of children with cerebral palsy, Kamaralzaman et al. (2018) carried out research in Malaysia. Using a cost-of-illness methodology, they took into account indirect, developmental, and direct non-healthcare expenditures in addition to direct healthcare costs. Seventy-four parents either filled out physical copies or online surveys. With a total cost of RM14,715.49, direct healthcare was the most expensive. Development expenses came in second at RM10,146.07, direct non-healthcare expenditures at RM2,674.00, and indirect costs at RM2,175.20. The annual finance cost for a child with cerebral palsy was RM29,710.76, which put a heavy financial strain on their parents. According to their findings, the average family's financial burden per case of CP in Changzhou was 4,188,500 yuan, of which 3,982,700 yuan was incurred indirectly and 205,800 yuan was incurred directly due to medical expenses. Changzhou's CP socioeconomic impact was estimated to be around 2.244 billion yuan. The study emphasized how significantly CP affects afflicted people and their families' quality of life in terms of their health and finances.

A study by Umar, Adamu, and Abdulkareem (2020) assessed the expenses of treatment for a subset of cerebral palsy patients in an environment with limited resources. Forty-five percent

of the children belonged to the low socioeconomic class (Ogunlesi SES IV and V), while the bulk of the children (79.0%) lived in metropolitan regions. The monthly mean cost per patient for cerebral palsy care was ₦37,026.1 ($102.85), while the total monthly cost of care was ₦3,702,612.6 ($10,285.04). 77% of the entire monthly cost was made up of the direct cost of care, with 23% coming from indirect sources. Approximately 45.0% of monthly direct costs were attributed to medications and pharmaceuticals, making them the leading cost drivers. With an average monthly cost per patient of ₦444,313.5 ($1,234.20), the whole annual cost came to ₦44,431,351.2 ($123,420.42). This study sheds focus on the significant financial burden that families and caregivers of children with cerebral palsy endure in environments with limited resources, in part because of the high expense of prescription pharmaceuticals.

2.2.3 Managing Cerebral Palsy

To discuss the difficulties in diagnosing and treating cerebral palsy in African children, medical professionals from 22 African nations and five non-African nations gathered. They emphasized that patients with cerebral palsy have restricted access to basic care because there are few diagnostic centers and medical professionals with this experience. This paucity of resources is made worse by the dearth of solutions that are readily available, such as prescription drugs, surgeries, and ongoing therapy. The problem is made more difficult by the lack of pertinent guidelines (Donald et al., 2015).

In order to describe the literature on the medical and rehabilitative care of cerebral palsy (CP) in India, Jindal (2019) carried out a study. Written by multiple medical specialists, the study uses mixed, qualitative, and quantitative designs. The majority of the research were observational (30%) and interventional (45%). The World Health Organization's International Classification of Functioning, Disability, and Health was commonly used in studies to frame outcomes. This classification placed a strong emphasis on bodily structure and function, with less attention paid to activity and involvement.

The aim of Gmmash et al. (2020) was to determine the difficulties that physical therapists (PTs) and occupational therapists (OTs) encounter when providing early intervention (EI) for infants who have cerebral palsy or who are at risk for it. The main obstacles that PTs and

OTs identified were poor coordination and communication, challenges in working with families, restrictions on policy, meeting the unique medical needs of each patient, and unequal access to resources.

In Kano, Nigeria, Abdullahi and Isaiah (2020) investigated the variables impacting caregivers' active involvement in the rehabilitation of children with cerebral palsy. Forty young caregivers took part, and they shared their experiences of therapists' encouragement, family support, empathy, seeing other children with CP improve, the child's cooperation in at-home activities, and seeing the child's condition improve as facilitators. Nevertheless, they identified the caregiver's work, financial limitations, and the number of children as obstacles to their active involvement in the recovery process.

2.3 Level Five Facility

In Kenya, a Level 5 hospital represents a higher tier of healthcare facilities within the country's healthcare system, mostly receiving patients on a referral basis from lower-tier facilities. These hospitals are typically regional referral hospitals, serving as major centers for healthcare delivery, training, and research in their respective regions. They play a critical role in providing specialized medical services, managing complex medical cases, and serving as hubs for medical education and research. A Level 5 hospital is equipped with advanced medical facilities, including specialized diagnostic and treatment services such as intensive care units (ICUs), operating theaters, and advanced imaging technologies like MRI and CT scans. These hospitals also have specialized medical personnel, including specialists in various fields such as surgery, internal medicine, pediatrics, obstetrics and gynecology, and others.

Additionally, Level 5 hospitals serve as teaching hospitals for medical students and interns, offering hands-on training and experience under the supervision of experienced medical professionals. They also often conduct medical research to advance healthcare knowledge and practices in the country. One of the key functions of a Level 5 hospital is to serve as a referral center for lower-level healthcare facilities in the region. Patients with complex medical conditions or those requiring specialized care are referred to Level 5 hospitals from

Level 4 hospitals (county hospitals) and other lower-level facilities. This ensures that patients receive the appropriate level of care based on their medical needs.

2.4 Summary and Research Gap

The foregoing literature shows that the prevalence of cerebral palsy is high. Studies reviewed suggest that costs associated with the management of CP are high and prohibitive to both the caregivers and the healthcare system. However, much of this evidence is from studies carried out in developed economies. To provide contextual evidence, this study assessed the economic burden of children with cerebral palsy on Machakos Level 5 Hospital. Based on the arguments compared regarding available literature, various areas have not been extensively studied. First, it is essential to investigate the aspect of economic modeling further. In this regard, it remains essential to determine whether local governments and authorities can replicate economic modeling utilized in calculating the financial burden of cerebral palsy by national governments. Evaluating the cost per person, cost per family and costs incurred by local hospitals would provide elaborations on the use of several economic models to estimate the economic burden linked to cerebral palsy. The study evaluated the economic model used by Machakos Level 5 Hospital and the County Government of Machakos to determine the economic burden of providing care for children with cerebral palsy.

VT OMNES VNVM SINT

Table 2.1: Research Gaps

Author (s)	Title	Findings	Gap (s)
Dana Olzenak McGuire, Lin H. Tian, Marshalyn Yeargin-Allsopp, Nicole F. Dowling,a and Deborah L. Christensen	Prevalence of cerebral palsy, intellectual disability, hearing loss, and blindness, National Health Interview Survey, 2009–2016	The study found that the overall prevalence of CP was 2.58 per 1000 live births, with a higher prevalence among males and non-Hispanic black children. The prevalence of CP was also higher among children born prematurely or with low birth weight. The study also found that the prevalence of CP decreased over time, from 3.5 per 1000 live births in 1996 to 2.0 per 1000 live births in 2006.	Insufficient attention to the experiences and perspectives of healthcare practice, and the potential impact of this on the provision of care
Shih, S. T. F. Davis, E. Opacka-Juffry, J. Ong, M. J. Williams, K. Hagan, R.	A systematic review of economic evaluations of treatments for cerebral palsy".	The systematic review conducted by Shih et al. (2018) found that economic evaluations of treatments for cerebral palsy (CP) were limited in number, diversity, and quality. The authors identified 19 studies that met their inclusion criteria and found that the majority of these studies focused on evaluating interventions for children with CP, with only a few studies assessing	The paper highlighted the need for studies that compare the cost-effectiveness of interventions across different countries and healthcare systems and quality economic evaluations of interventions for CP are needed to inform decision-making and resource allocation in healthcare.

		interventions for adults with CP. The authors also noted that there was a lack of consistency in the methods used in the studies, which made it difficult to compare and generalize the findings.	
Gmmash S, Alotaibi M, Alghadir A, Alshehri M	Challenges in providing early intervention for infants with or at risk for cerebral palsy: a qualitative study of physical and occupational therapists' perspectives.	The authors identified several challenges that PTs and OTs face in providing EI for infants with or at risk for CP. These challenges included limited resources, lack of collaboration among healthcare professionals, lack of standardized assessments, difficulty in engaging and motivating parents, and difficulty in providing culturally responsive care.	The study did not address all of the relevant factors affecting PTs and OTs in providing early intervention for infants with or at risk for cerebral palsy

2.5 Conceptual Framework

Figure 2.1 illustrates the conceptual framework that was applied in the study;

