



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

Knowledge, attitudes and practices of primary healthcare nurses on motor development in children aged 0-24 months in Khomas region, Namibia.

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November 2025

DECLARATION

I, Zenra Lynn Buys, hereby declare that the work contained in the thesis entitled “Knowledge, attitudes and practices of primary healthcare nurses on motor development in children aged 0-24 months in the Khomas region, Namibia” is my own original work and that I have not previously, in its entirety or in part, submitted it at any university or other higher education institution for the award of a degree.

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DEDICATION

I dedicate this thesis to my late grandmother and late mother. To my grandmother, who recognised the value of education despite having limited resources and being denied such opportunities herself yet ensured that I had access to them. To my mother, whose difficult decisions and sacrifices paved the way for a brighter future for me.

I am deeply grateful to God for granting me a sound mind, the resources to pursue this journey and the courage to face challenging tasks.

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ABSTRACT

Primary healthcare (PHC) nurses play a critical role in monitoring motor development which is a vital aspect of overall child growth and an important indicator for detecting developmental impairments. Early identification of atypical motor patterns facilitates timely intervention, reducing the long-term effects of childhood disabilities. This study therefore aimed to assess the knowledge, attitudes and practices (KAP) of Namibian PHC nurses on motor development monitoring to support early detection and align local practices with international standards of care.

In total, forty-five (45) PHC nurses participated in this mixed-methods study. The research followed an exploratory sequential design, commencing with a qualitative phase in which ten (10) in-depth interviews were conducted with chief nurses at each facility using a structured interview guide. Findings from the qualitative phase informed the development of the quantitative instrument. Thirty-five (35) PHC nurses responded to the questionnaire developed for the quantitative data collection phase. PHC nurses completed a structured questionnaire to further explore and quantify the identified themes. This process provided information on the structure and routine operations of the facility and further provided an overview of the existing opportunities to develop knowledge, observed attitudes and current practices employed within the facility. Quantitative results indicated moderate knowledge levels (mean score 58.1%) and highly positive attitudes toward developmental monitoring (mean 8.66/10). Although most participants (88.6%) routinely assessed motor milestones during immunisation visits, only 54.3% were familiar with validated screening tools, suggesting inconsistencies in practice quality. No significant relationships were observed between knowledge, attitudes, and practices (Spearman correlation). Similarly, qualitative findings echoed the same trends as quantitative results, revealing a potentially strong professional commitment but highlighting barriers such as inadequate training, lack of standardised tools and inconsistent referral systems. The study concluded that PHC nurses in Namibia display positive attitudes and moderate knowledge of motor development monitoring, yet limited use of standardised tools and inconsistent practices hinder effective implementation. Strengthening developmental surveillance requires targeted in-service training, adoption of

standardised assessment protocols and improved referral systems to enhance early identification and intervention for developmental delays.

Keywords: motor development, developmental monitoring, primary health care, nurses, early detection, Namibia, childhood disability

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ABBREVIATIONS

AAP	American Academy of Paediatrics
ADL	Activities of Daily Living
ASQ	Ages and Stages Questionnaire
AIMS	Alberta Infant Motor Scale
At-risk infant	Infants at risk of disability
CDC	Centre for Disease Control and Prevention
DD	Developmental Delays
DSQ	Developmental Screening Questionnaire
ECD	Early Childhood Development
EIEI	Early Identification and Early Intervention
GM	General Movements
HIC	Higher Income Country
ICF	International Classification of Functioning, Disability and Disease
KAP	Knowledge, Attitude and Practices
LMIC	Low-and –Middle-Income Country
MoHSS	Ministry of Health and Social Services
NSA	Namibia Statistics Agency
HPCNA	Health Professions Council of Namibia
PHC	Primary Health Care
PHCN	Primary Health Care Nurses
PT	Physiotherapists
RR	Research Rabbit
SDGs	Sustainable Development Goals
WHO	World Health Organisation
UN	United Nations
UNICEF	United Nations International Children’s Emergency Fund

CHAPTER ONE: INTRODUCTION

1.1 Background

This chapter provides the background to the research study and outlines the problem that prompted the investigation. It presents the aim and specific objectives of the study, followed by the research questions that guide the inquiry.

Definition and prevalence of disability

The World Health Organisation (WHO) defines disability as the outcome of interactions between individuals with health conditions such as cerebral palsy, Down syndrome or depression and personal and environmental factors including negative attitudes, inaccessible infrastructure and limited social support (WHO, 2012). In addition, the International Classification of Functioning (ICF) defines disability as *'an interaction between structural and functional impairments and the resulting limitations in activity and participation, which are influenced by personal and environmental factors'* (Kohli-Lynch et al., 2019). According to the data from the Namibia Statistics Agency (NSA), nearly 27,000 children under the age of 18 were reported to have a disability in 2016. Furthermore, the Namibia 2023 Housing and Population Census shows that 3.8 % of the population has some form of disability, with 11,9% of households having at least one person with a disability (NSA, 2023).

Impact of disability

Disability does not only affect a person's health but also leads to social challenges such as poverty, limited access to basic education, unemployment and poor living conditions (WHO, 2018). These issues worsen the negative effects of disability. Evidence shows that children with disabilities and their families face more economic and social disadvantages than those without disability (UNICEF, 2012). Access to services like education becomes crucial as children grow older, laying the foundation for lifelong learning and development. However, children with disabilities often suffer with lower rates of school enrolment and retention (Olusanya et al., 2018). They usually require additional learning support and specialised services such as rehabilitation to improve their development potential and ensure equal access to education. The Namibian Inter-Censual

Demographic Survey Report showed 52.2% of children in 2016, aged 4 years and older struggle to engage in learning activities due to a form of disability (NSA, 2016).

Importance of early detection

In addition, Olusanya et al. (2018) emphasise that early detection and intervention for children with, or at risk of, developmental disabilities are a key part of effective Early Childhood Development (ECD) policy. Despite strong evidence showing the importance of routine newborn and developmental screening, ongoing developmental surveillance and timely intervention within the first five years of life, many lower-middle-income countries (LMICs), such as Namibia, still have limited access to these important services. Studies carried out before and after the introduction of the Nurturing Care Framework (NCF), have highlighted the critical need for these interventions, however, implementing them remains challenging due to barriers in low-resource settings (Tuyisenge et al., 2023).

Motor development and developmental delays

Khan and Leventhal (2023) describe developmental delays as a situation when a child fails to reach developmental milestones compared to peers from the same population. These delays are usually caused by impairments in any of the distinct areas, such as gross and fine motor skills, speech and language, cognitive and performance, social and activities of daily living (ADL). Delays can be isolated (affecting one area), multiple (affecting two or more areas) or global (affecting most areas). The term 'delay' suggests that a child will eventually catch up, which means that it is a time-limited issue (Olusanya et al., 2018). Although developmental delays might manifest in multiple areas, this study specifically focuses on motor development. Motor skills usually develop with other skills; however, they typically emerge earlier than social and cognitive abilities, which makes them a reliable early indicator of delays (Aizawa et al., 2021). Additionally, Shumway-Cook et al. (2023) explains that movement comes from the interaction of various systems, including sensory-perceptual, cognitive and motor domains. Impairments in any of these systems can hinder motor function, making the early identification of developmental delay essential for effective management (Kumar et al., 2024; Tuyisenge et al., 2023). Intervention is particularly critical during the first two (2) years and nine (9) months in life. This period is important because

of the rapid brain growth and increased neuroplasticity (Doyle et al., 2009; International Alliance of Academies of Childhood Disability [IAACD], 2018). Intervening during this sensitive developmental stage leads to significantly better outcomes.

In this study, intervention refers to the process of identifying delays in motor development as a risk factor for childhood disability and starting appropriate management strategies. Routine developmental monitoring, including screening and formal evaluations help to identify children at risk of delays and enables prompt support services (Tuyisenge et al., 2023; Olusanya et al., 2018). Such monitoring systems are important to identify developmental issues before they become more complicated and difficult to address. Ultimately, early identification serves as the foundation for early intervention, which is consistently highlighted in literature as a key factor in achieving improved long-term outcomes (Doyle et al., 2009).

Role of PHC nurses and surveillance of motor development

Adeniyi et al. (2022) and Tuyisenge et al. (2023) advocate integrating developmental surveillance within the primary healthcare (PHC) system. They believe that this is a practical cost-effective strategy in low-and-middle income settings, given the resource constraints. This integration aligns with the United Nations (UN) Sustainable Development Goals (SDGs), which underscores the connection between poverty eradication, health, education, inequality reduction and sustainable growth. Among the 17 goals, Goal 3, '*Ensure healthy lives and promote well-being for all at all ages*' is most directly relevant, as the early identification and management of developmental delays improves child health outcomes and long-term well-being (UN, 2015). In support of this, the WHO (2018) has recommended the integration of developmental surveillance with immunisation services, recognising this as a strategy to improve early detection and intervention for children at risk of developmental disabilities.

These benefits extend beyond Goal 3, as effective surveillance systems also contribute to education (Goal 4), gender equality (Goal 5) and less inequalities (Goal 10). Nurses working in PHC settings are particularly well-positioned to advance these goals. Their role in incorporating developmental surveillance into regular services, such as vaccination visits, ensures early identification of at-risk children and timely intervention (Adeniyi et al., 2022; UNICEF, 2021). This

positions developmental surveillance as both a health intervention as well as a broader strategy for achieving sustainable development.

Global and local policy context

However, to perform this role effectively, nurses need access to standardised tools and resources to allow them to effectively carry out these tasks. Govender et al. (2021) emphasises the importance of routine developmental checks at specific milestones in children, namely at 9, 18, 24, and 34 months of age. Having a structured surveillance system ensures that potential developmental concerns are identified and addressed well before formal schooling begins, thereby enhancing long-term development in children.

Knowledge Attitude and Practices (KAP) studies are based on behavioural theories that explain how KAP influence health behaviour. The KAP model suggest that knowledge shapes attitudes, which in turn influences practices, although knowledge alone is often not sufficient (Liang et al., 2025). These ideas provide a useful perspective on how nurses' knowledge of motor development impacts their attitude toward the need for surveillance and the practices they follow.

The Namibian Inter-Censal Demographic Survey reports that developmental assessments are mainly conducted by paediatricians, occupational therapists and physiotherapists (NSA, 2016). Unfortunately, in Namibia, these specialised professionals are few and largely concentrated in private healthcare sectors, which creates unequal access to developmental assessment services for the general population. Public health care workers, primarily the PHC nurses, serve as the first point of contact for most children during routine health and immunisation visits. They are, therefore ideally positioned to monitor developmental milestones and identify children who may require further assessment.

Namibia's health system operates within a dual framework, public and private. The public sector serves about 82% of the population, while the private sector caters to the remaining 18%, mostly those with medical aid coverage. Although it is one of the least densely populated countries in Southern Africa, Namibia still offers relatively good access to healthcare, with approximately 76% of the population living within 10 km of a health facility (Christians, 2020). This shows that

Namibian children have the potential for regular monitoring of developmental delays within the healthcare system.

1.2 Problem statement

Early identification of developmental delays is critical for timely intervention, which improves children's health, learning and social outcomes (UNICEF, 2022). [When developmental challenges go undetected, intervention is delayed, which does not only negatively affect the child, but also their families and communities \(WHO, 2018\). Madsen et al. \(2021\) note that although the child might experience physical impairments, the resulting activity limitations and participation restrictions can have significant consequences for family functioning and social integration. This highlights the importance of regular monitoring of developmental milestones and early detection of developmental delays.](#)

Monitoring motor development is an essential part of early childhood health programs worldwide. However, implementation in LMICs remains inconsistent (Olusanya et al., 2023). Early intervention (EI) depends on the ability to recognise both risk factors and early signs of developmental delays (UNICEF, 2021). The effectiveness of these monitoring efforts largely depends on the KAP of healthcare professionals who are responsible for regularly assessing children's development.

In Namibia, developmental assessments are primarily conducted by specialists, who are few and concentrated in private healthcare, limiting access for most families (NSA, 2016). PHC nurses, as the first point of contact during routine child health visits, are ideally positioned to monitor developmental milestones. However, evidence from other African countries show that integrating developmental surveillance into PHC practice remains limited (Adeniyi et al., 2021). The adoption of developmental monitoring models from high-income countries has proven to be challenging in LMIC due to differences in training, workloads and resource availability (Azizatunnisa et al., 2024).

Despite Namibia's relatively good healthcare access, there is limited evidence on the KAP of PHC nurses in Namibia regarding motor development surveillance. [Understanding these factors is essential to identify barriers and opportunities for strengthening early identification systems and](#)

improving developmental outcomes for children at risk of disability. When developmental challenges go undetected, intervention gets delayed, which does not only negatively affect the child, but also their families and communities (WHO, 2018). Madsen et al. (2021) note that although the child might experience physical impairments, the resulting activity limitations and participation restrictions can have significant consequences for family functioning and social integration. This highlights the importance of regular monitoring of developmental milestones and early detection of developmental milestones.

This study therefore aims to investigate the KAP of PHC nurses on motor development in children aged 0–24 months. By examining these variables, the study seeks to identify key barriers and opportunities within the Namibian primary healthcare system that influence the timely detection of motor developmental delays. Situating these findings within the broader context of low- and middle-income countries (LMICs), the study further aims to determine how the challenges observed in Namibia align with or differ from those reported in comparable health systems, thereby contributing evidence to inform contextually appropriate strategies for early identification and intervention. The study findings will help strengthen the Namibian health system by identifying potential knowledge gaps and determining whether nurses require additional motivation or support to perform tasks that enhance monitoring and evaluation processes. Gaining insight into current practices for monitoring motor development will also highlight opportunities to improve parent education, inform leadership decisions regarding the review and enhancement of nursing curricula and improve health service provision to young children.

1.3 Aim of the study

This study aims to investigate the KAP of PHC nurses on motor development in children aged 0-24 months, to inform strategies for early identification of infants at risk of developmental delays.

1.4 Objectives of the study

- To assess the level of knowledge of PHC nurses have on motor development in children aged 0-24 months,

- To analyse the attitudes of PHC nurses toward monitoring motor development in infants and children.
- To explore the methods or tools currently used in practice by PHC nurses when monitoring motor development in children aged 0-24 months.
- To assess for associations between independent variables (KAP) and dependent variables (vaccination duties, facility type, education level and years of experience) to determine the relationship between the different variables.

1.5 Research questions

- What knowledge do PHC nurses have on motor development in children aged 0-24 months?
- What are the attitudes of PHC nurses toward monitoring motor development in infants and children?
- What methods or tools do PHC nurses currently use in practice when monitoring motor development in children?

This concludes chapter one. The background and problem statement presented information that explains why it is necessary to conduct research in this area. The specific research aim and objectives were stated and the research questions concluded this chapter. Chapter two will now present the literature view.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter discusses the literature reviewed related to motor development in children. The chapter also discusses the importance of primary healthcare professionals in routine monitoring of development and existing surveillance systems currently being utilised worldwide and in Africa. Further emphasis will be placed on the importance of motor development specifically in development monitoring. The chapter will include a description of the healthcare system in Namibia and the role of nursing staff within this system.

Databases used to search the literature included: Google Scholar, PubMed, Scopus, CINAHL and EBSCO. In addition, the Artificial Intelligence (AI) tool Research Rabbit (RR) was implemented to enhance the literature search.

The following keywords and phrases were used in the literature search 'Disabilities', 'Infants/Children, primary healthcare', 'community-based', 'developmental delays', 'early detection', 'early intervention', 'motor development', 'nurses', 'low-and-middle income countries'.

Articles included in the literature review were restricted to those published in the English language published in the last five years. Older literature sources were however, included as research in this field has been developing over a number of years and excluding older literature would affect the accuracy of the review. Other grey literature was sourced from the World Health Organisation (WHO), United Nations (UN), United Nations International Children's Emergency Fund (UNICEF), Ministry of Health and Social Services (MoHSS) and the Namibia Statistics Agency (NSA) websites.

Consultation with the Health Professions Council of Namibia (HPCNA) was done to seek clarity on the scope of practice of nurses. This literature review excluded studies that focused on pre-natal monitoring of infants at risk of developmental delays or the monitoring of children with existing diagnosis of neural impairment because the focus of the review was on postnatal developmental monitoring of developing children within primary healthcare settings. Additionally, studies

involving children with diagnosed neurological impairments often require specialized assessment tools and clinical management approaches that differ from routine developmental surveillance conducted by primary healthcare workers. The literature review will discuss the importance of motor development in child development, describes monitoring systems observed internationally and in Africa. It also outlines the challenges observed in duplicating evaluation and monitoring systems used in other countries.

2.2 Understanding motor development and the need to monitor it

Motor development is a key part of early childhood growth. It involves gradual acquisition of movement skills that enable a child to interact effectively with their surroundings. Early detection of motor delays is important because timely intervention can significantly improve long-term physical, cognitive and social outcomes (UNICEF, 2021). In primary healthcare and community settings, monitoring motor development helps to identify at-risk children early on, which ultimately enables quick referrals and support before the delays become severe (Kohli-Lynch et al., 2019). Therefore, conducting a KAP study in this context is important and necessary to identify gaps among healthcare workers when it comes to their understanding, perception and practise of motor development monitoring. Ultimately, this will help guide strategies to strengthen early childhood intervention systems (Azizatunnisa et al., 2024).

2.3 The need for a surveillance system to identify children at risk of disability

Literature shows that the prevalence of developmental disabilities is increasing globally over time (Kim, 2021). These disabilities often involve developmental delays during infancy and early childhood. The term developmental delay is explained by Olusanya et al. (2018) as the failure to attain developmental milestones by the expected age, usually in children under the age of 5. Developmental delays may occur in various areas, such as motor, sensory, cognitive, language and social skills. The negative effects of childhood disability, as discussed in chapter one, create a need for early intervention when the signs of developmental delays are detected.

The scientific reasoning for early detection and intervention is that children's brains demonstrate plasticity (brains ability to form neuronal connections) at a young age. This plasticity occurs through the process of pruning, which is when excessive neuronal connections are removed

(Kohli-Lynch et al., 2019). The creation of new synapses and removal of excessive connections are important to develop functional circuits in the developing brain. Simply put, plasticity enables the brain to learn from experiences (Johnston et al., 2001).

Studies conducted in Africa emphasise the need for early detection and intervention. Tuyisenge et al., (2023) conducted a cross-sectional study in Rwanda, which found that 24.6% of children aged 9 to 16 months tested positive for developmental delays in at least one area. These figures are lower than the figures reported in the 2019 Rwandan Demographic Health Survey (Tuyisenge et al., 2023). Nonetheless, these findings may not be a true reflection of the entire Rwandan population, as the sample primarily consisted of urban, middle-income families. This highlights the need for more research in rural settings to better understand national trends in child development.

Evidence from Nigeria reveals that surveillance, screening and monitoring of early childhood development are still limited in many LMICs. Using a validated tool completed by parents (Ages and Stages Questionnaire), the study found that one in three infants was at risk of developmental delays, with perinatal asphyxia and prematurity identified as major risk factors. These findings highlight the importance of early detection and standardised screening to guide effective primary care and policy planning in resource-limited settings (Adeniyi et al., 2022). Both, Choo et al., (2019) and Adeniyi et al., (2022) recommended in their studies that surveillance of infants should be conducted within a primary healthcare facility and outlined the procedures to be followed. From these studies, we are provided with evidence that a monitoring system for development strengthens the ability to identify infants at risk of disability. We must also consider whether a similar system is available in Namibia.

2.4 Surveillance systems for monitoring development used in other countries/ continents

The Well-Child model for monitoring infants for developmental delays is used in Europe and America (Turner, 2018; Johansen et al., 2017). The model emphasises regular check-up to specifically monitor development milestones. Other models used for evaluating young children's progress toward developmental milestones are integral components of paediatric care in organisations such as the Centre for Disease Control and Prevention (CDC) and Bright Futures, a

health promotion program led by the American Academy of Paediatrics (Lipkin et al., 2020). Guidelines that list individual milestones and the specific age at which most children are expected to reach them are part of these models. The CDC takes it a step further by educating the parents. They believe that parents should act early by consulting physicians if certain milestones have not been reached. Kim (2021) reports that in Norway, nearly 100% of parents with young infants regularly visit their local well-baby clinics. During these visits, services such as weight checks, vaccinations and developmental assessments are provided free of charge by their health system, from birth up to 5-years. Kim (2021) further describes the developmental screening programs in Asia. In Singapore, every child is scheduled for developmental screening at specific ages from one month to 4-6 years. The Denver Developmental Screening Test (DDST-Singapore) is used to carry out the screening. Furthermore, in Taiwan, the Youth Welfare Law of Taiwan enforces assessment of children to identify developmental delays. Their responsibilities include screening at-risk children, providing thorough assessments, diagnosing children with developmental delays and [writing therapy recommendations](#). In South-Africa, the Road-to-Health Card (RTHC) was used as an essential tool for monitoring child health programs. In 2011, the Road-to-Health Booklet (RTHB) replaced the RTHC as a more advanced tool for monitoring child development and preventing illnesses and death in children under the age of 5 (Win & Mlambo, 2020).

2.5 Challenges observed in surveillance systems in LMICs' health system

Govender et al., (2021) and Tuyisenge et al., (2023) observed that replicating surveillance models from high-income countries in LMICs poses significant challenges due to resource constraints. Consequently, it is recommended by the WHO (2018) that these models need to be adapted to the context and capacities of LMICs. Both authors strongly emphasise the importance of having a surveillance system to identify children with developmental delays and start early intervention. The literature shows that LMICs often lack the ability to identify and intervene early enough due to their weak healthcare systems. As a result, - infants and children with developmental delay are often missed (Tuyisenge et al., 2023). Adeniyi et al., (2022) emphasised that the importance of a surveillance system, particularly in LMICs, where early intervention for children at risk of disability can greatly improve long-term outcomes. Given the challenges identified by Govender et al., (2021) and Tuyisenge et al., (2023), it might benefit Namibia to have a connection between infants

and healthcare workers such as nurses. This could create a more effective system for monitoring at-risk infants.

Additionally, Win & Mlambo, (2020) found that issues like shortages of assessment and diagnostic tools, together with inadequate training for healthcare staff led to a lower completion rate of the RTHB. This raises concerns that even with a recognised surveillance system, limitations and challenges may still negatively impact the efforts to identify children at risk of developmental delays. Identified challenges may be specific to the country or could pose a risk in the system of many other countries. In Namibia, like other countries, children attending clinics for vaccinations are expected to have their health passports filled out, including the section on developmental milestones. Drawing from Win and Mlambo's (2020) study, which emphasised the importance of monitoring developmental progress, the Namibian health passport likewise provides this opportunity. However, this brings up an important question: to what extent is this practice being carried out and do healthcare workers have the necessary knowledge to accurately assess and record developmental milestones?

2.6 Key practices and role-players identified in a formal surveillance system

Choo et al., (2019) state that the assessing developmental delays should include a detailed and systematic examination and a structured referral system. Similarly, Adeniyi et al., (2022) and Tuyisenge et al., (2023) recommend a monitoring system at the primary healthcare level. This could be one of the easiest implementations with the current resources in their regions. Govender et al., (2021) identified key practices, such as detailed history-taking for all infants and tracking child developmental milestones, as well as assessing muscle tone and reflexes. These elements are fundamental in monitoring motor development. In Norway, the well-baby visits attended by parents do not use standardised screening tools, but assessments are rather based on clinical judgement of the public health nurses and general practitioners. This, along with parental concerns are the primary basis for decision making (Kim, 2021). The WHO supports the approach that surveillance for child development should be combined with vaccination clinics to improve early detection and intervention for children at risk of developing disability (WHO, 2018). Govender et al., (2021) recommend that developmental surveillance should occur regularly at specific times, such as 9 months, 18 months, 24 months and 34 months, before children start

school at age 5 years. Their study included many challenges that may be specific to the local context, highlighting the need to investigate knowledge and practices in other areas.

