

Determinants of hospital quality using infant morbidity in Namibia - an instrumental variable approach on 2009 SPA data



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A Research Report Submitted to the Faculty of Health Sciences, University of the Witwatersrand in partial fulfilment of the requirements for the Degree of Masters in Epidemiology in the field Biostatistics and Epidemiology

October, 2022

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Declaration

I hereby declare that except where specific reference is made to the work of others, the contents of this dissertation are original and have not been submitted in whole or in part for consideration for any other degree or qualification in this, or any other University. This dissertation is the result of my own work and includes nothing which is the outcome of work done in collaboration, except where specifically indicated in the text. This dissertation contains less than 21.820 words including appendices, bibliography, footnotes, tables and equations and has less than 150 figures.

Mildrate Murandu
2022

A handwritten signature in black ink, appearing to read 'Mildrate Murandu'. The signature is stylized with a large, looped initial 'M' and a series of connected, fluid letters for the rest of the name.

Acknowledgements

And I would like to acknowledge my supervisors Professor Eustasius Musenge and Dr Ijeoma Edeka for their unwavering support and supervision during my research writing period. I also extend my heartfelt gratitude to my lectures for imparting knowledge which helped me in my research.

Dedication

I want to dedicate this research to my daughter, Tatenda Marimira, whose presence has kept me going even in times when I felt like giving up.

Abstract

Background: Hospital quality of care is of importance to any health care system. High quality care contributes significantly to improved population health as well as reducing health costs. Hospital readmissions or revisits are potential indicators of health care quality.

Rationale: Despite the complexities found in measuring hospital quality, it remains of paramount importance. In developing countries there is paucity of evidence on the determinants of health care quality within health facilities. Availability of a skilled health care workforce has been identified as a challenge affecting health service delivery and there is limited knowledge on its causal effect. Governments need data -driven evidence to establish good and sound health frameworks and policies that seek to address the existing gaps.

Objectives: To determine prevalence of child readmissions by socio-demographic and health systems characteristics of health facilities in Namibia and further establish the effect of the type of qualification of the provider on child readmissions as a proxy of quality of care.

Methods: The cross-sectional study design used data drawn from the Namibia Service Provision Assessment (SPA). The data was collected from the sick child caregiver using a standardized interview questionnaire and a separate questionnaire was used for the Health Worker/Provider Interviews. The study restricted analysis to child health service provision data collected in 2009 from 411 facilities and a total of 816 individual observations. Probit and Instrumental Variable (IV) probit analysis, accounting for unobserved confounding factors, was used to explore the causal effects observed and control unobserved treatment variables on the outcome of interest (child readmissions)

Results: The IV probit results showed that the overall probability of a child revisiting for the same illness at the facility after the first encounter was 0.3. Highly skilled medical officers or physicians and medical assistants had a positive effect (increase) on readmission (medical officer coefficient (p value); 0.272 (0.737), medical assistant coefficient (p value); 1.522(0.135) though insignificant. The type of visit by the child had a strong effect on readmission (at less one percent level); marginal effects showed that a follow up visit increased the probability of readmission by 35%. The relationship of the caregiver to the child had statistically significant effect on child readmission ($p < 0.001$). The age of the provider and sex of provider had significant effect on child readmission (at five percent level). Other factors associated with child readmission were type of health facility, number of years the facility has been providing child health care services and the type of visit.

Conclusion: While health system related factors; sex, age of provider, type of health facility and type of visit were the most significant factors, socio-demographic factors were also noted. Our study findings highlight the influence of health personnel on health outcomes which can be addressed from a policy perspective. We conclude that if health policies are directed toward improving the skills of health care providers, then the quality of health care will be improved.

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NOMENCLATURE

CQI: Continuous Quality Improvement

HIV/AIDS: Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome

IV: Instrumental Variable

MoD: Ministry of Defence

MoHSS: Ministry of Health and Social Services

NGO: Non-Governmental Organisation

NHPF: National Health Policy Framework

PHC: Primary Health Care

QA: Quality Assurance

SPA: Service Provision Assessment

UNICEF: United Nations Children's Fund

VCT: Voluntary Counselling and Testing

WHO: World Health Organisation

1.0 INTRODUCTION

1.1.1 Background

Improving quality of care is increasingly becoming important for improved population health and patients' experiences of care while simultaneously reducing health care costs (1). Traditionally this was left to individual clinicians, poor health outcomes such as death or infections were used to monitor and find ways to improve the quality of care (2); clinicians were confident that they alone were mandated to assess and manage the quality of care (2). This situation has changed dramatically; quality of care dimensions for patients are now encompassing to include access and effectiveness: these are commonly discussed in terms of the structure of the health care system, processes of care, and patient outcomes resulting from care (3).

Measures of quality of care

The notion of health care is based on three major cornerstones: quality, access, and cost. Although the three are inter-dependent, quality has a stronger impact on the two other cornerstones (4, 5). Quality is accomplished when service provision is done in an efficient, cost-effective and acceptable manner (5). According to Donabedian, many different approaches can be used to measure quality of care (6). Evaluation of quality of care can be done by assessing the structure in which care is delivered, assessing the process of care and/or outcomes of care (7). Generally, there has been more focus on outcome measures in assessing quality of health care, there are several reasons for this; mainly because the goal of quality measurement is to offer care that improves the patient's health-leading to patient satisfaction

(5). Secondly, the use of structural and/or process variables alone may be invalid because improvements in such measures may not improve health (8).

Outcome Measures

Outcome measures for quality of care are increasingly used to monitor and compare hospital performance to identify areas for improvement (9). Hospital readmissions/revisits is one of the commonly used outcome measures of quality of care (9). It has been established that problems relating to readmissions are much compounded in poorly resourced regions including sub-Saharan Africa (14, 15). This could be due to multiple factors within and outside the health system (15-17). However, limited resources and overburdened health care systems have been cited as playing a major impact (14). Health care systems differ by region and thus introspection into health care service delivery through quality of care assessments must be done to reduce morbidity and mortality (16, 17). There also exist differences in the burden of diseases for specific regions and countries hence the need to contextualize health challenges and identify local solutions and priority areas.

Previous studies in various regions have found several factors as contributors to variations in hospital readmissions. These factors are associated with the hospital such as ownership, bed size, volume, teaching status, and staffing (12). The other factors are related to the patient-level socio demographics such as race, health literacy, and social support (13), and other patient social support and community factors that are outside the control of the hospital. Some studies have shown that there is a positive association between highly skilled staff and improved health outcomes (11, 12, 14): the presence of different medical specialists and adequate number of staff directly influence the performance of the

hospital in delivering quality care (14). Procurement, development, training, and grooming of human resources are critical in improving the quality of care in health facilities (15).

1.1.2 Overview of the Health Care System in Namibia

The Namibian health system has been reforming over the years with; adoption and implementation of various strategic plans, revision of policy framework, and restructuring the system to take a Primary Health Care (PHC) approach¹. The system is diverse with the lead provider being the public sector (18, 19). The Ministry of Health and Social Services (MoHSS) is the main implementer and provider of public health services with a four-tier system which comprises of: one national referral hospital, three intermediate hospitals, thirty district hospitals, forty-four health centers, and two hundred and sixty five clinics. To increase health access in hard to reach population, outreach services are provided across the country through 1150 outreach points(18). This general pattern is also evident in other sub-Saharan African countries where there is a higher ratio of more qualified health professionals in urban and richer areas, and in tertiary care facilities as compared to the rural and poor locations and lower level (primary) level facilities. In Namibia these lower-level facilities (clinics and health centres) are more accessible by a majority population than hospitals because of their numerous in number and wide distribution. An additional key characteristic to these facilities is that they are usually staffed with nurses and midwives, who provide basic patient care (18, 19). Highly qualified health workers have preferred to move from public to private sector or in urban settings where there is improved

1. Primary health care is a whole-of-society approach to health and well-being centred on the needs and preferences of individuals, families and communities. It addresses the broader determinants of health and focuses on the comprehensive and interrelated aspects of physical, mental and social health and wellbeing.

infrastructure leading to inequitable distribution of health workers between geographic areas and health facilities leading to understaffing.

The existing workforce in Namibia experience increased workload and job dissatisfaction as a result of undertaking tasks that they are not trained for (16). In other settings task shifting², as recommended by WHO, has been considered as a way to make better use of available human resources for health. In addition, extension workers have been introduced to work under the supervision of local clinics and health centers which may also lead to substandard patient care if not properly done. For instance, in Kenya, it has been established that the training offered to auxiliary nurses is of low standard (17) when compared to their counterparts in more developed countries. Therefore, governments cannot afford to ignore these realities and they need to establish health and training frameworks and programs to address these pertinent issues of skilled labour force.

Another substantial player in the Namibian health system is the private sector which is divided into for-profit and not-for-profit health services. The private sector is sizeable with 844 private health facilities registered with MOHSS, comprising hospitals (13), primary care clinics (75), and health centres (8), pharmacies (75), and specialized care medical entities (557) (18). These services are commonly provided in urban areas. Notably, there have been key achievements in reforming this diverse health system, however, part of the gains has been reversed due to: emerge and re-emergence of diseases, dispersed population, and skills storages. Other factors that affect the delivery of service quality in the country remain unknown. All this calls for evaluation and revision of policy frameworks that are responsive to emerging issues as well as identifying new strategies for action (18, 19).

² Task shifting is a process of delegation whereby tasks are moved, where appropriate, to less specialized health workers without sacrificing the quality of service provided

1.2 Literature review

1.2. 1 Quality in Health Care

Evaluation of quality care in health has advanced over the years, leading to exciting modern science which is pivotal in quality assurance (QA), benchmarking patient safety, and continuous quality improvement (CQI) (20). The quality of care can be evaluated by assessing the structure, processes, and/or outcomes of care (7). There are numerous benefits for improving quality; there is increased efficiency and effectiveness in healthcare provision leading to increased trust in the health care system, and a positive impact on patient and staff satisfaction. (5, 20). Monitoring the performance of a health system is a step towards improving health care quality, therefore it remains important that quality measurements be done to guide and inform health system managers (20, 21).

1.2.2 Structural Measures of Quality in Health Care

Structural measures look into infrastructure of health care settings, skills and competence of health personnel, service delivery policies and availability of resources amongst other things (20). The use of structural measures in evaluating quality of care is important because it provides information about the health facility's ability and capacity to provide high-quality care which supports the enforcement of plans and critical tools needed by health facilities (5, 22). However using structural measures alone in evaluating the quality of care because it does not inform us whether the care in terms of resource availability improves the patients' outcomes (22, 23).

1.2.3 Process measures of Quality in Health Care

Process measures are also termed performance measurements which provide information on the extent to which health care service providers are consistent in adhering to the standard and recommended guidelines of care (20). Because they are generally linked to procedures or treatments, they provide

feedback for quality improvement initiatives (20, 24). Quality improvement gives the clinicians an insight into performance gaps (between the actual and recommended practice) that have the potential to affect patient outcomes (25). In addition to this advantage, they are usually easy and quick to collect. Potential limitations are that they are not available for many key areas –thus it is not possible to measure all processes of care, hence it is difficult to capture the true quality of care provided (20, 25).

1.2.4 Outcome Measures of Quality in Health Care

Outcome measures assess patient's health emanating from the care they have received, hospital mortality, readmission, and length of stay are commonly used measures of quality of care (7, 26). However, they are still limitations associated with their use; comprehensive and detailed information is needed from medical records making it an expensive approach, large volumes of data are required to detect significant differences and in the case of rare outcomes longer periods are required (27). Besides, there are also confounding effects of social determinants which include social-economic status, access to safe housing, and presence of multiple chronic conditions (26, 27). However, they are useful indicators of quality of care pending adjustment of confounding factors and high readmission rates in the case of defined conditions (28).

1.2.5 Determinants of Health Care Quality

Health facility readmissions or revisits have commonly become potential indicators of health care quality. Adult-specific readmission rates are widely known and easily accessible through public health administrative data. On the contrary, data and knowledge on paediatric readmissions or revisits is limited, likely due to the difficulty found in longitudinal tracking of patients within and across health facilities (29). One of the major limiting factors in reduction of child mortality in many low- and middle-income countries are the deficiencies in the quality of paediatric care at health facilities and the

scarcity of data hinders more research around the subject. Data for this study is inclusive of all health facilities (clinics, health centres, and hospitals) because of the limitations due to low volumes of in-patient data, readmissions were defined as revisits or returns to the health facility for the same illness.

Readmissions cause a high burden to healthcare systems (unnecessary expenditures) and patients (clinical failure) (28, 30). In the US nearly 20% of Medicare patients are readmitted within 30 days after health facility discharge, associated with an estimated annual cost of 17 billion (30). Unlike developed countries, where the clinical outcome for certain specific conditions (including risk of death) have been associated with quality of health facility care, in low-income countries (including Namibia) there is little information showing the relation between sick young children and clinical outcomes yet it is evident that health systems of most countries in sub-Saharan Africa are overburdened with childhood deaths due to preventable and treatable illnesses. Readmissions or revisits are thought to be related to quality of care, for instance, due to postoperative complications and improper administration of treatment (31). As readmissions vary widely across countries, regions, and centres, at least part of them might be avoidable especially if they are due to poor quality of care (31), consequently, there is growing interest in the readmission or revisits rate as an indicator of quality of health facility care (28, 31). The way this indicator is used in different countries varies widely and no gold standard exists on how to assess quality of care(32). However, most preventable readmissions or revisits have been reported to occur early within one month of discharge (33).

Evidence from literature shows that health facility readmissions are affected by multiple factors within and outside the health systems (28, 34, 35). Studies on readmissions among children have shown that socio-economic factors such as the caregivers' age, household income, child characteristics such as,

age, severity of illness, length of stay in a health facility, comorbidities, and health system factors including availability of drugs, equipment, and staff qualifications are associated with readmissions (28, 32, 34, 35). However, the health systems factors have been cited as playing a major role in the increase of readmissions, especially in developing countries (34). Most of the under-five children in poorly resourced regions, such, as sub-Saharan Africa die from preventable and curable diseases which may in part, be attributable to inequalities in provision and quality of care (36).

The term readmission had been defined variously as hospitalisation within 1, 2, 4, or 12 months of discharge (30, 32, 33). . Reducing readmissions or revisits has become a focus to improve quality of care. Also, reducing readmissions is cost-effective as it comes with reductions in unnecessary expenditures thereby easing financial pressure on national budgets (34).

Determinants of health care quality are measured using scientific data and expert judgment. In addition, there is a growing emphasis on the importance and validity of patients' perspectives on the quality of care. A study conducted in India to explore the factors that influence patients' decisions about healthcare providers revealed that patients are more concerned with affordability and accessibility of healthcare than provider's qualifications (37). In a different setting, a study showed that the quality of healthcare services mainly depends on practitioners' knowledge and technical skills as this will lead to correct patient care management. This calls for healthcare professionals to improve their competencies (i.e., the attitudes, knowledge, and skills) to deliver high-quality services.

These studies and many others that sought to assess factors that influence quality of care have been bottled with potential bias because they were cross-sectional and could not establish causality due to potential unmeasured confounding factors (5, 30, 32, 34). In simpler terms, health facilities may differ

in characteristics of patients admitted such as the severity of illness of the patients that they treat, as health facilities with lower readmission rates (higher quality) and more qualified staff may attract a sicker patient population. Thus, the readmission rates for a health facility will have a component that reflects the severity of illness of the patients they treat and another that reflects the technical quality of health workers providing care (5).

The severity of illness of patients may be correlated to their choice of health facility resulting in the patient choice being endogenous, in which case use of standard regression analysis will give inconsistent estimates of the health facility-specific contribution to mortality (38). In other words, if high-quality health facilities attract sicker patients, those facilities may not look very “good” after estimating their adjusted readmission rates (5, 38). Analysis of quality of health care provided in health facilities is often based on clinical outcomes such as readmission (revisits), and death among others. Several studies have revealed that clinical outcomes are rooted in the qualification of the provider which incorporates an individual choice of health facility, location of the health facility (urban or rural), and the day individuals visit health facilities to access health services.

One approach to address the challenges of endogeneity (correlation with unobserved factors) is the instrumental variable (IV) method (39). In this study, we apply IVs on the type of qualification of the provider, as a treatment variable associated with health quality of care proxy as readmissions; individuals will receive quality health services indirectly through choosing health facilities offering better services and also visiting health facilities when they are likely to be attended by a provider with higher qualifications. We then apply IVs on this treatment variable to account for the effect of unobserved factors on readmission rates (quality of care indicator) and adjusting for other covariates.

1.3 Problem statement

Health care quality is important because it increases the likelihood of desired health outcomes in the patients (28). Improved patient outcomes are critical results to any health system (40). The National Health Policy Framework of Namibia (2010-2020) – NHPF which serves as a guiding document for health and health actions in Namibia stipulates that “quality of care is and will be a pivotal dimension of all health services in the country”. Like any other country in sub-Saharan Africa, the country has been hard hit by the various epidemics which required the government to introduce quick reforms to curtail health problems. These include re-orientation and restructuring of the health sector in line with the primary health care approach; which has contributed to improved access to health services. The vastness of the country has hindered access to health care amongst the rural population. More than half (60%) of the population is concentrated in the northern urban part of the country, where there is clustering of health facilities. An estimated 76% of population live within 10 km of a health facility while 21% live more than 10km away (19).

Other than access, availability of skilled health workforce is a challenge in both rural and urban parts of the country; the system is predominantly led by the public sector where issues of the workforce are topical, while this challenge is known and documented in the NHFP, what remains unknown is the effect of qualification on the quality of care.

Although major efforts have been put to address the human resource challenges in response to the needs of the health system, an emerging issue is disproportionate qualifications of health care workers manning the health facilities, the private sector of Namibia takes up seventy-two percent of doctors and a little less than 50% of the registered nurses. Service delivery issues in the country are related to the shortage of staff, particularly in remote areas (19). According to the NHPF; there is overcrowding in

hospitals due to layman's perception of better-quality services at hospital level as compared to primary care level.

Another foreseen challenge are the varying level of service management skills at all levels which can be addressed through training, deployment and retaining Namibians health workers in the health system. (19). The quality of care is largely being affected by shortcomings within the public health care system. There is a dearth of knowledge on these determinants of health facility quality of care (20). Measurement of health facility quality is critical to problem identification and improvement in the health service delivery system. Using recognized outcomes measures such as readmissions and revisits to measure health facility quality will help in improving patient care and ultimately health outcomes.

1.4 Justification

Limitations in access and availability of patient databases which capture information of patients on admission and during discharge, hinders outcome-based measurements of health care quality, which can be calculated using health facility-specific readmission rates (20). Most of health care quality studies have been done in developed countries such as the United States of America and the UK, using public and private health administrative data (30-32), however, there is paucity of evidence on such studies in Africa, including Namibia. Also, most of the existing studies were cross-sectional and thus posing limitations on establishing causality due to potential unmeasured confounding as a result of selection bias (5). To address these challenges, this study will utilise IVs to establish the true effect of treatment/s (type of qualification of the provider) on readmissions/revisits adjusting for other related covariates or factors. Recognising that one of the country's biggest challenge is human resource, disproportionate qualifications of health care workers manning several facilities. The results from this

study will contribute towards policy, guidelines development and review implementation of the National Health Policy Framework of Namibia (2010-2020): a guiding document for health and health actions in Namibia stipulates that “quality of care is and will be a pivotal dimension of all health services in the country”. (40).

1.5 Research Question, Aim and Objectives

1.5.1 Research Question

What are the determinants of health facility quality care based on the child readmission/revisits patterns in health facilities of Namibia in 2009?