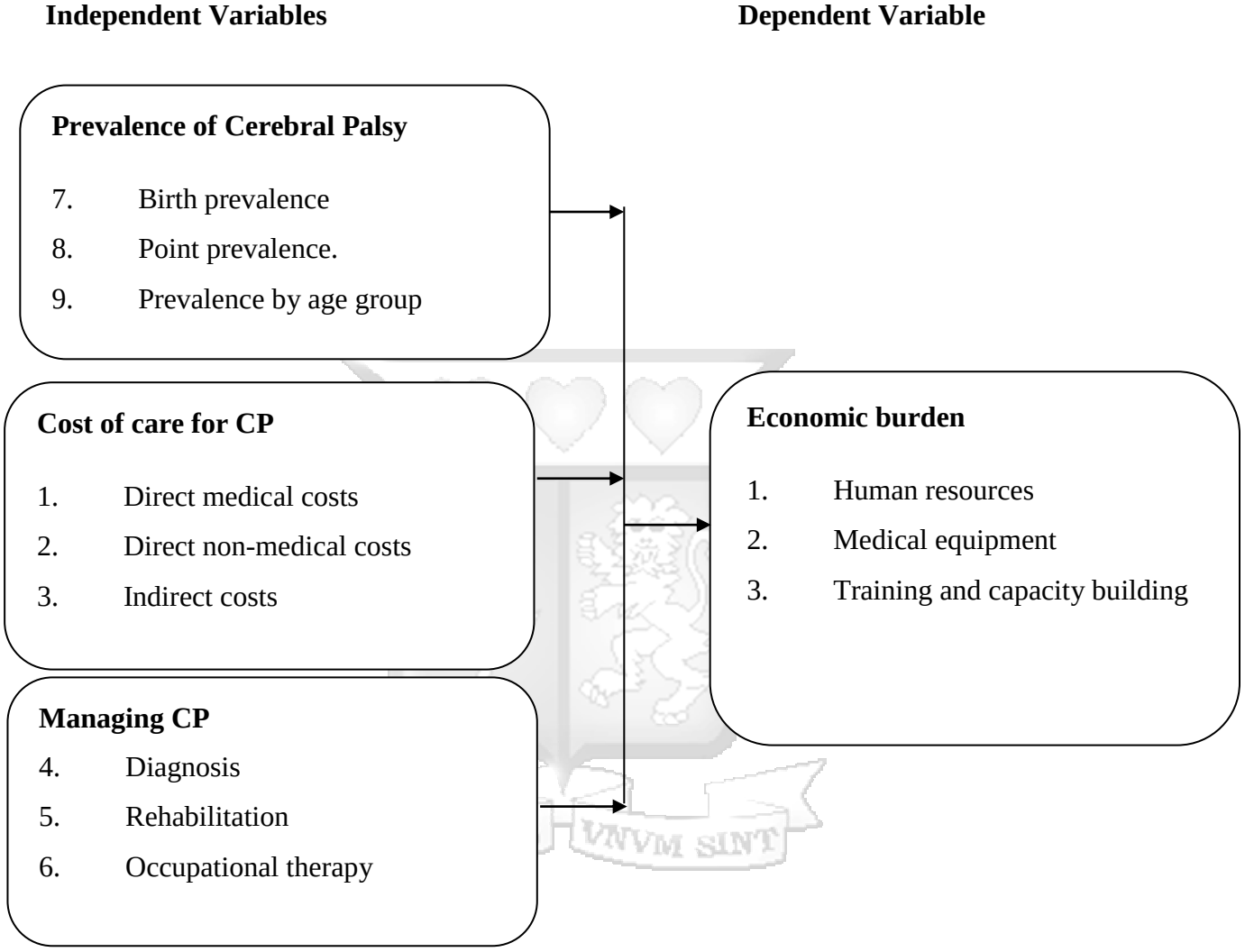

Figure 2.1: Conceptual Framework

Figure 2.1 illustrates the conceptual framework that was applied in the study. From the diagram, the treatment (care) of children with cerebral palsy was considered an independent variable. Independent variables (that are influenced by the dependent variable) included hospital administration costs, primary care costs, rehabilitation costs, healthcare personnel's

salaries, the cost of revamping facilities, the cost of creating public awareness about cerebral palsy, recurrent and development expenditure incurred by the County Government of Machakos in providing care for children suffering from cerebral palsy. Moderating variables included laws enacted by the Machakos County Assembly, laws enacted by the National Assembly, laws enacted by the Senate, and guidelines/standards made by the Machakos Health Department and Ministry of Health regarding the treatment of developmental disabilities.

Regarding the dependent variables, the costs associated with treating and caring for children suffering from cerebral palsy was measured before the findings were presented. Data on recurrent and development expenditures were obtained from the Machakos County Government's fiscal papers available on public platforms. Data and information about healthcare costs, equipment, and facilities were obtained once the researcher visited the facilities and applied the research methodology described in the next section.

Integration with the Study's Framework:

- **Independent Variables:** In the conceptual framework, the treatment (care) of children with cerebral palsy is considered an independent variable influenced by hospital administration costs, primary care costs, rehabilitation costs, healthcare personnel's salaries, facility revamping costs, public awareness costs, and recurrent and development expenditure. These elements are inputs in the Health Production Function, reflecting the resources allocated to produce health outcomes for children with cerebral palsy.

- **Dependent Variables:** The costs associated with treating and caring for children with cerebral palsy represent the economic burden measured by the Cost of Illness Theory. These costs are critical for understanding the financial impact on the healthcare system and society. By examining these costs, the study evaluates the economic implications of cerebral palsy treatment and care.

- **Moderating Variables:** Laws enacted by the Machakos County Assembly, National Assembly, Senate, and guidelines/standards made by the Machakos Health Department and Ministry of Health act as moderating variables. These regulatory

frameworks influence the efficiency and effectiveness of healthcare inputs and can impact both the Health Production Function and the overall cost of illness. Policies and standards can enhance or hinder the production of health outcomes and alter the economic burden of cerebral palsy.

The study provides a robust framework for understanding the relationship between healthcare inputs, health outcomes, and the economic burden of cerebral palsy. This approach highlights the importance of efficient resource allocation and effective policy implementation in managing the health and economic impacts of developmental disabilities.

Table 2.1: Operationalization Table

Variable name	Type of variable	Indicators	Measurement	Analysis	Source
Prevalence of CP	Independent	• Birth prevalence • Point prevalence • Prevalence by age group • Geographical distribution	Nominal	Descriptive, regression	Jahan et al. (2021) Duke et al. (2020) Salih (2020)
Cost associated with CP	Independent	• Direct medical costs • Direct non-medical costs • Indirect costs	Nominal	Descriptive, regression	(Tonmukayakul et al., 2018). Shih et al. (2018) Pulgar et al. (2019) Amankwah et al. (2020)
Managing CP	Independent	• Diagnosis • Rehabilitation • Occupational therapy	Nominal	Descriptive, regression	(Donald et al., 2015). Gmmash et al. (2020) Abdullahi and Isaiah (2020)
Economic Burden of CP	Dependent	• Human resources • Medical equipment • Training and capacity building	Nominal	Descriptive, regression	Wanjiku et al. (2019) Olusanya et al. (2020)

2.5 Chapter Summary

This chapter has looked at the theoretical framework that guides this study, related literature in line with the objectives, a summary of the research gaps, conceptual framework and the operationalization of the variables. Next, the chapter focused on research methodology.

CHAPTER THREE
RESEARCH METHODOLOGY

3.0 Introduction

The methodology section of this chapter outlined the planned study design, study location, target population, sample size, and sampling method, data collection tools, data analysis and presentation, and ethical considerations to be addressed in the study.

3.1 Research Philosophy

Positivism is a research philosophy that assumes that knowledge can be obtained through observation and experience. It relies on empirical evidence to explain social phenomena and seeks to establish causal relationships between variables. In the context of the economic burden of CP in a hospital, positivism would entail gathering data through direct observation or measurement to establish the prevalence of CP, the cost of care, and how to manage CP. The research sought to identify cause-and-effect relationships between the variables and draw generalizable conclusions based on the data collected.

The positivist research philosophy has been widely used in CP research to collect and analyze data on the condition's prevalence, economic burden, and management, among other variables. Gorter et al. (2018) aimed to identify the cost-effectiveness of early interventions for children with CP. The study used a positivist research approach to collect data on the costs of different interventions and their effectiveness in improving children's outcomes. Shih et al. (2018) systematically reviewed economic studies on CP to inform future research. The study used a positivist research approach to analyze and synthesize the data on the economic burden of CP and the cost-effectiveness of different interventions.

3.2 The Research Design

The study employed a descriptive cross-sectional research design to evaluate various aspects of the study. A descriptive research design aims to describe and document the characteristics of a specific population, situation, or phenomenon. It involves collecting data without manipulating any variable, and the researcher's role is to observe and record what is occurring without interfering. (White & McBurney, 2013). The economic burden of cerebral

palsy on Machakos Level 5 Hospital is a subject that has yet to be explored extensively by researchers. Therefore, using descriptive cross-sectional research design was vital in unearthing details about cerebral palsy in the facility, the costs incurred by the county's health unit, and other costs associated with primary care for persons suffering from the condition.

The study employed a descriptive cross-sectional research design to thoroughly assess various dimensions of cerebral palsy care and its associated costs. This methodological approach allowed researchers to systematically capture a detailed snapshot of the current state of treatment, financial expenditures, and influencing factors at a specific point in time. By using this design, the study provided comprehensive insights into the economic burden, healthcare practices, and policy implications related to the care of children with cerebral palsy, offering a well-rounded understanding of the issue's multifaceted impacts. Quantitative and qualitative data was collected. This approach combines the strengths of both qualitative and quantitative methods to provide a more comprehensive understanding of a research problem. The researcher used a questionnaire and an interview guide for key informants in this study. The data collected was analyzed both quantitively and thematic analysis.

3.2 Population and Sampling

3.2.1 Population

The study's target population includes healthcare personnel treating cerebral palsy at the Machakos Level 5 Hospital. These include nurses, orthopedic surgeons, occupational therapists, physiotherapists, and other therapists. The table below shows the distribution of hospital staff, including those who deal directly with cerebral palsy patients.

Table 3.1: Population of Healthcare Workers in ML5H

Staff Profession	Number
Nurses	30
Orthopedic surgeons	2
Occupational therapists	7
Physiotherapists	9
Healthcare Admin (Pediatrics)	4
Machakos County Health Department	4
Total	**58**

Source: ML5H Human Resources

3.2.2 Sampling

This research applied the simple random sampling method to sample the number of healthcare workers involved in the study, especially for the number of nurses attached to the unit. The sample was calculated using the Slovin formula as below:

Slovin's formula is calculated as:

$n = N / (1 + Ne2)$

where:

n = sample size

N = population size

e = acceptable margin of error

$n= 300/ (1+310 * 9^2)$

= 24.135

=24 participants

Further, the target population included hospital healthcare administrators, such as the head of pediatric departments. The researcher did a census for this category of respondents since the number was few, according to Table 3.1. In addition, the researcher did Key Informant Interviews for this category.

Table 3.2: Sample size

Staff Profession	Number
Nurses	24
Orthopedic surgeons	1
Occupational therapists	2
Physiotherapists	2
Other therapists	2
Senior Healthcare Admin	4
Machakos County Health Department	4
Total	**39**

3.3 Data Collection Methods

Data was collected using a questionnaire and an interview guide. Questionnaires were distributed to caregivers and nurses to identify the economic burden of palsy. The questionnaire consisted of closed-ended questions that were analyzed using descriptive statistics, such as frequencies, percentages, means, and standard deviation. The questionnaire also had a Likert scale to evaluate the healthcare workers' perceptions and opinions on the study variables. The researcher notified the target audience and sought consent for their participation in the research. This was done after they completed their shifts to avoid disrupting service delivery. Once consent was given, the researcher administered the questionnaire and gave time to the respondent to fill out and return the feedback.

Key Informant Interviews were utilized for healthcare specialists and administrators in Machakos Level 5 Hospital and the County Government of Machakos, respectively. The researcher set an appointment with the Key informants and availed herself at the agreed time. The interview was recorded and transcribed for data analysis.