To better understand required knowledge for monitoring child development, Hirani et al., (2025) aimed to assess the awareness, attitudes and practices (KAP) of healthcare in secondary care maternal and child hospitals regarding early childhood development (ECD). They conducted a mixed-methods study using the Caregiver Knowledge of Child Development Inventory (CKCDI) for knowledge together with practice and attitude questions in qualitative interviews to explore perceptions, barriers and facilitators. The main findings showed approximately 78.6% of the 35-participants had low knowledge scores in ECD. Only three participants had received training specific to ECD training. The qualitative findings indicated that significant barriers to practice included time constraints, insufficient resources and tools, lack of institutional support and competing priorities. Participants emphasised the need for ongoing training, better integration of ECD into routine services and support systems for practice. The limitations of the study discussed that since it was based in two hospitals, the findings may not be a representation of other primary care settings. It however reflects the relevance of such studies through a strong example of combining KAP survey and qualitative insights about barriers and facilitators in health workers' application of developmental monitoring, including aspects of motor development in ECD.

Recent studies have highlighted the critical role of both healthcare providers and caregivers in effectively monitoring motor development in young children. Ramu et al. (2024) showed that targeted training for primary healthcare nurses significantly enhances their knowledge, confidence and practical use of developmental screening tools, leading to earlier identification of motor delays. Similarly, Kumar et al. (2024) found that while many parents have limited knowledge regarding motor milestones and developmental warning sign, they generally maintain positive attitudes toward early identification, which shows the need for continuous caregiver education during routine child health visits. Supporting these findings, Pedersen et al. (2022) reported that caregiver knowledge and attitudes directly impact practices that promote motor skills such as tummy time and active play. Educational interventions significantly improve both understanding and implementation of these activities. Collectively, these studies emphasise that strengthening both professional training and caregiver education is essential for the early

detection and promotion of optimal motor development in children. In their study many other challenges were included, and these might be specific to the country context. Therefore, a need to investigate knowledge and practices in other areas should be highlighted. Comparing Win & Mlambo's (2020) study to the Namibian setting, the Namibian health passport also includes a section that should be completed for developmental milestones it thus creates the question on whether nurses do practice this and if they have the required knowledge on the expected task.

2.7 Conceptual framework

This study is guided by the Nurturing Care for Early Childhood Development framework, created by WHO, UNICEF and the World Bank. It was launched at the 71st World Health Assembly in 2018. The framework promotes child health and well-being and advocates for optimal developmental outcomes (WHO, 2018). It offers a clear roadmap based on five strategic actions, namely, lead and invest, focus on families and communities, strengthen services, monitor progress and scale up and innovate.

In LMICs, the framework suggests using existing services across sectors such as health, education and social protection. Key actions include updating national service standards to reflect the five components of nurturing care, improving workforce competencies through training, encouraging intersectoral collaboration, ensuring supportive supervision and setting up quality assurance mechanisms. It also highlights the importance of monitoring children's development and making timely referrals to specialised services when necessary, showing the importance of early intervention.

Evidence by Govender et al., (2021) and Tuyisenge et al., (2023) supports the idea that early intervention in an infant's life can limit the effects of disability and promote participation. Early developmental interventions show benefits on the cognitive and motor developmental outcomes for infants born prematurely. Intervention initiated within the first 1000 –days has a greater impact on brain development, due to the extensive neurological development occurring in that initial phase (Spittle et al., 2015).

Furthermore, identifying developmental delays in children at an early stage leads to major long-term economic benefits for individuals, families and society. Early detection enables timely and

focused interventions which tend to be more effective and less expensive than remedial measures introduced later in life. Children who receive early support are more likely to reach their full developmental potential, which results in better educational outcomes, greater productivity and less dependency on social services. This leads to a more skilled workforce and lower public spending on special education, healthcare and social welfare over time. Early identification of developmental delays is critical due to the rapid pace of brain development in the first years of life. During this period, especially from birth to age 3, the brain exhibits high neuroplasticity, meaning it is particularly responsive to environmental inputs and interventions. Spotting delays during this window allows for timely support that can significantly improve developmental trajectories (Thompson, 2016). Furthermore, early screening tools and developmental monitoring practices are evidence-based practices recommended by global health authorities such as WHO, CDC, AAP, to ensure children reach their developmental potential. These tools are both practical and reliable when used consistently in healthcare and early education settings.

2.8 Research gap

Despite substantial international evidence highlighting the importance of developmental surveillance systems and the effectiveness of early detection of motor delays, there is limited context-specific evidence regarding how such monitoring is implemented within Namibia's PHC system. Although tools such as the child health passport provide a mechanism for recording developmental milestones, it remains unclear whether healthcare workers, particularly nurses, consistently perform motor development monitoring, possess adequate knowledge and skills to do so accurately, or face contextual barriers that hinder effective practice. Furthermore, most existing studies from low- and middle-income countries focus on prevalence of developmental delays or system-level challenges rather than the KAP of frontline healthcare providers responsible for routine surveillance. This lack of local evidence creates a critical gap in understanding the readiness of the Namibian primary healthcare workforce to detect motor developmental delays early and to initiate appropriate referral and intervention pathways.

2.9 Conclusion

This chapter discussed the literature reviewed related to motor development in children. The chapter focussed on the importance of primary healthcare professionals in routine monitoring of development and existing surveillance systems currently being utilised worldwide and in Africa. Furthermore, the chapter discussed the importance of motor development specifically in development monitoring. Lastly, the chapter discussed the conceptual framework which guides this study, which is the Nurturing Care for Early Childhood Development framework.

CHAPTER 3: METHODOLOGY

3.1 Study design

An exploratory sequential mixed-methods design was employed to gain an in-depth understanding of the primary healthcare context from the nursing staff's perspective and to develop a contextually relevant quantitative instrument. The initial qualitative phase explored facility functioning, staffing structures, and the experiences of frontline nurses responsible for routine vaccinations and child health services. Key areas examined included prior training in motor development, access to ongoing learning opportunities, actions taken when atypical development was observed, referral pathways and perceptions of nurses' roles in developmental monitoring. Findings from this phase informed the development of a structured questionnaire tailored to assess the KAP of these nurses. The subsequent quantitative phase expanded the scope by providing measurable data on knowledge levels, prevailing attitudes and routine practices across a larger sample. This design strengthened the study by ensuring that the survey instrument was grounded in real-world context, enhanced the relevance and validity of the findings and enabled comparison between reported frontline practices and expected standards within the health system.

3.2 Study setting

The study was carried out in Namibia's Khomas Region. Namibia, located in Southern Africa, has an estimated population of 3,022,401 in 2023 (NSA, 2023). Administratively, the country is divided into 14 regions, with Khomas being among the most densely populated, housing approximately 494,605 inhabitants. According to the Health Care Workforce Status Report (2022), the MoHSS considers Khomas to have a moderate number of PHC facilities. Namibia's health system consists of both public and private sectors. The public sector is governed by the Namibian government, whereas the private sector is operated by individuals and companies.

However, all facilities are subjected to licensing and approval by the MoHSS. Within the public health system, the referral structure ensures that infants and young children are seen at PHC facilities for routine vaccinations and postnatal check-ups, starting from 10 weeks after birth. This study focused on children aged 0-24 months.

The study was conducted at each of the approved facilities. The interview with the chief nurse was conducted in their designated office or a private area should the office not be accessible at the time. The study questionnaire was then shared to the rest of the nursing staff through a poster on the notice board or shared via a WhatsApp group or where hard copies were provided nursing staff would complete them in a private section of the facility and provide back to the researcher.

3.3 Study population

The study population was comprised of nurses employed at public PHC facilities and the two hospitals where vaccinations are administered to infants up to 6-weeks of age, within the Khomas Region. These nurses are generally involved in administering routine infant vaccinations, as outlined in the Namibian Child Health Passport. .

There are typically two categories of nurses employed within the PHC facilities. 1. Registered nurses hold a bachelor's degree in nursing and have the responsibility of scientific application of nursing principles such as complex patient assessment and developing care plans. 2. Enrolled nurses typically have a 2-year diploma and have execution of care plans developed by registered nurse as their duties and further provide hands-on care, monitor vital signs and administer medications under the direct or indirect supervision of a registered nurse.

In Namibia, MoHSS is responsible for managing and providing public health services through a four-tier health system, comprising of PHC facilities, district hospitals, intermediate hospitals and a central referral hospital. At the PHC level, clinics are primarily staffed by nurses and supported by pharmacy technicians or assistants. Referrals are made to higher levels of care when cases go beyond the clinic's scope of practice or available resources (Christians, 2020). The Ministry of Health and Social Services Namibia Healthcare Workforce Status Report (2022) indicates that Namibia has a total of 322 clinics and 56 health centers operating at PHC level. At this level, infants and young children attend facilities for routine immunizations and health check-ups, and PHC services also serve as the first point of entry into the Namibian health system for acute illness or the presentation of symptoms. Infants and children are assessed and managed at this level, and when their condition exceeds the scope of care available at PHC facilities, they are referred to district hospitals for further management.

3.4 In addition to vaccination, PHC nurses monitor child developmental progress, which makes them essential healthcare providers for early childhood developmental surveillance. Public health facilities in the Khomas region include 2 referral hospitals, 3 health centres and 9 clinics, making a total of 14 sites where infants and young children access vaccination services through the public healthcare system (Health Care Workforce Status Report, 2022). The referral hospitals operate postnatal clinics that primarily care for infants up to six weeks or ten weeks after birth. Health centres and clinics continue to provide vaccination and monitoring thereafter. Based on available staffing data, about 112 nurses were eligible to participate. The total number of 112 nurses was determined by the researcher following one-on-one interviews with the chief nurses at each facility. During these interviews, the researcher confirmed the operational structure of the facilities and identified the number of nurses whose duties included providing care to infants and young children. It was noted that not all nurses within the facilities were responsible for administering vaccinations or monitoring the health and development of infants and children, and therefore only nurses with these responsibilities were included in the calculated population.

Sample and sampling procedure

The sample selection included nurses working in public primary health facilities in the Khomas region of Namibia. The sampling procedure depended on whether the health facility provided a service where children receive their routine immunisations, as recommended by the WHO. Nurses from the total number of health facilities where routine vaccinations are administered to infants and young children, located in the Khomas region of Namibia were included in the study.

For the quantitative part of the study, total population sampling was applied for all nurses working in the post-natal clinic at the time of data collection. The sample size for the quantitative part was 112 nurses. For the qualitative part, purposive sampling was applied and the sample size which was determined by data saturation was 10 nurses. The following inclusion and exclusion criteria were used:

3.4.1 Inclusion criteria to study

The study had specific criteria for inclusion. Firstly, participants were required to be registered with the Health Professions Council of Namibia and Nursing Council. Secondly, eligible nurses

needed to regularly administer vaccines to infants and children at their health facilities, during some part of their rotation. However, for the in-depth interviews, this was not a strict requirement. Instead, participants were required to hold supervisory positions at the time of data collection, as this allowed them to provide insights into facility-level management and operational practices. All registered nurses were considered suitable participants because they possessed a basic understanding of child development from their formal educational training. The study specifically aimed to explore factors that should be included into routine child health visits. It recognised vaccination appointments as a great opportunity due to their regularity and accessibility.

3.4.2 Exclusion criteria for the study

Some nurses were excluded from the study for several reasons. Firstly, those employed at a health facility but not actively involved in the postnatal unit were excluded as their roles would not provide relevant experience with infant vaccination or developmental surveillance. Secondly, nurses serving temporarily or as volunteers were also excluded as their limited engagement with the facility would not reflect the continuity of care central to this study. Furthermore, nurses who were on leave or attending training during the data collection period were also excluded to ensure that only those directly accessible and available for participation were included. Finally, student nurses completing short-term clinical rotations as part of their training were not eligible, as their experiences would not represent the responsibilities and perspectives of fully registered, practicing nurses.

3.5 Variables

The study included both dependent and independent variables. The dependent variables were knowledge, attitudes and practices related to motor development assessment. The knowledge score was calculated by adding up 10 knowledge questions, each correct answer counts as one point. The knowledge questions were predominantly multiple-choice questions with one question requiring a long answer question. This gave a total score between 0 and 10, with higher scores (7-10) indicating better knowledge. The attitude score came from 10 Likert-scale items, with higher scores (7-10) reflecting more positive attitudes. Practice variables were analysed

separately, as they represented different aspects of current practice, including frequency, methods, barriers and responses to concerns. The independent variables included participant characteristics, such as health facility type, registration category, education level, vaccination duties, inclusion of motor development in the curriculum, years in current position, total years as a healthcare professional and average number of children seen per day. Associations between these independent variables and the dependent outcomes was explored to identify possible predictors of knowledge, attitudes and practices.

3.6 Data collection

Data collection commenced after approval was obtained from NUST (FHNRRAS:09/2025) and MoHSS (Ref: 22/3/1/2). Further approval from the medical superintendents at the respective hospitals and approval from the Khomas regional office to access the health centres and clinics was obtained.

3.6.1 Qualitative phase

The data collection process included an in-depth interview with the chief nurse at each facility or the post-natal department (10 registered nurses excluding the pilot study interviewee). If the chief nurse was not available during the period of data collection the interview was then conducted with the nurse acting in the position during that period. In-depth interviews were included in the data collection process to better understand the health facility structure and determine the number of nurses in the facility. It further contributed to expectations regarding the level of knowledge from the nursing staff whose everyday duties include the routine distribution of vaccines and their attitudes and existing practices regarding motor development. The in-depth interviews were all conducted by the primary researcher.

All interviews were audio-recorded and transcribed immediately using software on the recording device. Transcripts were initially saved under the interview date and subsequently assigned alphabetical codes to eliminate any potential link to the date of data collection. Upon completion of transcription and coding, all audio files were permanently deleted. In accordance with the informed consent process, participants were advised that withdrawal from the study would not be possible beyond this stage, as anonymised transcripts could not be linked to individual

participants. Transcripts were stored securely on a password-encrypted cloud platform, accessible exclusively to the primary researcher. Access to the anonymised data was extended to the research supervisors only after transcription and coding was completed.

3.6.2 Quantitative phase

Following the completion of each in-depth interview, a structured questionnaire was developed and distributed to nurses identified through the study's sampling criteria. The qualitative data informed the development of the questionnaire by providing information on opportunities to develop or enhance knowledge on motor development, share information on attitudes observed amongst nursing staff and existing practices or expected practices within the facility. The questionnaire was developed as a Google Form and disseminated electronically via a secure link. As most participating facilities indicated that nursing staff primarily use personal email accounts, the preferred distribution method was through WhatsApp groups used for professional communication among nursing staff. To accommodate varying levels of digital access, hard-copy versions of the questionnaire were also provided at each facility, along with a poster displaying a QR code linking directly to the online form. Responses submitted electronically were automatically stored in a password-protected Google database accessible only to the researcher. The questionnaire included an integrated informed consent section, which required participants to indicate consent before submission. Hard-copy questionnaires were collected by the chief nurse at each facility, who subsequently informed the primary researcher for retrieval. All responses were anonymised prior to analysis. Data from the hard-copy questionnaires were entered into the electronic database to ensure uniform data management. The original hard copies are securely stored in a locked filing cabinet and will be retained for a period of five years in accordance with institutional data management and ethical guidelines.

Development of the data collection tool provided to the nursing staff other than the chief nurse: Upon completion of the one-on-one interviews the researcher developed a questionnaire assessing KAP based on information gathered during the interviews. Background information such as nurses' exposure to motor development as part of their training, follow-up training sessions and expectations regarding motor development monitoring were utilised to develop the

questions for the KAP questionnaire. The researcher then further consulted sources from WHO, UNICEF and the tools used for assessment by the Well child and CDC programs to extract relevant questions on motor development in infants and children.

3.7 Data processing and analysis

3.7.1 Qualitative data

Thematic analysis was employed as an analytical framework to identify, analyse and report patterns of meaning within the qualitative data. This approach allowed for a systematic examination of nurse managers' perspectives regarding their own and their staff's knowledge, experiences, and practices related to motor development assessment in young children. The analysis was conducted using NVivo 14 qualitative data analysis software (QSR International, 2024), which facilitated systematic coding, organisation, and retrieval of data segments.

The analytical process followed a structured sequence beginning with familiarisation with the data through repeated reading of interview transcripts. Initial codes were generated to capture key concepts and ideas expressed by participants. These codes were then systematically organised into potential themes that addressed the research objectives. The themes were reviewed and refined to ensure they accurately represented the data and formed a coherent pattern. Finally, themes were clearly defined and named to reflect their essence and relationship to the research questions.

Through this rigorous analytical process, five major themes emerged from the data, each encompassing multiple sub-themes that capture the depth and complexity of nurses' knowledge, attitudes, and practices regarding motor development assessment. The first three themes correspond directly to the four study objectives, examining knowledge of motor developmental milestones, attitudes toward motor development assessment, and current practices in motor development assessment. Two additional themes emerged that provide crucial context for

understanding the implementation of developmental monitoring: barriers to effective motor development assessment, and facilitators and integration within primary healthcare.

The findings are presented thematically, with each major theme and its corresponding sub-themes discussed in detail. Participant voices are included throughout to illustrate key findings and provide authentic representation of nurse managers' perspectives on their own practice and that of their staff. Where appropriate, findings are interpreted in relation to existing literature to situate the Namibian context within broader global evidence on developmental surveillance in primary healthcare settings.

3.7.2 Quantitative data

The researcher analysed the quantitative data using IBM SPSS (version 30) employing both descriptive and inferential statistical techniques to summarise the data. Descriptive statistics, including frequencies, percentages, means, medians and standard deviations, for all variables were calculated.

In accordance with the requirements for parametric tests (i.e., independent samples t-test, one-way ANOVA, Pearson's correlation), the assumption of normality was assessed for each continuous variable using the Kolmogorov–Smirnov (with Lilliefors correction) and Shapiro–Wilk tests. Where normality was violated, non-parametric equivalents were employed instead.

The Shapiro–Wilk test is generally considered more appropriate for smaller samples ($n < 50$), and its result was given priority in determining departure from normality (Razali & Wah, 2011). A significance level of $p < 0.05$ was used to indicate a violation of the normality assumption.

3.7.2.1 Summary of Statistical Test Selection and Justification

Research Objective	Parametric Test Considered	Non-Parametric Test Used	Justification
Compare knowledge scores	Independent samples t-test	Mann–Whitney U test	K–S: $p = .036$; S–W: $p = .062$. Borderline normality violation: non-

between 2 groups (e.g., by motor dev training)			parametric approach applied conservatively given small sample size.
Compare knowledge scores across 3+ groups (e.g., by experience, education, facility)	One-way ANOVA	Kruskal–Wallis H test	Same as above; normality not fully met across all subgroups.
Compare attitude scores between 2 groups (e.g., by motor dev training)	Independent samples t-test	Mann–Whitney U test	K–S: $p < .001$; S–W: $p < .001$. Clear normality violation; severe negative skew/ceiling effect.
Compare attitude scores across 3+ groups (e.g., by experience, education level)	One-way ANOVA	Kruskal–Wallis H test	K–S: $p < .001$; S–W: $p < .001$. Same as above.
Examine association between knowledge score and attitude score	Pearson's r correlation	Spearman's rank-order correlation (ρ)	Normality violated for attitude score ($p < .001$). Spearman's ρ used as it does not assume bivariate normality and is appropriate for ordinal or non-normally distributed continuous data.

Given the small sample size (n=35), they reported effect sizes alongside p-values to show the practical significance of the findings. All questionnaire responses were numerically coded and cleaned before analysis, and they addressed missing data through pairwise deletion to maximise available cases. The level of statistical significance was set at $p < 0.05$.

Descriptive statistics summarised demographic characteristics, knowledge scores, attitude scores, and reported practices. The analysis described categorical variables with frequencies and percentages and summarised continuous variables using means, standard deviations, medians, and ranges.

The researchers calculated a composite knowledge score by adding up correct responses to ten knowledge questions, with a range from 0 to 10. Participants were categorised as having poor (0–3), moderate (4–6), or good (7–10) knowledge. Similarly, the researcher calculated an overall attitude score by summing responses to ten Likert-scale items, with higher scores reflecting more positive attitudes toward motor development assessment. Practice-related items were analysed individually to identify common behaviours, barriers, and typical responses associated with developmental monitoring.

3.7.3 Calculation of composite scores

Due to the mixed response formats across attitude items, a composite attitude score was created only for items sharing identical response scales to ensure valid summation. Items 1 (Importance of monitoring) and 2 (Monitoring identifies disability) both used Yes/No/Maybe format with identical scoring (1=No, 2=Yes, 3=Maybe), allowing for creation of an "Attitude Agreement Score" by summing these two items.

The resulting score ranged from 2 (minimum - both "No") to 6 (maximum - both "Yes"), with a neutral midpoint of 4. Higher scores indicated more positive attitudes toward motor development monitoring.

Items using different response formats (Items 3-10) were analysed individually rather than combined into a composite score, as combining items with different scales would produce invalid measurements.

Internal consistency of the 2-item Attitude Agreement Score was assessed using Cronbach's alpha, with $\alpha \geq 0.70$ considered acceptable for research purposes.

All analyses were interpreted carefully due to the modest response rate and the cross-sectional study design, which restricts causal inference and generalisability. However, the statistical approach matched the mixed-methods exploratory sequential design, ensuring that the quantitative findings were meaningfully informed by themes from the qualitative phase.

3.8 Pilot study

The pilot study was conducted in the post-natal unit, at WCH. The chief nurse of the unit was initially approached for participation in a one-on-one interview. After the study was explained, she referred the researcher to the senior nurse in charge of the postnatal unit, who was considered more appropriate to provide information on vaccination practices. Consequently, the interview was rescheduled and conducted with the senior nurse. The interview took place face-to-face and was audio-recorded using a mobile application on the primary researcher's phone, which also enabled real-time transcription and secure storage of the recording. Before the interview commenced, the study was formally introduced to the participant, and written informed consent was obtained. The qualitative section of the pilot study was done with the nurse in charge at one health facility. Revisions to the interview guide were made. Revisions made are described in chapter 3.8.1. The pre-laminar KAP questionnaire was distributed to the nursing staff to test ease of access.

3.8.1 Revisions and adaptations made post-pilot

i. Interview guide

On page 1, paragraph 3, the number of interview questions was corrected from 12 to 14. One question had initially been omitted, and one additional question was added during the pilot process.

Question 14 was added: *“Does the nursing curriculum of the institution you attended include a study area on motor development in children?”*

Several questions required rephrasing during the pilot interview to ensure clarity and comprehension for the participant.

The participant also queried the method for selecting answers on the consent form (i.e., whether to use a tick or a cross). The form was updated to specify that a **cross (X)** should be placed in the relevant box.

ii. Questionnaire

After the pilot interview, a digital version of the questionnaire (including a QR code for access) was distributed to nurses in the facility to gather pilot quantitative data. Within one week, two completed responses were received. Both participants provided consent and responded to all questions. Following review of the responses, an additional question was added to **Section A, Question 8**, as shown in Table 3.1 below:

Table 3. 1 Adaptations made to interview guide

Adaptions made to the interview guide and the questionnaire:	
Interview guide	Questionnaire
Correction on pg.1 paragraph. 3	Question added to Section A, Question 8
Question 14 was added:	

Is a theoretical section on motor development part of the curriculum at your training institution?	Is a theoretical section on motor development part of the curriculum at your training institution?
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Due to the low response rate noted on the pilot questionnaire it was decided to take printed hard copies to the remaining facilities for completion by the nurses. Providing the option of completing either electronically or a hard copy.

3.9 Data collection instruments

3.9.1 Attitude measurement scales

The attitude section employed multiple response formats depending on the nature of each question:

Items measuring importance and agreement (Items 1-2, 3, 6):

- Yes/No/Maybe format
- Coded as: 1=No, 2=Yes, 3=Maybe

Items measuring level of agreement (Items 4-5):

- 5-point Likert scale
- 1 = Strongly Disagree
- 2 = Disagree
- 3 = Neutral/Unsure
- 4 = Agree
- 5 = Strongly Agree

Service availability rating (Item 7):

- 5-point quality scale

- 1 = Very Poor

- 2 = Poor

- 3 = Fair

- 4 = Good

- 5 = Very Good

Training sufficiency (Item 8):

- 5-point sufficiency scale

- 1 = Not sufficient at all

- 2 = Not sufficient

- 3 = Neutral/Unsure

- 4 = Less sufficient

- 5 = Sufficient

Screening feasibility (Item 9):

- 5-point likelihood scale

- 1 = Not likely at all

- 2 = Unlikely

- 3 = Neutral/Unsure

- 4 = Likely

- 5 = Very likely

Time estimation (Item 10):

- Six-time categories: 10 minutes, 15 minutes, 30 minutes, 45 minutes, 60 minutes, 60+ minutes

3.10 Ethical consideration

Ethical clearance for this study was obtained from the Namibia University of Science and Technology (NUST) Research Ethics Screening Committee (Reference number: *FHNRAS:09/2025*). Permission to conduct the study was further granted by the Ministry of Health and Social Services (MoHSS) (Reference number: *22/3/1/2*). Additional approval was obtained from the Superintendent's office at WCH, Intermediate Hospital Katutura (IHK) and from the Khomas Regional Council to allow data collection within the respective hospitals and PHC clinics in the Khomas region.