1.5.2 Objectives

1. To describe the socio-demographic characteristics of sick children and their caregivers who accessed care in health facilities of Namibia between July 13, 2009, and October 16, 2009.
2. To describe the health system factors of health facilities sought by sick children and their caregivers in Namibia between July 13, 2009, and October 16, 2009.
3. To determine the prevalence of readmissions/revisits and distribution by associated factors in health facilities of Namibia between July 13, 2009, and October 16, 2009.
4. To determine the effect of the type of qualification of the provider and other associated factors on the quality of care using IV modelling techniques in he of Namibia between July 13, 2009, and October 16, 2009.

CHAPTER 2: METHODOLOGY

This chapter highlights details on the research methodology of the study providing details on the background information of the study, data management, and data analysis. These details include: study site, study population, sampling technique, sample size, data collection methods, sample power calculations, selection and measurement of variables, management of data and data analysis plan, ethical considerations and limitations of the study.

2.1 Study design

This was a cross-sectional study aimed at assessing the determinants of quality of care in child health services using readmissions/revisit rates for children below 5 years in Namibia who accessed health services in Namibia between July 13, 2009, and October 16, 2009. The study design is retrospective because we used past records from the Service Provision Assessment (SPA) which was conducted between July and October of 2009. The survey provided information on the general performance of facilities that offer health service provision, furthermore, it provided detailed insights of the strengths and weaknesses of the service delivery environment for each assessed service area.

2.2 Study site

Study sites were all health facilities (both public and private) including and faith-based organisations in all 34 districts of the country of Namibia. In this study, the health facility is a generic name referring to all health sites (hospitals, clinics, and health centres) in Namibia that offers preventive, curative/ameliorative, palliative, or rehabilitative services, both public and private. The selection of all

registered health facilities was intended to reflect a wide range of child health services provided throughout Namibia. The health facilities (8%) that were excluded comprise of health facilities that were under construction, proven to be duplicated, or could not be enumerated due to technical reasons when interviewers visited them, hence no data was collected from these health facilities. (18). The country is in sub-Saharan Africa with a surface area of 824,116 square kilometers, divided into thirteen major regions namely Kunene, Omusati, Ohangwena, Osana, Oshikoto, Kavango, Otjozondjupa, Erongo, Omaheke, Khomas, Hardap, Caprivi and Karas, as shown in Figure 2.1 (41). These major regions are further divided into districts. According to the Namibia 2011 population and census report, its estimated population is 2, 113 077 million and 57.2% live in the rural areas. Approximately 14 %of the proportion of the population was children under the age of 5 years and about 13% of children were orphaned, with one living one parent or none (41).

2.3 Study population

The study population was children up to the age of 5 in Namibia in 2009. We chose this population because of our outcome of interest (readmissions/ revisits) because childhood diseases are amongst the top conditions burdening the health care system (18), furthermore, children with complex chronic conditions are prone to frequent readmissions and thus reflect the quality of care received.

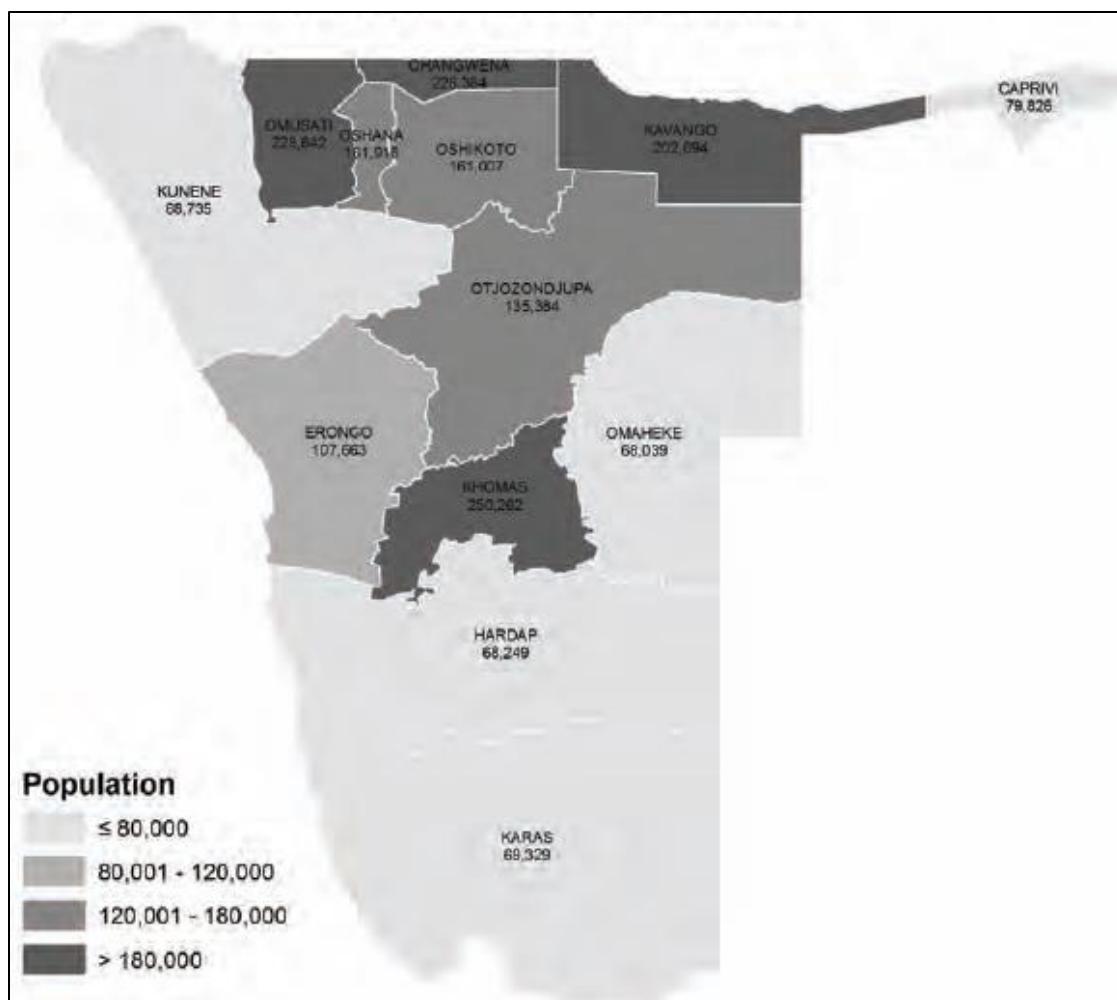


Figure 2.1 : Namibia regions and populations

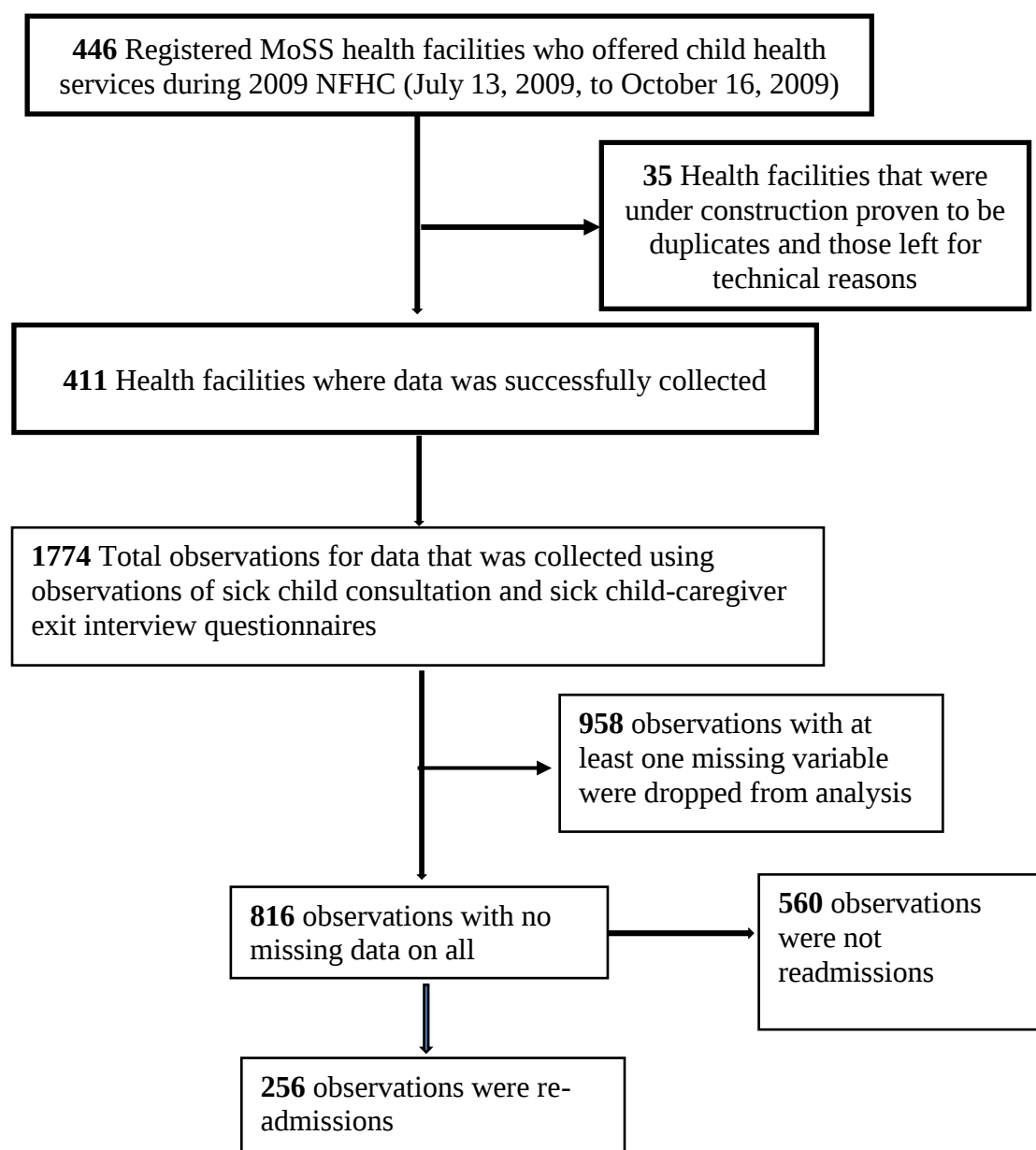
2.4 Study Sample

There was no sampling in our study, we used all the data from the Namibia Service Provision Assessment (SPA) which successfully collected data from 92% (411) of 446 health facilities registered by the Namibia MoHSS (18).

From the 411 selected health facilities in the census, a total of 1774 individual observations and exit interviews were conducted for sick child outpatient curative care. The selection of all registered health facilities was intended to reflect a wide range of child health services provided throughout Namibia. The 8% of health facilities that were excluded comprise of those who were under construction, proven

to be duplicated, or could not be enumerated to technical reasons when interviewers visited them, hence no data was collected from these facilities (18). From 1774 observations, 958 observations had at least one missing variable and 816 observations had complete data on all variables; 256 (31.4%) of observations with complete data responded with a yes for a revisit or readmission. Figure 2.1 illustrates the sample selection process. Key steps include the selection of health facilities and children who were readmitted for analysis.

Figure 2.2: Sample Selection Flow Chart



2.5 Sample Power Calculation

This study was a secondary data analysis and therefore we calculated the sample power to determine the adequacy of the sample size to detect differences in effects of exposure factors on the outcome (readmissions) see the formula in Appendix A. The power calculation was based on study proportion differences between children who were readmitted (31.4%) and children who were not readmitted (69.6%) at the 5% significance level and using one sample size proportion of 816 study participants. We obtained sample power of 1.00; a power equal or greater than 0.8 shows adequate sample size. Therefore our final sample size of 816 study participants was adequate to detect differences in effects of exposure factors on readmission.

2.6 Data Sources

This study used data from the nationwide SPA survey at facilities in Namibia between July 13, 2009, and October 16, 2009. The SPA survey is an assessment conducted at health facilities with the aim of providing an overview of a country's health service delivery system. In developing countries, these

surveys help in strengthening the monitoring of health systems. Namibia's latest and only SPA assessment was conducted in 2009. (18).

The study data were from observation of sick child consultations and sick child caretaker exit interview questionnaires capturing information on child health, availability, quality, and health service provision. The Observation questionnaire was customized to the service being provided for the sick child. A checklist was used to record the observations by an observer who assessed the extent to which service providers adhered to standards of care, based on generally accepted practices for good quality service delivery. Clinical patient management processes, procedures and examinations and the content of information (including history, symptoms, and advice) exchanged between the provider and the client were also recorded. After clients were observed receiving a service, they were asked to participate in an Exit Interview as they left the facility (18). The Exit Interview was made up of questions which sought to solicit for the client's understanding of the consultation or examination, their recall of instructions received about treatment and or preventive behaviour. The interviewer also prompted the client's perception of the service delivery environment. Health workers or providers were interviewed (using a standard tool) regarding their qualifications (training, experience, and continued in-service training), the supervision they had received, and their perceptions of the service delivery environment. Information from the two separate datasets (observation of sick child and sick child caretaker exit interview) datasets were merged using a common identifier (facility name) to produce one dataset.

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2.6 Measurement of Variables

2.6.1 Readmission

The outcome variable for the study was a binary outcome variable defining readmission or revisit for

the same illness. In several studies, the term readmission has been defined as a repeated hospitalization within months of discharge (30) and most avertible readmissions have been reported to occur early, within 1 month of discharge, and literature has consistently suggested the adoption of this time interval in comparative studies (42). We defined re-admission as either a revisit/follow-up or a return to the health facility wards (within four weeks) for the same illness for children diagnosed with dehydration, respiratory and digestive system (intestinal) ailments, malaria, fever (measles), ear problems, throat problems and any other diagnoses(26, 29). The study participants were observed when accessing health services and caregivers were asked if they have brought the sick child for the same illness before, to which they responded with a "yes" or "no". Readmissions (revisits) were defined as with “yes” if the time between the present and previous visits was not more than four weeks. We defined non-readmission as those who responded with a “no” though they might have been brought before with a different illness.

2.6.2 Socio-demographic characteristics of the child and caregiver

The socio-demographic characteristics of the child and caregiver included the child's age, sex of the child, age and level of education of caregiver, the relationship of the child with the caregiver, and payment method used. Age, education level, and payment method were assessed by the following questions, "How old is the [Name] in completed months?" and the responses were given from zero and above in completed months. The caregiver's age was assessed as, "How old were you at your last birthday?" and responses were given in completed years. Education level was assessed as, “What is the highest level of school you attended?”, and the responses were recorded as primary, post-primary/vocational, secondary/A-level, college, and university.

The caregiver's relationship with the sick child at the time of the survey was assessed as, “What is your relationship to [sick child]?” and the responses were; mother, father, sibling, aunt, uncle, grandmom/dad, and other. Part of the payment plan was captured as a binary variable. Respondents were asked if they had medical cover to which they responded with a “yes” and “no”.

2.6.3 Characteristics of health system factors- healthcare providers and facilities

Provider characteristics included sex and age of health service provider, current qualification of provider, hour worked by the provider, type of health facility and managing authority, number of years the facility has been providing child services, time waited for provider, total fees paid for services received (part of the payment plan, facility conducted child service training, type of visit and distance to the health facility).

These variables were recorded in the following manner; the age of the provider was captured as a continuous variable, the sex of provider as a binary variable, "male" and "female", the current qualification of provider was categorised as a specialist, medical officer or physician, medical assistant, registered nurse or midwife, enrolled nurse or midwife and nursing assistant or auxiliary and the hours worked by the provider was captured as a continuous variable as hours worked by the provider in a week. The type of the health facility was categorised as hospital, health centre, and clinic, and the managing authority recorded as public, public mission/NGO, and private. The number of years the facility provided child services, time waited for provider and total fees paid for services were captured as continuous variables. The number of years the facility has been providing child services was recorded in years (number of years the health facility had been providing child health services), time waited for the provider in hours (difference between the time they were attended to and the time they arrived at the health facility) and Namibian dollar currency (total amount of money paid for health services provided).

Health facility pre-service training referred to child health service provision trainings which were conducted before services were provided and on the job. It was captured as a binary variable, "yes" or

"no". According to the Namibian Health Facility Census report routine staff training was a structured 'classroom type' training offered to service providers and if at least half of the health service providers at a facility reported receiving in-service or pre-service training relevant to their jobs at any time during the 12 months preceding the survey, that facility was defined having routine staff training. The type of visit was categorised as follows; the first visit was a referral from another facility for the same illness and follow-up was a revisit for the same illness at the same facility. Distance to the health facility was assessed as "Is this the closest facility to your home", and recorded as no or yes(18).

2.7 Data Management

The data was analysed using STATA version 15. Data cleaning was done by initial checking of completeness of data using descriptive commands. Data fields were examined separately for errors and missing values. The percentage of missing data for each variable was calculated to check if it was within the recommended 15-20% benchmark. Variables were recorded and re-categorized where necessary. Internal consistency of modified scales was re-tested using inferential methods; using the Cronbach's alpha. The Cronbach's alpha is computed by correlating the score for each scale item with the total score for each observation (child observation and service/caregiver response), and then comparing that to the variance for all individual item scores. It is recommended that the alpha lies between 0.65 and 0.8, which indicates that more items share covariance and probably measure the same underlying concept.

2.8 Data Analysis

For the descriptive analysis, we used methods appropriate for cluster analysis. Summary measures for categorical variables were described using proportions, and for continuous variables, we used medians and inter-quartile range (IQR); after having observed that the data was not normally distributed. To test

for the association of each explanatory variable with readmission, we used Pearson's chi-square test for categorical variables and the rank sum test for continuous variables. We used backward stepwise regression approach that began with a full (saturated) model, gradually eliminating variables at each step from the model until we found the best explanatory variable/s (qualification of the health care provider). To estimate the causal effect of each explanatory variable with readmission, we used IV-probit methods since the outcome variable is a binary variable and details are outlined below section (2.8.1). To test for partial changes of dummy variables from 0 to 1 we estimated marginal effects after IV-probit. In building significance for all variables was set at $p=0.01$, 0.05 , 0.1 and marginally significant at $p<0.05-0.10$. The strength of instrumental variables was tested using the Wald test and F statistic which we concluded strong if it is greater than 10.

2.8.1 Identifying the causal relationship between treatment and outcome variables

Studies that use observational data mainly face endogeneity problems (5). This is when the researcher is not aware of other factors affecting the treatment variable/s, hence they will falsely conclude the treatment effects (38). The unobserved factors are part of the model's error term that is correlated with the treatment variable, which is the essence of the endogeneity problem. To address the endogeneity problem, several studies have incorporated instrumental variable (IV) techniques (38). The IV estimation requires the number of "instrumental variables" must be at least as large as the number of the endogenous treatment variables. The potential IV/s for endogenous variables should meet the two requirements for instrumental variables; they must have a strong relationship with the endogenous variable (relevance criterion/ strength) and must not be related to the unobserved determinants of the outcome (exclusion restriction/validity); in other words, the IVs should not affect the outcome directly

(readmission/revisits) or indirectly after taking observed characteristics into account except through its effect on treatment (provider qualification).

Patients are likely to select or attend hospitals based on the advice of their doctors, the severity, and complexity of their conditions, the hospital's reputation, and the availability of their caregivers in the case of children (5, 38). For instance, a disproportionately large number of patients with severe and/or complex conditions may be attracted to highly esteemed hospitals (5). For this research study, we chose qualification of the provider as a treatment variable which is affected by the unobserved factors as follows;

- **Provider qualification endogeneity**

Many patients seeking health service decide which health facility to visit or the provider depending on the severity of the illness and availability of resources. For instance, in the case of severity of illness, many patients with high unobserved severity of the illness are likely to choose a health facility of high quality or a provider with higher qualifications (26). In the case of the capacity of the health facility, the distribution of providers with high qualifications like medical doctors is affected by the geographical setup of the location where the health facility is located (12, 43). This means that health facilities which are located in rural areas, those with low capacity, or those without enough resources are most likely to have low qualified staff (44, 45).