The two data collection methods were applied based on the nature and occupation of the study participants. The rationale behind the use of questionnaires in the study was to save time and costs during the investigation. Further, questionnaires are easy to analyze. The rationale behind using interviews is that they are vital in obtaining detailed information; in this case, information about financial aspects was collected during the investigation.

3.4 Data Analysis

Data and information from the interviews and questionnaires distributed to the participants was subjected to quantitative and qualitative analysis. The quantitative analysis in this study involved using various statistical techniques to analyze the data collected. The data collected from the study was summarized using measures such as frequencies, percentages, means, and standard deviation. These measures provided an overview of the data, including the distribution of the variables and their central tendencies. The Statistical Package for the Social Sciences (SPSS) software was used to conduct this quantitative analysis. The data was organized, cleaned, and analyzed to generate descriptive statistics to help identify trends, patterns, and relationships. Furthermore, SPSS was also used to perform inferential statistics such as regression, and correlation analysis, which helped to test hypotheses and determine the statistical significance of the findings.

Qualitative analysis using NVIVO was conducted to identify central themes in the data. Therefore, qualitative analysis was vital in identifying common themes and variations regarding the economic burden of cerebral palsy in Machakos Level 5 Hospital. Further, qualitative analysis is essential in comparing primary data from the field and secondary data or information from the literature reviewed. In this context, the researcher compared the data obtained to the available literature before making inferences.

3.6 Research Quality

A pilot study was carried out to establish the feasibility of the instruments. The pilot was carried out at Kitui County Referral Hospital. The sample size for the pilot was 3 participants, which is 10% of the main sample. This included a senior healthcare administrator and two caregivers/parents/guardians of children receiving CP treatment at the site. Data was then collected and analyzed. To test reliability, data was subjected to scale analysis to assess internal consistency. Internal consistency was gauged by Cronbach Alpha, whereby a coefficient of 0.7 and above was accepted.

Validity was also established before data collection. In the study, the researcher ensured that social interaction between the participants and the methods utilized in selecting participants did not threaten the internal validity of the research. The comparative approach applied in

the study was instrumental in ensuring that the findings are valid. External validity is the degree to which results from a particular study can be generalized to other events, groups, or situations. The researcher refrained from sampling bias as a way of maintaining the external validity of the study. The researcher's supervisors also reviewed the instrument, provided expert judgment of the instrument's validity.

3.10 Ethical Considerations

The researcher obtained clearance from the Strathmore University Institutional Ethical Review Committee (SU-IERC) and then proceeded to the National Commission for Science, Technology and Innovation (NACOSTI). The researcher also obtained clearance from the County Government of Machakos before collecting data for the study. The researcher respected the participants' right to anonymity.

The study was informed by the principles of ethics and their application in research. The researcher avoided plagiarism in the study. In this regard, all information gathered from various sources as referenced appropriately. Such a strategy ensured that the researcher respects the intellectual property of other researchers and scholars. The researcher exhibited utmost respect toward the participants of the study. In this regard, the principle of informed consent was applied in the study. Participants were informed about the nature of the study being conducted, reasons for the study, their right to participate or decide to avoid participating in the study, risks associated with the investigation, benefits of the study, limits of confidentiality, and contact information for any queries about the study being conducted. Participation in the study was voluntary, so no person was coerced to provide information about the subject being investigated. Therefore, the researcher was honest and transparent with the researchers during the study. Information about the identity of the participants remained confidential.

3.11 Chapter Summary

The chapter highlights the research philosophy, which in this case is positivism. The positivist research philosophy aimed to use scientific methods to identify and explain the economic burden of cerebral palsy in a hospital. The chapter then discussed the research design, which was descriptive. This design helped to describe the prevalence of cerebral

palsy in the hospital, the cost of care, and how to manage the condition effectively. The target population was caregivers, and sampling and the sample size have been discussed. The chapter also described the data collection instruments: questionnaires and interview schedules. Finally, the chapter discussed the data analysis and presentation methods, which involved using Statistical Package for the Social Sciences (SPSS) and NVIVO to analyze the data. The chapter concluded by discussing the ethical issues of the study and outlining the measures that were taken to ensure ethical research practices are followed.

CHAPTER FOUR
RESULTS AND FINDINGS

4.1 Introduction

This chapter presents the results and findings in the research objectives and methodology. The study assessed the economic burden of children with cerebral palsy in Machakos Level 5 Hospital. The first section of this chapter covers response rate, followed by descriptive statistics based on study variables, and finally inferential statistics outcome.

4.2 Response rate

The researcher administered 39 questionnaires to healthcare personnel treating cerebral palsy at the Machakos Level 5 Hospital. Out of this, 35 questionnaires were properly filled and returned. This represented 89.7% success rate. Saunders et al. (2009) point that a response rate of 50% and above is adequate for statistical analysis. Therefore, the response rate in this study was considered adequate for further analysis. The high response rate can be attributed to the small sample size that enabled the researcher to administer all the questionnaires and also conduct follow ups. The researcher also did seven key informant interviews with hospital administrators within the institution.

The target population for this research included a multidisciplinary team of healthcare professionals such as nurses, orthopedic surgeons, occupational therapists, physiotherapists, and other specialized therapists. Further, the interviews were conducted among healthcare administrative staff and The Department of Health at the Machakos County Government.

4.3 Prevalence of Cerebral Palsy

The study sought to assess the prevalence of cerebral palsy in Machakos Level Five Hospital. The findings in Table 4.1 show that a total of 423 children with cerebral palsy were attended in the previous year.

Results also indicate that 64.7% of respondents noted that children with cerebral palsy below 4 years have been handled, 60% reported 5-9 years, 48.6% indicated 10-14 years, and 25.7% reported 14-17 years. This implies that the majority of children with cerebral palsy who have been handled in Machakos Level Five Hospital were below 10 years.

Further, the findings reveal that 82.9% of respondents highlighted perinatal Asphyxia as a common underlying cause or risk factor associated with cerebral palsy in the children being treated in the hospital, 40% reported low birth weight, and 14.3% indicated maternal health.

Table 4.1: Prevalence of Cerebral Palsy

	Frequency	**Percent (%)**
Age range of the children with cerebral palsy		
0-4 years	31	64.7
5-9 years	21	60
10-14 years	17	48.6
14-17 years	9	25.7
Risk factors associated with cerebral palsy		
Perinatal Asphyxia	29	82.9
Low birth weight	14	40
Maternal Health	5	14.3
	Mean	**Std Dev**
Children with cerebral palsy	423	0

The interview discussions revealed that cerebral palsy among children is a common phenomenon and of great concern in the current community. Most parents with Cerebral palsy children in the community visit the hospitals once they experience complications like convulsions from their children. Some of them notice the condition when it is a bit too late and some never notice it at all. The community has also associated the disease with witchcraft; most parents with children having cerebral palsy are ostracized, and some mothers chased from their matrimonial homes.

> *"For the cerebral palsy situation in the community, in this community there's actually a high number of cerebral palsy patients with different severities."*
>
> *(Respondent #2)*
>
> *"Most of these children are seen in the community and a few of them present to the hospitals, especially when they have motor disabilities and present with complications like convulsions"*
>
> *(Respondent #2)*

"Cerebral palsy situation in the community it's fairly common, often picked up during infancy when the mother or guardian brings the child for mother-child clinic or during delivery when the mother has been expectant." (Respondent #1)

"It's just that some are not seeking health care, so some don't come to the facility, but they actually more than we think they're there. So I believe the situation is dire in terms of there are many children out there who need help and most of them are not getting it." (Respondent #5)

"The majority of mothers will start noticing there's a problem from around four to five months because that's when they're expecting the child to be able to support their neck." (Respondent #7)

These findings provide a detailed and insightful look into the situation of cerebral palsy within the community. One of the most notable observations is the high prevalence of cerebral palsy patients, encompassing individuals with varying degrees of severity. This indicates that cerebral palsy is a significant health concern within the community, affecting a considerable number of individuals and families. Despite the high prevalence, there appears to be a disparity in the healthcare-seeking behavior of affected individuals. While many children with cerebral palsy are identified within the community, only a few of them are brought to hospitals for medical attention, particularly when complications arise. This discrepancy may be attributed to various factors, including limited access to healthcare facilities, financial constraints, lack of awareness about available treatments, and cultural or social stigmas associated with disabilities.

The early detection of cerebral palsy is another key finding highlighted in the interview schedule. The condition is often identified during infancy, either when mothers bring their children for routine maternal and child health visits or during the delivery process. This suggests that efforts to detect and diagnose cerebral palsy early in life are somewhat successful within the community. Early detection is crucial as it allows for early intervention and access to necessary treatments and therapies, which can significantly improve the long-term outcomes for individuals with cerebral palsy. Despite the efforts to detect cerebral palsy early, there are concerns regarding underreporting and a lack of healthcare-seeking

behavior among some families. It is noted that some families do not seek healthcare for their children with cerebral palsy, which may lead to a lack of access to essential services and support. This finding underscores the need for targeted interventions to raise awareness about cerebral palsy, its symptoms, and the importance of seeking medical attention and support.

The respondents informed the researcher of various barriers the families and caregivers of children with CP face in accessing medical treatment and support services at the hospital. They include a lack of information concerning CP, the overall cost of care, community stigma, movement from one department to another by carrying children, the means of transport to the facility and underequipped rehabilitative services.

> *"One of the major barriers is Lack of knowledge and awareness because most of them don't know what is CP and when they are coming to the facility for the first time they are getting to know what it is."(Respondent #4)*

Mothers play a crucial role in identifying potential issues with their children's development. The majority of mothers tend to notice problems with their child's development, particularly related to neck control, around four to five months of age. This insight into the timing of symptom recognition can be valuable for healthcare providers and caregivers, as it provides a potential window for early intervention and support strategies.

The findings further shed light on the complex and multifaceted nature of cerebral palsy within the community. While efforts are being made to detect and diagnose the condition early, there are still significant challenges that need to be addressed, including improving healthcare access, raising awareness, and providing support for affected individuals and families. By addressing these challenges, we can work towards ensuring that individuals with cerebral palsy receive the care and support they need to lead fulfilling and healthy lives.