Prior to data collection, each participant received detailed information regarding the purpose, objectives, and procedures of the study. Participants were informed of their right to voluntary participation and their freedom to withdraw from the study at any time without any penalty or consequence. Written informed consent was obtained from all participants before data collection commenced. Separate consent forms were completed for participation in the in-depth interviews and for completing the questionnaire.

Furthermore, to ensure confidentiality and anonymity, participants were not identified by name at any stage of the research process. Each participant was assigned a unique identification code, which was used in all transcripts and data files. The audio recordings, field notes, and completed questionnaires were stored securely in a password-protected folder accessible only to the primary researcher and the research supervisor on the NUST SharePoint drive. Hard copy data, such as consent forms, were stored in a locked cabinet and will be retained for five years after completion of the study, after which all data will be permanently destroyed in accordance with institutional research data management policies.

The study posed minimal risk to participants, as it involved no invasive procedures. Possible discomfort was limited to the time required to complete the interview or questionnaire. Participants were assured that their responses would be used solely for academic purposes and that findings would be presented in aggregate form to prevent individual identification.

Declaration of Artificial Intelligent (AI) use in this study: AI applications such as Research Rabbit (RR) assisted in conducting the literature search. The AI application ChatGPT was moderately utilised to correct grammar and refine writing.

This concludes chapter 3 on Methodology. The next chapter will present the results of this research study.

CHAPTER 4: RESULTS

4.1 Introduction

This chapter presents the findings from the KAP study conducted among PHC nurses in Namibia. The study aimed to assess nurses' knowledge levels on motor development assessment in children aged 0-24 months, analyse their attitudes toward implementing formal assessment systems, and explore current practices employed in PHC settings. The results will be displayed under two sections (1) Qualitative results and (2) Quantitative results.

For the qualitative section a total of ten in-depth interviews were conducted. The study population included nurses working in a healthcare facility that provided a service of routine immunisation to children in Namibia's, Khomas region. Included were nurses from PHC centres/clinics and one state hospital. At the time of data collection access to three PHC clinics were hindered. Two clinics were not included as they were not on the approved list from the Regional Office and one was excluded as it was inaccessible due to road works during the approved data collection period. A questionnaire was then made available to all other nurses working in the facility within the specific department.

A total of thirty-five PHC nurses participated in the quantitative section of the study, representing a rather low response rate (31%) from the one-hundred and twelve (112) eligible and accessible nurses that were invited to participate. While lower than the anticipated 50% response rate, the sample provides valuable insights into the current state of motor development assessment practices among PHC nurses in Namibia. The results are presented in accordance with the four study objectives: (A) knowledge assessment, (B) attitudes analysis, and (C) exploring current practices (D) to assess for associations between independent variables (KAP) and dependent variables (vaccination duties, facility type, education level and years of experience).

Demographic characteristics of participants included in the qualitative section followed by the quantitative section, are presented first to provide context for the findings.

4.2 Qualitative results

This section presents the qualitative findings from semi-structured interviews conducted with chief nurses and nurse managers at PHC facilities in Khomas region, Namibia. The study aimed to describe the KAP amongst PHC nurses on assessment of motor development in children aged 0-24 months, with a view to informing strategies for early identification of infants at risk of developmental delays.

4.2.1 Demographic characteristics of interview participants

Table 4.1 below presents the demographic characteristics of the 10 participating chief nurses. The sample demonstrated diversity across multiple demographic variables including facility type, years of experience in both their current role, years of nursing experience and the number of nursing staff supervised within the facility.

Table 4. 1 Demographics of nurses interviewed

Characteristic	Range	Mean	Median
Duration in supervisory role	1 day – 8 years	3.0 years	2.1 years
Total years of nursing experience	1 – 28 years	14.7 years	11 years
Number of nursing staff supervised	1 – 63	15	12

The ten participating nurses were distributed across hospitals (1), clinics (6), and health centres (3). With all reporting that they have a supervisory role and other duties that varied between managing the facilities and stock, treating patients and expanding services to the communities.

4.2.2 Overview of themes

Through thematic analysis (detailed analytical approach described in Chapter 3, Section 3.7.1, five major themes and fifteen sub-themes emerged from the interviews with chief nurses and nurse managers (Table 4.2). These themes provide comprehensive insights into the knowledge, attitudes, and practices of PHC nurses regarding motor development assessment in children aged 0-24 months.

Table 4. 2 Major themes and sub-themes from qualitative results

Research questions	Major themes	Sub-themes
What knowledge do PHC nurses have on motor development in children aged 0-24 months?	Knowledge of Motor Developmental Milestones.	1. Understanding of normal development. 2. Formal training and education. 3. Knowledge gaps and uncertainties
What are the attitudes of PHC nurses toward monitoring motor development in infants and children?	Attitudes Toward Motor Development Assessment.	1. Perceived importance of motor development monitoring. 2. Role appropriateness and professional responsibility 3. Desire for training and standardisation.
What methods or tools do PHC nurses currently use in practice when monitoring motor development in children?	Current Practices in Motor Development Assessment.	1. Routine assessment activities 2. Documentation practices 3. Detection and referral of developmental delays
	Barriers to Effective Motor Development Assessment.	1. Staff shortages and workload pressures 2. Lack of programs and resources 3. Documentation challenges
	Facilitators and Integration within PHC.	1. Vaccination services as entry point for assessment 2. Existing programs and guidelines (EPI, IMCI) 3. Contextual factors (community health issues, maternal education)

4.3 Qualitative results presentation

4.3.1 Knowledge of motor developmental milestones

4.3.1.1 Understanding of normal development

The qualitative interviews revealed that PHC nurses demonstrated varying levels of understanding regarding normal motor developmental milestones in children aged 0-24 months. Most participants were able to articulate basic developmental expectations, such as when children should begin walking, talking or demonstrating motor skills like grasping and crawling. Nurses frequently referenced specific milestones including head control, social smiling, sitting, standing and walking as key indicators they monitor during routine visits. The data showed that nurses use their knowledge of normal development as a baseline to identify abnormalities, with several participants emphasising that understanding what is normal is essential to detecting delays. However, the depth of knowledge varied across participants, with some providing detailed descriptions of milestone progressions while others offered more general observations. This variation suggests that while foundational knowledge exists, there may be inconsistencies in how comprehensively nurses understand the full spectrum of motor developmental milestones.

Participants' voices

Table 4. 3 Participant quotations illustrating understanding of normal development

"If you know this child at this age, it's supposed to be walking or then you need to put the child on the scale and the mother is saying, no, they cannot stand. And that's when you come in and inquire, what's wrong? Why is the child not walking at this point?" (Interview A)

"Yeah, I think it's very important for you then to identify the abnormal. Yes. And if you don't know, what is the normal, then you will never know the abnormal." (Interview A)

"Smile like a developmental milestone is here. Social smile, head holding control, turn towards the origin of sound. Tend to hand to grab a toy...even if just your finger or whether she will grip grasp it. Sitting and standing, walking and all those are coming at 10 weeks." (Interview C)

"When the child is this month, maybe three month or what, this is the movement that you're supposed to make. This moving the hand or moving the fingers all those things. When the child is nine months, it's expected to be able to close or making sound and can be started to say mama or papa all those things" (Interview I)

"You also need to screen that child...you have to check if this child is growing according to a milestone, yeah, so that you can be able to detect if there's any abnormalities in that children." (Interview G)

4.3.1.2 Formal training and education

All participants confirmed that motor development was included as part of their nursing curriculum during their formal training. Nurses reported having received theoretical instruction on motor development through various courses, most mentioned were community nursing and midwifery modules. Several participants referenced specific training programs such as IMCI (Integrated Management of Childhood Illness) guidelines and mentioned the availability of educational materials including posters displayed in health facilities. However, despite this universal inclusion in training, many participants indicated that their education occurred long ago, with some expressing uncertainty about the details of what they had learned. The temporal distance from initial training, combined with limited ongoing refresher courses, emerged as a concern. Some participants mentioned receiving occasional training opportunities provided by the Ministry, though these were described as infrequent and dependent on selection for attendance. The data suggests that while foundational education exists, there may be a gap between initial training and current practice, highlighting the need for continuous professional development.

Participants' voices

Table 4. 4 Participant quotations illustrating formal training and education

<i>"Yeah, it was" (Interview A - theoretical section on motor development in curriculum)</i>
<i>"Yes, at University. Yes, we did. That is now long ago, yes, But. I wouldn't remember...Yes, there was something in community, yes." (Interview B)</i>
<i>"Yeah. what do you call it IMCI? IM. Guideline. That is a... infant, Mother something a bit like that" (Interview C)</i>
<i>"I think there is a part in community three and Midwifery two." (Interview E)</i>
<i>"Yeah, at UNAM there is those things...There is courses they are giving us. Okay. Like you can go for, they can call you for family planning or they can call you to go for vaccination or antenatal or postnatal care." (Interview F)</i>
<i>"Yeah, we are getting those training and there are sometimes whereby. Some staff we are given tasks to select staff to be sent to training site for nutritional and also ICI integrated the management of child yeah, so that exposure when they come back, they can give feedback." (Interview G)</i>
<i>"Yes, motor development is one of the covered topics at the training institution aimed to prepare future nurses to be able to determine whether the child has some delay in development." (Interview J)</i>

4.3.1.3 Knowledge gaps and uncertainties

Despite reporting formal training, several participants demonstrated knowledge gaps and expressed uncertainty about their understanding of motor development monitoring. Some nurses openly acknowledged their limited familiarity with developmental assessment, particularly when thrust into supervisory roles without adequate preparation. Documentation challenges were frequently attributed to insufficient knowledge, with participants indicating they were not adequately briefed on milestone development record-keeping. Several nurses mentioned difficulty understanding specific sections of the health passport related to developmental milestones, suggesting that even with available tools, knowledge gaps prevent effective utilisation. The data revealed that nurses recognised their limitations, with some expressing concern about missing important developmental indicators due to insufficient training or outdated knowledge. This honest acknowledgment of knowledge gaps, while concerning, demonstrates professional awareness and openness to improvement. The findings suggest that current knowledge levels may be inadequate for consistent, high-quality developmental surveillance, particularly regarding the specific techniques for motor development assessment and proper documentation procedures.

Table 4. 5 Participant Quotations Illustrating Knowledge gaps

Participants' voices

<i>"I'm not really familiar with it. It's not supposed to be me...I'm sorry." (Interview A)</i>
<i>"Record keeping is very poor. So basically, I think we were not briefly told about the milestone development record keeping...We are just aware that there is a milestone. Yeah." (Interview B)</i>
<i>"But nowadays cannot say I sure about how" (Interview D)</i>
<i>"Sometime is just maybe a person that does not understand the whole card, some of those pages, they don't really understand their word. Yeah. Sometimes it is just poor record keeping." (Interview E)</i>
<i>"So, we don't know if we're missing out on some parts...And then this is where we might. Because when the patient comes and says child and adult, you know, you need to examine, especially with the children" (Interview H)</i>

4.3.2 Attitudes toward motor development assessment

4.3.2.1 Perceived importance of motor development monitoring

Participants unanimously expressed strong positive attitudes toward the importance of monitoring motor development in young children. Nurses consistently articulated that knowledge of developmental milestones is essential for identifying abnormalities and ensuring early detection of delays. The data revealed that participants view motor development monitoring as a critical component of their professional responsibilities, with many emphasising that without this knowledge, they would be unable to differentiate between normal and delayed development. Participants recognised the value of early identification in facilitating timely referrals and interventions, demonstrating awareness of the broader implications of developmental surveillance. Several nurses highlighted the importance of reassuring parents about their children's development and providing guidance when concerns arise. This strong positive attitude toward the importance of motor development monitoring was consistent across all interviews, regardless of facility size or participant experience level. The unanimous recognition of importance suggests that attitudinal barriers are not a primary concern; rather, the challenge lies in translating these positive attitudes into consistent practice through adequate knowledge, resources, and systematic approaches.

Participants' voice

Table 4. 6 Participant quotations illustrating perceived importance

<i>"Yeah, I think it's very important for you then to identify the abnormal. Yes. And if you don't know, what is the normal, then you will never know the abnormal." (Interview A)</i>
<i>"Yes, it's very important. to know different types of motor development of a child, because this is how we pick up some abnormalities. If we are not aware, we won't pick up." (Interview B)</i>
<i>"Yes, it is very important. to reassure parents or their caregivers. Yeah. That is the normal development of the child. This is abnormal, what is abnormal? Refer to the doctor, to refer to paediatricians or hospitals." (Interview C)</i>
<i>"So, it's needed so that they can detect earlier for us to help now...It's needed, but I think they</i>

<i>also need refreshment or be equipped with skills on how to do it." (Interview D)</i>
<i>"Very much. Because without them knowing anything, they will not be able to detect and help those kids. So, it's really needed" (Interview G)</i>
<i>"Yes. That's the only way we can differentiate whether this one is delayed, or this one is fine. Yeah, it's very important." (Interview I)</i>
<i>"Very important, for early identification and referrals" (Interview J)</i>

4.3.2.2 Role appropriateness and professional responsibility

Participants demonstrated strong conviction that nurses are the appropriate healthcare professionals to conduct routine monitoring of motor development in young children. This confidence was grounded in nurses' position as first-point-of-contact healthcare providers and their central role in PHC delivery. Participants emphasised that nurses are present from birth, conducting initial new-born assessments and maintaining ongoing contact through vaccination visits and routine check-ups. Several nurses articulated that they serve as the "entry point" for the healthcare system, positioning them ideally to detect developmental concerns before children are seen by physicians. While acknowledging that specialist support and referral systems are necessary for confirmed delays, participants were confident in their ability to conduct initial screening and identification. The data revealed a sense of professional ownership over this responsibility, with nurses viewing developmental monitoring as an integral part of their role rather than an additional burden. However, some participants noted that while nurses are appropriate for this role, they require adequate support including training, tools, and clear referral pathways to fulfil this responsibility effectively.

Participants' voices

Table 4. 7 Participant quotations illustrating role appropriateness

<i>"Yeah. I believe so because as well, immediately when the child is born, it's the nurses they do assess. So even with after birth, you are supposed to do head to toe examination of the new-born" (Interview A)</i>

"Yeah, we can, but we also need help from the specialists. So we can because we are the first-hand primary healthcare workers. So they come to us, we are the first, like we are the first hand contact." (Interview B)

"Yes, they just need to know there something motivating them or enforcement because they are the entrance." (Interview D)

"Yes, I may say 100%, yes, because normally we are the entry for everything before the doctor the nurse is supposed to have detected that abnormalities or any need for a special child to go for special care." (Interview G)

"Yes, I would say so, because this is the actually. We are the advocate of the patients. We are the front staff of the fraternity. When you come to any facility or any institution or set up a health institution. The person that you will meet first to attend to the client, or the patient will be a nurse." (Interview H)

"Yes. Because even in hospital, it is nurses conducting delivery. So even when they are coming here for immunisation or for their check-up or sick. So, it's nurses helping them. So, it's nurses who are very needed in these activities." (Interview I)

"Yes, because they spend much time with the patients from taking vital signs to having a dialogue with the mothers and the babies /child" (Interview J)

4.3.2.3 Desire for training and standardisation

Participants expressed unanimous and enthusiastic support for receiving training on standardised methods of monitoring motor development. This desire for training was articulated with notable urgency, with participants emphasising that such training is "very much needed" and describing how they are "always crying for" additional professional development opportunities. Nurses recognised that standardised approaches would facilitate consistency in practice, enabling all healthcare workers to reach common goals and perform assessments uniformly. The data revealed awareness that current practice may be inadequate, and that updated training would enhance their ability to identify developmental delays effectively. Several participants connected the need for training to specific gaps they have observed, such as inability to support children with sensory impairments or uncertainty about proper assessment techniques. The enthusiasm for training opportunities suggests high receptivity to interventions aimed at strengthening developmental monitoring capacity. Participants viewed training not merely as desirable but as essential to fulfilling their professional responsibilities effectively. This strong desire for standardisation also reflects recognition that current practice may be too reliant on individual clinical judgment without adequate evidence-based frameworks to guide decision-making.

Participants' voices

Table 4. 8 Participant quotations illustrating desire for training

<i>"Yeah. I think it's very important to have a training like that for a standardise method because then you will help people doing the same thing at the same time just to reach a common goal. It even makes it easier for it's standardised." (Interview A)</i>
<i>"Yes, it's very, very important to go for training. Just update ourselves also. Without training, we won't be able to pick up this milestone delay." (Interview B)</i>
<i>"That one is very needed." (Interview D)</i>
<i>"Yes, very much. It will help very much." (Interview E)</i>
<i>"Very much. Even the training that we are always crying for the one for this, people who are deaf language. Sign language workshop...even for them to go for extra workshop or training to</i>

<i>be" (Interview G)</i>
<i>"Yes, is very, very much because also the issue here is, you know, in the older days or also in the nursing profession itself, when you screen a patient, you need to examine. And that is one thing that I have seen that examination does not take place the way it used to take place. So if we don't introduce that in terms of at least to make sure that we do get training on that, so we do it the proper way" (Interview H)</i>
<i>"Yes. It's a very important. like if maybe if maybe we find that the child is having this disability, there should be a place where we must send this child so that they can get assistance." (Interview I)</i>
<i>"Yes, this will lead to closing gaps related to late identification." (Interview J)</i>

4.3.3 Current practices in motor development assessment

4.3.3.1 Routine assessment activities

Participants described various practices currently employed when assessing motor development during routine child health visits. Nurses reported that assessment typically occurs during vaccination visits, with six-week check-ups identified as a key opportunity for comprehensive physical examination. Common assessment activities included weighing children, measuring height and head circumference, plotting growth on charts, and observing general motor abilities such as head control, grasping, sitting, and walking. Several nurses described integrating developmental observation into routine vital signs assessment and general examination procedures. The data revealed that assessment is often triggered by maternal complaints or concerns, with nurses responding to parents' reports of delayed speech, inability to walk at expected ages, or feeding difficulties. Some participants described systematic screening at specific intervals, while others indicated more opportunistic assessment based on clinical judgment and parental input. The extent of assessment appeared to vary depending on workload, staffing levels, and individual nurse practices. While all participants indicated that some form of motor development observation occurs, the systematic nature and comprehensiveness of these assessments varied considerably across facilities and practitioners.

Participants' voices

Table 4. 9 Participant quotations illustrating routine assessment activities

<i>"Taking of the vital science, just making sure, then if you know this child at this age, it's supposed to be walking or then you need to put the child on the scale and the mother is saying, no, they cannot stand. And that's when you come in and inquire, what's wrong?" (Interview A)</i>
<i>"Monitoring if the mother also comes and complains to them, but my child is a year, he's not even saying mama mama you know the patient comes first...just in case you have picked up a premature baby check what was the birth weight? How is the development they are coming from the routine checkups" (Interview B)</i>
<i>"They see if they are saying hello or dadda. Of movement of the arms and the legs and hands...checking also where they are with their passport which is also showing the weight in the length." (Interview C)</i>
<i>"We are more in growth monitoring where you measure the weight, the mark in just to find out whether this child is not growing well or there's any malnutrition. We are more on that." (Interview D)</i>
<i>"Yeah, they do. As part of the vaccination. Yes. Especially at six weeks...Yeah, because we do six weeks physically examination, and then from there they continued. If any abnormality is found and they are referred" (Interview E)</i>
<i>"You also need to screen that child. It's not just you just need to give him an vaccine? You have to check if this child is growing according to a milestone...we need to do height, we check the height, we do the weight also, then also you check also to see the charges responding by examining" (Interview G)</i>
<i>"Screening for childhood Development milestones at any visit at the health facility." (Interview J)</i>

4.3.3.2 Documentation practices

Documentation of developmental milestones in health passports emerged as a significant area of concern, with participants reporting highly variable completion rates. Some nurses indicated that developmental sections of health passports are "totally completed," while others acknowledged that documentation is "not seen in all cases" or completed "sometimes but not always." Several participants candidly described documentation as "very poor," with milestone sections often left incomplete or only partially filled. Nurses attributed incomplete documentation to multiple factors including staff shortages leading to rushed visits, insufficient understanding of specific passport sections, general poor record-keeping practices, and competing priorities during busy clinic sessions. The data revealed awareness that proper documentation requires plotting measurements and tracking progress over time, but that this ideal is not consistently achieved in practice. Some participants acknowledged that while the health passport provides clear guidance on what should be documented, actual completion depends heavily on individual nurse practices and workload pressures. The gap between the documentation tool's potential and its actual utilisation represents a missed opportunity for systematic tracking of children's developmental progress over time.

Participants' voices

Table 4. 10 Participant quotations illustrating documentation practices

<i>"Not seen all of the cases. Because that will mean when you are monitoring...So you write in the card, there are pages where you are supposed to plot, when you do the vitals, then you plot and then you can now cross-examine" (Interview A)</i>
<i>"Record keeping is very poor. So basically, I think we were not briefly told about the milestone development record keeping. So with us, we just check, okay, it's six months, the child is supposed to do this this and then you compare, oh, okay. But the record keeping is very poor." (Interview B)</i>
<i>"Yes, they are totally completed." (Interview C)</i>
<i>"Sometimes. But not always. I don't want to lie. You shouldn't. Sometimes...Sometimes it's just lack of staff. So, they want to rush and finish everyone and sometime is just maybe a person that does not understand the whole card, some of those pages, they don't really understand their word. Yeah. Sometimes it is just poor record keeping." (Interview E)</i>

"With my experience, that's where a gap is. Yes, you'll find some are really completed to date. Some that are just completed halfway. And then that the gap that I've seen that need to be a mostly cards are not completed full find some they just complete what the service that they are delivering at the moment, and they forget to check the previous to see if there's something missing." (Interview G)

"Not in all cases because of shortages of staffs so the few we have tend to skip somethings in order to finish" (Interview J)

4.3.3.3 Detection and referral of developmental delays

Participants' experiences with detecting and referring children with developmental delays varied considerably, reflecting inconsistent systematic surveillance across facilities. Some nurses reported identifying specific cases of delayed walking, speech delays, cleft lip, and malnutrition-associated developmental concerns, while others indicated they had never encountered or been approached about developmental delays. When delays were identified, the primary referral pathway described was to medical doctors within the facility, who would then refer to specialised services or hospitals as needed. Several participants noted that delays are often detected late because mothers do not attend routine follow-up appointments regularly or because developmental concerns were not adequately assessed during earlier visits. Malnutrition emerged as a commonly identified factor associated with developmental delays, particularly in certain geographic areas where unemployment and food insecurity are prevalent. The data revealed that while some nurses successfully identify delays and activate referral systems, this appears dependent on individual clinical acumen rather than systematic screening protocols. Several participants acknowledged that developmental delays may be missed, particularly when visits are rushed or when nurses lack confidence in assessment techniques. The absence of standardised screening tools and systematic surveillance protocols may result in some at-risk children remaining unidentified until delays become more pronounced.