According to the NHPP of Namibia, there are disparities in both access and distribution of health workforce. There is concentration of health facilities in the northern part of the country such

that 76% of the population live within a 10 km radius of a health facility, however staff shortage challenges are rife particularly in remote areas. More doctors are in the private sector yet the Namibian is dominated by public facilities. The disproportionate in the qualifications of providers at the health facilities contributes to the patient's choices in seeking medical care.

2.8.2 The model

Since there complexity and variability of definitions of quality, our model will focus on the following: technical quality of care is; the skill of the health care worker which is associated with unobserved characteristics (as explained above) such as the severity of illness, location, and availability of other non-human resources. Health care workers offer high technical quality through making high-quality decision making which involves “doing the right thing right.” Premised upon skill, judgment, and timeliness of execution. We defined the observed outcome quality of care (readmission) as an equation of observed determinants or treatment (provider qualification) with IV instruments to account for unobserved factors and adjusting for other covariates.

$$Y_{icl}^* = \beta_0 + \beta_1 X_{icl} + \beta_2 E_{icl} + \varepsilon_{icl}$$

$$Y_{icl} = \begin{cases} 1 & \text{if } Y_{icl}^* \geq 0 \\ 0 & \text{if } Y_{icl}^* < 0 \end{cases} \quad (1)$$

Where

Y_{icl}^* is the unobserved difference between the chance of being readmitted for the same illness and not readmitted

Y_{icl} is the dummy variable that takes value 1 if the individual i , on the day c and at the location l was readmitted or revisited for the same illness and 0 vice versa.

X_{icl} is a vector of observable (exogenous) socio-demographic factors which include gender, age,

education, relationship of the caregiver and additional exogenous variables for the health system factors. The variables include the type of facility (health center, clinic or hospital), child health service provision trainings conducted pre-service, the most recent visit for the same illness, as well as the form of payment used to pay the services.

E_{icl} is the vector of endogenous variables that are correlated with the unobserved determinants of readmission such as the category of the provider offering health services to the sick child, time waited for the provider to attend the sick child and the highest level of education attained by the caregiver.

ε_{icl} is the residual component of readmission.

From the function specified in (1), the probability of a sick child revisiting or readmitted estimated using the probit model is given as follows

$$\begin{aligned} Pr(Y_{icl} = 1|X_{icl}, E_{icl}) \\ = \Phi(\beta_0 + \beta_1 X_{icl} + \beta_2 E_{icl} + \varepsilon_{icl}) \end{aligned} \quad (2)$$

Finally, the estimated IV probit model is given by the following system of equations:

$$Y_{icl}^* = \beta_0 + \beta_1 X_{icl} + \beta_2 E_{icl} + \varepsilon_{icl}$$

$$E_{icl} = \gamma_0 + \gamma_1 X_{icl} + \gamma_2 I_{icl} + v_{icl}$$

$$Y_{icl} = \begin{cases} 1 & \text{if } Y_{icl}^* \geq 0 \\ 0 & \text{if } Y_{icl}^* < 0 \end{cases}$$

The first equation estimates the probability of readmissions or revisits for the same illness as previously shown in equation (1), and the second equation estimates the endogenous variables as a function of instrumental variables (I_{icl}), together with other independent variables.

The instruments must be uncorrelated with unobserved factors (severity of illness and perceived quality of care) but correlated with the endogenous variables (qualification of the provider) (5).

2.8.3 Addressing endogeneity problem in the model

The goal of the model is to estimate the causal effect of the treatment variables (qualification of provider) on the outcome variable (readmissions/revisits) (46). To address the endogeneity problem we have discussed above, we incorporated the popular technique, of introducing one or more additional variables, known as the instrumental variables (IV) (47). Instrumental variables will be correlated with the treatment variables but not with the error term (unobserved factors influencing both the independent variable and the outcome).

To identify the potential IV for our endogenous variable, we used the two requirements for instrumental variables (48). This means that the instrumental variable must have a strong correlation with the endogenous variable (relevance criterion) and must not be related to the unobserved determinants of health service provision (exclusion restriction) (49). For this study, we used three IVs variables; region- which is the location of the facility, day of the week when the client visited the facility and the distance to the facility, on the endogenous variable (qualification of provider) which met the requirements of good instruments i.e., the IV should be related to the endogenous variable (qualification of provider) but uncorrelated with unobserved factors (severity of illness).

For instance; the region or location of the facility is strongly associated with the qualification of the provider; we have already stated above that highly qualified staff prefer well-resourced urban and richer settings compared to rural and poor locations; day of the week when client visited is also related to the endogenous variable (qualification of provider) but uncorrelated with the unobserved factors (severity

of illness); highly skilled staff are usually available at the health facilities during the normal working days of the week and may (but not always) be available during the weekend. (50). The instrumental variable distance to the facility is related to the endogenous variable (qualification of the provider) and not related to unobserved factors (severity of illness and perceived quality of care); In urban areas (where there are likely to be more qualified health care workers) there are more facilities, this stimulates competition as facilities strive to offer better services than their neighbors, a different situation is observed in the rural setting; health care providers may possess lower qualifications compared to those in urban settings, furthermore patients will travel longest regardless of the severity of illness just to seek medical attention.

2.8.4 Testing for the endogeneity

After estimating the IV probit model, a test for endogeneity of qualification of health care provider was computed using the Wald test of exogeneity, we set the null hypothesis that the endogenous variable; the qualifications of health care professional are exogenous (there is no correlation between this endogenous variable and the error term of readmissions (dependent) variable) for both equations (48). Wald test results show that the p-value is 0.0137, so we reject the null hypothesis at the 0.1 level of significance. There is a negative correlation of -0.68 between the errors in the main outcome (readmission) and the treatment variable (qualification of the provider) which is significant at 0.1 level ($p=0.09$), further supporting that the treatment variable (qualification of the provider) is endogenous. To test for the strength of our instruments, we used the significant coefficients associated with instrumental variables and an F statistic of the first stage, which is 11.05 greater than 10, and conclude that distance to the facility and day of the week when the client visited the facility are strong instruments (48).

CHAPTER 3: RESULTS

This chapter presents detailed results on descriptive and IV regression analysis. Firstly, there is a summary of the socio-demographic characteristics of participants and health system factors. Followed by the prevalence of readmissions by participants’ socio-demographic characteristics and health system factors. The final presentation of results is on probit IV regression analysis of the final model.

3.1 Summary of the caregiver and sick child’s socio-demographic characteristics

The analysis was restricted to 816 records of sick children. Table 3.1 shows the summary of the caregiver and child’s socio-demographic characteristics. The sick children who were readmitted represents 31% of the study sample as shown in Figure 3.1. The proportion of male and female sick children was 51.1% and 48.9% respectively. Table 3.1 shows that the majority (94.4%) of caregivers who brought the sick children to the hospital were females and over 75.0% were mothers, the next common relationship of caregivers were grandparents (7.4%). The median age of caregivers and the sick children was 30 years (IQR 29.3 – 30.8) and 22.1 months (IQR 21.0-23.3) respectively. Most caregivers attained secondary education (68.1%), followed upper primary education (22.9%).

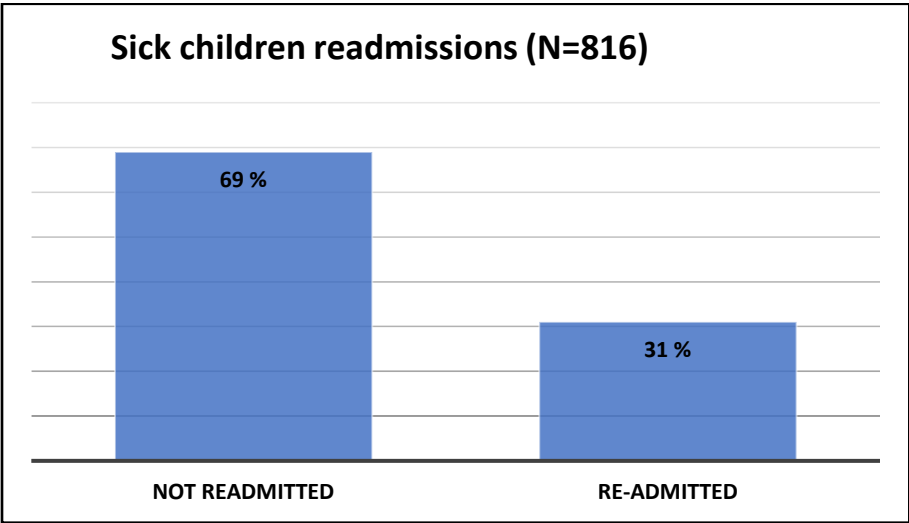


Figure 3.1: Sick children readmissions

Table 3.1: Summary of the caregiver and sick child's socio-demographic characteristics

Variables n= 816	n (%) or median (IQR)
Socio-demographic characteristics	
Caregiver Age in years	30 (29.3-30.8)
Sex of Caregiver	
Male	46 (5.6)
Female	770 (94.4)
Age of child in months	22.1 (21.0-23.3)
Sex of child	
Male	423 (51.1)
Female	405 (48.9)
Relationship of caregiver to a sick child	
Mother	626 (76.7)
Father	23 (2.8)
Aunt/Uncle	66 (8.1)
Grandparent	60 (7.4)
Other	8(1.0)
Sibling	33 (4.0)
Highest level of education attained by caregiver	
Informal	3 (0.37)
Primary	59 (7.23)
Upper Primary	187 (22.9)
Secondary	556 (68.1)
Tertiary	11 (1.35)

3.2 Summary of the provision and access to care characteristics

Table 3.2 below details the provision and access to care characteristics. The majority of the providers were females (76.8%) with a median age of 40 years (IQR 39.7 - 41.3). Among the providers who attended to the sick children, 41.1% were nurses or midwives, nearly half 49.9% were registered nurses³ or midwives and 3.7 % of the providers were medical officers or physicians and specialists (0.4%). Health care services were mainly sought at lower-level facilities (clinics, 70.2%) and a smaller proportion were hospitals (9.6%). Most of the health facilities (90.8%) were public institutions. The median time of which health provided child health care services was 8.7 years (IQR 8.7-9.4) and 33.3 % offered pre-service training to health care providers. Most caregivers (94.9%) were not part of a pre-payment plan scheme which means they were supposed to pay for the services directly from their pockets, the median amount of medical fees paid was \$7.1 (IQR 6.0-8.1). The median time patients had to wait for the service provider was 114.1 minutes (IQR 106.8-121.4).

³ The difference between an enrolled nurse and registered nurse is in the qualification, education preparation and experience. Enrolled nurses complete a Diploma of Nursing, which is a two-year course, and registered nurses complete a Bachelor of Nursing, which is a three-year course

Table 3.2: Summary of health system factors on provision and access to care (N=816)

Variables	n (%) or median (IQR)
Health Provision	
Provider Age	40 (39.7 -41.3)
Provider Sex	
Male	199 (23.2)
Female	627 (76.8)
Current qualification of the provider	
Specialist	3 (0.4)
Medical officer or physician	30 (3.7)
Medical assistant	4 (0.5)
Registered nurse or midwife	360(44.1)
Enrolled nurse or midwife	407 (49.9)
Nursing assistant or auxiliary	12(1.5)
Number of years facility providing child health service	8.7 (8.0-9.4)
Hours worked by service provider	40.8(40.5– 41.1)
Type of health facility	
Hospital	78(9.6)
Health centre	161 (19.7)
Clinic	577(70.7)
Health facility managing authority	
Public	741 (90.8)
Public mission/NGO	52 (6.4)
Private	23 (2.8)
Health access	
Total fees paid for provider in dollars	7.1 (6.0- 8.1)
Time waited for the provider in minutes	114.1 (106.8-121.4)
Part of pre-payment plan	
No	774(94.9)
Yes	42 (5.1)
Health facility pre-service	
No	544 (66.7)
Yes	272 (33.3)

3.3 Prevalence of readmission by socio-demographic factors

Table 3.3 below presents the prevalence readmissions by of socio-demographic factors. The proportion of sick males and females that were readmitted was 51.2 % and 48.8 % respectively; there is no association between sex and readmission status ($p=0.829$). About 6.3 % and 93.7 % of caregivers of sick children who were readmitted were males and females respectively, there is no was evidence of statistical significance ($p= 0.608$). The median age of children who were readmitted (18 months) was not significantly different from the median age of children who were not readmitted (17.5 months). The relationship between the caregiver and the sick child was associated with the readmission of a child ($p=0.000$) regardless of the type of relationship. Most caregivers were mothers (84.0 %). Lastly, the educational level attained by the caregiver was not associated with readmission status ($p\text{-value} = 0.446$). The median age of caregiver of the readmitted sick child (30 years) was significantly different ($p= 0.003$) from the median age of caregivers whose children who were not readmitted (27 years).

Table 3.3: Prevalence of readmission by socio-demographic factors

		Readmission			
Variable		Yes (n= 256) n (%) / median (IQR)	No (n= 560) n (%) / median (IQR)	Total (n)	P-Value
Sex of Child	Male	131 (51.2)	282 (50.4)	413	0.829
	Female	125 (48.8)	278 (49.6)	403	
	Total (n)	256	560	816	
Sex of Caretaker	Male	16 (6.3)	30 (5.4)	46	0.608
	Female	240 (93.7)	530(94.6)	770	
	Total (n)	256	560	816	
Age of Child (in months)		18	17.5	816	0.341
Caregiver Age in years		30	27	816	0.003**
Relationship of caregiver to the sick child	Mother	215(84.0)	411(73.4)	626	0.000**
	Father	11 (4.3)	12(2.4)	23	
	Sibling	2 (0.8)	31(5.5)	33	
	Aunt/uncle	16 (6.2)	50 (8.9)	66	
	Grandparent	9 (3.5)	51 (9.1)	60	
	Other	3(1.2)	5(0.9)	8	
	Total (n)	256	560	816	
	Informal	1 (0.4)	2(0.4)	3	0.446
Highest level of education attained by caregiver	Primary	14 (5.5)	45(8.0)	59	
	Upper primary	65 (25.4)	122 (21.8)	411	
	Secondary	171 (66.8)	385 (68.8)	556	
	Tertiary	5 (2.0)	6 (1.1)	11	
	Total (n)	256	560	816	

**** significant p-value**

3.4 Prevalence of readmission by Provider characteristics

Table 3.4 below shows the prevalence of readmissions by provision and access to care factors relationship. The sex of the provider was associated with readmissions ($p=0.000$). A high proportion of readmitted sick children were attended by female providers (68.8%) compared to male providers (31.3 %). The median age of the provider with readmissions was lower (40 years) than the median age with providers with no readmissions (44 years), this difference was statistically significant ($p=0.023$). The qualification of the provider was not associated with readmissions ($p=0.202$). Most children who were readmitted were attended by enrolled nurse or midwives (49.2%), followed by the registered nurse or midwives (42.6%) and enrolled medical officer or physician (5.5%). The managing authority of the health facility was not associated with readmissions ($p=0.990$). Although there was consistently a lesser proportion of children readmitted across the three facility types (hospital, health centre and clinics) compared to children not readmitted, this difference was statistically significant ($p=0.004$). The median hours worked by the service provider per week were similar for readmitted (40.0) and non-readmitted (40.0) children. The median number of years of facilities providing child health services was lower for readmitted children (4) than non-readmitted children (5). Readmissions were higher for children with no prepayment plan (96.1 %) than those with prepayment plan (3.9 %), however, this difference was not significant ($p=0.278$). A majority (88.8 %) of sick children who were readmitted were on a first visit (a referral from another facility for the same illness) and 11.4 % on a follow-up visit (a revisit for the same illness at the same facility) % were, there was a very significant ($p=0.000$) association to readmission status. Distance to the health facility was not associated with readmissions ($p=0.602$). Many sick children were readmitted to facilities closest to them.

Table 3.4: Prevalence of readmission by health system factors on provision and access to care

Variable		Readmission Status			
		Yes (n= 256) n (%) /median (IQR)	No (n= 560) n (%) /median (IQR)	Total (n)	P-Value
Sex of provider	Male	80 (31.3)	109 (19.5)	189	0.000**
	Female	176 (68.8)	451 (80.5)	627	
	Total (n)	256	560	816	
Provider Age		40 (27-50)	44(29-50)	816	0.023**
Current qualification of the provider	Specialist	1(0.4)	2 (0.4)	3	0.202
	Medical officer or physician	14 (5.5)	16(2.9)	30	
	Medical assistant	3(1.2)	1 (0.2)	4	
	Registered nurse or midwife	109(42.6)	251 (44.8)	360	
	Enrolled nurse or midwife	126(49.2)	281(50.2)	407	
	Nursing assistant or auxiliary	3(1.2)	9 (1.6)	12	
	Total (n)	256	560	816	
Health facility managing authority	Public	233 (91.0)	508(90.7)	741	0.990
	Public Mission /NGO	16 (6.3)	36(6.4)	52	
	Private	7(2.7)	16 (2.9)	23	
	Total (n)	256	560	816	
Type of health facility	Hospital	36(14.1)	42(7.5)	78	0.004**
	Health centre	40 (15.6)	121 (21.6)	161	
	Clinic	180 (70.3)	397 (70.9)	577	
	Total (n)	256	560	816	
Hours worked by service provider		40(40.3- 41.3)	40 (40.3-41.3)	816	0.668
Number of years facility providing child health service		4(0.5 -13)	5(1 - 16)	816	0.182
Part of pre-payment plan	Yes	10 (3.9)	32(5.7)	42	0.278
	No	246(96.1)	528(94.3)	774	
	Total (n)	256	560	816	
Type of visit	First visit	218(88.6)	549 (98.7)	767	0.000**
	Follow up	38 (11.4)	11(1.3)	49	
	Total (n)	256	560	816	
Distance to the facility	Yes	216 (84.4)	546 (97.5)	762	0.602
	No	40 (15.6)	14 (2.5)	54	
	Total (n)	256	560	816	

****significant p-value**

3.5 Determinants of readmissions using IV analysis

Table 3.5 presents the results of estimated probit and IV-probit models. The first column (Probit) of table 3.5 shows the regular probit coefficients (which does not account for endogeneity) (48), where the explanatory variable have either positive or negative effect on the outcome of interest(readmission/revisits). A positive coefficient means that an increase in the explanatory variable leads to an increase in the probability of readmissions, a negative coefficient means that an increase in the explanatory variable leads to a decrease in the predicted probability of readmission.

The results show that conducting pre/ in-service training for child health care provision positively affects the probability of a sick child being readmitted, this is relative no trainings, although not significant ($p=0.224$). The negative coefficients health center (-0.343) and clinics (-0.0212) show reduced probabilities of readmissions or revisits, this is relative to the hospital, which is the base, both are not significant. The results also show that there is an increased chance of readmission if the child is on a follow-up visit when compared to those who had not sought any health service before, the coefficient of a follow-up visit is positive (1.46) and statistically significant. A follow-up visit is defined as a visit in which a child would have sought treatment services from a different health service provider before visiting the facility, either from a different health facility, faith, or traditional healers. The age of caregiver coefficient of 0.003 (p -value 0.0561) shows a positive effect on the chances of readmissions. We do not find any statistically significant effect on the levels of our key variable of interest; health care provider qualification (medical officer, medical assistant, registered nurse, enrolled nurse and nursing assistant)

Table 3.5 Probit and IV Probit Analysis

Variable		Probit Coefficient (p-value)	IV Probit Coefficient (p-value)	
			2 nd	1 st
Health facility conducted pre/in-service child health service training	No (base)			
	Yes	0.224 (0.024)	0.215 (0.019)	-0.069 (0.198)
Type of facility where service was provided	Hospital (base)			
	Health Centre	-0.343 (0.112)	-1.052 (0.000)	0.734 (0.000)
	Clinic	-0.0212 (0.911)	-0.972 (0.000)	0.779 (0.000)
Type of visit	First Visit (base)			
	Follow-up	1.460 (0.000)	1.011 (0.002)	-0.188 (0.129)
Hours worked by service providers		0.006 (0.582)	0.022 (0.229)	-0.068 (0.260)
Age of the caregiver		0.003 (0.0561)	-0.012 (0.137)	-0.006 (0.017)
Provider qualification			1.707 (0.070)	
	Specialist (base)			
	Medical officer	0.272 (0.737)		
	Medical assistant	1.522 (0.135)		
	Registered nurse	-0.055 (0.943)		
	Enrolled nurse	0.069 (0.928)		
	Nursing assistant	-0.301 (0.725)		
Region in which the health facilities are located				-0.03(0.686)
Day of the week				0.05 (0.042)
Distance to the facility				0.169 (0.037)
Observations		816	816	
Log likelihood		-465.47	-2218.3	
Pseudo R-squared		0.0585		
Wald test of exogeneity			6.07	
p-value			0.014	
F-test first stage				11.05

It is important to note that the probit model results outlined do not take into account the endogeneity problem. The study intended to measure the effect of health care provider qualifications on the probability of readmissions. There is potential for bias because there are other unobservable factors that influence the qualifications of health care providers available at any given health facility. This potential statistical bias often found when using observational data (as used in this study) from the unmeasured confounders is mediated through identifying and specifying an instrumental variable, which may represent a “natural experiment” affecting treatment (qualification of health care provider).