4.3.1 Prevalence of Cerebral Palsy in Children being treated at the hospital.

The prevalence of cerebral palsy among children receiving treatment at Machakos Level 5 Hospital is a matter of significant concern, with a total of 423 cases reported as of 2022. These cases are distributed across the year, with varying numbers of new cases diagnosed each month.

Analyzing the data, January appears to have the highest number of new cases, totaling 68. This could be attributed to various factors, such as seasonal influences, increased awareness leading to more diagnoses, or other factors specific to that time of year.

In contrast, June had the lowest number of new cases, with only 15 reported. This could be due to various reasons, such as decreased healthcare-seeking behavior during certain months, reduced exposure to risk factors, or simply natural fluctuations in disease incidence. The remaining months show a relatively consistent number of new cases, ranging from 31 to 36, with no clear pattern emerging. This suggests cerebral palsy affects children in Machakos consistently throughout the year, without significant seasonal variation. The data indicates a steady presence of cerebral palsy cases in the hospital, highlighting the need for ongoing support and care for affected children and their families.

4.4 Cost Associated with Children Living with Cerebral Palsy

The study sought to determine the direct medical costs associated with treating and managing cerebral palsy patients at Machakos Level Five Hospital. The findings in Table 4.2 show that healthcare personnel's salaries are at 7.3 million, and hospital administration costs are at 2.1 million. Items with the lowest costs were Rehabilitation costs, 11,000, and Primary care costs, 43 350 Kenya shillings. There was no investment in revamping the facilities and the cost of public awareness.

Table 4.2: Annual costs associated with the treatment and management of cerebral palsy patients

Items	Cost (Kenya shillings)
Hospital administration costs	2,163,494
Primary Care costs	43,350
Rehabilitation costs	11,000
Healthcare Personnel's' salaries	7,277,647
Cost of equipment	115,000
Revamping facilities	-
Cost of public awareness	-

Source: Machakos County Government

This finding highlights the direct medical costs associated with treating and managing cerebral palsy patients at Machakos Level Five Hospital. The study identified several key cost components, healthcare personnel salaries were the second-highest cost, totaling 7.3 million Kenyan shillings. Hospital administration costs were also identified as a significant expense of 2.1 million Kenyan shillings. This includes costs associated with managing the hospital's operations and resources.

In contrast, rehabilitation costs were relatively low, totaling only 11,000 Kenyan shillings. This could indicate a potential area for improvement or investment, as rehabilitation plays a crucial role in the long-term management and improvement of outcomes for cerebral palsy patients. Similarly, primary care costs were relatively low, amounting to 43,350 Kenyan shillings. This highlights the need for increased focus on primary care services for cerebral palsy patients, as early intervention and ongoing care can significantly impact patient outcomes. The findings suggest that while certain aspects of cerebral palsy treatment and management, such as hospital administration cost is and healthcare personnel, incur substantial costs, there is very minimal effort to create public awareness to empower the community. There are also opportunities to optimize resources and improve the efficiency of care delivery, particularly in rehabilitation and primary care services.

It was evident from most the responses that there are no current innovative technologies to diagnose cerebral palsy though there are plans underway.

"There are none at the moment that's regarding the assistive devices for rehabilitation."

"There is an emphasis on the preventive aspect of it where we are trying to work with the maternity department to intervene early, especially in cases of high-risk pregnancies, and to think of ways of screening early, however, that will need a lot of goodwill from the hospital management and county referral government. (Respondent #4)

4.5 Capacity in Managing Cerebral Palsy

The study sought to determine Machakos Hospital's capacity to manage cerebral palsy. Using a five-point Likert scale, the respondents were asked to state their agreement or otherwise with statements on capacity in managing cerebral palsy in children.

The discussions informed that the hospital can manage cerebral palsy since the needed human resources was available apart from a shortcoming in commodities that optimizes patient management.

"I would say it has what it takes, it just needs to reorganize itself and all these children are given priority"

"I am not in a position to compare with other hospitals since I have not enquired any of them"

"If you compare our capacity with the neighboring counties, we still are better of coz we are getting referrals from Kitui, Kajiado and Makueni" (Respondent #1)

As indicated in Table 4.3, majority of respondents agreed that the hospital has the necessary medical equipment and resources to diagnose and treat cerebral palsy in children (mean=2.4, SD=1.1), healthcare personnel at the hospital are adequately trained to diagnose and manage cerebral palsy in children (mean=2, SD=1.0), and the hospital provides access to various forms of therapy (such as physical, occupational) for children with cerebral palsy (mean=2.3, SD=1.1).

Conversely, majority of respondents disagreed that the hospital has a comprehensive rehabilitation program for children with cerebral palsy (mean=3.7, SD=1.1), the hospital provides access to sensitive technology for children with cerebral palsy (mean=3.9, SD=1.1), and the hospital regularly conducts research on the treatment and management of

cerebral palsy in children (mean=4.3, SD=0.8). Furthermore, most of respondents refuted assertion that the hospital actively collaborates with other healthcare providers and organizations to improve the quality of care for children with cerebral palsy (mean=3.7, SD=1.1).

Table 4.3: Machakos Hospital's capacity to manage cerebral palsy

Statement, N=35	M	Std Dev
The hospital has the necessary medical equipment and resources to diagnose and treat cerebral palsy in children.	2.4	1.1
The healthcare personnel at the hospital are adequately trained to diagnose and manage cerebral palsy in children.	2.0	1.0
The hospital has a comprehensive rehabilitation program for children with cerebral palsy.	3.7	1.0
The hospital provides access to various forms of therapy (such as physical, occupational and speech therapy) for children with cerebral palsy.	2.3	1.1
The hospital has a strong referral network to specialists outside the hospital for children with cerebral palsy.	3.4	1.2
The hospital has adequate follow-up care and support services for children with cerebral palsy and their families.	3.3	1.1
The hospital provides access to sensitive technology for children with cerebral palsy.	3.9	1.1
The hospital regularly conducts research on the treatment and management of cerebral palsy in children.	4.3	0.8
The hospital actively collaborates with other healthcare providers and organizations to improve the quality of care for children with cerebral palsy.	3.7	1.1
The hospital has the necessary medical equipment and resources to diagnose and treat cerebral palsy in children.	3.2	1.2
The hospital has a personalized team of healthcare personnel dedicated to training children with cerebral palsy.	2.9	1.2

4.6 Strategies for Machakos Hospital in Managing the Economic Burden Linked to Cerebral Palsy

The respondents provided a range of effective strategies for Machakos Hospital to manage the economic burden associated with cerebral palsy. These strategies encompass various aspects of care and support, indicating a comprehensive approach to addressing the challenges faced by patients and their families.

One key suggestion is the implementation of assistive technologies, which can greatly improve the quality of life for cerebral palsy patients. These technologies can range from

mobility aids to communication devices, helping patients better navigate their daily lives. Ensuring adequate and competent staffing is also crucial, as skilled healthcare professionals are essential for providing high-quality care to cerebral palsy patients. This includes not only medical staff but also rehabilitation specialists and support workers.

Providing necessary medical equipment and resources for treating cerebral palsy is another important strategy. This ensures that patients have access to the best possible care and can help prevent complications associated with the condition. Rehabilitation programs specifically designed for children with cerebral palsy are essential for their development and well-being. These programs can help improve mobility, communication, and overall quality of life for patients. Proper management of patients during labor to prevent perinatal asphyxia, a known risk factor for cerebral palsy, is crucial. This highlights the importance of prenatal and perinatal care in reducing the incidence of cerebral palsy. Subsidized supportive services for cerebral palsy patients can help alleviate the financial burden on families, ensuring that patients receive the care and support they need without facing excessive financial hardship. Establishing a support system for families and caregivers of cerebral palsy patients is also vital. This can include counseling, education, and practical support to help families cope with the challenges of caring for a child with cerebral palsy. Collaboration with other healthcare providers and organizations that focus on the welfare of children with cerebral palsy can help improve access to care and resources for patients. Providing access to health insurance schemes that comprehensively cover the cost of cerebral palsy treatment is crucial. This ensures that patients can access the care they need without facing financial barriers.

Implementing a package-like model of interdisciplinary teams specialized in cerebral palsy management can improve the coordination and effectiveness of care for patients. Prioritizing assistive devices in budgetary allocations ensures that patients have access to the tools they need to live full and independent lives. Finally, adequate training of healthcare workers in managing cerebral palsy patients is essential. This ensures that patients receive the best possible care and that healthcare providers are equipped to address the complex needs of patients with cerebral palsy.

4.7 Correlation Analysis

From Table 4.4, prevalence of CP has a positive and significant association with economic burden linked to cerebral palsy (r=0.584, P=.000). This means that change in CP prevalence is accompanied by change in economic burden in the same direction. Results also indicate that cost has a positive and significant association with economic burden linked to cerebral palsy (r=0.799, P=.000). This denotes that change in cost associated with CP is accompanied by change in economic burden in the same direction. Further, findings reveal that managing CP has a negative and significant association with economic burden linked to cerebral palsy (r= -0.772, P=.000). The results imply that change in managing CP is accompanied by change in economic burden in opposite direction.

Table 4.4: Correlation Matrix

		Economic Burden	Prevalence	Cost	Managing CP
Economic Burden	Pearson Correlation	1			
	Sig. (2-tailed)				
Prevalence	Pearson Correlation	.584**	1		
	Sig. (2-tailed)	.000			
Cost	Pearson Correlation	.799**	.628**	1	
	Sig. (2-tailed)	.000	.000		
Managing CP	Pearson Correlation	-.772**	-.599**	-.728**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	35	35	35	35

** Correlation is significant at the 0.01 level (2-tailed).

4.8 Multiple Regression Analysis

From the results in table 4.5, coefficient of determination (R Square) = 0.716. This implies that 71.6% of variation in economic burden linked to CP can be explained by the predictor variables (prevalence, cost and managing CP). The remaining 28.4% can be attributed to factors not included in this study model.