Participants' voices

Table 4. 11 Participant quotations illustrating detection and referral

<i>"No, not. Maybe that will mean the person that works in the immunisation. I think that person that is the person that will ask this question, yes." (Interview A)</i>
<i>"Yes, a colleague of mine last year. picked up a child that was not walking, and she was two years. Child was in every month with complaints of other things, but when we pick up, we refer immediately to doctor...the child was seen for different things, but we managed to pick it up from there." (Interview B)</i>
<i>"Sorry. currently not yet. Never experience those babies or children...Also not" (Interview C)</i>
<i>"Not yet, except those that are underweight." (Interview D)</i>
<i>"They did, but not for immunisation. For any other complaint." (Interview E)</i>
<i>"Yes, in some cases, we find them, you find a kid, maybe a let me if a child is going to say that lot time it will be detected late if the mother was not coming for routine follow-up appointment...If detected such, we have to refer to doctors because we have medical doctors here and then the medical doctor right to referral to other levels." (Interview G)</i>
<i>"Developmental delay, not really, really reported to the office as such, but the only ones that we always speak of is just more than malnutrition part. Sometimes they also go with it that when the child's obviously malnourished the development in terms of the motor and also to the witness the neurological part also, you can see that there is a mental a delay there." (Interview H)</i>
<i>"Yes there is. Like mostly here development of the kids is affected by my malnutrition. Yes. You can see the child is maybe 24 months, but it just weighs maybe 6kg to or 8kg...So in most cases they are not even talking, but it's mostly affected by malnutrition...Most people here are unemployed, and they are not really giving the food." (Interview I)</i>

4.3.4 Barriers to effective motor development assessment

4.3.4.1 Staff shortages and workload pressures

Staff shortages and excessive workload emerged as significant barriers affecting nurses' ability to

conduct comprehensive motor development assessments. Participants described facilities operating with insufficient nursing staff, requiring supervisors to constantly find coverage for absent personnel. The data revealed that understaffing leads to rushed patient encounters, with nurses prioritising immediate medical needs over comprehensive developmental screening. Several participants explicitly connected incomplete documentation and abbreviated assessments to time pressures created by high patient volumes relative to available staff. Nurses described feeling "overwhelmed" and needing to "rush and finish everyone," which compromises the thoroughness of developmental monitoring. The impact of staff shortages extends beyond individual patient encounters to affect overall service quality, with participants noting that competing demands across multiple clinic departments strain available personnel. Some participants indicated that even when nurses recognise the importance of developmental monitoring, workload realities force difficult choices about what can realistically be accomplished during each visit. The staffing challenges appear particularly acute in smaller facilities with minimal nursing complements but also affect larger health centres managing substantial patient population.

Participants' voices

Table 4. 12 Participant quotations illustrating staff shortages

<i>"if they say there is a shortage, then I make sure that I also find someone for that...I have 17 staff members...19 in total, actually." (Interview A)</i>
<i>"Sometimes it's just lack of staff. So they want to rush and finish everyone" (Interview E)</i>
<i>"So basically, that is a home supervisory 11, that is the in charge of the whole clinic. Where I have like 45 staff members" (Interview H)</i>
<i>"Not in all cases because of shortages of staffs so the few we have tend to skip somethings in order to finish" (Interview J)</i>

4.3.4.2 Lack of programs and resources

Participants consistently reported the absence of structured programs specifically aimed at supporting developmental monitoring practices at the facility level. When asked about existing programs, most nurses indicated there were none or described ad-hoc training opportunities that depended on ministry selection of specific individuals to attend external workshops. Several participants noted that while occasional training is provided, there are no "fixed programs" for ongoing education or systematic implementation of developmental surveillance. Some nurses mentioned that occupational therapists occasionally visit from regional offices to conduct assessments, but these services focus on broader populations including adults and are not consistently available for routine child development monitoring. The lack of standardised screening tools was implicitly referenced through participants' descriptions of relying on clinical judgment and general observation rather than formal assessment instruments. Several participants indicated that after identifying concerns, the primary recourse is immediate referral to doctors or specialists rather than facility-based intervention or structured follow-up protocols. The absence of programs was particularly evident in smaller, more remote facilities where nurses described having no platform or system to support developmental monitoring beyond the basic health passport. This resource gap extends beyond material resources to include the absence of supportive structures such as regular supervision focused on developmental monitoring, quality assurance mechanisms, and systematic feedback loops to improve practice.

Participants' voices

Table 4. 13 Participant quotations illustrating lack of programs

<i>"Unless they have maybe for the ministry provide a training and then so whoever attends that training can come back and just give the nurses the education that's like from that training" (Interview A)</i>
<i>"don't have programs that are fixed the lock me and we only refer to the hospital. If you have picked up this delay. milestone, you refer to a doctor first and then to the specialist, to the hospitals. Okay. So, we don't have a fixed program." (Interview B)</i>
<i>"That one I cannot answer correctly as a haven't seen it. But it is nursing no, but a program for.. therapeutic. What do you call them? The therapists, Occupational...Occupational therapists? Yeah. They used to do that department from the region; they used to come assess" (Interview D)</i>
<i>"Nothing, not really." (Interview E)</i>
<i>"No, there is not a platform or maybe anything. No. Yeah, we just see the child when they are coming in... I think it will be a good idea if there's any place or anything maybe say, okay, this child is having this type of disability, then there should be a place already to say send them for assistance." (Interview I)</i>

4.3.4.3 Documentation challenges

Beyond the general poor record-keeping attributed to workload pressures, participants identified specific challenges related to understanding and utilising developmental sections of health passports. Several nurses acknowledged that they or their colleagues do not fully understand certain pages of the health passport related to developmental milestones, leading to these sections being left incomplete. The data revealed that documentation challenges stem from multiple sources including inadequate training on proper completion methods, time constraints during busy clinic sessions, and prioritisation of immediate service delivery over comprehensive record-keeping. Participants noted that even when nurses check developmental milestones informally during assessment, this observation may not be translated into written documentation. Some nurses described that completion is selective, with staff documenting only the specific service provided during that visit while forgetting to check previous sections or

complete the full developmental profile. The gap between the health passport's design and its actual utilisation represents a lost opportunity for longitudinal tracking of children's developmental trajectories. Several participants acknowledged that poor record-keeping is a recognised problem but expressed uncertainty about how to address it systematically, suggesting that documentation challenges require both technical training on proper completion and systemic changes to allow adequate time and emphasis on this aspect of care.

Participants' voices

Table 4. 14 Participant quotations illustrating documentation challenges

<i>"Record keeping is very poor. So basically, I think we were not briefly told about the milestone development record keeping" (Interview B)</i>
<i>"Sometimes it's just lack of staff. So they want to rush and finish everyone and sometime is just maybe a person that does not understand the whole card, some of those pages, they don't really understand their word. Yeah. Sometimes it is just poor record keeping." (Interview E)</i>
<i>"With my experience, that's where a gap is. Yes, you'll find some are really completed to date. Some that are just completed halfway. And then that the gap that I've seen that need to be a mostly cards are not completed full find some they just complete what the service that they are delivering at the moment, and they forget to check the previous to see if there's something missing." (Interview G)</i>
<i>"Probably need to have a bit of support, because when you come to us nurses in the facility, they don't look at the physiotherapy part of it because you are not on the site" (Interview H)</i>
<i>"Not in all cases because of shortages of staffs so the few we have tend to skip somethings in order to finish" (Interview J)</i>

4.3.5 Facilitators and integration within primary healthcare

4.3.5.1 Vaccination services as entry point for assessment

Participants universally identified routine vaccination visits as the primary opportunity for conducting motor development assessments, recognising the strategic advantage of this established point of contact. Nurses described that vaccination schedules create regular, predictable encounters with infants throughout the critical 0–24-month period, providing natural opportunities to integrate developmental monitoring. The six-week vaccination visit was particularly emphasised as a key moment for comprehensive physical examination, establishing a baseline for ongoing monitoring. Participants articulated that vaccination visits should not focus solely on administering injections but rather serve as holistic child health encounters that include developmental screening. Several nurses described that the vaccination process itself requires assessment of the child's readiness to receive immunisations, which naturally leads to broader health evaluation including developmental observation. The data revealed recognition that combining vaccination with developmental monitoring is not only efficient but aligns with policy expectations, with some participants noting this should be a guideline requirement rather than merely an expectation. However, while vaccination visits were universally recognised as the appropriate venue for assessment, actual implementation of comprehensive developmental monitoring during these encounters varied, suggesting that recognising the opportunity does not automatically translate to consistent practice without additional support structures.

Participants' voices

Table 4. 15 Participant quotations illustrating vaccination services

<i>"Are also at times away you come in and assess is a child really able to take the injection on that specific days? Oh, Because the mother might say, no, the child is fine, but then you notice that, no, this child has a cough" (Interview A)</i>
<i>"Just in case you have picked up a premature baby check what was the birth weight? How is the development they are coming from the routine checkups to be checking in, telling the mothers that you need to fit the baby" (Interview B)</i>
<i>"Yeah, I think so, because there isn't here is to detect now the other. But if we concentrate only on giving injection, there is no other way we can detect it...Anyway, like six weeks. Yeah, it's it's under that. Okay. Yeah, because of examination" (Interview D)</i>

"As part of the vaccination. Yes. Especially at six weeks...Yeah, because we do six weeks physically examination, and then from there they continued" (Interview E)

"it's part of them. When a child is coming for immunisation, you also need to screen that child. It's not just you just need to give him a vaccine?" (Interview G)

"It should be a policy or guideline issue. Yeah, so it is a matter that when they're doing the vaccination, they need to look at the milestone's growth monitoring...it's something that is really part of the vaccination and the clinic and also the screening room" (Interview H)

"Yes, it's very, very important. Like when we are giving immunisation, there is a schedule that we follow is also in the health passport of the kids" (Interview I)

4.3.5.2 Existing programs and guidelines (EPI, IMCI)

Participants referenced several existing programs and guidelines that provide partial support for developmental monitoring, though implementation and accessibility varied. The Expanded Programme on Immunisation (EPI) was mentioned as a framework that structures vaccination services and includes some developmental components. Several nurses referenced IMCI (Integrated Management of Childhood Illness) guidelines, though familiarity with specific components varied. Some facilities displayed posters showing developmental milestones, providing visual references for both healthcare workers and parents. Participants described occasional training opportunities, with staff being selected to attend workshops on nutrition, IMCI, or child health topics, returning to provide feedback to colleagues. The health passport itself was recognised as a tool that includes developmental milestone sections, though as discussed earlier, utilisation is inconsistent. Some facilities receive visits from occupational therapists or specialised teams from regional offices, though these services are sporadic and not focused exclusively on routine developmental surveillance. Participants from larger facilities described more access to training and specialised support compared to smaller, more remote clinics. The data revealed that while foundational elements exist within the health system, these programs are not consistently implemented, not universally accessible, and not specifically focused on systematic motor development monitoring, suggesting opportunities for strengthening and standardising existing initiatives.

Participants' voices

Table 4. 16 Participant quotations illustrating existing programs

<i>"We have I think posters having those developments. Is it the milestones? Yeah...Yeah. what do you call it IMCI? IM. Guideline. That is a... infant, Mother something a bit like that" (Interview C)</i>
<i>"Occupational therapists? Yeah. They used to do that department from the region, they used to come assess, but normally they go in the field. And they are just not only dealing with the children, they also dealing with the adults" (Interview D)</i>
<i>"We are giving health education to the mothers. And about vaccination. They must know their babies must get vaccinated...There is courses they are giving us. Okay. Like you can go for, they can call you for family planning or they can call you to go for vaccination or antenatal or postnatal care" (Interview F)</i>
<i>"Yeah, we are getting those training and there are sometimes whereby. Some staff we are given tasks to select staff to be sent to training site for nutritional and also ICI integrated the management of child yeah, so that exposure when they come back, they can give feedback" (Interview G)</i>
<i>"Yes, probably in terms of this supporting thing that they have, that they will support staff at the region. They support staff at the region, or our supervisors. Then we need to have those programs in place where every time we must make sure that at least we do have on the training...refresher training is also for development" (Interview H)</i>
<i>"So far only the EPI (expanded program on Immunisation) and IMCI (WHO /UNICEF initiative focused on reducing mortality and morbidity (integrated management of childhood illness)" (Interview J)</i>

4.3.5.3 Contextual factors (Community health issues, maternal education)

Participants identified various contextual factors that influence developmental monitoring practices and outcomes, particularly related to community health challenges and maternal engagement. Malnutrition emerged as a predominant concern, with several nurses noting that developmental delays are frequently associated with inadequate nutrition linked to unemployment and poverty. Participants described socioeconomic challenges in their catchment areas that affect children's overall health and development, requiring nurses to address multiple interconnected issues rather than isolated developmental concerns. Maternal health literacy and engagement varied, with some mothers unable to read health passports or unaware of developmental expectations. Several participants emphasised the importance of health education for mothers, both during antenatal visits and at vaccination encounters, to increase awareness of developmental milestones and encourage timely healthcare seeking. Cultural beliefs and myths were mentioned as factors that may delay recognition of problems, with some mothers attributing developmental differences to normal variation when they may indicate delays. Participants noted that regular attendance at routine follow-up appointments is crucial for effective surveillance, but inconsistent attendance patterns compromise longitudinal monitoring. Geographic factors were implicit in comparisons between urban facilities with better access to resources and more remote clinics with limited support. The data revealed that effective developmental monitoring cannot be separated from broader community health contexts, requiring nurses to navigate complex social determinants of health while attempting to implement systematic developmental surveillance.

Participants' voices

Table 4. 17 Participant quotations illustrating contextual factors

<i>"And if this has been any history of disability, that's when you come and talk to the mother and ask these questions to find out" (Interview A)</i>
<i>"The patient comes first...telling the mothers that you need to fit the baby, the weight is dropping, everything" (Interview B)</i>
<i>"We are more in growth monitoring where you measure the weight, the mark in just to find out whether this child is not growing well or there's any malnutrition" (Interview D)</i>

"We are giving health education to the mothers. And about vaccination. They must know their babies must get vaccinated. It's very important to prevent the disease" (Interview F)

"let's not get tired of it getting the mother, especially during ante-natal visit when they are still pregnant. So that at least they know what to do and the child is born...In cases as we get them when we need to ask the mother was the child born like that but say, no, the child does not loved to cry. So, she thought it's normal" (Interview G)

"And then with all the myths and beliefs, cultural things, you will not know that you miss it and it will be too late...if the person is saying no, this is, but you don't ask, if there is a social issue, there is a physiotherapy issue involved" (Interview H)

"Like mostly here development of the kids is affected by my malnutrition. Yes. You can see the child is maybe 24 months, but it just weighs maybe 6kg to or 8kg...Most people here are unemployed, and they are not really giving the food...Some mothers, maybe they cannot read" (Interview I)

4.4 Summary of qualitative findings

This chapter presented findings from semi-structured interviews conducted with ten chief nurses and nurse managers from primary healthcare facilities in Windhoek, Namibia. Through thematic analysis using NVivo 14, five major themes and fifteen sub-themes emerged, providing comprehensive insights into the knowledge, attitudes, and practices of PHC nurses regarding motor development assessment in children aged 0-24 months.

The findings revealed that while PHC nurses possess foundational knowledge of motor developmental milestones and demonstrate overwhelmingly positive attitudes toward developmental monitoring, significant gaps exist in translating this knowledge and positive disposition into consistent, systematic practice. All participants confirmed receiving formal training on motor development during their nursing education and unanimously recognised the importance of early identification of developmental delays. Nurses expressed strong conviction that they are the appropriate healthcare professionals to conduct routine developmental monitoring, given their position as first-point-of-contact providers with regular access to infants through vaccination visits. Importantly, participants demonstrated enthusiastic desire for training

on standardised assessment methods, describing this need as urgent and essential for fulfilling their professional responsibilities effectively.

However, current practices revealed considerable variability and inconsistency in how motor development assessments are conducted and documented. While nurses integrate some developmental observation into routine vaccination visits, approaches are largely opportunistic and based on individual clinical judgment rather than systematic screening protocols. Documentation of developmental milestones in health passports ranges from complete to very poor, with significant gaps attributed to staff shortages, workload pressures, inadequate training on record-keeping, and lack of structured programs and standardised screening tools. Detection and referral of developmental delays were inconsistent across facilities, suggesting that without systematic approaches, some at-risk children may be missed. Despite these barriers, the existing vaccination infrastructure, combined with programs such as EPI and IMCI, provides a foundation that could be strengthened to support more comprehensive developmental surveillance. The findings suggest that while foundational elements exist for effective developmental monitoring, multi-level interventions addressing knowledge gaps, resource constraints, standardised tools, and supportive supervision are essential for translating positive attitudes and existing infrastructure into consistent, high-quality practice in Namibian primary healthcare settings.

4.5 Quantitative results

This section presents the quantitative findings from the questionnaire survey conducted among primary healthcare nurses in the Khomas region, Namibia. While the qualitative findings from chief nurses and nurse managers (Section 4.2-4.4) provided rich contextual understanding of organisational and systemic factors influencing motor development assessment, the quantitative component directly assessed individual nurses' knowledge levels, measured their attitudes using standardised scales, and documented self-reported practice patterns.

The quantitative data collection involved thirty-five primary healthcare nurses who completed a structured questionnaire, representing a 31% response rate from one-hundred and twelve eligible nurses. The findings complement the qualitative themes by providing measurable data on the extent and distribution of knowledge gaps, the strength and consistency of attitudes across

the nursing workforce, and the frequency of specific practice behaviours. Together, the qualitative and quantitative results offer a comprehensive picture of the current state of motor development assessment in Namibian PHC settings, combining the depth of qualitative insights with the breadth and generalisability of quantitative measurement.

4.5.1 Demographic characteristics of survey participants

Table 4.18 presents the demographic characteristics of the thirty-five participating primary healthcare nurses. The sample demonstrated diversity across multiple demographic variables including facility type, years of experience, professional qualifications and training background.

Table 4. 18 Demographics of nurses who completed the questionnaire

Demographic characteristic	Category	Frequency (n)	Percent (%)
Facility type	Hospital	17	48.6
	Health Centre	3	8.6
	Clinic	15	42.9
	Total	35	100
Years in position	10 years +	1	2.9
	>5-10 years	7	20.0
	>4-5 years	4	11.4
	>2-4 years	13	37.1
	< 2 years	10	28.6
	Total	35	100
Years as HCP	10 years +	5	14.3
	>5-10 years	6	17.1
	>4-5 years	4	11.4
	>2-4 years	13	37.1
	< 2 years	7	20.0
	Total	35	100
	Enrolled nurse	16	45.7

HPCNA registration	Registered nurse	18	51.4
	Student nurse	1	2.9
	Total	35	100
Education level	Master's degree	4	11.4
	Honors degree	4	11.4
	Bachelor's degree	12	34.3
	Diploma	4	11.4
	Certificate	8	22.9
	Grade 12	1	2.9
	Missing entry	2	5.7
	Total	35	100
Administers vaccines	No	2	5.7
	Yes	31	88.6
	Missing entry	2	5.7
	Total	35	100
Daily child attendance	1 to 10	13	37.1
	11 to 20	4	11.4
	21 to 30	5	14.3
	31 to 40	5	14.3
	51 to 60	2	5.7
	>60	3	8.6
	Missing entry	3	8.6
	Total	35	100
Motor development in curriculum	No	5	14.3
	Yes	22	62.9
	Unsure	5	14.3
	Missing entry	3	8.6
	Total	35	100

The 35 nurses who participated were spread across hospitals (48.6%), clinics (42.9%), and health centres (8.6%). Most had 2 to 4 years of experience in their current roles (37.1%), while only a few had more than 10 years (2.9%). The group included both registered nurses (51.4%) and enrolled nurses (45.7%). Educational backgrounds differed, with bachelor's degrees being the most common (34.3%). A large majority (88.6%) gave vaccinations to children, allowing regular contact with young kids. Daily attendance ranged from 1 to 10 children (37.1%) to over 60 children (8.6%), indicating a significant variation in workload. Most participants (62.9%) said their training included motor development content, whereas 14.3% noted they had no such training and 14.3% were not sure.

4.5.2 Knowledge assessment

Table 4.19 below presents descriptive statistics for overall knowledge scores based on 10 knowledge items assessing understanding of motor developmental milestones, appropriate assessment practices and clinical decision-making related to motor development.

Table 4. 19 Descriptive statistics for overall knowledge score

Overall Knowledge Score		Statistic	Std. Error
Mean		5.81	0.264
95% Confidence interval for mean	Lower bound	5.27	
	Upper bound	6.35	
5% Trimmed mean		5.77	
Median		6.00	
Variance		2.161	
Std. Deviation		1.47	
Minimum		3	
Maximum		10	
Range		7	

Nurses achieved a mean knowledge score of 5.81 out of 10 points (SD=1.47), with scores ranging from 3 to 10. The median score of 6.00 and the minimal difference between mean and 5% trimmed mean (5.77) indicated a relatively symmetrical distribution. The 95% confidence interval (5.27 to 6.35) suggested moderate precision in the estimate despite the small sample size.

4.5.3 Knowledge categories

Table 4.20 and Figure 4.1 below presents the distribution of participants across three knowledge categories based on their total scores: poor (0-3 correct, 0-30%), moderate (4-6 correct, 40-60%), and good (7-10 correct, 70-100%).

Table 4. 20 Knowledge level categories

Knowledge Categories	Frequency	Percent
Poor (0-30%)	2	5.7
Moderate (40-60%)	20	57.7
Good (70-100 %)	9	25.7
Total	31	88.6
Missing	4	11.4

Only (n=9, 25.7%) of nurses demonstrated good knowledge (7-10 correct), while the majority (n=20, 57.1%) exhibited moderate knowledge (4-6 correct), and (n=2, 5.7%) showed poor knowledge (0-3 correct). Four participants (n=4, 11.4%) had missing knowledge scores.

4.5.4 Individual knowledge items

Table 4.21 presents the frequency distribution of correct and incorrect responses for each of the 10 knowledge items, revealing specific areas of strength and weakness in motor development knowledge.

Table 4. 21 Individual knowledge items

Items	Status	Frequency	Percent (%)
Developmental milestones definition	Correct	35	100.0
Motor milestones definition	Incorrect	3	8.6
	Correct	32	91.4
Hand dominance 6 mo	Incorrect	27	77.1
	Correct	8	22.9
Rolling concern 6mo	Incorrect	9	25.7
	Correct	26	74.3
Identify motor delay	Incorrect	27	77.1
	Correct	8	22.9
Mean age sitting	Incorrect	14	40.0
	Correct	21	60.0
Mean age crawling	Incorrect	7	20.0
	Correct	28	80.0
Mean age assisted walking	Incorrect	16	45.7
	Correct	19	54.3
Screening vs surveillance	Incorrect	33	94.3
	Correct	2	5.7
Normal muscle tone	Incorrect	10	28.6
	Correct	21	60.0
	System error	4	11.4

All participants (100%) correctly identified the definition of developmental milestones (K1), and (n=32,91.4%) correctly defined motor developmental milestones (K2). High accuracy was also observed for mean age of crawling (n=28, 80.0% correct, K7) and concern for rolling at 6 months (n=26, 74.3% correct, K4).

However, critical gaps emerged: (n=33, 94.3%) incorrectly believed screening and surveillance are interchangeable terms (K9), n=27 which is 77.1% incorrectly answered questions about hand dominance in the first 6 months (K3), and n=27 which is 77.1% incorrectly identified what constitutes motor developmental delay (K5). Knowledge of sitting age (K6) and walking age (K8) was moderate at (n=21, 60.0%) and (n=19, 54.3%) correct, respectively.

4.5.5 Distribution of responses across individual knowledge items and motor development in curriculum.

Figures 4.2 through 4.11 present the distribution of correct and incorrect responses for each of the 10 individual knowledge items, providing visual representation of performance patterns across the sample (N=35).