The first-stage and second-stage regression results from the instrumental variable probit estimator are displayed in the IV Probit column of Table 3.5. These models rule out the hypothesis of reverse causality bias in the probit estimates. In the first stage model, the first stage estimates an expectation of the endogenous variable (qualification of provider) conditional on measured confounders and the instrumental variables: the region where the health facility is located, the day of the week when the child visited the clinic and the distance to the facility (hence the greyed boxes on the results). The second stage model then predicts outcomes as a function of the estimated treatment values from the first-stage, measured confounders, and potentially other control variables. The presence of instrumental variables makes these models more reliable for establishing causality.

The first stage estimates the prediction of the treatment variable (qualification of healthcare

professional) using the IVs (the region, day of visit, and distance to the facility) and other covariates. Two of the three instruments are strong as they are sufficiently correlated with the endogenous treatment variable; day of visit and distance to the facility are both positively correlated and statistically significant ($p < 0.1$), in addition, the F test greater than 10 ($F = 11.05$). The results in the fifth column of Table 3.5 show all covariates of type of health providers are not statistically significant at one, five, and ten percent levels. The exception being the age of the caregiver and the type of visit, both are statistically significant effect on the qualification of the provider.

The second stage IV -probit model results are displayed in the fourth column of Table 3.5. This model takes the predicted values of the endogenous variable (qualification of the provider) from the first stage into the main equation of interest. In addition, this second stage retains variation in treatment variable (qualification of the provider) predicted from the instruments, which means all the variation is driven by the instruments, and the link between the treatment variable and other unobserved variables is broken. This controls the endogeneity of the qualification of the provider on the probability of readmission (our outcome of interest).

The Wald test ($p\text{-value} = 0.001$) and the correlation coefficient (1.8) both statistically significant at 10% -level show that the current qualifications of the provider is endogenous therefore IV methods can be preferred than probit models.

Conducting pre/in-service child health service training has a positive significant effect ($p = 0.019$) on the probability of readmission of a child. The coefficients of type of facility indicate that both health center (-1.052) and clinic (-0.972) have a negative effect compared to the hospital because they are smaller, more negative, than the coefficient of the hospital, furthermore, the two coefficients are so

close that we might not need to separate the levels of health facilities. Follow-up visits have a positive (1.011) and significant ($p=0.002$) effect on the readmission of a child, a child may seek treatment from another health care provider or an informal health service provider. The number of hours worked by service providers and the age of the caregiver had no significant effect on the readmission status of the child. The qualification of the health care service provider shows a significant positive effect (at 10% level) on the chance of having a child readmitted. There is no significant statistical evidence that health services provided by medical officer or assistant will reduce readmissions (medical officer – $p>0.1$, medical assistant- $p>0.1$).

3.6 Checking for robustness and interpretation of models

To check for magnitude effect of regressors on readmission, we conducted marginal effect analysis as shown in table 3.6 below. The overall probability of readmission for the same illness is 0.3 for both probit and IV-probit models, said differently there is a 30% chance that the sick child will have a subsequent visit to the health facility.

Marginal effects show that pre/ in-service child health services training increased the probability of readmission by 4.9% and 5.1% for probit and IV-probit models respectively, and this association was significant for both models at $p=0.1$. This sounds counterintuitive, as training is expected to have a negative effect on the chances of readmission. The probit and IV probit models predict a significant increase of 38% in the probability of readmission if the child had a prior visit to seek treatment at either another health facility or from an informal health service provider, this result corroborates with theory because a child who may have sought health care even in none health settings is likely to be ill. The IV-probit results also show that there is no statistically significant effect that the type of facility visited

reduces the probability of readmission by 4.1%, however, a significant decrease of 3.4% was found in the probit model.

The marginal effects show that for every hourly increase in the time worked by the health care there is a corresponding 0.1% increase in the probability of readmission, however, this is not statistically significant for both models. The IV -probit marginal result shows that there is a 0.1 % increase in the probability of readmission for every year increase in age of caregiver though not statistically significant, on the contrary, the probit model estimates a 0.1 % decrease in the probability of readmission, this effect is statistically significant at one percent level.

Finally, our variable of interest is showing that there 0.1 % change in the probability of readmission for every variation in the level of qualification of the health service provider. The effect is only statistically significant for the IV probit model at a 10 percent level.

Table 3.6: Average marginal effects on readmission of sick children: summary of robustness checks

Variable		Probit Marginal effect (dy/dx) (p-value)	IV-Probit Marginal effect (dy/dx) (p-value)
Health facility conducted pre/in-service child health service training	No(base)		
	Yes	0.084 (0.015)	0.214 (0.019)
Type of facility where service was provided	Hospital (base)		
	Health Centre	-0.106 (0.119)	-1.052 (0.000)
	Clinic	-0.020 (0.748)	-0.972 (0.000)
Type of visit	First visit (base)		
	Follow up	0.516 (0.00)	1.011 (0.002)
Hours worked by health providers		0.002 (0.660)	0.011 (0.214)
Age of the caregiver		0.001 (0.524)	0.008 (0.021)
Current qualification of the provider		-0.007 (0.731)	1.179 (0.000)
Pr(readmission) = 0.3			

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

CHAPTER 4: DISCUSSION

This chapter details the results, conclusions, and recommendations based on the study objectives. The study sought to identify the determinants of hospital quality using child revisits as a proxy outcome in Namibian health facilities. The first two objectives were descriptive: firstly, to describe the socio-demographic characteristics of sick children and their caregivers, secondly to describe the health system factors of health facilities in Namibia. These objectives are addressed in the previous chapter.

4.1 Prevalence of readmission by socio-demographic factors

The third objective of the study sought to determine the prevalence of readmissions/revisits and distribution by associated factors in hospitals of Namibia. Amongst the socio-demographic factors investigated were; sex of child, sex of caregiver, age of the sick child, level of education of caregiver, age of caregiver, and the relationship of caregiver to the child. All these factors show no statistically significant relationship with the outcome (readmission), except for the relationship of the caregiver to the child. The relationship of the caregiver to the child had a significant effect (at one percent level) on the readmissions, this substantiates the notion from other studies that caregiver relationships are related to improved health outcomes (reduced mortality, improved health status, and reduced distress) (51). Therefore, the caregiver relationship to recipient of health care is an important factor to be considered in the health outcomes the sick children. Further exploration of the effect may be considered in future studies to give a comprehensive analysis.

4.2 Prevalence of readmission/revisits by health provider factors

The third objective also sought to look at the prevalence of readmissions/revisits by provider factors. Findings show that the sex of provider was associated with readmissions at five percent level, the effect of age of the provider on readmissions was statistically significant at one percent level, the number of years the health facility has been offering service, the type of facility, and type of visit by the sick child significant influence the readmission status of the child. Other factors such as distance to the facility, hours worked by the health care provider, managing authority did not show any significant difference in the readmission status of the child. These findings suggest that health care provider characteristics contribute significantly to the health outcomes of the sick child, and as the fourth objective, this study further investigated the effect of health care provider qualifications on and other associated factors on the quality of care using IV modeling techniques.

4.3 Causal effect of the qualification of health care provider on readmission/revisits

Concerning the fourth objective, the results of this study show the causal effect of the qualification of the health care professional provider on the probability of a child being readmitted for the same illness. Out of the six levels of provider qualifications, only two show a significant effect on the outcome of interest (readmissions), the two are medical officer/physicians and medical assistants. The two are the highest qualification after the medical specialist, the low patient volume (0.3%) seen by specialist was a drawback in establishing the statistical significance. Naturally highly qualified health service providers are highly competent having good knowledge and technical skills that lead to correct patient care management and good health outcomes. aid delivery of high-quality services. In other words, it is plausible that specialised qualification contributes to high-quality performance which leads to

improved health outcomes. According to the NHFP of Namibia; the country's workforce situation is above the WHO benchmark of 2.5 health workers per 1000 population; there are 3.0 health workers per 1000 population, specifically 1:2,952 for doctors, 1:704 for registered nurses, among others. While there seems to be a low burden especially amongst nurses who are the largest players within the health system there is a very unequal distribution with most health workers concentrated in urban areas and a high percentage found in the private sector in particular in private clinics. These disparities in the distribution of the health workforce on the system in Namibia call for the policymakers to address issues of health care provider capacity through post-qualification trainings. Other than basic training achieved, for maintenance of knowledge levels and technical competence health service providers must continually be exposed to current and new information.

Furthermore, results of the IV marginal effect show that if a child is managed by a qualified provider there is minimal chance of readmission (probability is 0.1%). The association chance may be indicative of the abundance of qualified healthcare workers within the Namibian health care system as supported or argued by the health ministry of the country (38). In the 2009 service provision assessment report the proportion of health care facilities with at least one qualified health care worker in hospitals was 100%, 96% in health care centres, and 98% in clinics which means that the facilities have an available skilled workforce. Literature shows that the presence of qualified staff contributes to improved health outcomes amongst patients (24).

Our study also showed that having health care providers trained before (pre-service) they started offering child health services or on the job (in-service) is positively associated (0.215 IV-probit model) with the probability of child readmission. According to the 2009 Namibia Health Facility Census (HFC), 87 percent of facilities were offered routine staff training during the 12 months preceding the

survey (18). We can conclude that having health care workers who are knowledgeable on using existing guidelines may not necessarily better assess and treat sick children with a high level of sensitivity and specificity thus contributing to a reduction in the probability of readmission. These findings are consistent with previous studies; provision of care consistent with clinical practice guidelines has been associated with lower readmission rates in children and adults with various conditions (52-54). Other evidence also shows that inadequate knowledge or reported practice for detecting and managing some common diseases affecting children occurred less frequently in teaching hospitals than non-teaching hospitals (26). This reinforces the need for staff to be continually trained and updated on current guidelines for standard assessment and treatment for most common disorders for which children are not provided care (26). We found that who, where, and how health services are delivered in health facilities are associated with poorer patient outcomes in line with other observational studies of quality service and patient outcomes. This includes all those studies which used other health service delivery data and various statistical or mathematical techniques.

We finally note from the results that if the child had previously visited another health care provider (whether informal or formal) the probability of readmissions is increased by 38%. Extensions to this analysis could study this is an important finding, with a possibility of using an instrumented approach.

4.5 Limitations

The ability to adjust for severity is limited when using observational data because of the inadequacy of clinical information, however, they are widely and readily available to guide research on preliminary quality measures of hospital care. We failed to account for other variables that can be associated with the quality of health services and readmissions. The unobserved factors include actual distance, co-payment of services, location, and capacity of the health facility where health services were provided. We recommend that future studies of quality of health services use data obtained from diverse sources other than survey data collected for service provision assessment only, they can further explore the use

of medical expenditure records maintained by hospital administrative departments, clinical records maintained by health care professionals, and direct observations of the health care worker–patient encounter. Each source of data produces a different view of the quality of care and variables such as distance, the severity of illness, availability of resources and administrative costs can be measured and controlled (55). Furthermore, we recommend refinement of the service provision assessment tool to collect precise data on additional variables which can be used for extended analysis.

4.5 Strengths

The main strengths of this study were the use of country patient-level data which minimizes the effects of unobserved confounders. Despite that health care quality or hospital quality is a multifaceted concept which covers a wide range of aspects , synthesizing measures across the different dimensions is a worthwhile but daunting task in health economic research. In addition, non- availability of patient level databases with health outcomes makes research in this area more challenging.

Although it is possible that the severity of illness of children who accessed services at health centres, clinics, or hospitals might differ in unobservable characteristics, our study showed that, that if any, the health centres and clinics offer services to patients with lower socioeconomic status. For example, we discovered that sick children treated at low-level facilities (health centres) had low socioeconomic status (93% had no pre-payment plan- no medical aid cover), which is mainly associated with poor outcomes such as readmissions.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

This study offers insights into factors affecting readmission as proxy indicator of hospital quality. There is statistical significance of socio-demographic and health system factors. The most significant finding of this study was the prevalence of health provider -related factors within the healthcare system and these are of interest from a policy perspective. The factors mainly lie within the influence of hospital personnel. Therefore, the readmissions are preventable and can be linked to the quality provided by the hospital and the hospital care professionals.

In the Namibian context, factors such as health care provider characteristics (age, sex, and qualifications), the type of visit, type of facility, and the number of years the hospital has been offering child care services, had a significant effect on the probability of readmission. From the results of the IV-probit model, we conclude that if health policies are directed toward improving the skills of health care providers, then the quality of health care will be improved. Patient case management from highly skilled technical staff will ensure that there is closer adherence to evidenced-based guidelines for patient care thus ensuring that quality of care is incorporated into a dimension of all health services.

Despite the qualifications, a health worker is holding, providing pre-service and on-the-job training for a particular health service will improve the quality of health service. From the IV-probit model results, we can see that considering the unobserved factors associated with provider qualification and the training offered will reduce the chances of readmission. The chances that the sick child will be attended by a skilled health worker depends on the severity of the illness, geographical location of the health facility, and proximity to the facility. We recommend that the distribution of highly skilled health personnel should consider the geographical coverage of the health facility. The descriptive statistics

show that many readmitted sick children accessed health services at clinics where you rarely find highly qualified health care workers such as specialists and medical officers. Future research can focus on instrumenting other factors which had a significant effect on the outcome of this study.

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APPENDICES

Appendix A: Formula for calculating sample power for two proportions

a) Formula for calculating sample power for two proportions

$$1 - \beta = \Phi \left(\frac{(p_2 - p_1) - z_{1 - \alpha / 2}}{\sigma_D} \right) + \Phi \left(\frac{(-p_2 - p_1) - z_{1 - \alpha / 2}}{\sigma_D} \right)$$

, where $1 - \beta$ is the power, Φ is the **standard Normal distribution function**, n_1 and n_2 are the sample sizes between the unexposed and exposed group, p_1 and p_2 are the proportions of the unexposed and exposed groups, α is the significance level, $z_{1 - \alpha}$ is the $(1 - \alpha)$ the quantile of the standard normal distribution and $\sigma_D = \sqrt{p_1(1 - p_1) / n_1 + p_2(1 - p_2) / n_2}$ is the standard deviation of the difference between the two proportions.

Appendix B: Observation of Sick Child Protocol

MAY 1, 2014

THE DHS PROGRAM SERVICE PROVISION ASSESSMENT SURVEY

OBSERVATION OF SICK CHILD CONSULTATION

1. Facility Identification

	QTYPE	S	C	O
FACILITY NUMBER				
PROVIDER SERIAL NUMBER [FROM STAFF LISTING FORM]				
CLIENT CODE [FROM CLIENT LISTING FORM]				

2. Provider Information

<u>Provider Qualification Category:</u> PROVIDER TYPE 1 01 PROVIDER TYPE 2 02 PROVIDER TYPE 3 03 PROVIDER TYPE 4 04 PROVIDER TYPE 5 05 PROVIDER TYPE 6 06 PROVIDER TYPE 7 07 PROVIDER TYPE 8 08 PROVIDER TYPE 9 09 OTHER TYPE 96	PROVIDER CATEGORY
SEX OF PROVIDER: (1=Male; 2=Female)	SEX OF PROVIDER



3.Information About Observation

Date:	DAY		
	MONTH		
	YEAR	2	0
		2	
Name of the observer:	OBSERVER CODE		

[YEAR] [COUNTRY] SPA Survey
OBSERVATION

SICK CHILD
1 of 8

4. OBSERVATION OF SICK CHILD CONSULTATION

NO.	QUESTIONS	CODING CLASSIFICATION	GO TO																
BEFORE OBSERVING THE CONSULTATION, OBTAIN PERMISSION FROM BOTH THE SERVICE PROVIDER AND THE CLIENT. MAKE SURE THAT THE PROVIDER KNOWS THAT YOU ARE NOT THERE TO EVALUATE HIM OR HER, AND THAT YOU ARE NOT AN "EXPERT" TO BE CONSULTED DURING THE SESSION.																			
	READ TO PROVIDER: Hello. I am [OBSERVER]. I am representing the [IMPLEMENTING ORG] We are conducting a study of health facilities in [COUNTRY] with the goal of finding ways to improve the delivery of services. I would like to observe your consultation with this client in order to understand how services for sick children are provided in this facility. Information from this observation is confidential. Neither your name nor that of the client will be recorded. The information acquired during this observation may be used by the MOH or other organizations to improve services, or for research on health services; however, neither your name nor the names of your clients will be entered in any database. Do you have any questions for me? If at any point you feel uncomfortable you can ask me to leave. However, we hope you won't mind our observing your consultation. Do I have your permission to be present at this consultation? <table border="1" style="border-collapse: collapse; text-align: center;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;">2</td> <td style="width: 20px; height: 20px;">0</td> <td style="width: 20px; height: 20px;">2</td> <td style="width: 20px; height: 20px;"></td> </tr> <tr> <td colspan="2">DAY</td> <td colspan="2">MONTH</td> <td colspan="4">YEAR</td> </tr> </table> Interviewer's signature (Indicates respondent's willingness to participate)							2	0	2		DAY		MONTH		YEAR			
				2	0	2													
DAY		MONTH		YEAR															
100	RECORD WHETHER PERMISSION WAS RECEIVED FROM THE PROVIDER.	YES..... 1 NO → 2	END																
	READ TO CLIENT: Hello, I am _____. I am representing the [IMPLEMENTING ORG] We are conducting a study of health services in [COUNTRY]. I would like to be present while you are receiving services today in order to understand how sick child services are provided in this facility. We are not evaluating the [NURSE/DOCTOR/PROVIDER] or the facility. And although information from this observation may be provided to researchers for analyses, neither your name nor the date of service will be provided in any shared data, so your identity and any information about you will remain completely confidential. Please know that whether you decide to allow me to observe your visit is completely voluntary and that whether you agree to participate or not will not affect the services you receive. If at any point you would prefer I leave please feel free to tell me. After the consultation, my colleague would like to talk with you about your experience here today. Do you have any questions for me at this time? Do I have your permission to be present at this consultation? Interviewer's signature (Indicates respondent's willingness to participate)																		
101	RECORD WHETHER PERMISSION WAS RECEIVED FROM THE CARETAKER.	YES..... 1 NO → 2	END																
102	RECORD THE TIME THE OBSERVATION STARTED <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> </table> <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> </table> .																		
103	IS THIS THE FIRST OBSERVATION FOR THIS PROVIDER FOR THIS SERVICE?	YES..... 1 NO 2																	
104	RECORD SEX OF THE CHILD. CONFIRM SEX OF CHILD WITH THE PROVIDER	MALE 1 FEMALE..... 2																	