Table 4.5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.846a	0.716	0.689	0.20449

a Predictors: (Constant), Managing CP, Prevalence, Cost

The significance of the regression model was tested using Analysis of Variance (ANOVA). Table 4.6 shows F=26.081, and p=0.000 which is less than 0.05 thus the model is statistically significant in predicting economic burden of children with cerebral palsy.

Table 4.6: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.272	3	1.091	26.081	.000b
	Residual	1.296	31	0.042		
	Total	4.568	34			

a Dependent Variable: Economic burden
b Predictors: (Constant), Managing CP, Prevalence, Cost

Table 4.7 shows the regression weights. The unstandardized coefficients indicate the corresponding change in the dependent variable. The findings reveal that taking other independent variables at zero, a unit increase in prevalence of CP will lead to 0.045 unit increase in economic burden linked with cerebral palsy. However, the influence is not significant as indicated by p value =0.727 greater than 0.05.

The findings also reveal that taking other independent variables at zero, a unit increase in cost will lead to 0.487 unit increase in economic burden linked with cerebral palsy. The influence is also significant as shown by p value =0.003 less than 0.05. Further, results reveal that taking other independent variables at zero, a unit increase in managing CP will lead to 0.39 unit decrease in economic burden linked with cerebral palsy. The influence is also significant as shown by p value=0.011 less than 0.05.

Table 4.7: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.753	0.568		8.37	0.000
	Prevalence	0.014	0.038	0.045	0.352	0.727
	Cost	0.184	0.056	0.487	3.266	0.003
	Managing CP	-0.246	0.091	-0.39	-2.694	0.011

a Dependent Variable: Economic burden

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of findings, discussion, conclusions, and recommendations. Suggestions for studies are also highlighted. The chapter is arranged under themes that reflect the research objectives.

5.2 Summary and Discussion of the Findings

This study assessed the economic burden of children with cerebral palsy in Machakos Level 5 Hospital. The study employed an explanatory research design while evaluating various aspects of the study. The study's target population included parents/caregivers and healthcare personnel specializing in treating cerebral palsy at the Machakos Level 5 Hospital. The convenience sampling method was used in the study. Questionnaires were distributed to caregivers and nurses to identify the economic burden of palsy. Semi-structured interviews were utilized for healthcare specialists and administrators. Data and information obtained from the interviews and questionnaires distributed to the participants were subjected to quantitative and qualitative analysis. The summarized findings were as follows:

5.2.1 Prevalence of Cerebral Palsy

The study's first objective was to assess the prevalence of cerebral palsy among patients at Machakos Level 5 Hospital, shedding light on the demographic characteristics and underlying factors associated with the condition. The findings revealed that a significant majority of children with cerebral palsy treated at the hospital were below 10 years old, highlighting the early onset of this neurological disorder in the region. Further analysis indicated that Perinatal Asphyxia was the most common underlying cause or risk factor associated with cerebral palsy in these children, followed by low birth weight and maternal health issues. These findings underscore the critical need for improved maternal and neonatal care to reduce the incidence of cerebral palsy.

The study's regression analysis revealed that while the prevalence of cerebral palsy positively influenced the economic burden linked with the condition, this influence was statistically insignificant. This suggests that other factors, such as the availability of healthcare resources and support systems, may play a more significant role in determining the economic impact of cerebral palsy in the region. These findings align with previous research, providing further evidence of the complex interplay between cerebral palsy and its associated risk factors. Durkin et al. (2016) also found that cerebral palsy cases were often associated with factors such as low birth weight, highlighting the importance of addressing these underlying issues to reduce the incidence of cerebral palsy. Similarly, McGuire et al. (2019) concluded that disability prevalence was higher among children with low birth weight, emphasizing the need for targeted interventions to support these vulnerable populations. Furthermore, the study's findings are consistent with those of Jahan et al. (2021), who reported that the median age at cerebral palsy diagnosis was 3 years old. This highlights the importance of early detection and intervention in managing cerebral palsy, as early diagnosis can lead to improved outcomes and quality of life for affected individuals. These findings provide valuable insights into the region's prevalence and underlying factors associated with cerebral palsy. They underscore the importance of addressing maternal and neonatal health issues to reduce the incidence of cerebral palsy, as well as the need for targeted interventions and support systems for affected individuals and their families.

5.2.2: Costs Associated with Cerebral Palsy

The second objective of the study aimed to determine the direct medical costs associated with the treatment and management of cerebral palsy patients at Machakos Level Five Hospital, providing insights into the financial implications of caring for individuals with this condition. Healthcare personnel salaries were identified as the highest cost component. This highlights the substantial investment in skilled medical professionals required to provide quality care for cerebral palsy patients. Additionally, hospital administration costs were identified as a significant expense, reflecting the resources needed to manage the hospital's operations and ensure the efficient delivery of care. Tonmukayakul et. al (2018) argued that economic impact of cerebral palsy is influenced by various factors, with the availability of healthcare resources and support systems playing a significant role in determining the

economic burden associated with the condition. Early detection and intervention are crucial in managing cerebral palsy, as highlighted by studies showing that the median age at cerebral palsy diagnosis is around 3 years old (ibid). Addressing underlying issues like low birth weight is essential to reduce the incidence of cerebral palsy and improve outcomes for affected individuals.

In contrast, rehabilitation costs and primary care costs were identified as the items with the lower costs. While these costs may be relatively low, they are crucial for the holistic care and well-being of cerebral palsy patients. Investing in rehabilitation programs and primary care services can greatly improve patient outcomes and quality of life. The cost of public awareness was the least among the identified cost components, indicating minimal resources allocated to raising awareness about cerebral palsy. This underestimates the importance of education and advocacy in addressing the needs of cerebral palsy patients and their families. The study's regression analysis revealed that costs of care positively and significantly influence the economic burden linked with cerebral palsy. This indicates that the financial costs associated with caring for individuals with cerebral palsy have a tangible impact on the overall economic burden experienced by patients and their families.

These findings are consistent with previous research, providing further evidence of the substantial financial burden associated with cerebral palsy. Studies have shown that the costs associated with cerebral palsy can vary substantially, with a strong positive relationship between the severity of cerebral palsy and expenditure (Tonmukayakul et. al, 2018). Families often face substantial expenses related to special education services, developmental assistance, and assisted living, contributing to the overall financial burden (cerebral palsy.org, n.d.). In Malaysia, the estimated annual median total economic burden on parents/caregivers per child with cerebral palsy was RM52,540.00 (~USD12,515.03) in 2020, with indirect costs being the greatest cost component (Ismail, Razak and Suddin et.al, 2022). The economic burden of cerebral palsy is a significant concern for families and healthcare systems.

Pulgar et al. (2019) linked cerebral palsy with higher costs, highlighting the significant financial strain placed on healthcare systems and families. Similarly, Fejes, Varga, and Hollódy (2019) argued that a significant portion of family income goes towards treating

cerebral palsy, emphasizing the need for financial support and assistance for affected families. Additionally, Kamaralzaman et al. (2018) concluded that cerebral palsy treatment imposes a huge and burdensome financial burden on parents, further highlighting the need for comprehensive support systems and interventions.

5.2.3 Managing Cerebral Palsy

The third objective of the study aimed to determine Machakos Hospital's capacity to manage cerebral palsy, focusing on its infrastructure, healthcare personnel, therapy options, rehabilitation programs, access to technology, research activities, and collaborations with other healthcare providers. The findings indicated a general agreement among respondents that the hospital has the necessary medical equipment and resources to diagnose and treat cerebral palsy in children. Additionally, healthcare personnel at the hospital were perceived to be adequately trained to diagnose and manage cerebral palsy in children. The hospital was also noted to provide access to various forms of therapy for children with cerebral palsy.

Jahan, Muhit et. al (2021) found that the age of the child, the extent of their functional limitations and associated impairments, as well as the education and economic status of their parents, all play significant roles in determining the utilization of rehabilitation services among children with cerebral palsy in low- and middle-income countries (LMICs). These findings suggest that policymakers and service providers can enhance access to rehabilitation services and promote equity in their utilization. By doing so, we can improve the functional outcomes and overall quality of life for children living with cerebral palsy.

Regression analysis revealed that the hospital's capacity to manage cerebral palsy negatively and significantly influenced the economic burden linked with the condition. This suggests that improving the hospital's capacity to manage cerebral palsy could potentially reduce the economic burden experienced by patients and their families. These findings are consistent with previous research. Abdullahi and Isaiah (2020) acknowledged the importance of support in managing cerebral palsy, highlighting the need for comprehensive care programs. Additionally, Donald et al. (2015) noted that poor availability of diagnostic facilities or medical personnel with experience and expertise hinders effective management of cerebral

palsy, emphasizing the importance of well-equipped healthcare facilities and trained personnel.

5.3 Conclusion

5.3.1 Prevalence of Cerebral Palsy and Economic Burden

The study's analysis of cerebral palsy cases at Machakos Level Five Hospital highlighted Perinatal Asphyxia as the most prevalent risk factor, followed by low birth weight and maternal health issues. These findings underscore the importance of improving perinatal care to reduce the incidence of cerebral palsy. Additionally, the study revealed that the prevalence of cerebral palsy significantly contributes to the economic burden associated with the condition. This emphasizes the need for early detection and intervention to minimize the long-term financial impact on patients and their families. Addressing these key risk factors requires a multifaceted approach, including improving access to quality maternal and neonatal care, enhancing perinatal monitoring and management practices, and providing comprehensive support services for at-risk mothers and infants. By implementing these strategies, healthcare providers and policymakers can work towards reducing the incidence of cerebral palsy and alleviating the economic burden on affected individuals and their families. Furthermore, the study's findings highlight the importance of ongoing research and collaboration in cerebral palsy management. Continued research efforts can help identify new risk factors, improve diagnostic and treatment methods, and enhance overall care quality.

5.3.2 Cost of Care and Economic Burden

The study's analysis of the direct medical costs associated with cerebral palsy treatment at Machakos Level Five Hospital revealed that the cost of healthcare personnel salaries was the highest cost component, underscoring the significant resources allocated to staffing the hospital with skilled medical professionals.

Additionally, hospital administration costs were noted as a significant expense, reflecting the resources needed to manage the hospital's operations and ensure efficient care delivery. In contrast, rehabilitation and primary care costs were identified as the items with the lowest

costs. While these costs may be relatively low, they are crucial for cerebral palsy patients' holistic care and well-being.