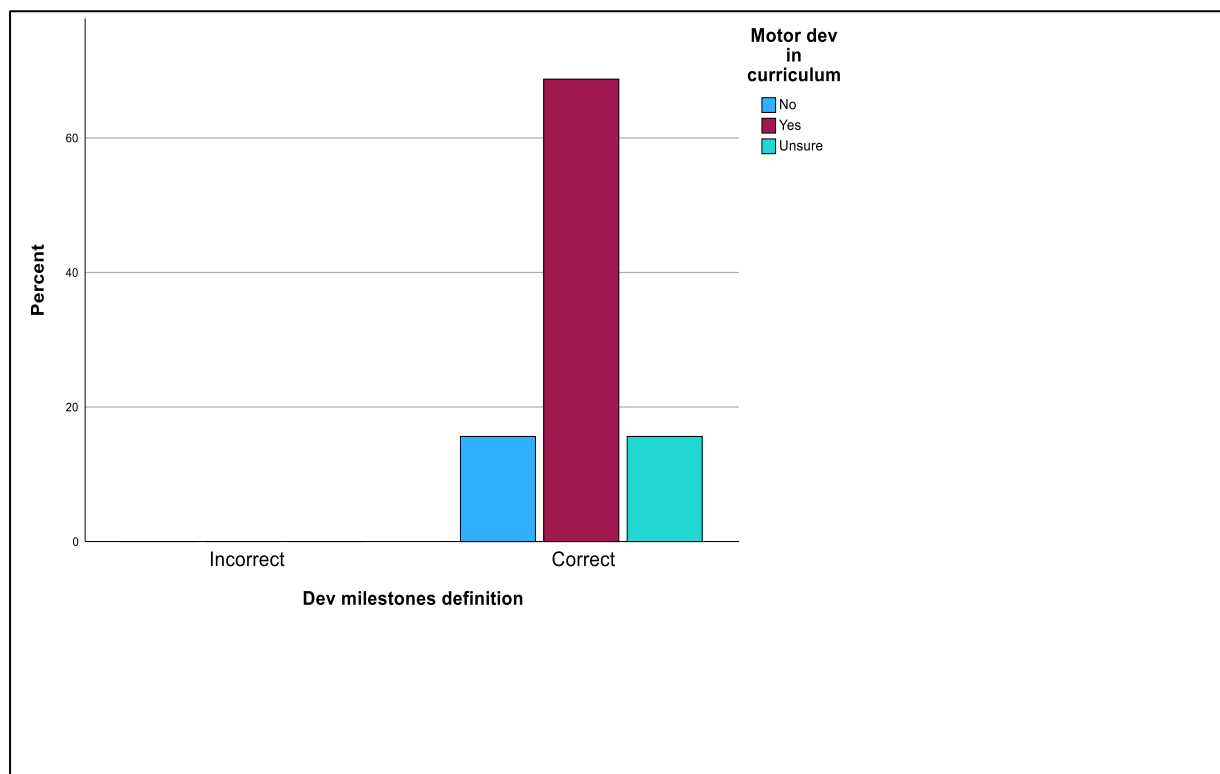


Figure 4. 1 Distribution of responses to "Developmental milestones are described as abilities, skills or behaviours that should be attained by a specific age" (N=35)

All participants (n=35, 100%) correctly identified the definition of developmental milestones.

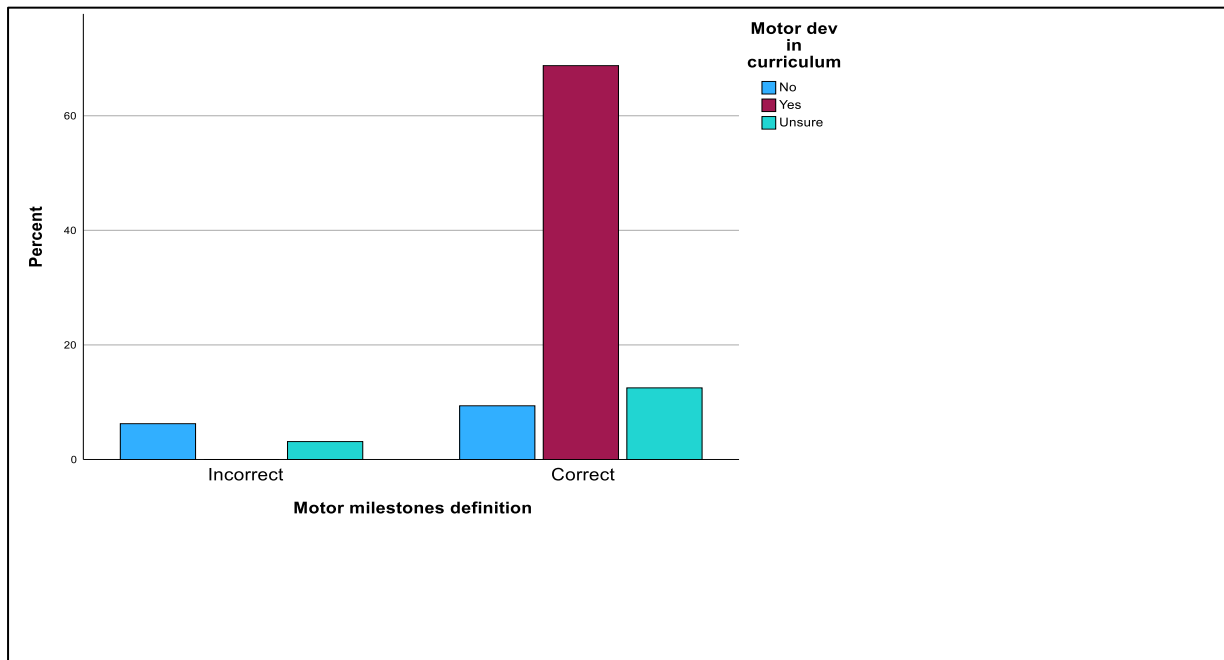


Figure 4. 2 Distribution of responses to "Motor developmental milestones are described as movement abilities, skills or behaviours that should be attained by a specific age" (N=35) The majority (n=32, 91.4%) correctly defined motor developmental milestones, while three participants (n=3, 8.6%) answered incorrectly

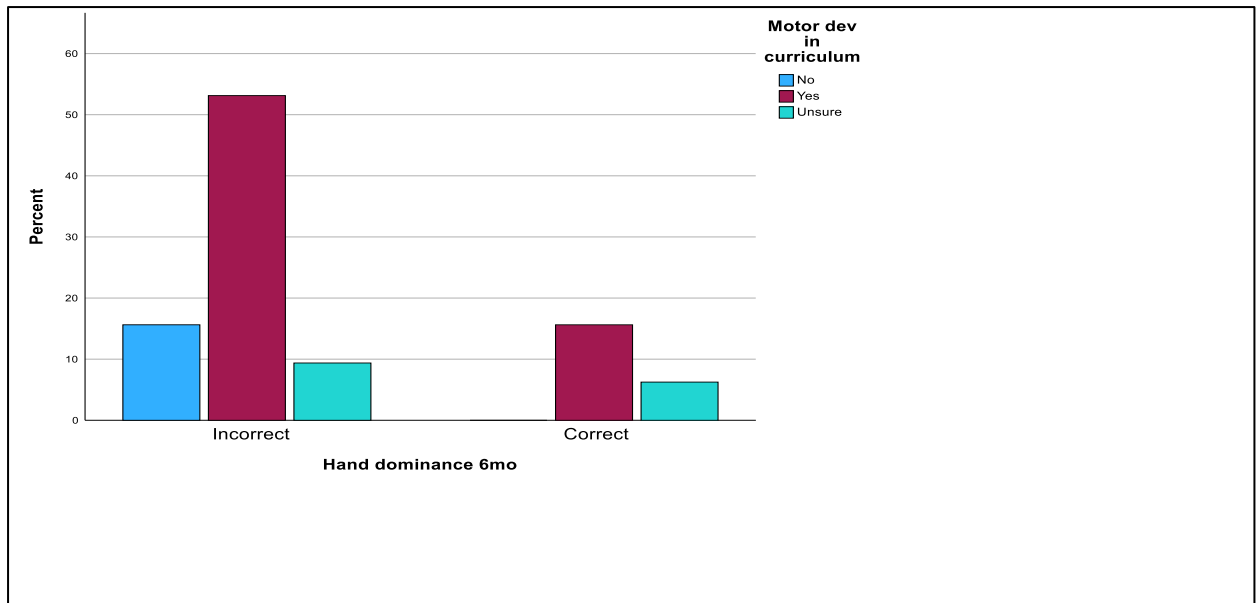


Figure 4. 3 Distribution of responses to "Do infants show hand dominance within the first six (6) months of life?" (N=35)

The majority (n=27, 77.1%) incorrectly believed infants show hand dominance within the first six months, while eight participants (n=8, 22.9%) answered correctly.

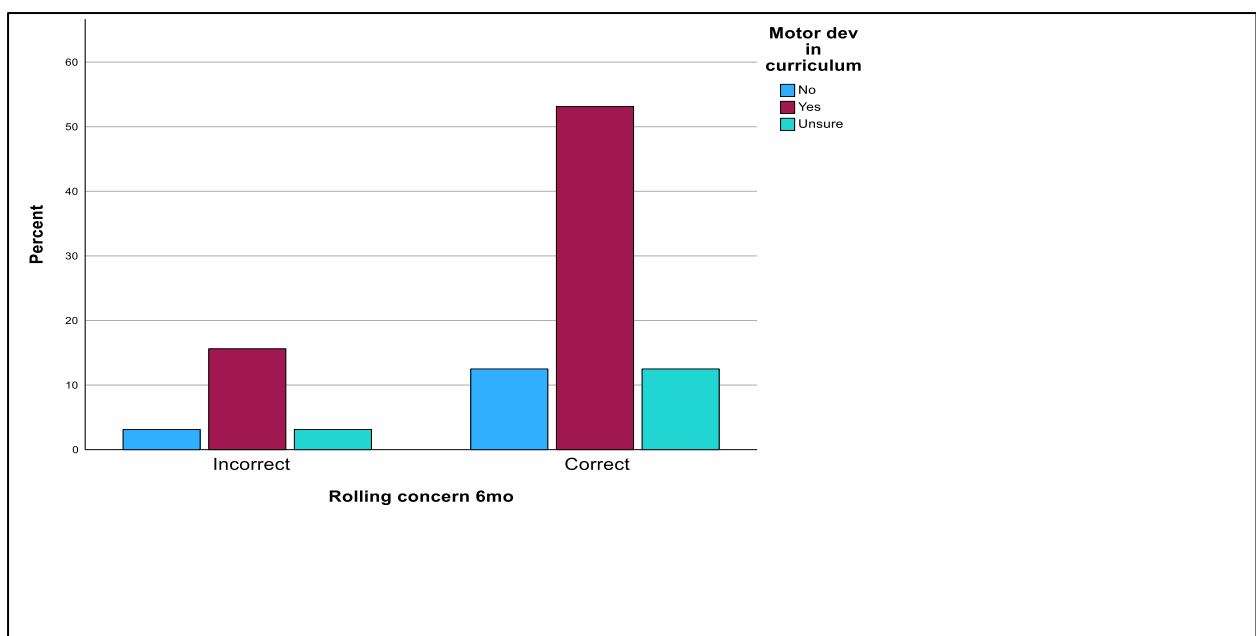


Figure 4. 4 Distribution of responses to "Would you be concerned when infants are not yet rolling independently by 6 months?" (N=35)

Most participants (n=26, 74.3%) correctly identified that concern is appropriate when infants are not rolling by six months, while nine (n=9, 25.7%) answered incorrectly.

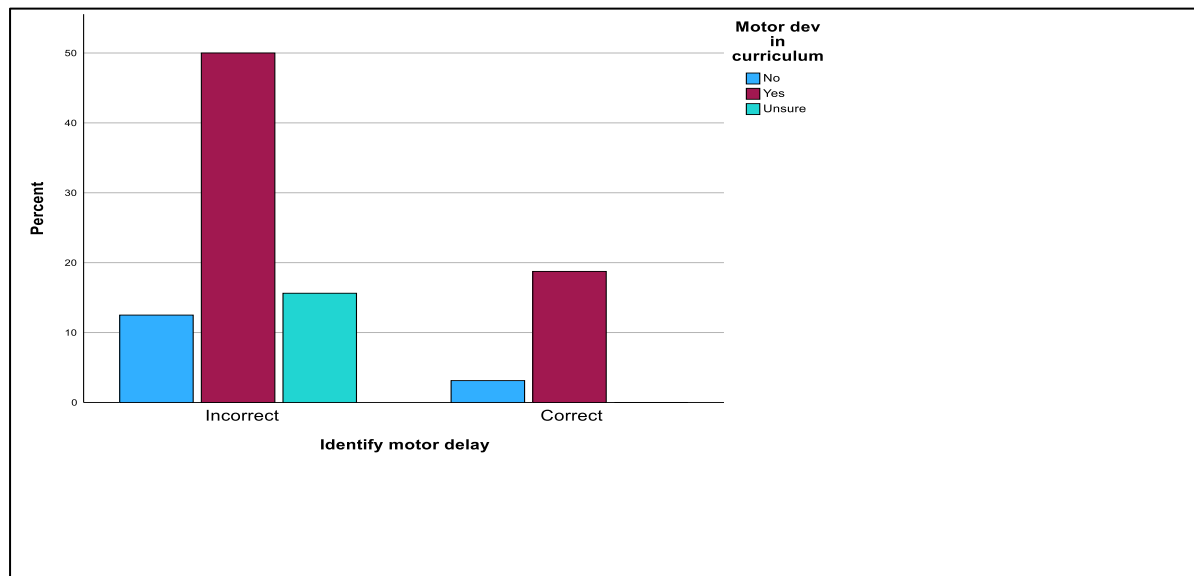


Figure 4. 5 Distribution of responses to "Which of the following would you consider a motor developmental delay?" (N=35)

The majority (n=27, 77.1%) answered incorrectly when identifying what constitutes motor developmental delay, while eight participants (n=8, 22.9%) answered correctly.

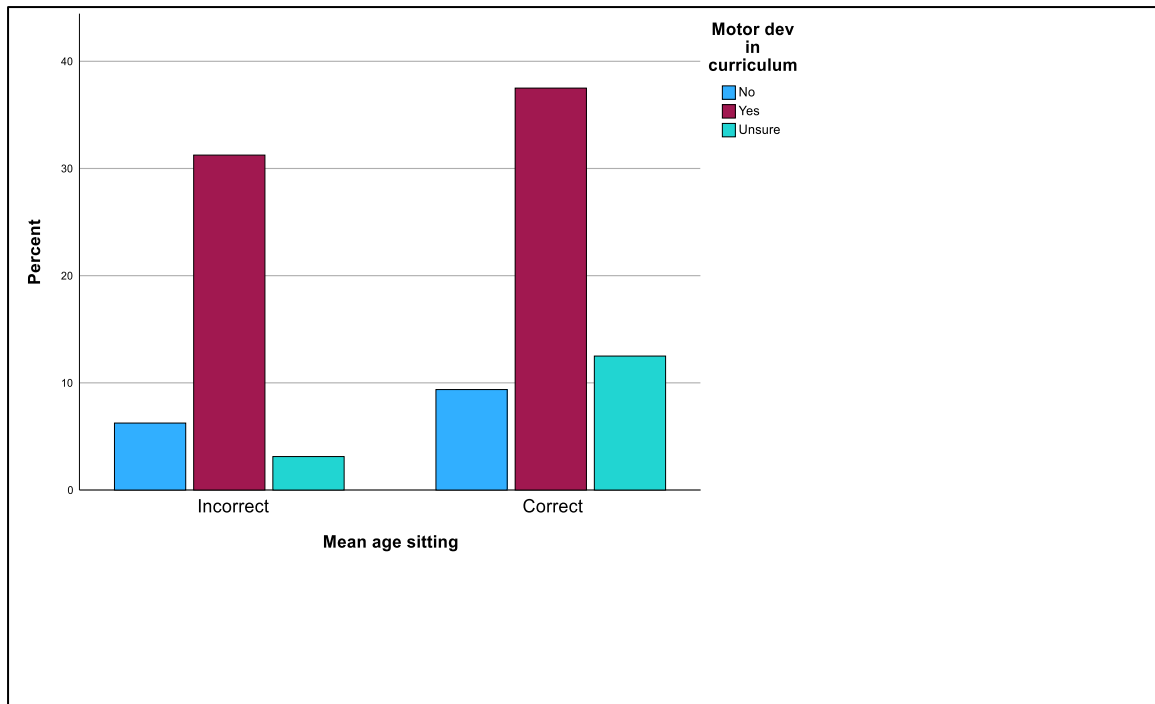


Figure 4. 6 Distribution of responses to "The mean age for unsupported sitting is..." (N=35)

Twenty-one participants (n=21, 60.0%) correctly identified the mean age for unsupported sitting, while 14 (n=14, 40.0%) answered incorrectly.

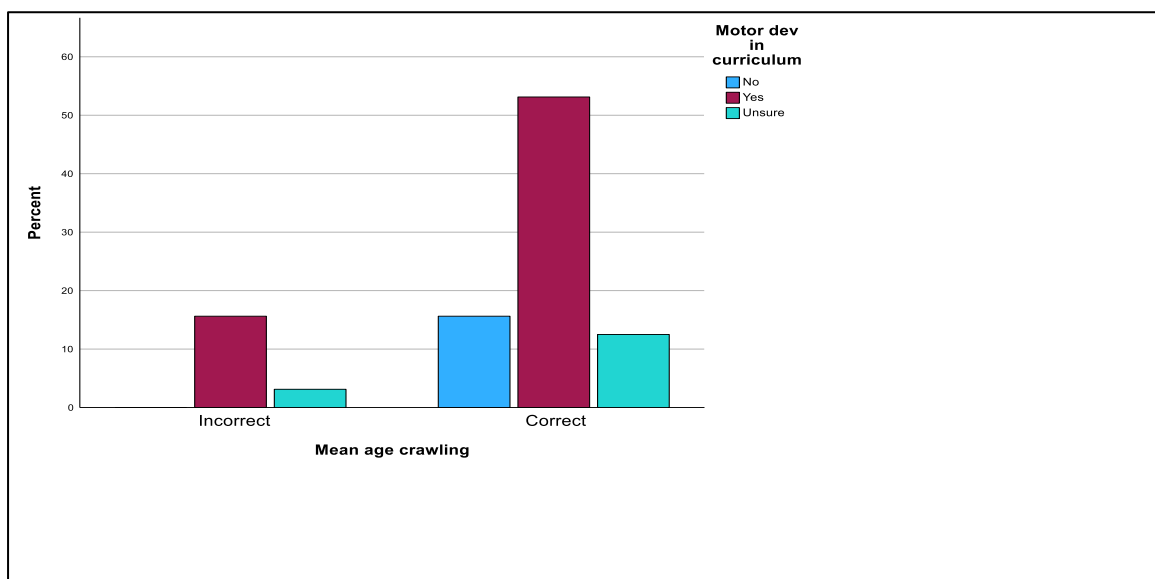


Figure 4. 7 Distribution of responses to "The mean age for hands and feet crawling is..." (N=35)

Knowledge of crawling age was strong, with 28 participants (n=28, 80.0%) answering correctly and seven (n=7, 20.0%) answering incorrectly.

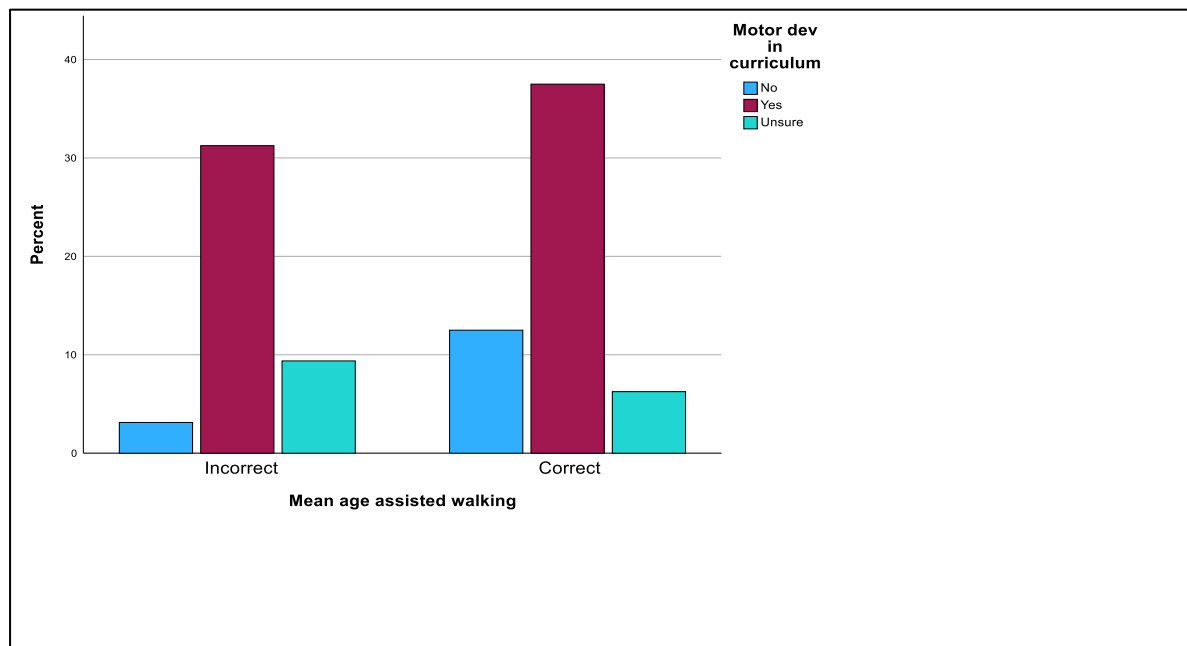


Figure 4. 8 Distribution of responses to "Children start walking with assistance at the age of..." (N=35)

Nineteen participants (n=19, 54.3%) correctly identified the age for assisted walking, while 16 (n=16, 45.7%) answered incorrectly.

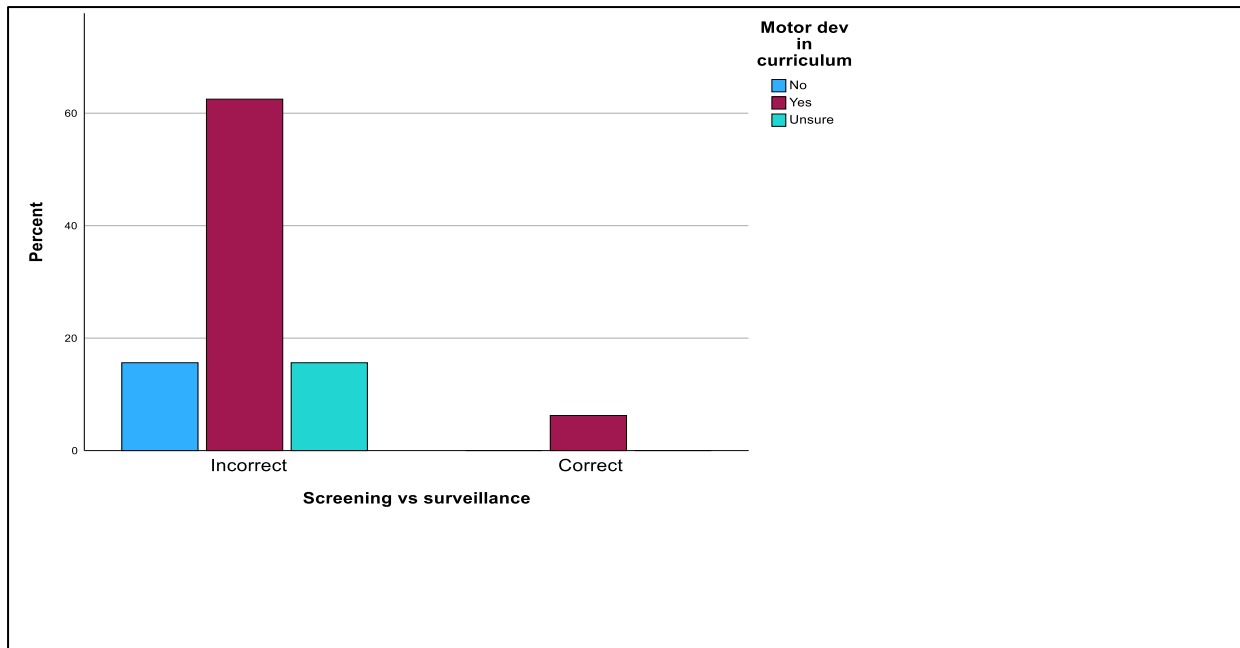


Figure 4. 9 Distribution of responses to "Developmental screening and developmental surveillance are terms that can be used interchangeably" (N=35) The largest knowledge gap was observed for this item, with 33 participants (n=33, 94.3%) incorrectly believing screening and surveillance are interchangeable terms, while only two (n=2, 5.7%) answered correctly.