5.PROVIDER INTERACTION WITH CARETAKER AND CHILD

NO.	QUESTIONS / OBSERVATIONS	CODES
FOR EACH OF THE GROUPS THAT FOLLOW, CIRCLE ANY ACTIONS TAKEN BY THE PROVIDER OR THE CLIENT. IF NO ACTION IN THE GROUP IS TAKEN, CIRCLE "Y" FOR EACH GROUP AT THE END OF THE OBSERVATION		

CLIENT HISTORY

105	RECORD WHETHER A PROVIDER ASKED ABOUT OR WHETHER THE CARETAKER MENTIONED THAT THE CHILD HAD ANY OF THE FOLLOWING MAIN SYMPTOMS	
01	Fever	A
02	Cough or difficult breathing (e.g., fast breathing or chest in-drawing)	B
03	Diarrhea	C
04	Ear pain or discharge	D
05	None of the above	Y
106	RECORD WHETHER A PROVIDER ASKED ABOUT OR WHETHER THE CARETAKER MENTIONED ANY OF THE FOLLOWING GENERAL DANGER SIGNS	
01	Child is unable to drink or breastfeed	A
02	Child vomits everything	B
03	Child has had convulsions with this illness	C
04	None of the above	Y
107	RECORD WHETHER A PROVIDER CHECKED FOR SUSPECTED SYMPTOMATIC HIV INFECTION BY ASKING FOR ANY OF THE FOLLOWING:	
01	Mother's HIV status	A
02	TB disease in any parent in the last 5 years	B
03	Two or more episodes of diarrhea in child each lasting 14 days or more	C
04	None of the above	Y

PHYSICAL EXAMS

108	RECORD WHETHER A PROVIDER PERFORMED ANY OF THE FOLLOWING PHYSICAL EXAMINATIONS ON THE SICK CHILD	
01	Took child's temperature by thermometer	A
02	Felt the child for fever or body hotness	B
03	Counted respiration (breaths) for 60 seconds	C
04	Auscultated child (listen to chest with stethoscope) or count pulse	D
05	Checked skin turgor for dehydration (e.g., pinch abdominal skin)	E
06	Checked for pallor by looking at palms	F
07	Checked for pallor by looking at conjunctiva	G
08	Looked into child's mouth	H
09	Checked for neck stiffness	I
10	Looked in child's ear	J
11	Felt behind child's ear	K
12	Undressed child to examine (up to shoulders/down to ankles)	L
13	Pressed both feet to check for edema	M
14	Weighed the child	N
15	Plotted weight on growth chart	O
16	Checked for enlarged lymph nodes in 2 or more of the following sites: neck, axillae, groin	P
17	None of the above	Y

NO.	QUESTIONS / OBSERVATIONS	CODES
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OTHER ASSESSMENTS

109	RECORD WHETHER A PROVIDER ASKED ABOUT OR PERFORMED OTHER ASSESSMENTS OF THE CHILD'S HEALTH BY DOING ANY OF THE FOLLOWING:	
01	Offered the child something to drink or asked the mother to put the child to the breast MARK AS YES IF YOU OBSERVE CHILD DRINKS OR BREASTFEEDS DURING VISIT	A
02	Asked about normal feeding habits or practices when the child is not ill	B
03	Asked about normal breastfeeding habits or practices when the child is not ill	C
04	Asked about feeding or breastfeeding habits or practices for child during this illness	D
05	Mentioned the child's weight or growth to the caretaker, or discussed growth chart	E
06	Looked at the child's immunization card or asked caretaker about child vaccination History	F
07	Asked if child received Vitamin A within past 6 months	G
08	Looked at the child's health card either before beginning the consultation, or while collecting information from the caretaker, or while examining the child THIS ITEM MAY BE EITHER THE VACCINATION CARD OR OTHER HEALTH CARD	H
09	Wrote on the child's health card	I
10	Asked if child received any de-worming medication in last 6 months	J
11	None of the above	Y

COUNSELING OF CARETAKER

110	RECORD WHETHER A PROVIDER DID ANY OF THE FOLLOWING	
01	Provided general information about feeding or breastfeeding the child even when not sick	A
02	Told the caretaker to give extra fluids to the child during this illness	B
03	Told the caretaker to continue feeding the child during this illness	C
04	Told the caretaker what illness(es) the child has	D
05	Described signs and/or symptoms in the child for which to immediately bring child back	E
06	Used a visual aid to educate caretaker	F
07	None of the above	Y

ADDITIONAL COUNSELING

111	RECORD WHETHER A PROVIDER DID ANY OF THE FOLLOWING THIS REFERS ONLY TO MEDICINES THAT THE CARETAKER WILL GIVE TO THE SICK CHILD AT HOME AND DOES NOT INCLUDE STAT DOSES OR ONE TIME MEDS GIVEN TO THE CHILD DURING THE VISIT (E.G., ORS OR PAIN MEDICINE) FOR URGENT TREATMENT OF SYMPTOMS.	
01	Prescribed or provided oral medications during or after consultation	A
02	Explained how to administer oral treatment(s)	B
03	Asked the caretaker to repeat the instructions for giving medications at home	C
04	Gave the first dose of the oral treatment	D
05	Discuss follow-up visit for the sick child	E
06	None of the above	Y

NO.	QUESTIONS / OBSERVATIONS	CODES
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REFERRALS AND ADMISSIONS

112	RECORD WHETHER THE PROVIDER DID ANY OF THE FOLLOWING		
01	RECOMMEND THAT CHILD BE HOSPITALIZED URGENTLY (I.E., ADMITTED TO THE HOSPITAL OR REFERRED TO ANOTHER HOSPITAL)	A	
02	REFERRED CHILD TO ANOTHER PROVIDER WITHIN FACILITY FOR OTHER CARE	B	
03	REFERRED CHILD FOR A LABORATORY TEST WITHIN OR OUTSIDE FACILITY	C	
04	EXPLAINED THE REASON FOR (ANY) REFERRAL	D	
05	GAVE REFERRAL SLIP TO CARETAKER	E	
06	EXPLAINED WHERE (OR TO WHOM) TO GO	F	
07	PROVIDER EXPLAINED WHEN TO GO FOR REFERRAL	G	
08	NONE OF THE ABOVE	Y	
113	WHAT WAS THE OUTCOME OF THIS CONSULTATION? [THIS IS THE POINT WHEN THE OBSERVATION IS CONCLUDED]	TREATED AND SENT HOME. 1 CHILD REFERRED TO PROVIDER, SAME FACILITY. 2 CHILD ADMITTED, SAME FACILITY. 3 CHILD SENT TO LAB. 4 CHILD REFERRED TO OTHER FACILITY. 5	

NO.	QUESTIONS / OBSERVATIONS	CODES
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6.DIAGNOSIS

ASK THE PROVIDER TO TELL YOU THE DIAGNOSIS FOR THE SICK CHILD. IF A DIAGNOSIS OF DEHYDRATION WAS MADE, ASK IF IT WAS SEVERE, MILD, OR MODERATE AND INDICATE ACCORDINGLY. FOR ANY OTHER DIAGNOSIS, SIMPLY CIRCLE THE DIAGNOSIS MADE.		
DIAGNOSIS (OR MAIN SYMPTOM, IF NO DIAGNOSIS)		
201	DEHYDRATION	
	SEVERE DEHYDRATION.	1
	MODERATE DEHYDRATION.	2
	MILD DEHYDRATION.	3
	NONE OF THE ABOVE / NO DEHYDRATION.	4
202	RESPIRATORY SYSTEM	
	PNEUMONIA / BRONCHOPNEUMONIA	A
	BRONCHIAL SPASM / ASTHMA.	B
	UPPER RESPIRATORY INFECTION (URI) / ACUTE RESPIRATORY ILLNESS (ARI).	C
	RESPIRATORY ILLNESS, DIAGNOSIS UNCERTAIN.	D
	COUGH, DIAGNOSIS UNCERTAIN.	E
	NONE OF THE ABOVE.	Y
203	DIGESTIVE SYSTEM / INTESTINAL	
	ACCUTE WATERY DIARRHEA.	A
	DYSENTERY.	B
	AMEBIASIS.	C
	PERSISTENT DIARRHEA.	D
	OTHER DIGESTIVE / INTESTINAL (SPECIFY)_____	X
	NONE OF THE ABOVE.	Y
204	MALARIA	
	MALARIA (CLINICAL DIAGNOSIS).	1
	MALARIA (BLOOD SMEAR)	2
	MALARIA (RAPID DIAGNOSTIC TEST)	3
	NONE OF THE ABOVE.	4
205	FEVER/MEASLES	
	FEVER OF UNKNOWN ORIGIN.	1
	MEASLES WITH NO COMPLICATIONS.	2
	MEASLES WITH COMPLICATIONS (E.G., MOUTH/EYE OR SEVERE).	3
	TYPHOID FEVER.	4
	URINARY TRACK INFECTION.	5
	SEPTICEMIA.	6
	MENINGITIS.	7
	NONE OF THE ABOVE.	8
206	EAR	
	MASTOIDITIS.	A
	ACUTE EAR INFECTION.	B
	CHRONIC EAR INFECTION.	C
	OTHER EAR INFECTION.	X
	NONE OF THE ABOVE.	Y
207	THROAT	
	SORE THROAT/PHARYNGITIS.	1
	OTHER THROAT DIAGNOSIS (SPECIFY)_____	2
	NONE OF THE ABOVE.	3

NO.	QUESTIONS / OBSERVATIONS	CODES
208	OTHER DIAGNOSIS	
	ABSESS. A	
	BACTERIAL CONJUNCTIVITIS. B	
	SKIN CONDITION. C	
	OTHER DIAGNOSIS (SPECIFY) _____	
	XNO OTHER DIAGNOSIS. Y	

7.TREATMENT

ASK ABOUT THE TREATMENT THAT WAS EITHER PRESCRIBED OR PROVIDED. PROMPT IF NECESSARY.			
209	Did you prescribe any treatment today for this child? IF YES, CIRCLE ALL TREATMENTS THAT WERE PRESCRIBED OR PROVIDED TO CHILD IN THE FOLLOWING QUESTIONS	YES..... 1 NO 2	215
210	GENERAL TREATMENT		
01	BENZYL PENICILLIN INJECTION		A
02	OTHER ANTIBIOTIC INJECTION		B
03	OTHER INJECTION		C
04	CO-TRIMOXAZOLE TABLETS		D
05	CO-TRIMOXAZOLE SYRUP		E
06	AMOXICILLIN CAPSULES		F
07	AMOXICILLIN SYRUP		G
08	OTHER ANTIBIOTIC TABLET/SYRUP		H
09	PARACETAMOL		I
10	OTHER FEVER REDUCING MEDICINE		J
11	ZINC		K
12	VITAMINS (OTHER THAN VITAMIN A)		L
13	COUGH SYRUPS/OTHER MEDICATION		M
14	NONE OF THE ABOVE		Y
211	RESPIRATORY		
01	NEBULISER OR INHALER		A
02	INJECTABLE BRONCHODILATOR (E.G., ADRENALINE)		B
03	ORAL BRONCHODILATOR		C
04	DRY EAR BY WICKING		D
05	NONE OF THE ABOVE		Y
212	MALARIA		
01	INJECTABLE QUININE		A
02	INJECTABLE ARTEMETHER / ARTESUNATE		B
03	OTHER INJECTABLE ANTIMALARIAL (E.G., FANSIDAR)		C
04	SUPPOSITORY ARTEMETHER / ARTESUNATE		D
05	ORAL ACT/AL (E.G., COARTEM)		E
06	ORAL ARTEMETER / ARTESUNATE		F
07	ORAL AMODIAQUINE		G
08	ORAL FANSIDAR (SP)		H
09	ORAL QUININE		I
10	OTHER ORAL ANTIMALARIAL		J
11	NONE OF THE ABOVE		Y

NO.	QUESTIONS / OBSERVATIONS	CODES
213	DEHYDRATION	
01	HOME ORT (PLAN A)	A
02	INITIAL ORT IN FACILITY (4 HOURS - PLAN B)	B
03	INTRAVENOUS FLUIDS (PLAN C)	C
04	NONE OF THE ABOVE	Y
214	OTHER TREATMENT & ADVICE	
01	VITAMIN A (MAY ALSO BE FOR IMMUNIZATION)	A
02	FEEDING SOLID FOODS	B
03	FEEDING EXTRA LIQUIDS	C
04	FEEDING BREAST MILK	D
05	PRESCRIBED/GAVE DEWORMING TABLETS	E
06	ANY OTHER TREATMENT _____	X
07	NONE OF THE ABOVE	Y

ASK PROVIDER

215	Is this [NAME'S] first visit to this facility for this illness, or is this a follow-up visit?	FIRST VISIT 1 FOLLOW-UP 2 . DON'T 8 KNOW.	
216	Did you vaccinate the child during this visit or or refer the child for vaccination today other than VITAMIN A supplementation? IF NO: Why not?	YES, VACCINATED CHILD 01 YES, REFERRED 02 NOT DUE FOR VACCINATION 03 VACCINE NOT AVAILABLE. 04 CHILD TOO SICK. 05 NOT DAY FOR VACCINATION 06 DID NOT CHECK FOR VACCINATION 07 VACCINATION COMPLETED. 08	
217	RECORD THE TIME THE OBSERVATION ENDED.		
Observer's comments: 			

THE DHS PROGRAM SERVICE PROVISION ASSESSMENT SURVEY

SICK CHILD CARETAKER EXIT INTERVIEW

FACILITY IDENTIFICATION

FACILITY NUMBER	
PROVIDER SERIAL NUMBER [FROM STAFF LISTING FORM].....	
CLIENT CODE [FROM CLIENT LISTING FORM].....	

INFORMATION ABOUT INTERVIEW

DATE:.....	DAY	
	MONTH	
	YEAR	2 0 2
	Name of the interviewer:	INTERVIEWER CODE.....

1. Information About Visit - CARETAKER OF SICK CHILD

NO.	QUESTIONS	CODING CLASSIFICATION	GO TO																
	READ TO CLIENT: Hello, I am _____. As my colleague mentioned, we are representing [IMPLEMENTING ORGANIZATION]. We are conducting a study of health facilities in [COUNTRY] in order to improve the services this facility offers and would like to ask you some questions about your experiences here today. Please know that whether you decide to allow this interview or not is completely voluntary and will not affect services you receive during any future visit. You may refuse to answer any question, and you may stop the interview at any time. Information from this interview may be provided to researchers for analyses, but neither your name nor the date of services will be on any shared information, so your identity will remain completely confidential. Do you have any questions for me? Do I have your permission to continue with the interview?																		
	Interviewer's signature _____ (Indicates respondent's willingness to participate)	<table border="1"> <tr> <td></td><td></td><td></td><td></td><td>2</td><td>0</td><td>2</td><td></td> </tr> <tr> <td colspan="2">DAY</td> <td colspan="2">MONTH</td> <td colspan="4">YEAR</td> </tr> </table>					2	0	2		DAY		MONTH		YEAR				
				2	0	2													
DAY		MONTH		YEAR															
100	May I begin the interview?	CLIENT AGREES..... 1 CLIENT REFUSES 2	→ END																
101	RECORD THE TIME THE INTERVIEW STARTED																		
102	What is the name of the sick child?	NAME _____																	

CLIENT AGE

103	What month and year was [NAME] born?	MONTH <table border="1"><tr><td></td><td></td></tr></table> DON'T KNOW MONTH 98 YEAR <table border="1"><tr><td></td><td></td><td></td><td></td></tr></table> DON'T KNOW YEAR 9998							
104	How old is [NAME] in completed months?	AGE IN MONTHS <table border="1"><tr><td></td><td></td></tr></table> DON'T KNOW. 98							

SIGNS AND SYMPTOMS OF CURRENT ILLNESS

105	Has [NAME] had fever with this illness or any time in the past two days?	YES..... 1 NO..... 2	
106	Has [NAME] had a convulsion with this illness?	YES..... 1 NO..... 2	
107	Does [NAME] have cough or difficulty breathing with this illness?	YES..... 1 NO..... 2	
108	Can [NAME] drink, eat or breastfeed?	YES..... 1 NO..... 2	
109	Does [NAME] vomit everything when he/she eats or breastfeeds during this illness?	YES..... 1 NO..... 2	

110	Has [HE/SHE] had watery and frequent stools with this illness or any time in the past two days?	YES..... 1 NO..... 2			
111	Has [HE/SHE] been excessively sleepy during this illness?	YES..... 1 NO..... 2			
112	For what other reason(s) did you bring [NAME] to this health facility today? CIRCLE ALL ITEMS THE RESPONDENT MENTIONS PROBE: Anything else?	EAR PROBLEMS..... A SKIN SORE/PROBLEMS..... B INJURY..... C EYE PROBLEM..... D OTHER..... X (SPECIFY) NO OTHER REASON..... Y			
113	Has [NAME] been brought to this facility before for this same illness? IF YES, ASK: How long ago was that?	WITHIN THE PAST WEEK..... 1 WITHIN THE PAST 2-4 WEEKS..... 2 MORE THAN 4 WEEKS AGO..... 3 NO..... 4 DON'T KNOW..... 8			
114	How many days ago did the illness for which you brought [NAME] here begin? IF LESS THAN 1 DAY, ENTER 00	DAYS AGO..... <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr></table> DON'T KNOW..... 98			

INFORMATION PROVIDED TO CARETAKER

115	Did the provider tell you what illness [NAME] has?	YES..... 1 NO..... 2 DON'T KNOW..... 8	
116	What would you do if [NAME] does not get completely better or becomes worse?	RETURN TO FACILITY..... 1 GO TO OTHER FACILITY..... 2 GO TO OTHER HEALTH WORKER OR /PHARMACY..... 3 GO TO TRADITIONAL HEALER..... 4 NOTHING, JUST WAIT..... 5 DON'T KNOW..... 8	
117	Did the provider tell you about any signs or symptoms you may see for which you must immediately bring the child back? IF YES, ASK: Can you tell me what these are? IF NECESSARY, PROBE: Were there any serious symptoms or danger signs for which you were told to bring [NAME] back immediately?	FEVER..... A BREATHING PROBLEMS..... B BECOMES SICKER..... C BLOOD IN STOOL..... D VOMITING..... E POOR/NOT EATING..... F POOR/NOT DRINKING..... G CONVULSION..... H OTHER..... X (SPECIFY) NO, NONE..... Y DON'T KNOW..... Z	
118	Did the provider tell you anything about bringing [NAME] back to the health facility for follow-up or non-emergency reasons? IF YES: Why were you to return?	MORE MEDICINES..... A IF SYMPTOMS INCREASE OR BECOME WORSE..... B FOLLOW-UP APPOINTMENT..... C VIT. A SUPPLEMENTATION..... D LAB TEST RESULTS..... E CHILD ADMITTED..... F ROUTINE IMMUNISATION..... G OTHER..... X (SPECIFY) NO..... Y DON'T KNOW..... Z	