The cost of public awareness was the lowest, indicating the least investment in raising awareness about cerebral palsy in the community. This creates an opportunity for advocacy among the key stakeholders to sensitize them on the need to finance public awareness campaigns. The study's regression analysis further highlighted the significant contribution of the cost of care to the economic burden associated with cerebral palsy. This underscores the financial challenges faced by patients and their families in accessing and affording necessary medical care and support services. These findings underscore the need for comprehensive strategies to address the economic burden of cerebral palsy, including targeted interventions to reduce costs associated with public awareness, healthcare personnel salaries, and hospital administration.

5.3.3 Managing CP and Economic Burden

The study's assessment of Machakos Level Five Hospital's capacity to manage cerebral palsy yielded several key findings. It was concluded that the hospital possesses the necessary medical equipment and resources to diagnose and treat cerebral palsy in children. Additionally, healthcare personnel at the hospital were deemed adequately trained to diagnose and manage cerebral palsy in children, ensuring that patients receive high-quality care. The hospital was also found to provide access to various forms of therapy for children with cerebral palsy, enhancing the comprehensive care available to patients. However, the study also identified areas for improvement. It concluded that the hospital does not have a comprehensive rehabilitation program for children with cerebral palsy. This suggests a gap in the hospital's capacity to provide holistic care for cerebral palsy patients, highlighting the need for the development and implementation of such a program.

Interestingly, the study's regression analysis revealed that managing cerebral palsy contributes significantly to reducing the economic burden linked with the condition. This finding suggests that effective management strategies, including early detection, comprehensive care, and access to therapy, can lead to improved outcomes and reduced economic impact for patients and their families. These findings underscore the importance

of ensuring that healthcare facilities have the necessary resources and programs to effectively manage cerebral palsy.

5.4 Recommendations

Based on the findings of the study, it is recommended that healthcare providers and policymakers prioritize improving perinatal care to reduce the incidence of cerebral palsy. This can be achieved through measures such as enhancing access to quality maternal and neonatal care, improving perinatal monitoring and management practices, and providing comprehensive support services for at-risk mothers and infants. Additionally, early detection and intervention should be emphasized to minimize the long-term financial impact on patients and their families. Continued research and collaboration in cerebral palsy management are also essential to identify new risk factors, improve diagnostic and treatment methods, and enhance overall care quality.

The direct medical costs associated with cerebral palsy treatment at Machakos Level Five Hospital are heavily influenced by healthcare personnel salaries and hospital administration costs, while rehabilitation and primary care costs remain relatively low. The minimal investment in public awareness indicates a need for increased advocacy efforts to raise awareness about cerebral palsy in the community. The study also highlights the significant contribution of the cost of care to the economic burden associated with cerebral palsy, emphasizing the financial challenges faced by patients and their families. To address these issues, comprehensive strategies are needed, including optimizing healthcare personnel costs, improving hospital administration efficiency, increasing investment in rehabilitation and primary care, enhancing public awareness, and providing financial support for patients and families. Continued research and development efforts are also crucial to identifying cost-effective treatment approaches and improving overall care quality.

Finally, this study recommends that Machakos Level Five Hospital develops and implements a comprehensive rehabilitation program for children with cerebral palsy to address the identified gap in care. This program should include multidisciplinary approaches to therapy and care, focusing on improving functional outcomes and enhancing the overall quality of life for patients. Additionally, healthcare providers should continue to prioritize

early detection, comprehensive care, and access to therapy, as these strategies have been shown to significantly reduce the economic burden associated with cerebral palsy. By addressing these recommendations, the hospital can improve outcomes for patients with cerebral palsy and reduce the economic impact on patients and their families.

5.5 Areas for Further Research

This study assessed the economic burden of children with cerebral palsy in Machakos Level Five Hospital. The independent variables (prevalence, costs, and managing CP) accounted for 71.6% of variations in economic burden linked with cerebral palsy. Future studies can consider other factors that can explain the remaining 28.4% of economic burn variability. In particular, researchers can investigate the role of government policies in reducing the economic burden related to children with cerebral palsy.

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REFERENCES

Abas, O., Abdelaziem, F., & Kilany, A. (2017). Clinical Spectrum of Cerebral Palsy and Associated Disability in South Egypt: A Local Survey Study. *Open access Macedonian Journal of medical sciences*, *5*(1), 37–41. https://doi.org/10.3889/oamjms.2017.020

Abdel Malek, S., Rosenbaum, P., & Gorter, J. W. (2020). Perspectives on cerebral palsy in Africa: Exploring the literature through the lens of the International Classification of Functioning, Disability and Health. *Child: Care, Health and Development*, *46*(2), 175-186.

Abdullahi, A., & Isah, A. (2020). Caregiver's perspectives on facilitators and barriers of active participation in cerebral palsy rehabilitation in North West Nigeria: a qualitative study. *BMC Health Services Research*, *20*(1), 1-9.

Adanali, Y. K. (2017). Rational choice theory: Its merits and limits in explaining and predicting cultural behavior. *Erasmus Journal for Philosophy and Economics*, *10*(1), 137-141.

Amankwah, N., Oskoui, M., Garner, R., Bancej, C., Manuel, D. G., Wall, R., ... & Reimer, K. (2020). Original quantitative research-Cerebral palsy in Canada, 2011–2031: results of a microsimulation modelling study of epidemiological and cost impacts. *Health promotion and chronic disease prevention in Canada: research, policy and practice*, *40*(2), 25.

Arnaud, C., Ehlinger, V., Delobel-Ayoub, M., Klapouszczak, D., Perra, O., Hensey, O., ... & Krägeloh-Mann, I. (2021). Trends in Prevalence and Severity of Pre/Perinatal Cerebral Palsy Among Children Born Preterm From 2004 to 2010: A SCPE Collaboration Study. *Frontiers in neurology*, *12*.

Bhattacharya, U. (2017). Efficacy of Myofascial Release Technique in Comparison with Passive Stretching in Reducing Spasticity in children with Cerebral Palsy. *Journal Of Medical Science And Clinical Research*, *5*(11), 50-55. https://doi.org/10.18535/jmscr/v5i11.120

Bian C, Peng F, Guo H, Chen K. (2022) Investigation on Quality of Life and Economic Burden of Children with Cerebral Palsy in Changzhou. J Healthc Eng. Jan 4;2022:1519689. doi: 10.1155/2022/1519689. Retraction in: J Healthc Eng. 2023 Jul 12;2023:9789538. PMID: 35028115; PMCID: PMC8752206.Blossfeld, H. P., & Prein, G. (2019). *Rational choice theory and large-scale data analysis*. Routledge.

Center for Health Solutions. (2019). *Machakos County Profile*. Chskenya.org. Retrieved 22 June 2020, from https://www.chskenya.org/wp-content/uploads/2018/02/Machakos-County-Profile.pdf.

Centers for Disease Control and Prevention (2020). *Data and Statistics for Cerebral Palsy.* https://www.cdc.gov/ncbddd/cp/data.html

Chanie, E. S., Moges, N., Baye, F. D., Mekonnen, G. B., Fekadie, M. M., Bazezew, L. Y., Anley, D. T., Zemene, M. A., Gebeyehu, N. A., Adella, G. A., Kassie, G. A., Mengstie, M. A., Seid, M. A., Abebe, E. C., Gesese, M. M., Tegegne, K. D., Kebede, Y. S., Bantie, B., Feleke, S. F., . . .

Chanie, S. S. (2024). Estimate the burden of malnutrition among children with cerebral palsy in Sub-Saharan Africa: A systematic review with meta-analysis. *Scientific Reports*, *14*(1), 1-10. https://doi.org/10.1038/s41598-024-55730-1

Cox, J. C., List, J. A., Price, M., Sadiraj, V., & Samek, A. (2016). *Moral costs and rational choice: Theory and experimental evidence* (No. w22234). National Bureau of Economic Research.

Dan, B., & Paneth, N. (2017). Making sense of cerebral palsy prevalence in low-income countries. *The Lancet Global Health*, *5*(12), e1174-e1175.

Donald, K. A., Kakooza, A. M., Wammanda, R. D., Mallewa, M., Samia, P., Babakir, H., Bearden, D., Majnemer, A., Fehlings, D., Shevell, M., Chugani, H., & Wilmshurst, J. M. (2015). Pediatric Cerebral Palsy in Africa: Where Are We?. *Journal of child neurology*, *30*(8), 963–971. https://doi.org/10.1177/0883073814549245

Donald, K. A., Samia, P., Kakooza-Mwesige, A., Bearden, D. (2014). Pediatric cerebral palsy in Africa: *A systematic review. Seminars in Pediatric Neurology, 21(1),* 30-35

Duke, R., Torty, C., Nwachukwu, K., Ameh, S., Kim, M., Eneli, N., ... & Bowman, R. (2020). Clinical features and aetiology of cerebral palsy in children from Cross River State, Nigeria. Archives of Disease in Childhood, 105(7), 625-630.

Durkin, M. S., Benedict, R. E., Christensen, D., Dubois, L. A., Fitzgerald, R. T., Kirby, R. S., Maenner, M. J., Van Naarden Braun, K., Wingate, M. S., & Yeargin-Allsopp, M. (2016). Prevalence of Cerebral Palsy among 8-Year-Old Children in 2010 and Preliminary Evidence of Trends in Its Relationship to Low Birthweight. *Paediatric and perinatal epidemiology*, *30*(5), 496–510. https://doi.org/10.1111/ppe.12299

Easton, T., Boyd, R. N., Scuffham, P. A., & Downes, M. J. (2024). Health care resource use in preschool children with cerebral palsy. *Developmental Medicine & Child Neurology*. https://doi.org/10.1111/dmcn.15964

Ellery, S., Kelleher, M., Grigsby, P., Burd, I., Derks, J., & Hirst, J. et al. (2018). Antenatal prevention of cerebral palsy and childhood disability: is the impossible possible?. *The Journal Of Physiology*, *596*(23), 5593-5609. https://doi.org/10.1113/jp275595

Fejes, M., Varga, B., & Hollódy, K. (2019). Epidemiology, cost and economic impact of cerebral palsy in Hungary. *Ideggyogyaszati Szemle*, *72*(3-4), 115-122.