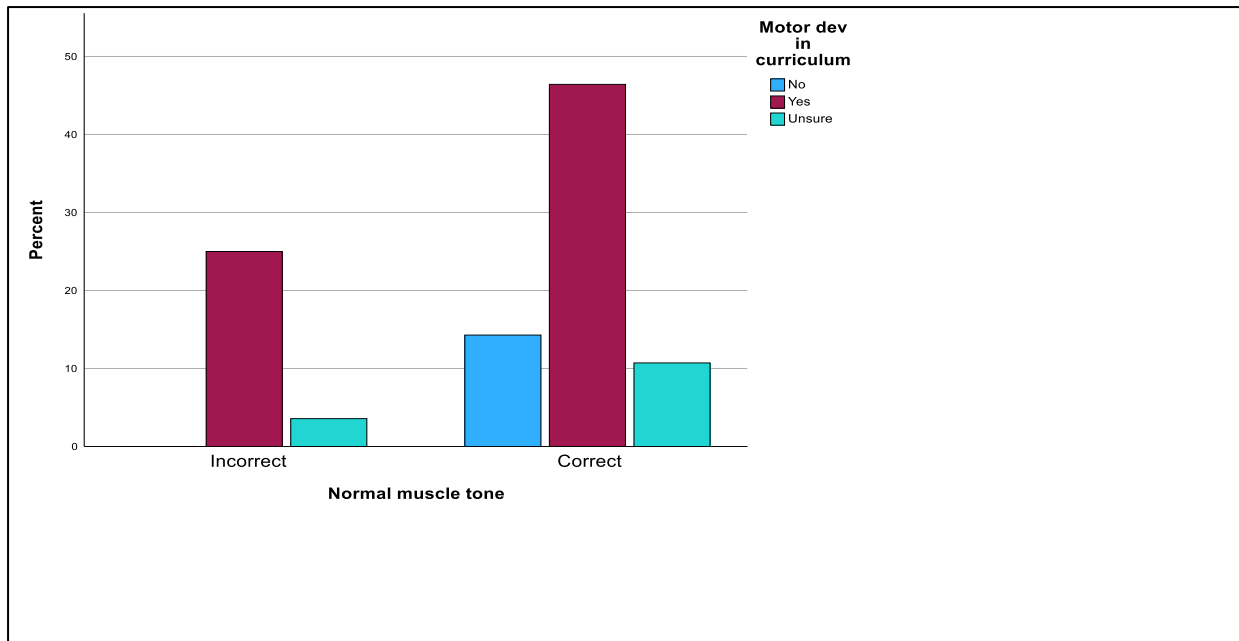


Figure 4. 10 Distribution of responses to "How would you best describe normal muscle tone?" (N=31) Twenty-one participants (n=21, 60.0%) correctly described normal muscle tone, while 10 (n=10, 28.6%) answered incorrectly. Four participants (n=4, 11.4%) had missing data for this item.

4.5.6 Testing of normality of knowledge score (Shapiro-Wilk)

Table 4.22 presents the Shapiro-Wilk test results for assessing the normality of the knowledge score distribution. The Shapiro–Wilk test is generally considered more appropriate for smaller samples ($n < 50$), and its result was given priority in determining departure from normality (Razali & Wah, 2011). The Shapiro–Wilk test result was borderline non-significant ($W(31) = 0.936$, $p = 0.062$), suggesting an approximately normal distribution.

Table 4. 22 Shapiro-Wilk for Normality test of knowledge score

	Statistic	Df	p-value
Knowledge score	0.163	31	0.062

The Shapiro-Wilk test yielded a statistic of 0.163 with $p=0.062$, indicating that knowledge scores did not significantly deviate from a normal distribution, supporting the use of parametric tests.

4.5.7 Knowledge by training background (T-test)

Tables 4.23, 4.24 and 4.25 present the results of independent samples t-test comparing knowledge scores between nurses who received motor development training in their curriculum versus those who did not. The tables compare the inclusion of motor development in the training curriculum with the observed levels of knowledge. This comparison was conducted to determine whether the inclusion of motor development training is associated with higher or lower knowledge scores among nurses.

Table 4. 23 Group statistics

Motor dev in curriculum		Frequency (n)	Mean	Std. Deviation	Std. Error Mean
Knowledge score	Yes	20	6.00	1.487	0.332
	No	4	5.50	1.915	0.957

Table 4. 24 Independent sample test

T-test for equality of means						
	Estimate	Df	p-values		95% Confidence Interval of the difference	
			One-sided p	Two-Sided p	Lower	Upper
Knowledge score	0.588	22	0.281	0.562	-1.263	2.263
	0.493	3.758	0.325	0.649	-2.387	3.387

Table 4. 25 Independent sample effect sizes

Independent samples effect sizes				
	Standardiser	Point estimate	95% Confidence interval	
			Lower	Upper

Knowledge score	Cohen's d	1.552	0.322	-0.759	1.396

Nurses with motor development training in their curriculum (n=20) achieved a mean score of 6.00 (SD=1.49), compared to 5.50 (SD=1.92) for those without training (n=4). This difference was not statistically significant, $t(22) = 0.588$, $p = 0.562$, with a small effect size (Cohen's $d = 0.322$).

4.5.8 Knowledge by years of experience

Tables 4.26 and 4.27 present the results of a one-way ANOVA conducted to examine whether nurses' knowledge scores differ according to their years of experience in their current position. This analysis compares the mean knowledge scores across different experience groups to determine if any statistically significant differences exist between them. By doing so, it helps to assess whether increased experience in the current role is associated with higher or lower levels of knowledge.

Table 4. 26 Analysis of variance of knowledge by years of experience

ANOVA-Table					
Knowledge score					
	Sum of Squares	Df	Mean Square	F	p-value
Between Groups	2.223	3	0.741	0.319	0.811
Within Groups	62.616	27	2.319		
Total	64.839	30			

Table 4. 27 ANOVA effect sizes of knowledge by years of experience

ANOVA effect sizes ^{a,b}			
	Point estimate	95% Confidence interval	
		Lower	Upper

Knowledge score	Eta-squared	0.034	0.000	0.138
	Epsilon-squared	-0.073	-0.111	0.042
	Omega-squared Fixed-effect	-0.071	-0.107	0.041
	Omega-squared Random-effect	-0.022	-0.033	0.014

One-way ANOVA revealed no significant differences in knowledge scores across experience categories (less than 2 years, 2-4 years, 4-5 years, 5-10 years, and 10+ years, $F(3,27) = 0.319$, $p = 0.811$, with negligible effect size ($\eta^2 = 0.034$)).

4.5.9 Knowledge by education level

Tables 4.28 and 4.29 present one-way ANOVA results examining knowledge differences across educational qualification levels. A one-way ANOVA was used in order to compare all the different educational qualification levels (groups) to see if there is a statistically significant difference between them.

Table 4. 28 Analysis of variance of knowledge by education level

ANOVA-table					
Knowledge score					
	Sum of Squares	Df	Mean Square	F	p-value
Between Groups	2.604	4	0.651	0.254	0.904
Within Groups	61.534	24	2.564		
Total	64.138	28			

Table 4. 29 ANOVA effect sizes of knowledge by education level

ANOVA effect sizes ^{a,b}				
		Point estimate	95% Confidence interval	
			Lower	Upper
Knowledge score	Eta-squared	0.041	0.000	0.101
	Epsilon-squared	-0.119	-0.167	-0.049
	Omega-squared	-0.115	-0.160	-0.047
	Fixed-effect			
	Omega-squared Random-effect	-0.026	-0.036	-0.011

No significant differences in knowledge scores were found across educational qualification levels, $F(4,24) = 0.254$, $p = 0.904$, with negligible effect size (eta-squared=0.041).

4.5.10 Knowledge by facility type

Tables 4.30 and 4.31 present one-way ANOVA results comparing knowledge scores across facility types.

Table 4. 30 Analysis of variance of knowledge by facility type

ANOVA-table					
Knowledge score					
	Sum of Squares	Df	Mean Square	F	p-value
Between groups	2.981	2	1.490	0.675	0.517
Within groups	61.858	28	2.209		
Total	64.839	30			

Table 4. 31 ANOVA effect sizes of knowledge by facility type

ANOVA effect sizes ^{a,b}				
		Point estimate	95% Confidence interval	
			Lower	Upper
Knowledge score	Eta-squared	0.046	0.000	0.208
	Epsilon-squared	-0.022	-0.071	0.151
	Omega-squared	-0.021	-0.069	0.147
	Fixed-effect			
	Omega-squared	-0.011	-0.033	0.080
	Random-effect			

Knowledge scores did not differ significantly across facility types (Hospital, Health Centre, Clinic), $F(2,28) = 0.675$, $p = 0.517$, with small effect size (eta-squared=0.046).

4.5.11 Knowledge by vaccination duties

Tables 4.32, 4.33, and 4.34 present the results of independent samples t-tests comparing knowledge scores between nurses who administer vaccines and those who do not. The t-test was used to compare the mean knowledge scores of these two groups to determine whether any observed difference between them is statistically significant.

Table 4. 32 Group statistics

Administers vaccines		N	Mean	Std. Deviation	Std. Error Mean
Knowledge score	Yes	27	5.89	1.553	0.299
	No	2	5.00	0.000	0.000

Table 4. 33 Independent sample T-test knowledge by vaccination duties.

		T	df	p-values		95% Confidence Interval of the Difference	
				One-Sided p	Two-Sided p	Lower	Upper
Knowledge Score	Equal variances assumed	0.796	27	0.216	0.433	-1.402	3.180
	Equal variances not assumed	2.975	26.000	0.003	0.006	0.275	1.503

Table 4. 34 Independent sample effect sizes of knowledge by vaccination duties

Independent samples effect sizes					
		Standardiser	Point Estimate	95% Confidence Interval	
				Lower	Upper
Knowledge score	Cohen's d	1.523	0.583	-0.866	2.023
	Hedges' correction	1.567	0.567	-0.842	1.966

Nurses administering vaccines (n=27) scored 5.89 (SD=1.55) compared to 5.00 (SD=0.00) for those not administering vaccines (n=2). When equal variances were not assumed, the difference was significant, $t(26) = 2.975$, $p = 0.006$, but the extremely small comparison group (n=2) limits interpretation.

4.6 Attitudes assessment

4.6.1 Distribution of individual attitude items

Table 4.35 presents frequency distributions showing response patterns for each attitude item.

Table 4. 35 Frequency distribution of individual attitude Items (N=35)

Characteristic	Category	Frequency (n)	Percent
Importance of monitoring	No	1	2.9
	Yes	33	94.3
	Maybe	1	2.9
	Total:	35	100
Monitoring identifies disability	Strongly disagree	0	0.0
	Disagree	2	5.7
	Neutral	1	2.9
	Agree	32	91.4
	Strongly agree	0	0.0
	Total:	35	100
One arm use concern	No	6	17.1
	Yes	21	60.0
	Maybe	8	22.9
	Total:	35	100
Prompt referral	Strongly disagree	3	8.6
	Disagree	0	0.0
	Neutral/Unsure	2	5.7
	Agree	5	14.3
	Strongly agree	25	71.4
	Total:	35	100
Early rehab referral	Strongly disagree	5	14.3
	Disagree	0	0.0

	Neutral/Unsure	1	2.9
	Agree	4	11.4
	Strongly agree	25	71.4
	Total:	35	100
Rehab at PHC	No	5	14.3
	Yes	30	85.7
	Total:	35	100
Service availability rating	Very poor	4	11.4
	Poor	3	8.6
	Fair	13	37.1
	Good	10	28.6
	Very good	5	14.3
	Total:	35	100
Training sufficiency	Not sufficient at all	4	11.4
	Not sufficient	6	17.1
	Neutral/Unsure	11	31.4
	Less sufficient	8	22.9
	Sufficient	6	17.1
	Total:	35	100
Feasibility of screening	Not likely at all	4	11.4
	Unlikely	2	5.7
	Neutral/Unsure	14	40.0
	Likely	4	11.4
	Very likely	11	31.4
	Total:	35	100
Time for Health Passport	10 minutes	10	28.6
	15 minutes	12	34.3
	30 minutes	3	8.6
	45 minutes	3	8.6
	60 minutes	1	2.9

	60 minutes or longer	3	8.6
	Missing	3	8.6
	Total:	35	100

Note: Items used different response formats. Items 1-2, 3, 6 used Yes/No/Maybe format (1-3 scale). Items 4-5 used 5-point Likert scale (1=Strongly Disagree to 5=Strongly Agree). Item 7 used 5-point quality scale (1=Very Poor to 5=Very Good). See Chapter 3, Section 3.7.3 for complete scale descriptions.

Near-unanimous agreement emerged on core attitudes: (n=33, 94.3%) said monitoring is important, (n=32,91.4%) agreed it identifies disability, (n=25,71.4%) strongly agreed on prompt referral importance, and (n=30,85.7%) supported rehabilitation at PHC level. However, service availability ratings were mixed, with (n=13, 37.1%) rating services as "Fair," 28.6% as "Good," and 20.0% as poor/very poor. Training sufficiency showed wide distribution: (n=11,31.4%) were neutral/unsure, 28.5% rated it insufficient, and 40.0% felt it was at least somewhat sufficient. Screening feasibility was split: (n=14,40.0%) were neutral/unsure, 42.8% saw it as likely/very likely, and 17.1% as unlikely. Most nurses (62.9%) estimated Health Passport completion at 10-15 minutes.

4.6.2 Descriptive statistics of individual attitudes items

Table 4.36 presents descriptive statistics for each attitude item, showing means, standard deviations, and ranges.

Table 4. 36 Descriptive statistics of attitudes items

Descriptive statistics					
	Frequency (n)	Minimum	Maximum	Mean	Std. Deviation
Importance of monitoring	35	1	3	2.00	0.243
Monitoring identifies disability	35	1	3	1.97	0.296
One arm use concern	35	1	3	2.06	0.639
Prompt referral	35	1	5	4.40	1.193

Early rehab referral	35	1	5	4.26	1.421
Rehab at PHC	35	1	2	1.86	0.355
Service availability rating	35	1	5	3.26	1.172
Training sufficiency	35	1	5	3.17	1.248
Feasibility of screening	35	1	5	3.46	1.314
Time for Health Passport	32	1	6	2.44	1.564
Valid N (listwise)	32				

Table 4.36 shows that Nurses are strongly endorsed the importance of monitoring motor development ($M=2.00$, $SD=0.24$ on 1-3 scale) and agreed that monitoring identifies disability ($M=1.97$, $SD=0.30$). They strongly agreed with prompt referral importance ($M=4.40$, $SD=1.19$ on 1-5 scale) and early rehabilitation referral benefits ($M=4.26$, $SD=1.42$). Service availability was rated as fair ($M=3.26$, $SD=1.17$), while training sufficiency ($M=3.17$, $SD=1.25$) and screening feasibility ($M=3.46$, $SD=1.31$) received neutral ratings. Most estimated 10-15 minutes for Health Passport completion ($M=2.44$, $SD=1.56$).

4.6.3 Overall attitude agreement score

Table 4.37 presents descriptive statistics for the composite attitude agreement score created from two items with matching scales.

Table 4. 37 Descriptive statistics of overall attitude score

Descriptive Statistics of Overall Attitude Score				
			Statistic	Std. Error
Attitude agreement score	Mean		8.66	0.418
	95% Confidence interval for mean	Lower bound	7.81	
		Upper bound	9.51	
	5% Trimmed mean		8.95	
	Median		10.00	
	Variance		6.114	

	Std. Deviation	2.473	
	Minimum	2	
	Maximum	10	
	Range	8	

The mean attitude agreement score was 8.66 out of 10 (SD=2.47), with scores ranging from 2 to 10. The median of 10 indicated that at least half of participants scored at or near maximum, while the 95% confidence interval ranged from 7.81 to 9.51.

4.6.4 Reliability of attitude scale

Table 4.38 presents reliability statistics for the attitude scale, assessing internal consistency of items measuring similar constructs.

Table 4. 38 Reliability test statistics

Reliability statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	N of Items
0.874	0.881	2

The attitude scale demonstrated excellent internal consistency with Cronbach's alpha of 0.874 for the two items sharing the same response scale, exceeding the 0.70 threshold.

4.6.5 Attitudes by training background

Table 4.39 below presents Mann-Whitney U test results comparing attitude scores between nurses with and without motor development training in their curriculum. Mann–Whitney U test was selected because; K–S: $p < .001$; S–W: $p < .001$. Clear normality violation; severe negative skew/ceiling effect.

Table 4. 39 Mann-Whitney Test

Mann-Whitney Test				
	Ranks			
Motor dev in curriculum		N	Mean rank	Sum of ranks
Attitude agreement score	No	5	4.90	24.50
	Yes	22	16.07	353.50
	Total	27		
Test statistics ^a				
			Attitude agreement Score	
Mann-Whitney U			9.500	
Wilcoxon W			24.500	
Z			-3.291	
Asymp. Sig. (2-tailed)			0.001	
Exact Sig. [2*(1-tailed Sig.)]			.002 ^b	
a. Grouping variable: Motor dev in curriculum				
b. Not corrected for ties.				

Nurses with motor development training (n=22) had significantly higher mean ranks (16.07) compared to those without training (n=5, Mean Rank=4.90). The Mann-Whitney U test showed a statistically significant difference, U=9.50, Z=-3.291, p=0.001.

4.6.6 Attitudes by years of experience

Table 4.40 presents Kruskal-Wallis's test results examining attitude differences across experience levels.

Table 4. 40 Kruskal-Wallis Test of attitudes by years of experience

Kruskal-Wallis Test			
	Ranks		
Years in position		N	Mean Rank

Attitude agreement score	10 years +	1	24.50
	5-10 years	7	21.29
	4-5 years	4	15.50
	2-4 years	13	16.46
	Less than 2 years	10	18.05
	Total	35	
Test statistics ^{a,b}			
		Attitude score	
Kruskal-Wallis H		2.209	
Df		4	
p-value		0.697	

No significant differences in attitude scores were found across experience categories (less than 2 years, 2-4 years, 4-5 years, 5-10 years, and 10+ years), $H(4) = 2.209$, $p = 0.697$, despite some variation in mean ranks.

4.6.7 Attitudes by education level

Table 4.41 presents Kruskal-Wallis's test results comparing attitudes across educational qualification levels.

Table 4. 41 Kruskal-Wallis test for attitudes by education level

Kruskal-Wallis Test			
Education level	Ranks	N	Mean rank
Attitude agreement score	Master's degree	4	22.50
	Honours degree	4	19.25
	Bachelor's degree	12	14.88
	Diploma	4	22.50
	Certificate	8	15.19

	Grade 12	1	4.00
	Total	33	
Test statistics ^{a,b}			
		Attitude agreement score	
Kruskal-Wallis H		7.801	
Df		5	
p-value		0.168	

Attitude scores did not differ significantly across educational levels, $H(5) = 7.801$, $p = 0.168$, although the p-value was lower than other demographic comparisons.

4.6.8 Attitudes by training sufficiency

Table 4.42 presents Mann-Whitney U test results comparing attitudes between nurses who perceive their training as sufficient versus insufficient.

Table 4. 42 Mann-Whitney Test for attitudes by training sufficiency

Mann-Whitney Test				
Training sufficient	Ranks	N	Mean rank	Sum of ranks
Attitude score	Insufficient	10	11.35	113.50
	Sufficient	14	13.32	186.50
	Total	24		
Test Statistics ^a				
			Attitude agreement score	
Mann-Whitney U			58.500	
Wilcoxon W			113.500	
Z			-0.722	
Asymp. Sig. (2-tailed)			0.470	
Exact Sig. [2*(1-tailed Sig.)]			.508 ^b	
a. Grouping Variable: Training Sufficient				

b. Not corrected for ties.	
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Nurses perceiving sufficient training (n=14) had slightly higher mean ranks (13.32) than those perceiving insufficient training (n=10, Mean Rank=11.35), but this difference was not significant, U=58.500, p=0.470.

4.7 Current practices assessments

4.7.1 Distribution of practice frequencies

Table 4.43 presents frequency distributions for all practice-related variables, revealing current patterns in motor development assessment practices.

Table 4. 43 Frequency distribution of practice characteristics

Characteristic	Category	Frequency	Percent (%)
Routine milestone check	No	3	8.6
	Yes	31	88.6
	System	1	2.9
Reason for not checking	Because of high patient volume	1	2.9
	By doing growth monitoring, weighing of babies and measuring height and muac	1	2.9
	For early detection of disabilities	1	2.9
	I believe it's the Occupational Therapist Job	1	2.9
	n/a	2	5.7
	No reason	1	2.9

	Shortage of staff. Work is overwhelming, no time for proper attention given and proper examinations.	1	2.9
	Therapy	1	2.9
	System	26	74.3
Response to concerns	Do not worry	1	2.9
	n/a	1	2.9
	Refer accordingly	24	68.6
	take the child to the hospital for screening and close monitoring	2	5.7
	System	7	20.0
Monitor preterm infants	No	8	22.9
	Yes	23	65.7
	Maybe	4	11.4
Delay recording method	All expected developmental milestones documented in patient notes as achieved/not achieved during each visit	20	57.1
	It is not documented	2	5.7
	Only achieved milestones documented in patient notes during each visit	6	17.1
	Only expected milestones not yet achieved are documented in patient notes during each visit	6	17.1
	System	1	2.9

Response to parent concern	Engage in the conversation by asking specific questions.	30	85.7
	I do not encourage the conversation as I do not have sufficient time to answer all their questions.	2	5.7
	I respond by telling them to ask the doctor when they see him/her.	2	5.7
	System	1	2.9
Action for parent concern	Flag for further surveillance at the next visit.	2	5.7
	Refer to another health professional who I consider to be more knowledgeable on child motor development	14	40.0
	Screen the child for any motor developmental delays.	18	51.4
	System	1	2.9
Management of delays	Advise on how the motor developmental milestones could be facilitated	5	14.3
	Refer to other healthcare professionals	7	20.0
	Refer to the doctor	21	60.0
	System	2	5.7
Discussion with colleagues	Strongly disagree	8	22.9
	Neutral	3	8.6
	Agree	3	8.6
	Strongly agree	19	54.3

	System	2	5.7
Familiar with tools	No	15	42.9
	Yes	19	54.3
	Total	34	97.1
	System	1	2.9

Most nurses (88.6%) reported routinely checking motor developmental milestones during immunisation visits. When concerns were identified, 68.6% reported they "refer accordingly." Two-thirds (65.7%) monitored motor development in preterm infants, while 22.9% did not. Documentation practices varied: 57.1% documented all expected milestones as achieved/not achieved, 17.1% documented only achieved milestones, 17.1% only unachieved milestones, and 5.7% did not document delays. Most nurses (85.7%) engaged with parent concerns by asking specific questions, with 51.4% screening the child and 40.0% referring to more knowledgeable professionals. When delays were detected, 60.0% referred to doctors, 20.0% to other healthcare professionals, and 14.3% provided facilitation advice. Familiarity with validated screening tools was split: 54.3% were familiar and 42.9% were not. Statistical analyses of practices by demographics were unreliable due to small cell counts (83.3% of cells with expected counts <5).

4.8 Relationship between knowledge, attitudes and practices (KAP Integration)

4.8.1 Correlations between KAP domains

Table 4.44 presents Spearman correlation coefficients examining relationships between knowledge scores, attitude scores, and key practice variables.

Table 4. 44 Correlation between knowledge, attitudes and practices

Correlations				
			Attitude Score	Knowledge score
Spearman's rho	Attitude score	Correlation coefficient	1.000	0.010
		p-value		0.959

		N	35	31
	Routine milestone check	Correlation coefficient	0.242	0.258
		p-value	0.167	0.161
		N	34	31

The link between knowledge and attitudes was negligible and non-significant ($p=0.010$, $p=0.959$, $n=31$). There were weak positive links between attitudes and routine milestone checking ($p=0.242$, $p=0.167$, $n=34$) and between knowledge and routine milestone checking ($p=0.258$, $p=0.161$, $n=31$), but neither reached statistical significance. These results indicated no strong relationships between the three KAP domains in this sample.

4. 9 Chapter summary

In summary, this chapter presented the findings of the study. The study revealed that while primary healthcare nurses demonstrated moderate knowledge and generally positive attitudes toward motor development monitoring, notable gaps persisted in distinguishing screening from surveillance and identifying developmental delays. Although most nurses routinely weighed children, checked milestones, and engaged parents during immunisation visits, these practices were often informal and inconsistently documented. Positive attitudes did not necessarily translate into stronger practices, as the relationships between knowledge, attitudes, and practices were weak and non-significant. Overall, the findings suggest that despite awareness of the importance of motor development assessment, a lack of standardised training, structured tools and clear protocols may limit consistent implementation in clinical practice.