TREATMENT AND CARETAKER COMFORT LEVEL

119	Did the provider give or prescribe any medicines for [NAME] to take at home?	YES, GAVE MEDS. 1 YES, GAVE PRESCRIPTION. 2 GAVE MEDS AND PRESCRIPTION. 3 NO 4	124
120	ASK TO SEE ALL MEDICATIONS THAT THE CARETAKER RECEIVED AND ANY PRESCRIPTIONS THAT HAVE NOT YET BEEN FILLED. CIRCLE THE RESPONSE DESCRIBING THE MEDICATIONS AND PRESCRIPTIONS YOU SEE.	HAS ALL MEDS. 1 HAS SOME MEDS, SOME UNFILLED PRESCRIPTIONS. 2 NO MEDICATIONS SEEN, HAS PRESCRIPTIONS ONLY. 3	
121	Did a provider at the facility explain to you how to give these medicines to [NAME] at home? IF "2" OR "8" SEND CLIENT BACK TO PROVIDER AT THE END OF THE INTERVIEW	YES. 1 NO. 2 DON'T KNOW. 8	
122	Do you feel comfortable or confident that you know how much of each medication to give [NAME] each day and for how many days to give it? IF "2" OR "8" SEND CLIENT BACK TO PROVIDER AT THE END OF THE INTERVIEW	YES. 1 NO. 2 DON'T KNOW. 8	
123	Has [NAME] been given a dose of any of these medications here at the facility already?	YES. 1 NO. 2 DON'T KNOW. 8	
124	Did [NAME] receive an injection for treating the sickness here at the facility today? IF NO, CHECK PRESCRIPTIONS AND RECORD IF THERE IS A PRESCRIPTION FOR AN INJECTION.	YES, RECEIVED INJECTION. 1 YES, RECEIVED PRESCRIPTION FOR INJECTION. 2 NO 3 DON'T KNOW 8	
125	Did anyone at the health facility weigh [NAME] today?	YES 1 NO 2	
126	Did anyone talk to you today about [NAME]'s weight and how [NAME] is growing?	YES 1 NO 2	
127	Did any provider ask you today about the types of foods and amounts that you normally feed [NAME] when [NAME] is not sick?	YES 1 NO 2 CANNOT REMEMBER 8	
128	What did the provider tell you about feeding solid foods to [NAME] during this illness?	GIVE LESS THAN USUAL 1 GIVE SAME AS USUAL 2 GIVE MORE THAN USUAL 3 GIVE NOTHING/DON'T FEED 4 DIDN'T DISCUSS 6 NOT CERTAIN/CAN'T REMEMBER 8	
129	What did the provider tell you about giving fluids (or breast milk, if the child is breastfed) to [NAME] during this illness?	GIVE LESS THAN USUAL 1 GIVE SAME AS USUAL 2 GIVE MORE THAN USUAL 3 GIVE NOTHING/DON'T FEED 4 DIDN'T DISCUSS 6 DON'T KNOW/CAN'T REMEMBER 8	

130	Was [NAME] given a vaccination today? IF YES, ASK TO SEE THE HEALTH CARD OR BOOKLET TO VERIFY.	YES, OBSERVED. 1 REPORTED, NOT SEEN..... 2 NO..... 3 DON'T KNOW 8	
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REFERRAL

131	Did the provider instruct you to take [NAME] to see another provider or to a laboratory in this facility for a finger or heel stick for blood to be taken for a test?	YES. 1 NO. 2	→ 134
132	Did you take [NAME] to the provider or laboratory for the finger or heel stick?	YES. 1 NO. 2	→ 134
133	Were you told the result of the test that was done?	YES. 1 NO. 2	
134	Did the provider instruct you to take [NAME] to see a provider in another facility, or for a laboratory test outside of this facility, for further care for [NAME]?	YES. 1 NO. 2	→ 136
135	Regarding this referral, please tell me:	YES NO DK	
01	Were you given any paper or record to take with you for the referral?	1 2 8	
02	Were you told <u>where</u> to go for the referral?	2 2 8	
03	Were you told <u>who</u> to see for the referral?	1 2 8	
04	Were you told <u>why</u> you are to go for the referral?	1 2 8	
05	Do you intend to go to this (these) referral(s)?	1 2 8	
136	Did you take [NAME] to see another health provider or traditional healer before coming here? IF YES, ASK: Whom did you see and where? CIRCLE ALL THAT APPLY	YES, OTHER PROVIDER THIS FACILITY..... A YES, OTHER PROVIDER DIFFERENT FACILITY. B YES, TRADITIONAL HEALER..... C SAW NO ONE Y	

2. Client Satisfaction

NO.	QUESTIONS	CODING CLASSIFICATION	GO TO																																																												
Now I am going to ask you some questions about the services you received today. I would like to have your honest opinion about the things that we will talk about. This information will help improve services in general.																																																															
201	How long did you wait between the time you arrived at this facility and the time you were able to see a provider for the consultation? TRY TO DETERMINE THE TIME THE CLIENT ARRIVED AT THE FACILITY AND WHEN THE FACILITY OPENS FOR SERVICES. WE ARE INTERESTED IN THE WAITING TIME FROM THE TIME THE FACILITY OFFICIALLY OPENS.	MINUTES <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr></table> SAW PROVIDER IMMEDIATELY000 DON'T KNOW998																																																													
202	Now I am going to ask about some common problems clients have at health facilities. As I mention each one, please tell me whether any of these were problems for you today, and if so, whether they were major or minor problems for you.																																																														
		<table border="1"> <thead> <tr> <th></th> <th>MAJOR</th> <th>MINOR</th> <th>NO PROB- LEM</th> <th>DK</th> </tr> </thead> <tbody> <tr> <td>01 Time you waited to see a provider</td> <td>1</td> <td>2</td> <td>3</td> <td>8</td> </tr> <tr> <td>02 Ability to discuss problems or concerns about [CHILD'S] illness</td> <td>1</td> <td>2</td> <td>3</td> <td>8</td> </tr> <tr> <td>03 Amount of explanation you received about the problem or treatment</td> <td>1</td> <td>2</td> <td>3</td> <td>8</td> </tr> <tr> <td>04 Privacy from having others see the examination</td> <td>1</td> <td>2</td> <td>3</td> <td>8</td> </tr> <tr> <td>05 Privacy from having others hear your consultation discussion</td> <td>1</td> <td>2</td> <td>3</td> <td>8</td> </tr> <tr> <td>06 Availability of medicines at this facility</td> <td>1</td> <td>2</td> <td>3</td> <td>8</td> </tr> <tr> <td>07 The hours of service at this facility, i.e., when they open and close</td> <td>1</td> <td>2</td> <td>3</td> <td>8</td> </tr> <tr> <td>08 The number of days services are available to you</td> <td>1</td> <td>2</td> <td>3</td> <td>8</td> </tr> <tr> <td>09 The cleanliness of the facility</td> <td>1</td> <td>2</td> <td>3</td> <td>8</td> </tr> <tr> <td>10 How the staff treated you</td> <td>1</td> <td>2</td> <td>3</td> <td>8</td> </tr> <tr> <td>11 Cost for services or treatments</td> <td>1</td> <td>2</td> <td>3</td> <td>8</td> </tr> </tbody> </table>			MAJOR	MINOR	NO PROB- LEM	DK	01 Time you waited to see a provider	1	2	3	8	02 Ability to discuss problems or concerns about [CHILD'S] illness	1	2	3	8	03 Amount of explanation you received about the problem or treatment	1	2	3	8	04 Privacy from having others see the examination	1	2	3	8	05 Privacy from having others hear your consultation discussion	1	2	3	8	06 Availability of medicines at this facility	1	2	3	8	07 The hours of service at this facility, i.e., when they open and close	1	2	3	8	08 The number of days services are available to you	1	2	3	8	09 The cleanliness of the facility	1	2	3	8	10 How the staff treated you	1	2	3	8	11 Cost for services or treatments	1	2	3	8
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05 Privacy from having others hear your consultation discussion	1	2	3	8																																																											
06 Availability of medicines at this facility	1	2	3	8																																																											
07 The hours of service at this facility, i.e., when they open and close	1	2	3	8																																																											
08 The number of days services are available to you	1	2	3	8																																																											
09 The cleanliness of the facility	1	2	3	8																																																											
10 How the staff treated you	1	2	3	8																																																											
11 Cost for services or treatments	1	2	3	8																																																											
203	Are you a part of any prepayment plan (such as medical aid, insurance or a similar program) or institutional arrangement that pays for some or all of the services you receive at this or any other facility?	YES.....1 NO.....2 DON'T KNOW8																																																													
204	Were you charged, or did you pay fees for any services your received or were provided today?	YES 1 NO.....2	→ 206																																																												

205	What is the total amount you paid for all services or treatments you received at this facility today?	TOTAL AMOUNT <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> </tr> </table> DON'T KNOW999998							
206	Is this the closest health facility to your home?	YES.....1 → 208 NO.....2 DON'T KNOW8 → 208							
207	What was the main reason you did not go to the facility nearest to your home? IF CLIENT MENTIONS SEVERAL REASONS, PROBE FOR THE MOST IMPORTANT, OR MAIN REASON.	INCONVENIENT OPERATING HOURS.....01 BAD REPUTATION02 DON'T LIKE PERSONNEL03 NO MEDICINE.....04 PREFERS TO REMAIN ANONYMOUS05 IT IS MORE EXPENSIVE06 WAS REFERRED07 OTHER. 96 DON'T KNOW.....98							
208	In general, which of the following statements best describes your opinion of the services you either received or were provided at this facility today READ ALL STATEMENTS, CIRCLE ONLY ONE 01) I AM VERY SATISFIED WITH THE SERVICES I RECEIVED IN FACILITY1 02) I AM MORE OR LESS SATISFIED WITH THE SERVICES I RECEIVED.2 03) I AM NOT SATISFIED WITH THE SERVICED I RECEIVED3								
209	Will you recommend this health facility to a friend or family member?	YES.....1 NO.....2 DON'T KNOW8							

3. Client Personal Characteristics

NO.	QUESTIONS	CODING CLASSIFICATION	GO TO
Now I am going to ask you some questions about yourself. I would like to have your honest responses as this information will help to improve services in general.			
301	What is your relationship to [SICK CHILD]?	MOTHER1 FATHER2 SIBLING3 AUNT OR UNCLE.....4 GRAND MOM/GRAND DAD.5 OTHER6 (SPECIFY)	
302	How old were you at your last birthday?	AGE IN YEARS DON'T KNOW98	
303	Have you ever attended school?	YES.....1 NO2	305
304	What is the highest level of school you attended? COUNTRY SPECIFIC	PRIMARY01 SECONDARY O-LEVEL.....02 SECONDARY A-LEVEL03 VOCATIONAL TRAINING04 COLLEGE (TECHNICAL).....05 UNIVERSITY.....06	→ 306
305	Do you know how to read or how to write?	YES, READ AND WRITE . . 1 YES, READ ONLY 2 NO 3	→
306	RECORD THE TIME THE INTERVIEW ENDED		
	Thank you very much for taking the time to answer my questions. Once again, any information you have given will be kept completely confidential. Have a good day!		
Interviewer's comments:			

Appendix D: Health Worker Interview

Facility Number:			
Provider SERIAL Number:		[FROM STAFF LISTING FORM]	
Provider Sex: (1=MALE; 2=FEMALE)			
Provider Status: (1=Assigned; 2=Seconded)			
Interviewer Code:			
Number of ANC Observations Associated with Provider.			
Number of FP Observations Associated with Provider.			
Number of Sick Child Observations Associated with Provider.			
INDICATE IF PROVIDER WAS PREVIOUSLY INTERVIEWED IN ANOTHER FACILITY.		YES, PREVIOUSLY INTERVIEWED 1	
IF YES, RECORD NAME AND FACILITY NUMBER WHERE HE/SHE WAS INTERVIEWED		NAME & NUMBER OF FACILITY END	
		NO, NOT PREVIOUSLY INTERVIEWED 2	
READ THE FOLLOWING CONSENT FORM Good day! My name is _____. We are here on behalf of the [IMPLEMENTING AGENCY] conducting a survey of health facilities to assist the government in knowing more about health services in [COUNTRY]. Now I will read a statement explaining the study. Your facility was selected to participate in this study. We will be asking you several questions about the types of services that you personally provide, as well as questions about training you have received. The information you provide us may be used by the [IMPLEMENTING AGENCY], other organizations or researchers, for planning service improvements or further studies of services. Neither your name nor that of any other health worker respondents participating in this study will be included in the dataset or in any report; however, there is a small chance that any of the respondents may be identified later. Still, we are asking for your help to ensure that the information we collect is accurate. You may refuse to answer any question or choose to stop the interview at any time. However, we hope you will collaborate with the study. Do you have any questions about the study? Do I have your agreement to proceed? SIGNATURE OF INTERVIEWER INDICATES INFORMED CONSENT WAS PROVIDED.			
101	May I begin the interview now?	YES. 1	END
		NO. 2	

EDUCATION AND EXPERIENCE

102	I would like to ask you some questions about your educational background. How many years of education have you completed in total, starting from your primary, secondary and further education?	YEARS.		
103	What is your current occupational category or qualification? For example, are you a registered nurse, or generalist medical doctor or a specialist medical doctor? [list will be country specific - must be extensive, with no need for "other"]	GENERALIST MEDICAL DOCTOR..... 01 SPECIALIST MEDICAL DOCTOR..... 02 ASSISTANT MEDICAL OFFICER 03 CLINICAL OFFICER 04 ASSISTANT CLINICAL OFFICER 05 REGISTERED NURSE..... 07 ENROLLED NURSE 08 NURSE ASSISTANT/ATTENDANT 09 LABORATORY SCIENTIST 13 LABORATORY TECHNOLOGIST 14 LABORATORY TECHNICIAN..... 15 LABORATORY ASSISTANT..... 16 NO TECHNICAL QUALIFICATION/NURSE AIDE..... 95 OTHER 96		
104	What year did you graduate (or complete) with this qualification? IF NO TECHNICAL QUALIFICATION (103=95), ASK: What year did you complete any basic training for your current occupational category?	YEAR		
105	In what year did you start working in this facility?	YEAR		
106	Have you received any dose of Hepatitis B vaccine? IF YES, ASK: How many doses have you received so far?	YES, 1 DOSE..... 1 YES, 2 DOSES..... 2 YES, 3 OR MORE DOSES..... 3 NO..... 4		108
107	Did you receive any of the vaccination as part of your services in this facility?	YES..... 1 NO..... 2		
108	Are you a manager or in-charge for any clinical services?	YES..... 1 NO..... 2		

GENERAL TRAINING / MALARIA / NON-COMMUNICABLE DISEASES

200	I will like to ask you a few questions about in-service training you have received related to your work. In-service training refers to training you have received related to your work since you started working. I will start with some general topics. Note that the training topics I will mention may have been covered as stand alone trainings, or they may have been covered under another training topic. Have you received any in-service training, training updates or refresher training in any of the following topics [READ TOPIC] IF YES, ASK: Was the training, training update or refresher training within the past 24 months or more than 24 months ago?	YES, WITHIN PAST 24 MONTHS	YES, OVER 24 MONTHS AGO	NO IN-SERVICE TRAINING OR UPDATES
01	Standard precautions, including hand hygiene, cleaning and disinfection, waste management, needle stick and sharp injury prevention?	1	2	3
02	Any specific training related to injection safety practices or safe injection practices?	1	2	3
03	Health Management Information Systems (HMIS) or reporting requirements for any service?	1	2	3
04	Confidentiality and rights to non-discrimination practices for people living with HIV/AIDS	1	2	3
05	TB infection control	1	2	3
06	Integrated Management for Emergency and Essential Surgical Care (IMEESC)	1	2	3

201	CHECK [Q103] FOR PROVIDER OCCUPATIONAL CATEGORY / QUALIFICATION CODE [13, 14, 15 OR 16] (i.e., LABORATORY-RELATED) CIRCLED ☐ → 700 CODE [13, 14, 15 OR 16] NOT CIRCLED ☐	
I will now ask you a few questions about services you personally provide in your current position in this facility and any in-service training, training updates or refresher trainings you may have received related to that service. Please remember we are talking about services you provide in your current position in this facility. The training topics I will mention may have been covered as a stand-alone training, or covered as part of another training topic.		
202	In your current position, and as a part of your work for this facility, do you personally provide any services that are designed to be youth or adolescent friendly? i.e., designed with the specific aim to encourage youth or adolescent utilization?	YES. 1 NO. 2
203	Have you received any in-service training, training updates or refresher training on topics specific to youth or adolescent friendly services? IF YES: Was the training, training update or refresher training within the past 24 months or more than 24 months ago?	YES, WITHIN PAST 24 MONTHS. 1 YES, OVER 24 MONTHS AGO. 2 NO TRAINING OR UPDATES. 3

MALARIA

204	In your current position, and as a part of your work for this facility, do you personally diagnose and/or treat malaria?	YES. 1 NO. 2																																	
205	Have you received any in-service training, training updates or refresher trainings on topics related to diagnosis and/or treatment of malaria?	YES. 1 NO. 2	→ 207																																
206	Have you received any in-service training, training updates or refresher trainings in any of the following topics [READ TOPIC]: IF YES: Was the training, training update or refresher training within the past 24 months or more than 21 months ago?	<table border="1"> <thead> <tr> <th></th> <th>YES, WITHIN PAST 24 MONTHS</th> <th>YES, OVER 24 MONTHS AGO</th> <th>NO IN-SERVICE TRAINING OR UPDATES</th> </tr> </thead> <tbody> <tr> <td>01 DIAGNOSING MALARIA IN ADULTS</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>02 DIAGNOSING MALARIA IN CHILDREN</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>03 HOW TO PERFORM MALARIA RAPID DIAGNOSTIC TEST</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>04 CASE MANAGEMENT / TREATMENT OF MALARIA IN ADULTS</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>05 CASE MANAGEMENT / TREATMENT OF MALARIA DURING PREGNANCY</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>06 INTERMITTENT PREVENTIVE TREATMENT OF MALARIA IN PREGNANCY</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>07 CASE MANAGEMENT / TREATMENT OF MALARIA IN CHILDREN</td> <td>1</td> <td>2</td> <td>3</td> </tr> </tbody> </table>		YES, WITHIN PAST 24 MONTHS	YES, OVER 24 MONTHS AGO	NO IN-SERVICE TRAINING OR UPDATES	01 DIAGNOSING MALARIA IN ADULTS	1	2	3	02 DIAGNOSING MALARIA IN CHILDREN	1	2	3	03 HOW TO PERFORM MALARIA RAPID DIAGNOSTIC TEST	1	2	3	04 CASE MANAGEMENT / TREATMENT OF MALARIA IN ADULTS	1	2	3	05 CASE MANAGEMENT / TREATMENT OF MALARIA DURING PREGNANCY	1	2	3	06 INTERMITTENT PREVENTIVE TREATMENT OF MALARIA IN PREGNANCY	1	2	3	07 CASE MANAGEMENT / TREATMENT OF MALARIA IN CHILDREN	1	2	3	
	YES, WITHIN PAST 24 MONTHS	YES, OVER 24 MONTHS AGO	NO IN-SERVICE TRAINING OR UPDATES																																
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06 INTERMITTENT PREVENTIVE TREATMENT OF MALARIA IN PREGNANCY	1	2	3																																
07 CASE MANAGEMENT / TREATMENT OF MALARIA IN CHILDREN	1	2	3																																

DIABETES

207	In your current position, and as a part of your work for this facility, do you personally diagnose and/or manage diabetes ?	YES. 1 NO 2	
208	Have you received any in-service training, training updates or refresher training on topics specific to the diagnosis and/or management of diabetes? IF YES: Was the training, training update or refresher training within the past 24 months or more than 24 months ago?	YES, WITHIN PAST 24 MONTHS.1 YES, OVER 24 MONTHS AGO.2 NO TRAINING OR UPDATES3	

CARDIO-VASCULAR DISEASES

209	In your current position, and as a part of your work for this facility, do you personally diagnose and/or manage cardio-vascular diseases such as hypertension?	YES. 1 NO 2	
210	Have you received any in-service training, training updates or refresher training on the diagnosis and/or management of cardio-vascular diseases? IF YES: Was the training, training update or refresher training within the past 24 months or more than 24 months ago?	YES, WITHIN PAST 24 MONTHS.1 YES, OVER 24 MONTHS AGO.2 NO TRAINING OR UPDATES3	

CHRONIC RESPIRATORY DISEASES

211	In your current position, and as a part of your work for this facility, do you personally diagnose and/or manage chronic respiratory conditions such as chronic obstructive pulmonary disease (COPD)?	YES. 1 NO 2	
212	Have you received any in-service training, training updates or refresher training on the diagnosis and/or management of chronic respiratory diseases? IF YES: Was the training, training update or refresher training within the past 24 months or more than 24 months ago?	YES, WITHIN PAST 24 MONTHS. 1 YES, OVER 24 MONTHS AGO. 2 NO TRAINING OR UPDATES 3	