Feldstein, P. J. (2012). *Health care economics*. Cengage Learning.

Folland, S., Goodman, A. C., & Stano, M. (2016). *The economics of health and health care: Pearson new international edition*. Routledge.

Gmmash, A. S., Effgen, S. K., & Goldey, K. (2020). Challenges faced by therapists providing services for infants with or at risk for cerebral palsy. *Pediatric Physical Therapy*, *32*(2), 88-96.

Grossman, M. (2017). *The demand for health: a theoretical and empirical investigation*. Columbia university press.

Hayles, E., Jones, A., Harvey, D., Plummer, D., & Ruston, S. (2015). Delivering healthcare services to children with cerebral palsy and their families: a narrative review. *Health & Social Care In The Community*, *23*(3), 242-251. https://doi.org/10.1111/hsc.12121

Hedström, P., & Stern, C. (2017). Rational choice theory. *The Wiley‐Blackwell Encyclopedia of Social Theory*, 1-7.

Hudik, M. (2019). Two interpretations of the rational choice theory and the relevance of behavioral critique. *Rationality and Society*, *31*(4), 464-489.

Igberaese, F. I., & Iseghohi, J. (2017). Burden of disease calculation, cost of illness analysis and demand for death: a theoretical review. *International Journal of Development and Management Review*, *12*(1), 32-44.

Igberaese, F. I., & Iseghohi, J. (2017). Burden of disease calculation, cost of illness analysis and demand for death: a theoretical review. *International Journal of Development and Management Review*, *12*(1), 32-44.

Jahan, I., Muhit, M., Hardianto, D., Laryea, F., Chhetri, A. B., Smithers‐Sheedy, H., ... & Khandaker, G. (2021). Epidemiology of cerebral palsy in low‐and middle‐income countries: preliminary findings from an international multi‐centre cerebral palsy register. *Developmental Medicine & Child Neurology*, *63*(11), 1327-1336.

Jindal, P., Macdermid, J. C., Rosenbaum, P., Direzze, B., Narayan, A., & Nayak, S. L. (2019). Treatment and re/habilitation of children with cerebral palsy in India: a scoping review. *Developmental Medicine & Child Neurology*, *61*(9), 1050-1060.

Jo, C. (2014). Cost-of-illness studies: concepts, scopes, and methods. *Clinical and molecular hepatology*, *20*(4), 327.

Kakooza-Mwesige, A., Andrews, C., Peterson, S., Mangen, F. W., Eliasson, A. C., & Forssberg, H. (2017). Prevalence of cerebral palsy in Uganda: a population-based study. *The Lancet Global Health*, *5*(12), e1275-e1282.

Kamaralzaman, S., Ying, T. C., Mohamed, S., Toran, H., Satari, N., & Abdullah, N. (2018). The economic burden of families of children with cerebral palsy in Malaysia. *Malays J Public Health Med*, *2018*(Special 1), 156-165.

Kirui, D. (2018). *In Kenya, Having a Child With Cerebral Palsy Can Mean Losing Your Job*. Women's Advancement. Retrieved 22 June 2020, from https://www.newsdeeply.com/womensadvancement/articles/2018/02/21/in-kenya-having-a-child-with-cerebral-palsy-can-mean-losing-your-job.

Krstić, M. S. (2020). Rational choice theory–limitations and alternatives. *Социолошки преглед*, *54*(1), 40-63.

Lagunju, I., Oyinlade, A., & Famosaya, A. (2016). Cerebral palsy in Nigerian children: profile and impact on educational opportunities. *DMCN*, *58*, 55.

Machakos Assembly. (2019). *County Fiscal Strategy Paper*. Machakosassembly.go.ke. Retrieved 22 June 2020, from https://www.machakosassembly.go.ke/wp-content/uploads/2019/03/2019-Machakos-CFSP-Signed-Copy.pdf.

Machuki, F. N., Munyoki, G., & Kabue, P. (2016). Care of children with cerebral palsy among guardians attending occupational therapy clinic at Kenyatta National Hospital, Nairobi City County, Kenya. *East African Medical Journal*, *93*(11), 606-619.

Maenner, M. J., Blumberg, S. J., Kogan, M. D., Christensen, D., Yeargin-Allsopp, M., & Schieve, L. A. (2016). Prevalence of cerebral palsy and intellectual disability among children identified in two U.S. National Surveys, 2011-2013. *Annals of epidemiology*, *26*(3), 222–226. https://doi.org/10.1016/j.annepidem.2016.01.001

Mallawaarachchi, S., Jayatissa, R., Jagoda, J., Tennakoon, G., & Mallawaarachchi, P. (2019). MON-PO593: Nutrition Status of Children with Cerebral Palsy: Usefulness of New us Cerebral Palsy Growth Chart. *Clinical Nutrition*, *38*(2), S279. https://doi.org/10.1016/s0261-5614(19)32426-4

Mbugua, M. N., Kuria, M. W., & Ndetei, D. M. (2011). The prevalence of depression among family caregivers of children with intellectual disability in a rural setting in Kenya. *International journal of family medicine*, *2011*.

McCafferty, S. (2016). Dynamic Systems Theory and Sociocultural Theory: Some Connections and Distinctions. *Language And Sociocultural Theory*, *3*(1), 83-88. https://doi.org/10.1558/lst.v3i1.30476

McConnell, K., Livingstone, E., Perra, O., & Kerr, C. (2021). Population-based study on the prevalence and clinical profile of adults with cerebral palsy in Northern Ireland. *BMJ open*, *11*(1), e044614. https://doi.org/10.1136/bmjopen-2020-044614

McGuire, D. O., Tian, L. H., Yeargin-Allsopp, M., Dowling, N. F., & Christensen, D. L. (2019). Prevalence of cerebral palsy, intellectual disability, hearing loss, and blindness, National Health Interview Survey, 2009-2016. *Disability and health journal*, *12*(3), 443–451. https://doi.org/10.1016/j.dhjo.2019.01.005

McIntyre, S., Goldsmith, S., Webb, A., Ehlinger, V., Hollung, S. J., McConnell, K., ... & Global CP Prevalence Group*. (2022). Global prevalence of cerebral palsy: A systematic analysis. *Developmental Medicine & Child Neurology*, *64*(12), 1494-1506.

Moll, J., & Hoque, Z. (2018). Rational choice theory. *Methodological issues in accounting research (Second edition).[2nd ed.]*, 8-18.

Montero-Mendoza, S., & Calvo-Muñoz, I. (2019). Analysis of relationship among the functional classification systems in cerebral palsy and the different types according to the Surveillance of

Cerebral Palsy in Europe. *Pediatric Dimensions*, *4*(1), 30-31. https://doi.org/10.15761/pd.1000181

Murugasen, S., Springer, P., Olusanya, B. O., Gladstone, M., Newton, C., Kakooza-Mwesige, A., & Donald, K. A. (2024). Cerebral palsy in African paediatric populations: A scoping review. *Developmental Medicine & Child Neurology*. https://doi.org/10.1111/dmcn.15878

Muthama, T. (2018). Factors Influencing Households Health Status in Machakos County, Kenya. *The International Journal Of Humanities & Social Studies*, *6*(12), 30-35. https://doi.org/10.24940/theijhss/2018/v6/i12/hs1812-006

Ngassa, E. A. (2018). *Assessment of prevalence and risk factors for cerebral palsy: A case of Mbeya zonal referral hospital* (Doctoral dissertation, The Open University of Tanzania).

Novak, I., & Morgan, C. (2015). Adjuvant therapies for cerebral palsy: An overview of systematic reviews. BMC Pediatrics, 15(1), 1-14. doi: 10.1186/s12887-015-0342-4

O'Sullivan, S. B., & Schmitz, T. J. (2014). Physical rehabilitation (6th ed.). Philadelphia, PA: F. A. Davis Company.

Oladunni O., Olaoye J., Owolabi O. et al. (2024) Socio-Economic Challenges Faced by Parents of Children with Cerebral Palsy at Ekiti State University Teaching Hospital, Ado-Ekiti, Ekiti State, Nigeria*: A Cross-sectional Study*. , 30 April 2024, PREPRINT (Version 1) available at Research Square [https://doi.org/10.21203/rs.3.rs-4293146/v1]

Oskoui, M., Coutinho, F., Dykeman, J., Jetté, N., & Pringsheim, T. (2013). An update on the prevalence of cerebral palsy: A systematic review and meta-analysis. Developmental Medicine & Child Neurology, 55(6), 509-519. doi: 10.1111/dmcn.12080

Peacock, W. (2015). My journey into the world of treating children with cerebral palsy. *Indian Journal Of Cerebral Palsy*, *1*(2), 65. https://doi.org/10.4103/2395-4264.173428

Phillips, J., & Norby, A. (2019). Factive theory of mind. *Mind & Language*, *3*(2), 20-25. https://doi.org/10.1111/mila.12267

Potharaju, N. (2016). Seizures in cerebral palsy. *Indian Journal Of Cerebral Palsy*, *2*(1), 3. https://doi.org/10.4103/2395-4264.188150

Purohit, A. (2015). Cerebral Palsy field indeed needs scientific deeds. *Indian Journal Of Cerebral Palsy*, *1*(1), 1. https://doi.org/10.4103/wkmp-0072.153553

Sadowska, M., Sarecka-Hujar, B., & Kopyta, I. (2020). Cerebral palsy: Current opinions on definition, epidemiology, risk factors, classification and treatment options. *Neuropsychiatric disease and treatment*, *16*, 1505.

Salary Survey. (2020). *Surgeon - Orthopedic Average Salary in Kenya 2020 - The Complete Guide*. Salaryexplorer.com. Retrieved 22 June 2020

Sara B. DeMauro, Scott A. McDonald, Roy J. Heyne, Betty R. Vohr, Andrea F. Duncan, Jamie E. Newman, Abhik Das, Susan R. Hintz,(2024) Increasing Prevalence of Cerebral Palsy Among Two-Year-Old Children Born at <27 Weeks of Gestation: A Cohort Study, *The Journal of Pediatrics, Volume 268*, 2024, 113944, ISSN 0022-3476, https://doi.org/10.1016/j.jpeds.2024.113944.