This concludes the results chapter and discussion chapter will now follow.

CHAPTER 5: DISCUSSION

5.1 Introduction

This chapter discusses the key findings of the mixed-methods study examining motor development assessment among PHC nurses in Namibia. The discussion integrates qualitative insights from interviews with chief nurses and nurse managers with findings from the KAP survey by exploring implications for practice and policy while acknowledging study limitations.

The study aimed to assess nurses' knowledge levels regarding motor development assessment in children aged 0-24 months, analyse their attitudes toward implementing formal assessment systems, and examine current practices in primary healthcare settings after gaining an understanding from chief nurses, on existing expectations regarding opportunities to gain knowledge, attitudes observed and current practices on motor development monitoring. This chapter is organised according to the four study objectives and concludes with an integrated discussion of relationships between the KAP domains.

5.2 Discussion of key findings

5.2.1 Knowledge of motor development assessment

The present study showed that primary healthcare nurses in Namibia have moderate knowledge of motor development assessment.

The qualitative interviews provided contextual depth to quantitative findings, revealing that while chief nurses confirmed all nursing staff received formal training on motor development during their education, significant knowledge gaps persist in practice. Insights from the qualitative findings stated that basic training in childhood development is included in training curricula and that all nurses had exposure to that. Some participants confirmed during the interviews that training programs are conducted at the facilities and that materials are made available to assist

with knowledge skills. However, many participants confirmed that their training occurred long ago and follow-up training occurs occasionally. These findings align with the results from the quantitative surveys showing moderate levels of knowledge. Although all participants had the exposure to motor development during their training the time that has passed since and no regular follow-up courses could explain the findings.

Findings from LMICs have consistently documented knowledge gaps among healthcare workers regarding early childhood development. Hirani et al. (2025) found that approximately 78.6% of healthcare workers in secondary care maternal and child hospitals had low knowledge scores in early childhood development, with only three participants having received prior training specific to early childhood development. Comparing this to the Namibian context we can see that exposure during training does provide a baseline level of knowledge. Rojas et al. (2024) conducted a study in the State of São Paulo, Brazil. This study shared many similarities with the current study both were conducted in LMICs, in a specific state or region of the country. Both studies focused on healthcare providers working in the PHC level of health services. Rojas et al. (2024) found that 80% of the participants in their study had never undergone training in child development and the findings revealed a clear gap in understanding child development. It further showed that child development was seen either as physiological processes or cognitive abilities but in fact child development should be viewed in a much broader bioecological model. In comparison, the moderate knowledge levels in the current study suggest that the Namibian nurses may lack a comprehensive understanding of child development, which could lead to acknowledging isolated aspects without a deeper grasp of causes, impacts, and management.

Drawing conclusions from the findings of these studies, including the current study, it shows that including child development in training curricula prepares nursing staff to have some level of knowledge regarding identification of basic developmental milestones and identifying concerns. These qualitative insights help explain the moderate knowledge scores observed quantitatively, suggesting that while foundational concepts were covered in training, specific practical applications such as documentation procedures and comprehensive assessment techniques may have been inadequately addressed. To ensure an in-depth understanding and higher levels of

knowledge continuous development and assessment within this area should continue routinely amongst nursing staff.

Similarly, Ramu et al. (2024) demonstrated in their study that baseline knowledge levels among primary healthcare nurses were insufficient but showed significant improvement following targeted training interventions. The moderate knowledge levels observed in the current study suggest that while Namibian nurses possess foundational understanding of motor development concepts a targeted training approach could address the existing gaps that may currently compromise their ability to effectively identify children at risk of developmental delays during routine healthcare visits.

Examining individual knowledge items revealed specific areas of strength and critical weaknesses that warrant targeted intervention. All participants correctly identified the definition of developmental milestones, and 91.4% accurately defined motor developmental milestones, indicating strong conceptual understanding at the foundational level. Additionally, the mean age for crawling, and concern for rolling delays at six months were well understood. These strengths suggest that nurses have acquired basic knowledge of major motor milestones and can recognise some developmental red flags. However, critical knowledge gaps emerged in three areas that are essential for effective developmental surveillance. Nurses incorrectly believed that developmental screening and surveillance are interchangeable terms, representing a fundamental misunderstanding of two distinct approaches to developmental monitoring that have different protocols, purposes, and implementation strategies (Choo et al., 2019). Developmental surveillance is describes as and screening as (reference) Second, 77.1% incorrectly believed that infants show hand dominance within the first six months of life, when in fact hand dominance typically develops around 18-24 months (Shumway-Cook et al., 2023). This misconception could lead to misinterpretation of normal infant motor behaviour, for example a child presenting with hemiplegia may present with one sided hand use only and could be potentially be classified as typical development. Participants also incorrectly identified what constitutes motor developmental delay, suggesting insufficient knowledge for making accurate clinical decisions about when to refer children for further evaluation. These findings are consistent with Win and Mlambo's (2020) observation that lack of training for health personnel contributes

to incomplete implementation of developmental surveillance systems, even when structured tools like the Road-to-Health Booklet are available.

A quasi-experimental before-and-after single-group study by Vieira et al., (2023) assessed nurses' knowledge and practices regarding child growth and development surveillance in the Family Health Strategy (FHS) in João Pessoa, Paraíba, Brazil. The study followed SQUIRE guidelines and used a validated instrument based on Raymundo's assumptions. Thirty nurses from Health District I participated. The study showed that the educational intervention, grounded in Social Learning Theory, significantly improved nurses' knowledge and practices in child growth and development surveillance during childcare visits in primary healthcare. It was evident in higher post-intervention scores, broader understanding of child development follow-up actions, and a reduction in difficulty in answering knowledge and practice items, as confirmed by statistical analysis. In the current study the absence of significant knowledge differences across demographic variables including training background, years of experience, education level, and facility type presents a surprising and concerning pattern. Nurses who reported having motor development content in their training curriculum scored only marginally and non-significantly higher than those without such training. This finding contrasts with expectations that formal training would produce measurable knowledge gains and suggests several explanations. Based on the findings of Vieira et al. (2023) it is essential to consider implementing a context-specific and targeted educational model tailored to the Namibian setting.

The motor development content currently included in nursing curricula may be insufficient in depth, breadth, or quality to support sustained knowledge retention and effective translation into clinical competency. Qualitative findings reinforce this concern, as participants reported that their initial training occurred many years ago and that they now feel uncertain about how to conduct developmental monitoring using current practices. Interviewees consistently highlighted the substantial time lapse since their formal education, noting that the absence of ongoing reinforcement through continuing professional development has likely contributed to knowledge attrition.

Additionally, clinical experiences may not provide adequate opportunities for nurses to apply and consolidate their theoretical knowledge about motor development, limiting experiential learning.

The lack of association between years of experience and knowledge is particularly noteworthy and aligns with findings from similar contexts.

Govender et al. (2021) identified that healthcare workers in LMICs often lack opportunities to deepen their developmental assessment skills through practice, as systematic surveillance protocols are frequently absent or inconsistently implemented. This finding has important implications, suggesting that relying on experiential learning alone is insufficient for building competency in motor development assessment. Instead, structured, ongoing training and supportive supervision are essential to develop and maintain the knowledge base necessary for effective developmental surveillance. The WHO (2018) emphasises that strengthening workforce competencies through both pre-service and in-service training is a critical component of nurturing care frameworks in resource-limited settings.

5.2.2 Attitudes toward motor development assessment

Primary healthcare nurses demonstrated strongly positive attitudes toward the importance and value of motor development assessment, with most participants agreeing that monitoring motor development is important and an almost equal number endorsing its role in identifying disability. Furthermore, 71.4% strongly agreed that prompt referral is essential when developmental delays are observed, and 85.7% supported the provision of rehabilitation services at primary healthcare level. Findings indicate minimal attitudinal barriers to implementing motor development assessment and suggest strong professional commitment to child health and development. Study results confirm that nurses hold favourable views toward integrating developmental monitoring into routine primary healthcare services. These positive attitudes are consistent with findings from Kumar et al. (2024), who reported that even parents held positive attitudes toward early identification of developmental delays despite having limited knowledge, suggesting that favourable attitudes toward developmental monitoring may be widespread across stakeholder groups. The strong endorsement of monitoring importance and early referral observed in the current study creates a favourable foundation for implementing systematic developmental surveillance systems in Namibia, as attitudinal resistance is often a significant barrier to practice change in healthcare settings.

This strong positive outlook towards monitoring motor development may assist in improving the moderate knowledge scores and concerns regarding the current practices observed amongst PHC nurses toward monitoring motor development. David and Hamdy (2013) use the self-determination theory to explain motivational models in adult learning. Intrinsic motivation is recognised as a strong facilitator in adult learning. Leading us to believe that acquiring knowledge and developing improved practices might be better facilitated due to the strong positive attitude observed amongst participants in this study.

Hirani et al. (2024) emphasise the urgent need for educational and policy changes to fill the gaps in ECD knowledge and training for healthcare professionals in Pakistan. Participants noted that their knowledge limitations concerning ECD affect their practices in the field, but they still seek ways to support ECD within their healthcare system. These findings resonate with this study's results. Knowledge gaps exist, yet healthcare workers continue to advocate for routine monitoring of motor development. The qualitative findings strongly corroborated these positive quantitative attitudes, with participants unanimously recognising the importance of motor development monitoring. Furthermore, nurses demonstrated strong conviction about their professional role appropriateness, with one participant stating "*Yes, I may say 100%, yes, because normally we are the entry for everything, before the doctor the nurse is supposed to have detected that abnormalities*" (Interview G). This qualitative emphasis on professional responsibility reinforces the quantitative finding of strong positive attitudes and suggests deep commitment to developmental monitoring as part of nursing identity.

Despite these positive core attitudes, practical concerns arose that could hinder the implementation of developmental surveillance. Participants rated service availability as only fair on average, with substantial variations in perceptions. Only 42.9% of nurses rated services as good or very good. This suggests that nurses recognise that current health system resources may be insufficient for effective developmental monitoring. Similar findings concerning ECD within the health system were noted in Hirani et al. (2024). Nursing staffs' perceptions in the current study regarding training sufficiency were mixed, with 31.4% expressing uncertainty about their training adequacy and 28.5% perceiving their training as insufficient for recognising developmental delays. This lack of confidence in one's own competency, even among those with positive

attitudes toward the importance of monitoring, may inhibit nurses from taking initiative in developmental assessment or lead to over-reliance on referral rather than conducting initial screening themselves. Screening feasibility was also viewed with considerable uncertainty, as 40.0% of nurses were unsure whether they could realistically conduct formal screening given their current workload and resources, while only 42.8% perceived it as likely or very likely.

The qualitative data provided important insights regarding these practical concerns. Participants explicitly described barriers including staff shortages: *"Sometimes it's just lack of staff. So, they want to rush and finish everyone" (Interview E)* and *"Not in all cases because of shortages of staffs so the few we have tend to skip somethings in order to finish" (Interview J)*. The absence of structured programs was also evident: *"don't have programs that are fixed...So we don't have a fixed program" (Interview B)* and *"Nothing, not really" when asked about existing programs (Interview E)*. These practical concerns echo findings from Hirani et al. (2025) whose qualitative interviews revealed that major barriers to implementing early childhood development practices included time constraints, insufficient resources and tools, lack of institutional support, and competing clinical priorities. Similarly, Tuyisenge et al. (2023) and Govender et al. (2021) highlighted that resource constraints in LMICs create significant challenges for replicating surveillance systems developed in high-income countries, necessitating adaptations that account for local realities.

The finding that attitudes were significantly more positive among nurses who received motor development training in their curriculum, compared to those without such training, represents an important insight into factors that shape professional values and willingness to implement developmental monitoring. Unlike knowledge scores, which showed no significant difference by training background, attitudes demonstrated a strong association with training exposure. This suggests that training's primary impact may be attitudinal and motivational rather than purely knowledge-based, helping nurses appreciate the importance of developmental assessment and fostering professional identity that includes responsibility for monitoring child development. This finding aligns with evidence from Ramu et al. (2024) which found that targeted training for primary healthcare nurses significantly improved not only their knowledge but also their confidence and willingness to use developmental screening tools in practice.

Current findings suggest that incorporating motor development content into nursing education may be particularly effective at shaping professional attitudes that support implementation of developmental surveillance, even if knowledge gains require ongoing reinforcement through continuing education and supportive supervision. The qualitative data strongly supported this interpretation, with all participants expressing a strong desire for training: "I think it's very important to have a training like that for a standardised method because then everyone can do the same thing at the same time to achieve a common goal" (Interview A) and "Yes, it's very important to go for training. We need to update ourselves. Without training, we will not be able to identify milestone delays" (Interview B). Pedersen et al. (2022) similarly reported that caregiver education interventions improved both understanding and implementation of motor-promoting practices, showing that attitudinal change is a crucial factor through which education influences practice behaviours.

5.2.3 Current practices in motor development assessment

The finding that 88.6% of nurses regularly check motor developmental milestones during immunisation visits was unexpectedly high and more encouraging than rates reported in many similar settings. This high rate suggests that developmental surveillance has become part of routine child health services in Namibia, supported by the inclusion of developmental milestone sections in the Health Passport. When concerns about development were identified, 68.6% of nurses reported that they refer children appropriately, which shows sound clinical judgement and recognition of the need for further evaluation when delays are suspected.

Fischer et al. (2014) raised important points regarding practices in their study. They highlighted that early identification can only be meaningful in the long-term outcomes of a child's health if it is followed with intervention. They further highlighted a key challenge in the early identification of developmental disabilities, which is the lack of screening tools that are sensitive and responsive to local contextual differences. Factors such as cultural views on disability and the need for instruments adaptable across diverse settings must be considered. In this regard, it is encouraging to note that existing developmental monitoring practices are evident within the Namibian context, demonstrating action from appropriate care providers.

65.7% of participants reported monitoring motor development in preterm infants, a high-risk group that requires closer oversight due to the higher risk of developmental delays associated with prematurity (Taczala et al., 2021). These patterns suggest that many Namibian nurses view developmental monitoring as part of their job and act when concerns arise. However, nearly one-quarter (22.9%) of nurses reported that they do not monitor motor development in preterm infants. This presents a crucial gap given that this population faces substantially elevated risk of developmental delays and would benefit most from close surveillance and early intervention (Taczala et al., 2021).

The high rate of engagement with parent concerns, is notable, with 85.7% of nurses reporting that they engage in conversation by asking specific questions when parents raise developmental worries. This further indicates good interpersonal and clinical skills. Kumar et al. (2024) stress the importance of involving parents in the identification of developmental milestones. These findings are more positive than those reported in some similar studies. For example, Adeniyi et al. (2022) noted that surveillance, screening and monitoring of early childhood development remain limited in many LMICs, with systematic approaches often absent despite high prevalence of developmental delays.

The relatively strong practices observed in the current study may reflect Namibia's health system emphasis on primary healthcare and the relatively well-resourced nursing workforce, as noted in the Health Care Workforce Status Report (Ministry of Health and Social Services, 2022). The assessment practices described by participants reflect approaches documented in the literature, though with varying degrees of systematisation. Choo et al. (2019) stated that assessment of developmental delays should include detailed and systematic examination, which contrasts with the more opportunistic approach described by some participants in this study. The WHO (2018) recommends combining surveillance for child development with vaccination clinics to enhance early detection, which matches participants' reports of integrating assessments into vaccination visits. Govender et al. (2021) outlined that comprehensive history taking, understanding developmental milestones and muscle tone and reflex assessments are important in tracking motor development. However, participants in this study described more basic observational approaches. Kim (2022) noted that in Norway, assessments rely on the clinical judgment of public

health nurses and parental concerns, like the practices shared by participants. However, Adeniyi et al. (2022) emphasised that using validated screening tools leads to more systematic identification of delays, suggesting that the clinical judgment approach described by participants may miss some at-risk children. Lipkin et al. (2020) described that standard elements of paediatric care in organisations such as the CDC include systematic milestone checklists, which appears more structured than the practices described by most participants in this study. The variation in practice comprehensiveness identified in these interviews suggests that while developmental observation is occurring, implementation of more systematic, standardised approaches as recommended in the literature could strengthen the consistency and effectiveness of motor development monitoring in Namibian PHC settings.

The qualitative interviews provided valuable insights into these practice patterns, showing that while developmental assessment is occurring, approaches vary considerably. Participants described integrating assessment into routine visits, saying, *"You also need to screen that child. It's not just you just need to give him an vaccine? You have to check if this child is growing according to a milestone"* (Interview G) and *"Yeah, they do. As part of the vaccination. Yes. Especially at six weeks"* (Interview E). However, the interviews also revealed that assessment is often opportunistic rather than systematic, noting that, *"Monitoring if the mother also comes and complains to them"* (Interview B) and *"We are more in growth monitoring where you measure the weight"* (Interview D). This qualitative context helps explain the high quantitative self-reported checking rates while also revealing potential limitations in comprehensiveness and standardisation.

However, several notable gaps and inconsistencies in practice patterns raise concerns about the quality and comprehensiveness of developmental assessments being conducted. Despite the high rate of self-reported routine checking, only 54.3% of nurses reported familiarity with validated screening tools, creating a substantial discrepancy that suggests many assessments may be informal, non-standardised, or based on clinical intuition rather than evidence-based instruments. This gap is concerning because systematic use of validated screening tools has been identified as essential for reliable identification of developmental delays and is recommended by global health authorities including the WHO and CDC (Thompson, 2016). Using unstandardised

methods lead to variability in assessment quality and can result in missed cases or false positives, undermining surveillance efforts. Fischer et al. (2014) concluded that investment in research and development is necessary to improve the performance of existing assessment tools and their sustainability for primary healthcare settings. As discussed in the literature review, mimicking successful approaches from HIC in LMICs remains a challenge. This highlights two concerns within the Namibian context, which are the limited use of standardised developmental assessment tools, and the challenge of identifying or developing an appropriate tool that meets key criteria such as age range of applicability, required training, time and cost efficiency, specificity, sensitivity, predictive values and overall validity and reliability.

Documentation practices also showed significant inconsistency, with only 57.1% of nurses reporting that they document all expected developmental milestones as achieved or not achieved during each visit. 34.2% used partial documentation approaches and 5.7% did not document developmental delays at all. The qualitative data provided insight into documentation challenges, with participants openly admitting, *"Record keeping is very poor. So basically, I think we were not briefly talked about the milestone development record keeping" (Interview B)* and *"With my experience, that's where a gap is. Yes, you'll find some are really completed to date. Some that are just completed halfway" (Interview G)*. actors contributing to these documentation challenges included workload pressures, insufficient understanding of health passport sections, and competing priorities. Poor documentation affects continuity of care, complicates tracking developmental progress over time and limits the utility of the Health Passport as a long-term developmental record. Win and Mlambo (2020) identified similar challenges in South Africa, where equipment shortages and lack of training for health personnel resulted in lower completion rates of the Road-to-Health Booklet, despite its recognition as a surveillance tool.

When developmental delays are detected, 60.0% of nurses reported that they refer children to doctors, while only 14.3% reported providing advice on activities and stimulation to support motor developmental milestones. This heavy reliance on referrals rather than providing developmental guidance may reflect limited knowledge of facilitation strategies or lack of confidence in counselling families, representing a missed opportunity for primary-level intervention. The fact that 40.0% of nurses refer children to other professionals when parents

express concerns, instead of screening themselves, also suggests either good recognition of limitations or insufficient confidence and training to conduct assessments independently.

The qualitative interviews revealed varied experiences with detection and referral of delays. Some participants reported successful identification, *"Yes, a colleague of mine last year. picked up a child that was not walking and she was two years...when we pick up, we refer immediately to doctor" (Interview B)*, while others indicated limited experience, *"Sorry not yet. Never experience those babies or children" (Interview C)*. This variability in detection experiences, combined with the quantitative finding of limited tool familiarity, suggests inconsistent surveillance quality across facilities and practitioners. The barriers cited by nurses who do not routinely check milestones, including high patient volume, staff shortages, overwhelming workload, and belief that developmental assessment is the occupational therapist's job rather than nursing responsibility, align with findings from Hirani et al. (2025), who identified time constraints, insufficient resources, lack of institutional support, and competing priorities as major barriers to implementing early childhood development practices. These systemic challenges imply that improving practice patterns will require not only building individual capacity but also strengthening the health system to address workload, staffing, and resource limitations that hinder developmental surveillance, despite the positive attitudes and moderate levels of knowledge among nurses.

5.2.4 Relationships between knowledge, attitudes and practices

The lack of significant connections between knowledge, attitudes and practices represents a significant shift from the traditional KAP model assumptions, which suggest a straightforward progression from knowledge to attitudes to behaviour change. The almost non-existent connection between knowledge and attitudes suggests that these areas function independently, with attitudes shaped more by professional values, training experiences, and perceived importance rather than by factual knowledge alone. Similarly, the weak and insignificant correlations between knowledge and practices, as well as between attitudes and practices, show that knowledge and attitudes alone do not drive practice behaviours. These findings challenge simplistic views of behaviour change and suggest that factors beyond individual KAP characteristics play critical roles in determining whether nurses implement developmental

surveillance in practice. The high self-reported rate of routine checking (88.6%) combined with moderate knowledge levels (58.1%) and concerns about the sufficiency of training further highlight this disconnect. It suggests that nurses may be performing developmental observations without having full knowledge or following standardised methods. This pattern raises concerns about the quality and consistency of assessments being performed and highlights the complexity of translating positive intentions into effective clinical practice.

The qualitative findings also shed a light on the contextual factors that influence the relationships between KAP domains. They show why knowledge, and attitudes alone may not be enough to encourage practice. Participants identified vaccination visits as strategic entry points: *"it's part of them. When a child is coming for immunisation, you also need to screen that child"* (Interview G) and *"It should be a policy or guideline issue"* (Interview H). This suggests that structural factors and organisational expectations shape how practices are implemented. However, they also noted significant systemic barriers that prevent translation of positive attitudes into consistent practice. For example, one notes that, *"Sometimes it's just lack of staff. So, they want to rush and finish everyone"* (Interview E) and another noted the absence of programs, saying, *"No, there is not a platform or maybe anything. No. Yeah, we just see the child when they are coming in"* (Interview I). These qualitative insights help explain why the quantitative data showed weak KAP relationships, demonstrating that organisational context, resource availability, and systemic support structures mediate the translation of individual knowledge and attitudes into actual practice behaviours.

These findings align with implementation science literature that emphasises the importance of contextual factors, organisational support and systemic facilitators for practice change. Hirani et al. (2025) found that healthcare workers recognised the value of early childhood development, however, they faced multiple barriers such as, time constraints, lack of resources, insufficient institutional support and competing priorities that prevented consistent implementation. Similarly, Win and Mlambo (2020) demonstrated that even when surveillance tools like the Road-to-Health Booklet are available, system-level challenges such as equipment shortages and lack of training weaken completion rates. The WHO (2018) Nurturing Care Framework notes that strengthening services requires not only training the workforce but also offering supportive

supervision fostering collaboration across sectors, ensuring quality assurance and enabling policy environments. The weak KAP relationships observed in this study suggest that interventions focused solely on knowledge transfer or attitude change are unlikely to produce sustained practice improvements without simultaneously addressing systemic barriers. Govender et al. (2021) advocated for comprehensive approaches to developmental surveillance that include standardised guidelines, accessible screening tools, clear referral pathways and adequate rehabilitation services, recognising that while individual practitioner is necessary, it is not enough for effective surveillance systems. The small sample size in the current study may have limited statistical power to detect modest correlations, and the ceiling effect created by high self-reported checking rates may have restricted variance in the practice variable, further constraining correlation analyses. Nevertheless, the pattern of weak relationships underscores that implementing effective developmental surveillance requires multi-level interventions addressing individual competencies, organisational structures, health system resources, and policy frameworks.

5.3 Study limitations

Several limitations must be acknowledged when interpreting the findings of this study. The qualitative section involved a small number of participants as the focus was on depth. It was thus difficult to generalise findings to a larger population. Findings were context-specific for the specific clinics. Results may not apply to other settings or populations. Personal beliefs, expectations, or experiences may influence interpretation of the data. Further, difficulty in replication is observed because participant responses and contexts may change. The quality of the data depended on how open and honest participants were in being able to clearly express their experiences or perceptions.