1. CHILD HEALTH SERVICES

300	In your current position, and as a part of your work for this facility, do you personally provide any child vaccination services?	YES..... 1 NO..... 2	
301	In your current position, and as a part of your work for this facility, do you personally provide any child growth monitoring services?	YES..... 1 NO..... 2	
302	In your current position, and as a part of your work for this facility, do you personally provide any child curative care services?	YES..... 1 NO..... 2	
303	Have you received any in-service training, training updates or refresher training on topics related to child health or childhood illnesses?	YES..... 1 NO..... 2	→ 400
304	Have you received any in-service training or training updates in any of the following topics [READ TOPIC] IF YES: Was the training, training update or refresher training within the past 24 months or more than 24 months ago?	YES, WITHIN PAST 24 MONTHS	YES, OVER 24 MONTHS AGO NO IN-SERVICE TRAINING OR UPDATES
01	EPI OR COLD CHAIN MONITORING	1	2 3
02	INTEGRATED MANAGEMENT OF CHILDHOOD ILLNESSES	1	2 3
03	DIAGNOSIS OF MALARIA IN CHILDREN	1	2 3
04	HOW TO PERFORM MALARIA RAPID DIAGNOSTIC TEST	1	2 3
05	CASE MANAGEMENT / TREATMENT OF MALARIA IN CHILDREN	1	2 3
06	DIAGNOSIS AND/OR TREATMENT OF ACUTE RESPIRATORY INFECTIONS	1	2 3
07	DIAGNOSIS AND/OR TREATMENT OF DIARRHEA	1	2 3
08	MICRONUTRIENT DEFICIENCIES AND/OR NUTRITIONAL ASSESSMENT	1	2 3
09	BREASTFEEDING	1	2 3
10	COMPLIMENTARY FEEDING IN INFANTS	1	2 3
11	PEDIATRIC HIV/AIDS	1	2 3
12	PEDIATRIC ART	1	2 3
13	OTHER TRAINING ON CHILD HEALTH (SPECIFY) _____	1	2 3

2. FAMILY PLANNING SERVICES

400	In your current position, and as a part of your work for this facility, do you personally provide any family planning services?	YES..... 1 NO..... 2	
401	Have you received any in-service training, training updates or refresher training on topics related to family planning?	YES..... 1 NO..... 2	→ 500
403	Have you received any in-service training, training updates or refresher training in any of the following topics [READ TOPIC] IF YES: Was the training, training update or refresher training within the past 24 months or more than 24 months ago?	YES, WITHIN PAST 24 MONTHS	YES, OVER 24 MONTHS AGO NO IN-SERVICE TRAINING OR UPDATES
01	GENERAL COUNSELING FOR FAMILY PLANNING	1	2 3
02	IUCD INSERTION AND/OR REMOVAL	1	2 3
03	IMPLANT INSERTION AND/OR REMOVAL	1	2 3
04	PERFORMING VASECTOMY	1	2 3
05	PERFORMING TUBAL LIGATION	1	2 3
06	CLINICAL MANAGEMENT OF FP METHODS, INCLUDING MANAGING SIDE EFFECTS	1	2 3
07	FAMILY PLANNING FOR HIV POSITIVE WOMEN	1	2 3
08	POST-PARTUM FAMILY PLANNING		3
09	OTHER TRAINING ON FAMILY PLANNING (SPECIFY) _____	1	2 3

3. MATERNAL HEALTH SERVICES

ANC - PNC - PMTCT

500	In your current position, and as a part of your work for this facility, do you personally provide any antenatal care or postnatal care services? IF YES, PROBE AND INDICATE WHICH SERVICES ARE PROVIDED	YES, ANTENATAL. 1 YES, POSTNATAL. 2 YES, BOTH. 3 NO, NEITHER. 4	
501	Have you received any in-service training, training updates or refresher training on topics related to antenatal care or postnatal care?	YES. 1 NO. 2	501
502	Have you received any in-service training, training updates or refresher training in any of the following topics [READ TOPIC] IF YES: Was the training, training update or refresher training within the past 24 months or more than 24 months ago?	YES, WITHIN PAST 24 MONTHS	YES, OVER 24 MONTHS AGO
01	ANC screening (e.g., blood pressure, urine glucose and protein)?	1	2
02	Counseling for ANC (e.g., nutrition, FP and newborn care)?	1	2
03	Complications of pregnancy and their management?	1	2
04	Nutritional assessment of the pregnant woman, such as Body Mass Index calculation and Mid-Upper Arm circumference measurement?	1	2
05	Intermittent preventive treatment of malaria during pregnancy	1	2
503	Do you personally provide any services that are specifically geared toward preventing mother-to-child transmission of HIV? IF YES, ASK: Which specific services do you provide? INDICATE WHICH OF THE LISTED SERVICES ARE PROVIDED AND PROBE: Anything else?	PREVENTIVE COUNSELING. A HIV TEST COUNSELING. B CONDUCT HIV TEST. C PROVIDE ARV TO MOTHER. D PROVIDE ARV TO INFANT. E NO PMTCT SERVICES. Y	
504	Have you received any in-service training, training updates or refresher training on topics related to maternal and/or newborn health and HIV/AIDS?	YES. 1 NO. 2	504
505	Have you received any in-service training, training updates or refresher training in any of the following topics [READ TOPIC] IF YES: Was the training, training update or refresher training within the past 24 months or more than 24 months ago?	YES, WITHIN PAST 24 MONTHS	YES, OVER 24 MONTHS AGO
01	Prevention of mother-to-child transmission (PMTCT) of HIV?	1	2
02	Newborn nutrition counseling of mother with HIV?	1	2
03	Infant and young child feeding	1	2
04	Modified obstetric practices as relates to HIV (e.g., not rupturing membranes)?	1	2
05	Antiretroviral prophylactic treatment for prevention of mother to child transmission of HIV?	1	2

DELIVERY SERVICES

506	In your current position, and as a part of your work for this facility, do you personally provide delivery services ? By that I mean conducting the actual delivery of newborns?	YES. 1 NO. 2	→ 509
507	During the past 6 months, approximately how many deliveries have you conducted as the main provider (include deliveries conducted for private practice and for facility) ?	TOTAL DELIVERIES <table border="1" style="display: inline-table; width: 100px; height: 20px; vertical-align: middle;"></table>	
508	When was the last time you used a partograph?	NEVER. 0 WITHIN PAST WEEK. 1 WITHIN PAST MONTH. 2 WITHIN PAST 6 MONTHS. 3 OVER 6 MONTHS AGO. 4	
509	Have you received any in-service training, training updates or refresher training on topics related to delivery care?	YES. 1 NO. 2	→ 511
510	Have you received any in-service training, training updates or refresher training in any of the following topics [READ TOPIC] IF YES: Was the training, training update or refresher training within the past 24 months or more than 24 months ago?	YES, WITHIN PAST 24 MONTHS	YES, OVER 24 MONTHS AGO
01	Integrated Management of Pregnancy and Childbirth (IMPAC)?	1	2
02	Comprehensive Emergency Obstetric Care (CEmOC)?	1	2
03	Routine care for labor and normal vaginal delivery?	1	2
04	Active Management of Third Stage of Labor (AMTSL)?	1	2
05	Emergency obstetric care (EmOC)/Life saving skills (LSS) - in general?	1	2
06	Post abortion care?	1	2
07	Special delivery care practices for preventing mother-to-child transmission of HIV?	1	2

NEWBORN CARE SERVICES

511	In your current position, and as a part of your work for this facility, do you personally provide care for the newborn?	YES. 1 NO. 2	
512	Have you received any in-service training, training updates or refresher training on topics related to newborn care?	YES. 1 NO. 2	→ 600
513	Have you received any in-service training, training updates or refresher training in any of the following topics [READ TOPIC] IF YES: Was the training, training update or refresher training within the past 24 months or more than 24 months ago?	YES, WITHIN PAST 24 MONTHS	YES, OVER 24 MONTHS AGO
01	Neonatal resuscitation using bag and mask	1	2
02	Early and exclusive breastfeeding	1	2
03	Newborn infection management (including injectable antibiotics)	1	2
04	Thermal care (including immediate drying and skin-to-skin care)	1	2
05	Sterile cord cutting and appropriate cord care	1	2
06	Kangaroo Mother Care (KMC) for low birth weight babies	1	2

4. SEXUALLY TRANSMITTED INFECTIONS - TB - HIV/AIDS

SEXUALLY TRANSMITTED INFECTIONS

600	In your current position, and as part of your work for this facility, do you personally provide any STI services?	YES..... 1 NO..... 2	
601	Have you received any <i>in-service training, training updates or refresher training</i> on topics related to STI services?	YES..... 1 NO..... 2	→ 603
602	Have you received any <i>in-service training, training updates or refresher training</i> in any of the following topics [READ TOPIC] IF YES: Was the training, training update or refresher training within the past 24 months or more than 24 months ago?	YES, WITHIN PAST 24 MONTHS	YES, OVER 24 MONTHS AGO
			NO IN-SERVICE TRAINING OR UPDATES
01	Diagnosing and treating sexually transmitted infections (STIs)	1	2
02	The syndromic management for STIs	1	2
03	Drug resistance to STI treatment medications	1	2

TUBERCULOSIS

603	Now I will ask if you provide certain TB-related services. For each service, regardless of whether you currently provide it, I will also ask if you have received related <i>in-service training, training updates or refresher training</i>	Do you provide [READ SERVICE]?	Have you received training or training update on [SERVICE]?		
	READ THE QUESTIONS FROM COLUMNS A AND B	(a)	(b)		
		YES	NO	YES, WITHIN 24 MONTHS	YES, OVER 24 MONTHS
					NO TRAINING
01	Diagnosis of tuberculosis based on sputum tests using AFB Smear Microscopy	1	2	1	2
02	Diagnosis of tuberculosis based on clinical symptoms or TB Diagnostic Algorithm	1	2	1	2
03	Treatment prescription for tuberculosis	1	2	1	2
04	Treatment follow-up services for tuberculosis	1	2	1	2
05	Direct Observation Treatment Short-course (DOTS) strategy	1	2	1	2
06	Management of TB - HIV co-infection	1	2	1	2
07	Management of MDR-TB or identification and referral of MDR-TB suspects	1	2	1	2

HIV/AIDS SERVICES

604	Now I will ask if you provide certain HIV-related services. For each service, regardless of whether you currently provide it, I will also ask if you have received related in-service training, training updates or refresher training.	Do you provide [READ SERVICE]?	Have you received training or training update on [SERVICE]?		
	READ THE QUESTIONS FROM COLUMNS A AND B	(a)	(b)		
		YES	NO	YES, WITHIN 24 MONTHS	YES, OVER 24 MONTHS
					NO TRAINING
01	Provide counseling related to HIV testing	1	2	1	2
02	Conduct the HIV test	1	2	1	2
03	Provide any services related to PMTCT	1	2	1	2
04	Provide any palliative care services	1	2	1	2
05	Provide any ART services, including prescription, counseling, or follow-up	1	2	1	2
06	Provide any preventive treatment for opportunistic infections (OIs) such as TB and pneumonia	1	2	1	2
07	Provide pediatric AIDS care	1	2	1	2
08	Provide HIV/AIDS home-based care	1	2	1	2
09	Provide post-exposure prophylaxis (PEP) services	1	2	1	2

7.DIAGNOSTIC SERVICES

700	In your current position, and as a part of your work for this facility, do you personally conduct laboratory tests? CIRCLE 'NO' IF THE PROVIDER ONLY COLLECTS SPECIMENS.	YES..... 1 NO..... 2	→ 800	
701	Please tell me if you personally conduct any of the following tests as part of your work in this facility	YES	NO	
01	Microscopic examining of sputum for diagnosing tuberculosis	1	2	
02	HIV rapid testing	1	2	
03	Any other HIV test, such as PCR, ELISA, or Western Blot	1	2	
04	Hematology testing, such as anemia testing	1	2	
05	CD4 testing	1	2	
06	Malaria microscopy	1	2	
07	Malaria rapid diagnostic test (mRDT)	1	2	
702	Have you received any in-service training, training updates or refresher training on topics related to the different diagnostic tests you conduct?	YES..... 1 NO..... 2	→ 800	
703	Have you received any in-service training, training updates or refresher training in any of the following topics [READ TOPIC] IF YES: Was the training, training update or refresher training within the past 24 months or more than 24 months ago?	YES, WITHIN PAST 24 MONTHS	YES, OVER 24 MONTHS AGO	NO IN-SERVICE TRAINING OR UPDATES
01	Microscopic examination of sputum for diagnosing tuberculosis	1	2	3
02	HIV testing	1	2	3
03	CD4 testing	1	2	3
04	Blood screening for HIV prior to transfusion?	1	2	3
05	Blood screening for Hepatitis B prior to transfusion?	1	2	3
06	Tests for monitoring ART such as TLC and serum creatinine.	1	2	3
07	Malaria microscopy	1	2	3
08	Malaria rapid diagnostic test (mRDT)	1	2	3

8.WORKING CONDITIONS IN FACILITY

800	Now I want to ask you a few more questions about your work in this facility. In an average week, how many hours do you work in this facility? IF WEEKS ARE NOT CONSISTENT, ASK THE RESPONDENT TO AVERAGE OUT HOW MANY HOURS PER MONTH AND THEN DIVIDE THIS BY 4.	AVERAGE HOURS PER WEEK WORKING IN THIS FACILITY																												
801	Now I would like to ask you some questions about supervision you have personally received. This supervision may have been from a supervisor either in this facility, or from outside the facility. Do you receive technical support or supervision in your work? IF YES, ASK: When was the most recent time?	YES, IN THE PAST 3 MONTHS. 1 YES, IN THE PAST 4-6 MONTHS. 2 YES, IN THE PAST 7-12 MONTHS. 3 YES, MORE THAN 12 MONTHS AGO. 4 NO. 5	→ 804																											
802	How many times in the past six months has your work been supervised?	NUMBER OF TIMES. EVERY DAY.'96																												
803	The last time you were personally supervised, did your supervisor do any of the following:	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 10%; text-align: center;">YES</th> <th style="width: 10%; text-align: center;">NO</th> <th style="width: 10%; text-align: center;">DK</th> </tr> </thead> <tbody> <tr> <td>01 Check your records or reports?</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">8</td> </tr> <tr> <td>02 Observe your work?</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">8</td> </tr> <tr> <td>03 Provide any feedback (either positive or negative) on your performance?</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">8</td> </tr> <tr> <td>04 Give you verbal or written feedback that you were doing your work well?</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">8</td> </tr> <tr> <td>05 Provide updates on administrative or technical issues related to your work?</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">8</td> </tr> <tr> <td>06 Discuss problems you have encountered?</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">8</td> </tr> </tbody> </table>		YES	NO	DK	01 Check your records or reports?	1	2	8	02 Observe your work?	1	2	8	03 Provide any feedback (either positive or negative) on your performance?	1	2	8	04 Give you verbal or written feedback that you were doing your work well?	1	2	8	05 Provide updates on administrative or technical issues related to your work?	1	2	8	06 Discuss problems you have encountered?	1	2	8
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06 Discuss problems you have encountered?	1	2	8																											
804	Do you have a written job description of your current job or position in this facility? IF YES, ASK: May I see it?	YES, OBSERVED 1 YES, REPORTED, NOT SEEN .. 2 NO 3																												
805	Are there any opportunities for promotion in your current job?	YES. 1 NO. 2 UNCERTAIN/DON'T KNOW. 8																												
806	Which type(s) of salary supplement do you receive, if any? PROBE: Anything else?	MONTHLY OR DAILY SALARY SUPPLEMENT. A PERDIEM WHEN ATTENDING TRAINING. B DUTY ALLOWANCE. C PAYMENT FOR EXTRA ACTIVITIES (NOT ROUTINELY PROVIDED). D OTHER _____ X (SPECIFY) NONE. Y																												
807	In your current position, what non-monetary incentives have you received for the work you do, if any? PROBE: Anything else?	TIME OFF / VACATIONS A UNIFORMS, BACKPACKS, CAPS, etc. B DISCOUNT MEDICINES, FREE TICKETS FOR CARE, VOUCHERS, etc. C TRAINING. D FOOD RATION / MEALS. E SUBSIDIZED HOUSING F NONE Y																												

808	Among the various things related to your working situation that you would like to see improved, can you tell me the three that you think would most improve your ability to provide good quality of care services? Please rank them in order of importance, with 1 being the most important. ENTER LETTER CORRESPONDING WITH THE 1ST MENTIONED INTO THE 1ST BOX, AND REPEAT WITH THE 2ND AND 3RD. IF THE PROVIDER ONLY MENTIONS 1 OR 2 ITEMS THEN PUT "Y" IN THE REMAINING BOX/ES. DO NOT LEAVE ANY BOX EMPTY. THERE MUST BE 3 ENTRY. DO NOT READ CHOICES TO YOUR RESPONDENT	MORE SUPPORT FROM SUPERVISORA MORE KNOWLEDGE / UPDATES TRAINING.....B MORE SUPPLIES/STOCKC BETTER QUALITY EQUIPMENT/ SUPPLIES..... D LESS WORKLOAD (i.e. MORE STAFF).....E BETTER WORKING HOURS / FLEXIBLE TIMES.....F MORE INCENTIVES (SALARY, PROMOTION, HOLIDAYS)G TRANSPORTATION FOR REFERRAL PATIENTSH PROVIDING ARTI PROVIDING PEP.....J INCREASED SECURITYK BETTER FACILITY INFRASTRUCTUREL MORE AUTONOMY / INDEPENDENCE.....M EMOTIONAL SUPPORT FOR STAFF (COUNSELING / SOCIAL ACTIVITIES)N OTHER (SPECIFY).....X NO PROBLEM.....Y
THANK YOUR RESPONDENT AND MOVE TO THE NEXT DATA COLLECTION POINT		

RANKING		



R14/49 Ms M Murandu

**HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M180142**

NAME: Ms M Murandu
(Principal Investigator)
DEPARTMENT: School of Public Health
Medical School
University

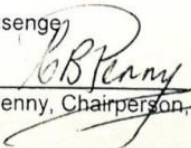
PROJECT TITLE: Determinants of hospital quality using infant mortality
in South Africa from 2005 to 2013

DATE CONSIDERED: 26/01/2018

DECISION:

CONDITIONS:

SUPERVISOR: Professor E Musenge

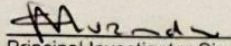
APPROVED BY: 
Professor CB Penny, Chairperson, HREC (Medical)

DATE OF APPROVAL: 09/03/2018

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary on 3rd floor, Phillip V Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.
I/We fully understand the conditions under which I am/we are authorised to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated from the research protocol as approved, I/we undertake to resubmit to the Committee. I agree to submit a yearly progress report. The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed in January and will therefore be due in the month of January each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).