Schroeder, T. (2016). A Sentimentalist Theory of Mind, by Michael Slote. *Mind*, *125*(497), 228-231. https://doi.org/10.1093/mind/fzv104

Shih, S., Tonmukayakul, U., Imms, C., Reddihough, D., Graham, H., Cox, L., & Carter, R. (2018). Economic evaluation and cost of interventions for cerebral palsy: a systematic review. *Developmental Medicine & Child Neurology*, *60*(6), 543-558. https://doi.org/10.1111/dmcn.13653

Sloan, F. A., & Hsieh, C. R. (2017). *Health economics*. Mit Press.

Stavsky, M., Mor, O., Mastrolia, S. A., Greenbaum, S., Than, N. G., & Erez, O. (2017). Cerebral Palsy-Trends in Epidemiology and Recent Development in Prenatal Mechanisms of Disease, Treatment, and Prevention. *Frontiers in pediatrics*, *5*, 21. https://doi.org/10.3389/fped.2017.00021

Tonmukayakul, U., Shih, S. T., Bourke-Taylor, H., Imms, C., Reddihough, D., Cox, L., & Carter, R. (2018). Systematic review of the economic impact of cerebral palsy. *Research in developmental disabilities*, *80*, 93-101.

Umar, U. I., Adamu, H., & Abdulkareem, A. (2020). Economic evaluation of cerebral palsy in a resource-challenged setting. *Nigerian Journal of Basic and Clinical Sciences*, *17*(1), 50.

Wang, H. H., Hwang, Y. S., Ho, C. H., Lai, M. C., Chen, Y. C., & Tsai, W. H. (2021). Prevalence and Initial Diagnosis of Cerebral Palsy in Preterm and Term-Born Children in Taiwan: A Nationwide, Population-Based Cohort Study. *International journal of environmental research and public health*, *18*(17), 8984. https://doi.org/10.3390/ijerph18178984

Weisbrod, B. A. (2016). *Economics of public health*. University of Pennsylvania Press.

White, T., & McBurney, D. (2013). *Research methods* (1st ed.). Wadsworth, Cengage Learning.

Whitney, D. G., Kamdar, N. S., Ng, S., Hurvitz, E. A., & Peterson, M. D. (2019). Prevalence of high-burden medical conditions and health care resource utilization and costs among adults with cerebral palsy. *Clinical epidemiology*, *11*, 469–481. https://doi.org/10.2147/CLEP.S205839

Yang S, Xia J, Gao J, Wang L. (2020) Increasing prevalence of cerebral palsy among children and adolescents in China: A systematic review and meta-analysis. *J Rehabil Med. 2021* May 24;53(5):jrm00195. doi: 10.2340/16501977-2841. PMID: 33961057; PMCID: PMC8814846.

APPENDICES

Appendix 1: Letter of Introduction

Dear respondent,

I hope this letter finds you well. My name is Phoebe Jela, and I am a student at Strathmore University. I am writing to introduce you to a research study that I am conducting on the economic burden of children with cerebral palsy in Machakos County.

The objectives of this study are to assess the prevalence of cerebral palsy in Machakos County, evaluate the economic burden associated with children living with cerebral palsy, determine Machakos Hospital's capacity in managing cerebral palsy, and identify the most effective strategies for Machakos Hospital in managing the economic burden linked to cerebral palsy.

As healthcare personnel specializing in the treatment of cerebral palsy at the Machakos Level 5 Hospital, your expertise and insights would be invaluable to this study. I would greatly appreciate your participation in this research through completing a questionnaire and/or participating in a semi-structured interview.

All responses will be kept confidential, and only the research team will have access to the data collected. Your participation is completely voluntary, and you may withdraw at any time without penalty.

Your involvement in this research will contribute to a better understanding of the economic burden of children with cerebral palsy in Machakos County and may inform the development of more effective strategies for managing this condition.

Thank you for your consideration, and I look forward to your response.

Sincerely,

Phoebe Jela

Appendix II: Research Instruments

Appendix I: Questionnaire for Healthcare Workers

Dear Participant,

Thank you for agreeing to participate in this study on the economic burden of cerebral palsy. The purpose of this questionnaire is to understand the economic costs associated with caring for a child with CP and how it impacts caregivers' financial situation.

Your participation in this study is voluntary, and all responses will be kept confidential. There are no right or wrong answers, and we encourage you to answer all questions as truthfully and accurately as possible.

Thank you for your participation in this study. Your contribution is greatly appreciated.

Sincerely,

Phoebe Jela

Researcher

VT OMNES VNVM SINT

A: Prevalence of Cerebral Palsy

1. How many children with cerebral palsy are have you attended to in the last year?

……

2. What is the age range of the children with cerebral palsy that you have handled?

- 0-4years [ ]
- 5-9years [ ]
- 10-14years [ ]
- 14-17 years [ ]

3. What are the common underlying causes or risk factors associated with cerebral palsy in the children being treated in the hospital?

- Perinatal asphyxia [ ]
- Low birth weight [ ]
- Multiple births [ ]
- Maternal health [ ]
- Genetics [ ]

VT OMNES VNVM SINT

B: Cost Associated with Children Living with Cerebral Palsy

2. Indicate the annual costs of the following items related to cerebral palsy *(To be filled by Medical Administrator).*

	Cost
Hospital administration costs	
Primary care costs	
Rehabilitation costs	
Healthcare personnel's salaries	
Cost of equipment	
Revamping facilities	
Cost of public awareness	
Machakos County Government's recurrent and development expenditure	

VT OMNES VNVM SINT

C: Capacity in Managing Cerebral Palsy

3. The statements in the table below are about the capacity of Machakos County Referral Hospital in managing cerebral palsy in children. Indicate whether you agree or disagree.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
The hospital has the necessary medical equipment and resources to diagnose and treat cerebral palsy in children.					
The healthcare personnel at the hospital are adequately trained to diagnose and manage cerebral palsy in children.					
The hospital has a comprehensive rehabilitation program for children with cerebral palsy.					
The hospital has a specialized team of healthcare personnel dedicated to treating children with cerebral palsy.					
The hospital provides access to various forms of therapy (such as physical, occupational, and speech therapy) for children with cerebral palsy.					
The hospital has a strong referral network to specialists outside the hospital for children with cerebral palsy.					
The hospital has adequate follow-up care and support services for children with cerebral palsy and their families.					
The hospital provides access to assistive technology for children with cerebral palsy.					
The hospital regularly conducts research on the treatment and management of cerebral palsy in children.					

The hospital actively collaborates with other healthcare providers and organizations to improve the quality of care for children with cerebral palsy.					

D: Strategies for Machakos Hospital in Managing the Economic Burden Linked to Cerebral Palsy

4. In your opinion, what are the most effective strategies for Machakos Hospital in managing the economic burden linked to cerebral palsy?

……

……

……

VT OMNES VNVM SINT

Appendix II: Interview Schedule

for Hospital Senior Health Administrators

1. Describe the cerebral palsy situation in the community?

……

……

……

2. What is the current prevalence of cerebral palsy in children being treated at this hospital?

……

3. What are some of the challenges does the hospital face in managing cerebral palsy?

……

……

……

……

……

4. What are the most common direct costs associated with treating children with cerebral palsy at this hospital (such as medical services, rehabilitation, assistive technology, etc.)?

……

……

……

5. What are the most common indirect costs associated with treating children with cerebral palsy at this hospital (such as lost productivity or premature death)?

……

……

……

6. What are the implications of financial costs of cerebral palsy?

……

……

……

7. How does the hospital currently manage the economic burden of cerebral palsy in children?

……

……

……

8. Does the hospital have any programs or services in place to help families manage the financial burden associated with caring for a child with cerebral palsy?

……

……

……

9. How does the hospital's capacity to treat and manage cerebral palsy in children compare to other referral hospitals in the region?

……

……

……

10. What barriers do families and caregivers of children with cerebral palsy face in accessing medical treatment and support services at this hospital?

……

……

……

11. Are there any innovative strategies or technologies being used at this hospital to reduce the economic burden of cerebral palsy in children?

……

……

……

12. What recommendations do you have for the hospital in terms of improving its capacity to manage the economic burden of cerebral palsy in children?

……

……

……

Appendix IV: Budget

Item/activity	Estimated Cost (KES)
Proposal development	25,000
Data collection	50,000
Data Analysis	50,000
Project preparation	30,000
Miscellaneous expenses	25,000
Total	**180,000**

VT OMNES VNVM SINT

Appendix V: Timeline of Activities

Activity	2022	2024			
	Aug - Dec	Jan - Mar	Apr	May	Jun
Topic selection and concept development					
Literature review and proposal development					
Proposal submissions and ERC and approval					
Pre-test and data collection					
Data analysis and project report writing					
Project submission and defense					

VT OMNES VNVM SINT

APPENDIX VI: IERC LETTER

Strathmore UNIVERSITY

5th September 2023

Dr Jela Phoebe,
jela.nakhabi@strathmore.edu

Dear Dr Jela,

RE: The Economic Burden of Children with Cerebral Palsy on Machakos Level Five Hospital

This is to inform you that SU-ISERC has reviewed and **approved** your above **SU-masters** research proposal. Your application reference number is **SU-ISERC1801/23.** The approval period is from **5th September 2023 to 4th September 2024.**

This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-ISERC.
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-ISERC within 72 hours of notification.
iv. Any changes anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-ISERC within 72 hours.
v. Clearance for the export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to the expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days of completion of the study to SU-ISERC.

Before commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology, and Innovation (NACOSTI) https://research-portal.nacosti.go.ke/ and obtain other clearances needed.

Yours sincerely,

Mr Ambrose Rachier,
Chairperson; SU-ISERC

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APPENDIX VII: NACOSTI PERMIT

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **658787**

Date of Issue: **17/September/2023**

RESEARCH LICENSE

This is to Certify that Dr.. Phoebe Jela of Strathmore University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Machakos on the topic: ECONOMIC BURDEN OF CHILDREN WITH CEREBRAL PALSY for the period ending : 17/September/2024.

License No: **NACOSTI/P/23/29497**

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Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

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