For the quantitative section firstly, the low response rate of 31% from the 112 eligible nurses raises concerns about non-response bias and whether the sample truly represents the population. Nurses who participated may differ from those who did not, in their KAP, potentially leading to an over-estimation or under-estimation of true population characteristics. Those who

are more interested in child development or with more positive attitudes toward developmental monitoring may have been more likely to participate, potentially inflating the observed attitude scores and practice rates. On the other hand, those with more knowledge or better practices may have been more confident in participating, while those less knowledgeable may have avoided participation. The direction and magnitude of non-response bias cannot be determined from the available data, limiting confidence in generalizing findings to all primary healthcare nurses in Namibia.

Secondly, the small sample size of thirty-five participants for the quantitative section and ten participants for the qualitative section limited statistical ability to detect meaningful differences and relationships. The exclusion of three clinics due to accessibility and administrative reasons may have further affected the sample representation. Many demographic subgroups had very few members, such as only four nurses without motor development training and only two nurses who do not administer vaccines, making statistical comparisons unreliable. The inability to conduct chi-square analyses for practice variables by demographics due to 83.3% of cells having expected counts less than five represents a major analytical limitation that prevented examination of whether practice patterns differ across important demographic characteristics. Small sample sizes also produce wide confidence intervals around effect size estimates, creating uncertainty about the true magnitude of observed differences. Additionally, multiple statistical tests conducted on the small sample increase the risk of Type I errors (false positives) while lacking power to detect true differences (increasing Type II errors or false negatives). The lack of significant differences in knowledge based on training, experience or education may reflect a lack of power rather than true absence of relationships.

Moreover, the cross-sectional design limits our ability to determine the cause-and-effect relationships between variables. While the study found that nurses with motor development training had significantly more positive attitudes, one cannot tell from this study whether the training led to improved attitudes or if those with positive attitudes were more likely to seek training. Similarly, the direction of causality in relationships between KAP domains cannot be established. The design also captures only a single time point, providing no information about

temporal changes in knowledge, attitudes, or practices over the course of nurses' careers or in response to policy changes or training initiatives.

Furthermore, relying on self-reported data introduces various potential biases. Social desirability bias may have inflated self-reported practice rates, as nurses could over-report socially valued behaviours such as routine milestone checking and engagement with parent concerns while under-reporting less favourable behaviours such as dismissing parent concerns due to time pressure. The high rate of self-reported routine checking (88.6%) despite moderate knowledge levels and limited familiarity with validated tools suggests that self-report may not accurately reflect actual practice behaviours or may reflect variable quality of assessments. Recall bias may have impacted responses to questions about training background, typical practices and responses to specific scenarios. The discrepancy between self-reported practices and independently observable behaviours cannot be quantified without direct observation or chart audit, limiting confidence in the accuracy of practice findings.

Another limitation is that generalizability of findings is limited by the sampling approach and context-specific factors. Participants were recruited from a single region of health facilities, which may limit the representativeness across Namibia's diverse geographic and resource contexts. The sample included more hospital-based nurses compared to clinic-based nurses, which may not reflect the distribution of nursing workforce in primary healthcare settings. The findings might not extend to other African countries or LMICs with different health system structures, nursing training approaches, cultural contexts or child health priorities. The Namibian health system emphasises primary healthcare and has a relatively well-resourced nursing workforce, which may create conditions that differ from those in other resource-limited settings, affecting how the findings can be applied. Despite these limitations, the study offers valuable preliminary data on KAP among primary healthcare nurses in Namibia. It highlights clear priorities for improving motor development assessment capacity and provides baseline evidence that can inform the development of interventions and future research.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This mixed-methods study provides crucial baseline evidence on the knowledge, attitudes and practices of primary healthcare nurses in Namibia regarding motor development assessment in children aged 0-24 months. The findings present a complex picture with moderate knowledge levels, strongly positive attitudes and high self-reported practice rates, along with significant gaps and inconsistencies that need attention. By combining quantitative survey data with qualitative insights from chief nurses and nurse managers, the study highlights both individual skills and systemic factors that affect the implementation of developmental surveillance.

Primary healthcare nurses demonstrated basic understanding of developmental concepts. However, they exhibited critical knowledge gaps in differentiating screening from surveillance approaches, recognising typical versus atypical development patterns, and identifying developmental delays. Surprisingly, knowledge levels were similar across different training background, years of experience, education level and practice setting, this suggests that knowledge gaps are common across demographic groups and that current training may not be enough to produce lasting competency. Qualitative interviews confirmed this finding, indicating that while motor development content is universally included in nursing curricula, the gap between initial training and current practice, combined with limited refresher opportunities, contributes to knowledge loss and uncertainty about proper assessment techniques. The lack of association between years of experience and knowledge indicates that clinical experience alone does not compensate for gaps in formal training, highlighting the need for structured educational interventions and ongoing professional development.

Nurses had overwhelmingly positive attitudes toward motor development assessment. They nearly all agreed on the importance of monitoring, its role in identifying disabilities and the need for prompt referral and early intervention. This positive foundation supports systematic developmental surveillance and suggests minimal barriers to practice change. Chief nurses and nurse managers unanimously saw developmental monitoring as an important professional responsibility and expressed a strong need for standardised training, with many describing this

need as urgent. However, practical concerns about service availability, training sufficiency and screening feasibility tempered this enthusiasm, Nurses recognised that systematic might hinder the implementation, despite their positive intentions. The finding that attitudes were significantly shaped by training exposure contrasts with knowledge, which showed no effects from training. This suggests that education serves important functions beyond knowledge transfer, fostering professional values and commitment to developmental monitoring, which could help change practices.

Current practice patterns revealed both strengths and weaknesses. The high rate of self-reported routine checking rate of 88.6% indicates that developmental surveillance has become more common in Namibia's primary healthcare system. Most nurses showed appropriate responses to developmental concerns through referrals and engagement with parents. Qualitative data confirmed that nurses include developmental observation into vaccination visits, particularly during six-week examinations. However, a significant number of nurses were unfamiliar with validated screening tools (42.9%), had inconsistent documentation practices and heavily relied on referrals, instead of providing developmental guidance. These issues raise concerns about the quality, thoroughness, and consistency of their assessments. The gap between high checking rates and limited tool familiarity suggests that many assessments might be informal or unstandardised, which could potentially compromising reliability and effectiveness of surveillance efforts. Qualitative interviews revealed that documentation challenges stem from several factors including staff shortages leading to rushed visits, insufficient understanding of health passport sections and competing priorities during busy clinic sessions.

The weak and non-significant relationships between knowledge, attitudes and practices challenge traditional KAP model assumptions. They highlight the complexity of changing behaviour in healthcare settings. The findings suggest that neither knowledge nor attitudes alone are enough to drive high-quality practice, and that systemic factors such as workload, resources, tools, organisational support and clear protocols play critical mediating roles. Qualitative insights shed a light on these contextual barriers, with participants mentioning staff shortages, absence of structured programs and standardised screening tools and lack of ongoing professional development opportunities that prevent the translation of positive attitudes into consistent,

systematic practices. To implement effective developmental surveillance, multi-faceted interventions are needed. These should address individual competencies through training, strengthen organisational structures through supportive supervision and quality assurance, improve health system capacity through resource allocation and tool provision, and establish clear guidelines and protocols at the policy level. The study has limitations, particularly the low response rate and small sample size in the quantitative part, which limit generalisability and statistical power. This necessitates cautious interpretation and replication with larger, more representative samples.

Despite these limitations, the study offers valuable insights by being the first systematic mixed-methods assessment of primary healthcare nurses' capacity for motor development surveillance in Namibia. It identifies specific knowledge gaps and practice inconsistencies that require attention, documents positive attitudes that can help with implementation, and shows that comprehensive, system-level approaches are necessary rather than knowledge-focused interventions alone. **The results should be used to inform both curriculum development at training level and continuous professional development.** The integration of quantitative and qualitative data provides a rich understanding of not only what gaps exist but also why these gaps persist and what contextual factors influence implementation. Importantly, the study identified potential facilitators that can be leveraged, such as the existing vaccination infrastructure that provides regular contact with infants, programs like EPI and IMCI that provide foundational structures, and nurses' strong professional commitment and desire for enhanced capacity.

Health promotion programs will further strengthen the awareness and commitment from parents to follow through on vaccination visits and have the opportunity to benefit from additional health services with regular surveillance. The findings are consistent with the priorities of the WHO Nurturing Care Framework, particularly the emphasis on strengthening workforce competencies, updating service standards, providing supportive supervision, and monitoring progress toward universal developmental surveillance. For Namibia, these results highlight a clear opportunity to better align national primary healthcare practices with expectations set by World Health Organisation and UNICEF. Enhancing healthcare workers' knowledge of motor development will not only improve early detection of developmental delays but also strengthen

routine child health surveillance. In addition, building this capacity may empower nursing staff to assume greater leadership roles in monitoring and evaluation, thereby contributing to overall health system strengthening. By establishing baseline evidence on current knowledge, attitudes, and practices (KAP) and identifying specific targets for intervention, this study provides a robust foundation for the design, implementation, and evaluation of initiatives aimed at improving early identification of children at risk of developmental delays within Namibia's primary healthcare system.

6.2 Recommendations

Based on the study findings and their implications for policy, practice and research, the following recommendations are proposed:

6.2.1 Recommendations for training and education

Nursing curricula should integrate both theoretical and practical components on motor development assessment to improve knowledge and confidence. Ongoing training and refresher courses should support evidence-based methods and ensure that skills are retained.

6.2.2 Recommendation for parent training

Parents should be educated on developmental milestones as part of antenatal classes and the warning signs to look for during specific stages of child development. This education should ideally start during pregnancy and be delivered in local Namibian languages to ensure better understanding and access. Such early education can improve timely screening by enabling parents to raise concerns with nurses during routine visits.

6.2.3 Recommendations for health system strengthening

The Ministry should implement approved developmental screening tools and ensure consistent use across facilities. Clear referral protocols, adequate staffing and supportive supervision systems are necessary to improve the quality of assessments and follow-up.

6.2.4 Recommendations for policy development

National guidelines should set standard procedures for developmental surveillance and clarify the responsibilities of nurses. Additionally, policies must ensure that resources are allocated adequately, promote collaboration across sectors and hold everyone accountable for consistent implementation.

6.2.5 Recommendations for future research

Future studies should use larger, multi-site designs to improve generalizability and examine contextual barriers. Research on intervention and validation research is needed to assess the impact of training, effectiveness of tools and improvements at the system level.

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LIST OF APPENDICES

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Appendix B: Ethical approval MoHSS

Appendix C: Ethical approval WCH

Appendix D: Ethical approval IHK

Appendix D: Ethical approval Khomas regional office

Appendix E: Cover letter

Appendix F: Consent form

Appendix G: Interview guide

Appendix H: Participant questionnaire



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FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES

DECISION/FEEDBACK ON RESEARCH PROPOSAL ETHICAL CLEARANCE

Dear Prof/Dr/Mr/Ms/Other(s):

Ms Zenra Lynn Buys

Student No (if applicable): 223137197

Research Topic:	Knowledge, attitudes and practices among primary healthcare nurses regarding motor development in children aged 0-24 months in the Khomas region, Namibia.
Supervisor (if applicable):	Dr TW Shumba
Co-supervisor(s): if applicable	Ms Carolie Cloete
Qualification registered for (if applicable):	Master of Health Sciences

FHNRAS:09/2025

Re: Ethical screening application No:

The Research Ethics Screening Committee has reviewed your application for the above-mentioned research project. Based on the recommendation of the expert reviewer, the research as set out in the application is hereby:

(Indicate with an X)

Approved: i.e. may proceed with the project	X	
Approved provisionally: i.e. may proceed but subject to compliance with recommendation(s) listed below		
Not approved: Not to proceed with the project until compliance with recommendation(s) listed below and resubmit ethics application for consideration		
IS MINISTRY OF HEALTH & SOCIAL SERVICES (MoHSS) APPROVAL REQUIRED?	YES: X	NO:

It is important to note that as a researcher, you are expected to maintain ethical integrity of your research, strictly adhere to the ethical policy of NUST, and remain within the scope of your research proposal and supporting evidence as submitted to the REC. Should any aspect of your research change from the information as presented, which could have an impact or effect on any research participants/subjects/environment, you are to report this immediately to your supervisor or REC as applicable in writing. Failure to do so may result in withdrawal of approval. Kindly consult your supervisor or HoD if you need further clarification.



REPUBLIC OF NAMIBIA

MINISTRY OF HEALTH AND SOCIAL SERVICES

Ministerial Building
Harvey Street
Private Bag 13198, Windhoek

OFFICE OF THE EXECUTIVE DIRECTOR

Tel: No: 061 -203 2139
Fax No: 061-222 558
Stark.Katokele@mhss.gov.na

Ref: 22/3/1/2

Date: 27 May 2025

Enquiries: Mr. S. Katokele

Ms. Zenra L. Buys
Namibia University of Science and Technology
Windhoek

Dear Ms. Buys

Title: Knowledge, attitude and practices among primary healthcare nurses regarding motor development in children aged 0-24 months in the Khomas Region, Namibia.

1. Reference is made to your application to conduct the above study.
2. The proposal has been evaluated and found to have merit.
3. Kindly be informed that permission to conduct the study has been granted under the following conditions
 - 3.1 The data to be collected must only be used for academic purposes;
 - 3.2 No other data should be collected other than the data stated in the proposal;
 - 3.3 No any specimen should be collected from Human Subjects;
 - 3.4 Stipulated ethical considerations in the protocol related to the protection of Human Subjects' information should be observed and adhered to; any violation thereof will lead to termination of the study at any stage;
 - 3.5 A quarterly report to be submitted to the Ministry's Research Unit;
 - 3.6 Preliminary findings to be submitted upon completion of the study;
 - 3.7 Final report to be submitted upon completion of the study;
 - 3.8 Separate permission should be sought from the Ministry for the publication of the findings.
4. All the cost implications that will result from this study will be the responsibility of the applicant and not of the MoHSS.

Yours sincerely,


PENDA ITHINDI
EXECUTIVE DIRECTOR





REPUBLIC OF NAMIBIA

MINISTRY OF HEALTH AND SOCIAL SERVICES

Private Bag 13215

Windhoek

NamibiaEmail: Amanda.Mootu.mhss.o.na@S.I.a.lin.e.mhss.ov.na

Harvey Street

Tel. No: (061) 2033024/3437

Fax No: (061) 222886

Enquiries: Mr D. Gariseb

Ref: 22/4/2/3

Date 14 July 2025

Windhoek Central Hospital OFFICE OF THE MEDICAL SUPERINTENDENT

Ms. Zenra L. Buys

Namibia University of Science and Technology

Windhoek

Conduct number 0813318481

Dear Ms. Buys

SUBJECT: PERMISSION TO CONDUCT A RESEARCH STUDY TITLED: KNOWLEDGE, ATTITUDE AND PRACTICES AMONG PRIMARY HEALTHCARE NURSES REGARDING MOTOR DEVELOPMENT IN CHILDREN AGED 0-24 MONTHS AT WINDHOEK CENTRAL HOSPITAL.

Reference is made to the above-mentioned subject:

Kindly be informed that permission has been granted to collect data on the above mentioned subject under the following conditions:

1. Patient /client information's should be kept confidential at all times
2. Consent to be obtained from the health care workers and patients to be interviewed.
3. The purpose for data collection is only for your study purposes as you have requested and does not include any remuneration.
4. Preliminary findings to be submitted to Customer care office, Windhoek Central Hospital upon completion of the study.



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REPUBLIC OF NAMIBIA
Ministry of Health and Social Services

Private Bag 13215
WINDHOEK
Namibia

Intermediate Hospital Katutura
Independence Avenue
WINDHOEK

Telephone (061) 203 4011
Tele fax (061) 222706
Email: Ndateelela.Amukuhu@m hss.gov.na

Enquiries: Ms. N. Amukuhu

Date: 22 July 2024

OFFICE OF THE CHIEF MEDICAL OFFICER

MS. ZENRA BUYS
UNIVERSITY OF NAMIBIA WINDHOEK,
NAMIBIA

Dear Ms. Buys,

SUBJECT: APPROVAL TO CONDUCT ACADEMIC RESEARCH

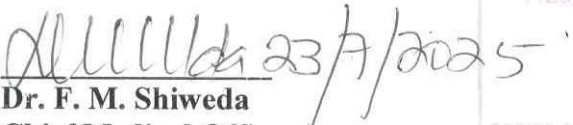
We trust this communication finds you well.

This letter serves to confirm that your application to conduct academic research at Intermediate Hospital Katutura has been approved. You are hereby granted permission to carry out your study titled: "Knowledge, Attitudes and Practices Among Primary Healthcare Nurses Regarding Motor Development in Children Aged 0-24 Months in the Khomas Region, Namibia. "

- a) Kindly take note of the following condition:
- b) Present the approval letter to the Head of Department or Senior Medical Officer of the concerned Department before resuming with your research.
- c) Upon completion, a copy of your final research findings must be submitted to this office upon completion of your study.

We wish you success in your academic endeavours and trust the above is in order.

Yours in Health,


Dr. F. M. Shiweda

Chief Medical Officer

re F. M. Shiweda



REPUBLIC OF NAMIBIA
MINISTRY OF HEALTH AND SOCIAL SERVICES

OFFICE OF THE REGIONAL DIRECTOR

Private Bag 13322

Windhoek
Namibia

Khomas Directorate
Florence Nightingale Street
Windhoek

Tel. (061) 203 5010
Fax: (061) 235997
International: (264 61 235997)

Enq: Mr. Aron Mushaandja

Ref: PF

Date: 28 July 2025

STAFF MATTER: CONFIDENTIAL

MS. ZENRA L. BUYS
0813318481
WINDHOEK

Dear Ms. Buys

RE: "KNOWLEDGE, ATTITUDES AND PRACTICES AMONG PRIMARY HEALTHCARE NURSES REGARDING MOTOR DEVELOPMENT IN CHILDREN AGED 0-24 MONTHS IN THE KHOMAS REGION, NAMIBIA." DIRECTORATE: KHOMAS REGION, DIVISION: DISTRICT HEALTH AND SOCIAL WELFARE SERVICES

1. Reference is made to your letter dated 15 March 2025.

2. I have pleasure to inform you that on recommendation of the Executive Director, permission has been granted for you to conduct a study on "Knowledge, attitude and practices among primary healthcare nurse regarding motor development in children aged 0-24 months at Khomasdal Health Centre, Katutura Health Centre, Okuryangava Health Centre, Wanahenda Clinic, Maxuilili Clinic, Donkerhoek Clinic, Baumgartsbrunn Clinic, Dordabis Clinic, Goreangab Clinic, Groot Auk Clinic Windhoek", Khomas Region, for a period of two (2) weeks and one (1) day with effect from 04 August 2025 until 18 August 2025.

3. The office wishes you success with your research.

Yours sincerely

HEALTH
SERVICES
DIRECTOR

0

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WINDHOEK

KHOMAS REGION

3

MINISTRY OF
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2025 - ()
3

TEL NO: 061
p/BAG 13322

DIRECTORATE

TOMAS UKOLA
DIRECTOR: KHOMAS REGION

Ply
J NAMIBIA

Cover Letter:

The study is titled: Knowledge, attitudes and practices among primary healthcare nurses regarding motor development in children aged 0-24 months in the Khomas region, Namibia.

Zenra Buys

Physiotherapy Lecturer

University of Namibia, Windhoek

Cell: +264 81 331 8481

Email: zenrabuys@gmail.com

15 March 2025

To Whom It May Concern,

Re: Cover Letter for Master's Research Study Proposal

I am writing to formally present my research proposal as part of the requirements for the Master of Health Sciences degree at the Namibia University of Science and Technology (NUST). I am currently employed as a physiotherapy lecturer at the University of Namibia, and I am pursuing this study as part of my academic advancement and contribution to Namibia's healthcare system.

The title of my proposed research study is: **"Knowledge, Attitudes and Practices among Primary Healthcare Nurses Regarding Motor Development in Children Aged 0–24 Months in the Khomas Region, Namibia."**

This study aims to assess the knowledge, attitudes, and practices (KAP) of primary healthcare nurses regarding the routine monitoring of motor development in young children during immunization visits at primary healthcare facilities in the Khomas region.

A list of the clinics to be included for data collection are:

1. Katutura Health Centre
2. Khomasdal Health Centre
3. Okuryangava Health Centre
4. Wanaheda Clinic
5. Maxuilili Clinic
6. Donkerhoek Clinic
7. Baumgartsbrunn Clinic
8. Dordabis Clinic
9. Goreangab Clinic
10. Groot Aub Clinic

The method of data collection includes: A one-one interview with the head nurse at each facility. This interview process is between 20-30 minutes. This is followed with a questionnaire(form) to be sent out to all nurses working in the facility to be completed by themselves and sent back to the primary researcher. This will be done in their own time.

The rationale for this research stems from the critical role primary healthcare nurses play in early child development surveillance, particularly through the use of the Namibian health passport. This passport serves as a tool to track key developmental milestones and enables early identification₁ of delays, which is essential for timely intervention and better long-term outcomes.

The study will utilize a self-administered questionnaire comprising four sections with a total of 38 questions. Participants will include primary healthcare nurses working in the Khomas region, identified based on their regular interaction with infants and toddlers during routine immunization appointments. Their insights will contribute

Interview Guide:

Interview conducted with the head nurse in the unit at each primary health care facility administering routine vaccinations to infants and children.

Introduction to the study:

The objective of this study is to assess the knowledge, attitudes, and practices (KAP) of nurses regarding the early identification of developmental delays. By exploring these variables, the study seeks to identify gaps in knowledge and areas where educational interventions may be necessary to enhance early detection practices. The findings from this research will contribute to the development of standardized monitoring protocols and referral systems, ensuring timely interventions for children with developmental delays. Additionally, the results may identify specific areas where knowledge deficits are prevalent, enabling targeted educational initiatives to highlight the importance of routine monitoring and its role in facilitating early referral to appropriate interventions.

This interview serves as a method to obtain a baseline of what the expectations are regarding routine monitoring of motor development amongst nurses administering vaccinations to infants and children.

The interview includes fourteen (14) questions and the length of the interview will be determined by the feedback received during questioning and answering, it is estimated to be 15-30 minutes. The interview will be recorded. It will then be transcribed and given an anonymous code. The interviewee will document only specific observations during the interview.

Participation in this research study is entirely voluntary, and you may withdraw at any time prior to the completion of the interview. Please note that once the interview is completed and transcribed, all personal identifying information will be removed, and the data will be anonymized using a coding system. After this point, withdrawal from the study will not be possible, as the data will no longer be linked to any specific individual. Your privacy and confidentiality is of utmost importance, and every effort will be made to protect your identity throughout the study. Should you choose to withdraw, you will not incur any penalty or loss of benefits to which you are normally entitled. There will be no negative consequences for your decision to not partake or withdraw from the study.

As the researcher, I may also decide to not include your questionnaire in the study if it does not comply to the study requirements. You will not incur any costs associated with your participation. Any information you share will be kept confidential and used solely for the purposes of this research. The information discussed will not be used against you or your interests.

During and after the research we will not use your name or that of your organization against the information you give, but we will use codes to represent you or your organization. All information collected will be entered into and stored on google drive and a computer and will be password protected. The researcher will be the only person who can access all the information. All the information which is collected for the purpose of this research will be disposed of after five years.

Furthermore, you shall be treated with respect and your views and opinions will be respected during the entire research.

(Attached for your consideration is a copy of my full research proposal.) Should you have any queries about my research you may also contact my Supervisors: Dr. TW Shumba at tshumba@unam.na or Ms. Carolie Cloete at ccloete@nust.na

CONSENT FORM

If you would like to take part, please read the Information sheet attached and this form carefully and feel free to read my research proposal. Please place a cross in the boxes that apply to you and sign your name at the end.

I have been informed about the study entitled: **“Knowledge, attitudes and practices amongst primary healthcare nurses regarding motor development in children aged 0-24 months in the Khomas region, Namibia.”** by..... (Provide name of researcher).

I confirm that I have understood the purpose and procedures for the above study.

Study Title:

Knowledge, attitudes and practices among primary healthcare nurses regarding motor development in children aged 0-24 months in the Khomas region, Namibia.

Take a break and have a coffee, while you take a few minutes to scan this code and answer questions related to the above study.