Principal Investigator Signature

15/03/2018
Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

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< 1% match (publications) Songül Cınaroglu, Onur Baser, "Understanding the relationship between effectiveness and outcome indicators to improve quality in healthcare", Total Quality Management & Business Excellence, 2016
Abstract Background: Hospital quality of care is of importance to any health care system. High quality care contributes significantly to improved population health as well as reducing health costs in national budgets. Hospital readmissions or revisits are potential indicators of health care quality. Rationale: Despite the complexities found in measuring hospital quality, it remains of paramount importance. In developing countries there is paucity of evidence on the determinants of health care quality within the health facilities. Availability of a skilled health care workforce has been identified as a challenge affecting health service delivery and there is limited knowledge on its causal effect. Governments need data-driven evidence to establish good and sound health frameworks and policies that seek to address the existing gaps. Objectives: To describe socio-demographic characteristics of sick children and health systems characteristics of hospitals in Namibia, and then determine their association with child readmissions and further establish the effect of qualified health personnel on the quality of care. Methods: The study was a secondary data analysis using data drawn from the Namibia Service Provision Assessment (SPA), a health facility assessment that provides information from all health facilities in the country, providing an overview of its health service delivery system. The study restricted analysis to child health service provision data collected in 2009 from 411 facilities, a total of 1774 individual observations and exit interviews were conducted for sick child curative

The study restricted analysis to child health service provision data collected in 2009 from 411 facilities, a total of 1774 individual observations and exit interviews were conducted for sick child curative care. Data was collected from both the sick child caregiver using a standardized exit interview questionnaire, a separate questionnaire was used for the Health Worker/Provider Interviews. Probit and Instrumental Variable (IV) probit analysis, accounting for unobserved confounding factors, was used to explore the causal effects of both observed and unobserved treatment variables on the outcome of interest (child readmissions) Results: The relationship of the caregiver to the child had statistically significant effect on child readmission ($p < 0.001$). The age of the provider and sex of provider had significant effect on child readmission (at five percent level). Other factors associated with child readmission were type of health facility, number of years the facility has been providing child health care services and the type of visit. The IV probit results showed that the overall probability of a child revisiting for the same illness at the facility after the first encounter was 0.3. Highly skilled medical officers or physicians and medical assistants had a significant negative effect on readmission (medical officer coefficient (p value); -1.533(0.057), medical assistant coefficient (p value); -112.293(0.002). The type of visit by the child had a strong effect on readmission (at less one percent level); marginal effects showed that a follow up visit increased the probability of readmission by 35%. Conclusion: Health provider related factors are the most significant factors determining the quality of care at the hospitals. Our study findings highlight the influence of health personnel on health outcomes which can be addressed from a policy perspective. We conclude that if health policies are directed toward improving the skills of health care providers then the quality of health care will be improved. 1.0 INTRODUCTION 1.1.1 Background Improving quality of care is increasingly becoming important for improved population health and patients' experiences of care while simultaneously reducing health care costs (1). Traditionally this was left to individual clinicians, poor health outcomes such as death or infections were used to monitor and find ways to improve the quality of care (2); clinicians were confident that they alone were mandated to assess and manage the quality of care (2). This situation has changed dramatically; quality of care dimensions for patients are now encompassing to include access and effectiveness: these are commonly discussed in terms of the structure of the health care system, processes of care, and patient outcomes resulting from care (3). The notion of health care is based on three major cornerstones: quality, access, and cost. Although the three are inter-dependent, quality has a stronger impact on the two other cornerstones (4, 5). Quality is accomplished when service provision is done in an efficient, cost-effective and acceptable manner (5). According to Donabedian, many different approaches can be used to measure quality of care (6). Evaluation of quality of care can be done by assessing the structure in which care is delivered, assessing the process of care and/or outcomes of care (7). Generally, there has been more focus on outcome measures in assessing quality of health care, there are several reasons for this; mainly because the goal of quality measurement is to offer care that improves the patient's health- leading to patient satisfaction (5). Secondly, the use of structural and/or process variables alone may be invalid because improvements in such measures may not improve health (8). Outcome measures for quality of care are increasingly used to monitor and compare hospital performance to identify areas for improvement (9). Hospital readmissions/revisits is one of the commonly used outcome measures of quality of care (9). It has been established that problems relating to readmissions are much compounded in poorly resourced regions including sub-Saharan Africa (14, 15). This could be due to multiple factors within and outside the health system (15-17). However, limited resources and overburdened health care systems have been cited as playing a major impact (14). Health care systems differ by region and thus introspection into health care service delivery through quality of care assessments must be done to reduce morbidity and mortality (16, 17). There also exist differences in the burden of diseases for specific regions and countries hence the need to contextualize health challenges and identify local solutions and priority areas. According to the World Health Organization report (WHO, 2002), five out of six regions in Africa are highly burdened with chronic and cardiovascular diseases except for Africa where communicable diseases are predominant (10). This situation partly explains why most studies done in developed countries have considered readmissions or revisits of these specific conditions or diseases that are predominant in their regions as proxy measures of quality of care in hospitals. The most common health conditions and diseases comprise of: pneumonia, heart failure, acute myocardial infarction, . . . and surgery amongst others (11). In Africa, more than half of child deaths in 2001 were attributable to acute respiratory infections, measles, diarrhoea, malaria, and HIV/AIDS. Countries in sub-Saharan Africa including, Namibia continue to battle with reducing the burden of childhood deaths due to preventable and treatable illnesses (18). According to the State of the World's Children Report by UNICEF (2019), Namibia is ranked 52nd in the world for under-five mortality with an estimated 2954 deaths per thousand in 2019 (19). Many children in Namibia continue to die of curable and preventable diseases, such as pneumonia and diarrhoea and these are potential measures of quality of care (19, 20). While some progress has been made in improving the quality of care in public facilities, challenges remain particularly in rural areas and there is still a need to improve the standard of paediatric care (20). Child deaths and hospital readmissions are potential proxies to measuring quality of care. Previous studies in various regions have found several factors as contributors to variations in hospital readmissions. These factors are associated with the hospital such as ownership, bed size, volume, teaching status, and staffing (12). The other factors are related to the patient-level sociodemographics such as race, health literacy, and social support (13), and other patient social support and community factors that are outside the control of the hospital. Some studies have shown that there is a positive association between highly skilled staff and improved health outcomes (11, 12, 14); the presence of different medical specialists and adequate number of staff directly influence the performance of the hospital in delivering quality care (14). Procurement, development, training, and grooming of human resources are critical in improving the quality of care in hospitals (15). The Namibian government has made strides towards developing remedial policies to address human resource challenges through the establishment of more training schools (in the past they often relied on expatriate workforce), despite all this, there however still remain challenges. Highly qualified health workers have preferred to move from public to private sector or in urban settings where there is improved infrastructure leading to inequitable distribution of health workers between geographic areas and health facilities leading to understaffing. The existing workforce in Namibia experience increased workload and job dissatisfaction as a result of undertaking tasks that they are not trained for (16). In other settings task shifting, as recommended by WHO, has been considered as a way to make better use of available human resources for health. In addition, extension workers have been introduced to work under the supervision of local clinics and health centers which may also lead to substitute patient care if not properly done. For instance, in Kenya, it has been established that the training offered to auxiliary nurses is of low standard (17) when compared to their counterparts in more developed countries. Therefore, governments cannot afford to ignore these realities and they need to establish health and training frameworks and programs to address these pertinent issues of skilled labour force. One of the biggest challenges in the health care system of Namibia is the human resource; there is an uneven distribution of medical specialists by geographic region and in numbers. There is also dearth of knowledge on determinants of hospital quality in Namibia. Thus, this study seeks to understand determinants of hospital quality with particular focus on qualification of the provider using readmissions/revisits as proxy outcome measures of quality of care within hospitals (21). In this study the term hospital is used as generic name for an institution providing treatment and nursing caring care for sick children across hospitals, health centres and clinics). 1 Task shifting is a process of delegation whereby tasks are moved, where appropriate, to less specialized health workers without sacrificing the quality of service provided 1.1.2 Overview of the Health Care System in Namibia The Namibian health system has been reforming over the years with; adoption and implementation of various strategic plans, revision of policy framework, and restructuring the system to take a Primary Health Care (PHC) approach. The system is diverse with the lead provider being the public sector (18, 19). The Ministry of Health and Social Services (MoHSS) is the main implementer and provider of public health services with a four-tier system which comprises of: one national referral hospital, three intermediate hospitals, thirty district hospitals, forty-four health centers, and two hundred and sixty five clinics. To increase health access in hard to reach population, outreach services are provided across the country through 1150 outreach points (18). This general pattern is also evident in other sub-Saharan African countries where there is a higher ratio of more qualified health professionals in urban and richer areas and in tertiary care facilities as compared to the rural and poor locations and lower level (primary) level facilities. In Namibia these lower-level facilities (clinics and health centres) are more accessible by a majority population than hospitals because of their numerous in number and wide distribution. An additional key characteristic to these facilities is that they are usually staffed with nurses and midwives, who provide basic patient care (18, 19). Another substantial player in the Namibian health system is the private sector which is divided into for-profit and not-for-profit health services. The private sector is sizeable with 844 private health facilities registered with MoHSS, comprising hospitals (13), primary care clinics (75), and health centres (8), pharmacies (75), and specialized care medical entities (557) (18). These services are 2. Primary health care is a whole-of-society approach to health and well-being centred on the needs and preferences of individuals, families and communities. It addresses the broader determinants of health and focuses on the comprehensive and interrelated aspects of physical, mental and social health and wellbeing, commonly provided in urban areas. Notably, there have been key achievements in reforming this diverse health system, however, part of the gains have been reversed due to: emerge and re-emergence of diseases, dispersed population, and skills shortages. Other factors that all the delivery of service quality in the country remain unknown. All this calls for evaluation and revision of policy frameworks that are responsive to emerging issues as well as identifying new strategies for action (18, 19). 1.2 Literature review 1.2.1 Quality in Health Care Evaluation of quality care in health has advanced over the years, leading to exciting modern science which is pivotal in quality assurance (QA), benchmarking patient safety, and continuous quality improvement (CQI) (20). The quality of care can be evaluated by assessing the structure, processes, and/or outcomes of care (7). There are numerous benefits for improving quality; there is increased efficiency and effectiveness in healthcare provision leading to increased trust in the health care system, and a positive impact on patient and staff satisfaction. (5, 20). Monitoring the performance of a health system is a step towards improving health care quality, therefore it remains important that quality measurements be done to guide and inform health system managers (20, 21). 1.2.2 Structural Measures of Quality in Health Care Structural measures look into infrastructure of health care settings, skills and competence of health personnel, service delivery policies and availability of resources amongst other things (20). The use of structural measures in evaluating quality of care is important because it provides information about the hospital's ability and capacity to provide high-quality care which supports the enforcement of plans and critical tools needed by hospitals (5, 22). However using structural measures alone in evaluating the quality of care because it does not inform us whether the care in terms of resource availability improves the patients' outcomes (22, 23). 8 | P a g e 1.2.3 Process measures of Quality in Health Care Process measures are also termed performance measurements which provide information on the extent to which health care service providers are consistent in adhering to the standard and recommended guidelines of care (20). Because they are generally linked to procedures or treatments, they provide feedback for quality improvement initiatives (20, 24). Quality improvement gives the clinicians an insight into performance gaps (between the actual and recommended practice) that have the potential to affect patient outcomes (25). In addition to this advantage, they are usually easy and quick to collect. Potential limitations are that they are not available for many key areas – thus it is not possible to measure all processes of care, hence it is difficult to capture the true quality of care provided (20, 25). 1.2.4 Outcome Measures of Quality in Health Care Outcome measures assess patient's health emanating from the care they have received, hospital mortality, readmission, and length of stay are commonly used measures of quality of care (7, 26). However, they are still limitations associated with their use; comprehensive and detailed information is needed from medical records making it an expensive approach, large volumes of data are required to detect significant differences and in the case of rare outcomes longer periods are required (27). Besides, there are also confounding effects of social determinants which include socio-economic status, access to safe housing, and presence of multiple chronic conditions (26, 27). However, they are useful indicators of quality of care pending adjustment of confounding factors and high readmission rates in the case of defined conditions (28). 1.2.5 Determinants of Health Care Quality Hospital readmissions or revisits have commonly become potential indicators of health care quality. Adult-specific readmission rates are widely known and easily accessible through public health administrative data. On the contrary, data and knowledge on paediatric readmissions or revisits is limited, likely due to the difficulty found in longitudinal tracking of patients within and across hospitals (29). Data for this study is inclusive of all health facilities (clinics, health centres, and hospitals) because of the limitations due to low volumes of in-patient data, readmissions were not defined revisits or returns to the health facility for the same illness. Readmissions cause a high burden to healthcare systems (unnecessary expenditures) and patients (clinical failure) (28, 30). In the US nearly 20% of Medicare patients are readmitted within 30 days after hospital discharge, associated with an estimated annual cost of 17 billion (30). Unlike developed countries, where the clinical outcome for certain specific conditions (including risk of death) have been associated with quality of hospital care, in low-income countries (including Namibia) there is little information showing the relation between sick young children and clinical outcomes yet it is evident that health systems of most countries in sub-Saharan Africa are overburdened with childhood deaths due to preventable and treatable illnesses. Readmissions or revisits are thought to be related to quality of care, for instance, due to postoperative complications and improper administration of treatment (31). As readmissions vary widely across countries, regions, and centres, at least part of them might be avoidable especially if they are due to poor quality of care (31), consequently, there is growing interest in the readmission or revisits rate as an indicator of quality of hospital care (28, 31). The way this indicator is used in different countries varies widely, and no gold standard exists on how to assess quality of care (32). However, most preventable readmissions or revisits have been reported to occur early within one month of discharge (33). Evidence from literature shows that hospital readmissions are affected by multiple factors within and outside the health systems (28, 34, 35). Studies on readmissions among children have shown that socio-economic factors such as the caregivers' age, household income, child characteristics such as age, severity of illness, length of stay in hospital, comorbidities, and health system factors including availability of drugs, equipment, and staff are associated with readmissions (28, 32, 34, 35). However, the health systems factors have been cited as playing a major role in the increase of readmissions, especially in developing countries (34). Most of the under-five children in poorly resourced regions, such as sub-Saharan Africa die from preventable and curable diseases which may in part, be attributable to inequalities in provision and quality of care (36). The term readmission had been defined variously as hospitalisation within 1, 2, 4, or 12 months of discharge (30, 32, 33). Reducing readmissions or revisits has become a focus to improve quality of care. Also, reducing readmissions is cost-effective as it comes with reductions in unnecessary expenditures thereby easing financial pressure on national budgets (34). Determinants of health care quality are measured using scientific data and expert judgment. In addition, there is a growing emphasis on the importance and validity of patients' perspectives on the quality of care. A study conducted in India to explore the factors that influence patients' decisions about healthcare providers revealed that patients are more concerned with affordability and accessibility of healthcare than provider's qualifications (37). In a different setting, a study showed that the quality of healthcare services mainly depends on practitioners' knowledge and technical skills; as this will lead to correct patient care management. This calls for healthcare professionals to improve their competencies (i.e. the attitudes, knowledge, and skills) to deliver high-quality services. These studies and many others that sought to assess factors that influence quality of care have been bottlenecked with potential bias because they were cross-sectional and could not establish causality due to potential unmeasured confounding factors (5, 30, 32, 34). In simpler terms, hospitals may differ in characteristics of patients admitted such as the severity of illness of the patients that they treat, 11 | P a g e as hospitals with lower readmission rates (higher quality) and more qualified staff may attract a sicker patient population. Thus, the hospital readmission rates for a hospital will have a component that reflects the severity of illness of the patients they treat and another that reflects the technical quality of health workers providing care (5). The severity of illness of patients may be correlated to their choice of hospital resulting in the patient choice being endogenous, in which case use of standard regression analysis will give inconsistent estimates of the hospital-specific contribution to mortality (38). In other words, if high-quality hospitals attract sicker patients, those hospitals may not look very "good" after estimating their adjusted readmission rates (5, 38). Analysis of quality of health care provided in health facilities is often based on clinical outcomes such as readmission (revisits), and death among others. Several studies have revealed that clinical outcomes are rooted in the qualification of the provider which incorporates an individual choice of health facility, location of the health facility (urban or rural), and the day individuals visit health facilities to access health services. One approach to address the challenges of endogeneity (correlation with unobserved factors) is the instrumental variable (IV) method (39). In this study, we apply IVs on the type of qualification of the provider, as a treatment variable associated with hospital quality of care proxy as readmissions; individuals will improve the quality of care indirectly through choosing hospitals offering better services and also visiting hospitals when they are likely to be attended by a provider with higher qualifications. We then apply IVs on this treatment variable to account for the effect of unobserved factors on readmission rates (quality of care indicator) and adjusting for other covariates. 1.3 Problem statement 12 | Page Hospital quality of care is important because it increases the likelihood of desired health outcomes in the patients (28). Improved patient outcomes are critical results to any health system (40). The National Health Policy Framework of Namibia (2010-2020) – NHFP which serves as a guiding document for health and health actions in Namibia stipulates that "quality of care is and will be a pivotal dimension of all health services in the country". Like any other country in sub-Saharan Africa, the country has been hard hit by the various epidemics which required the government to introduce quick reforms to curtail health problems. These include re-orientation and restructuring of the health sector in line with the primary health care approach, which has contributed to improved access to health services. The vastness of the country has hindered access to health

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The variables include the type of facility (health center, clinic or hospital), child health service provision trainings conducted pre-service, the most recent visit for the same illness, as well as the form of payment used to pay the services. $Dicl$ is the vector of variables correlated with the unobserved determinants of readmission such as the category of the provider offering health services to the sick child, time waited for the provider to attend the sick child and the highest level of education attained by the caregiver. ei is the residual component of readmission. From the function specified in (1), the probability of a sick child revisiting or readmitted estimated using the probit model is given as follows $P_r(Xicl = 1|Xicl, Dicl) = \Phi(\beta_0 + \beta_1 Xicl + \beta_2 Dicl + ei)$ (2). Finally, the estimated IV probit model is given by the following system of equations: $Xicl = \beta_0 + \beta_1 Xicl + \beta_2 Dicl + \beta_3 Dicl + ei$ and $Dicl = \beta_0 + \beta_1 Xicl + \beta_2 Dicl + \beta_3 Dicl + ei$ (3). The first equation estimates the probability of readmissions or revisits for the same illness as previously shown in equation (1), and the second equation estimates the endogenous variables as a function of instrumental variables (Itc), together with other independent variables. The instruments must be uncorrelated with unobserved factors (severity of illness and perceived quality of care) but correlated with a subset of the variables (qualification of the provider) that predict the outcome (readmissions/revisits) (5). 2.8.3 Addressing endogeneity problem in the model. The goal of the model is to estimate the causal effect of the treatment variables (qualification of provider) on the outcome variable (readmissions/revisits) (46). To address the endogeneity problem we have discussed above, we incorporated the popular technique, of introducing one or more additional variables, known as the instrumental variables (IV) (47). Instrumental variables will be correlated with the treatment variables but not with the error term (unobserved factors influencing both the independent variable and the outcome. To identify the potential IV for our endogenous variable, we used the two requirements for instrumental variables (48). This means that the instrumental variable must have a strong correlation with the endogenous variable (relevance criterion) and must not be related to the unobserved 27 | Page determinants of health service provision (exclusion restriction) (49). For this study, we used three IVs variables; region-which is the location of the facility, day of the week when the client visited the facility and the distance to the facility, on the endogenous variable (qualification of provider) which met the requirements of good instruments i.e. the IV should be related to the endogenous variable (qualification of provider) but uncorrelated with unobserved factors (severity of illness). For instance; the region or location of the facility is strongly associated with the qualification of the provider; we have already stated above that highly qualified staff prefer well-resourced urban and richer settings compared to rural and poor locations; day of the week when client visited is also related to the endogenous variable (qualification of provider) but uncorrelated with the unobserved factors (severity of illness); highly skilled staff are usually available at the health facilities during the normal working days of the week and may (but not always) be available during the weekend. (50). The instrumental variable distance to the facility is related to the endogenous variable (qualification of the provider) and not related to unobserved factors (severity of illness and perceived quality of care); in urban areas (where there are likely to be more qualified health care workers) there are more facilities, this stimulates competition as facilities strive to offer better services than their neighbors, a different situation is observed in the rural setting; health care providers may possess lower qualifications compared to those in urban settings, furthermore patients will travel longest regardless of the severity of illness just to seek medical attention. 2.8.4 Testing for the endogeneity After estimating the IV probit model, a test for endogeneity of qualification of health care provider was computed using the Wald test of exogeneity, we set the null hypothesis that the endogenous variable; the qualifications of health care professional are exogenous (there is no correlation between this endogenous variable and the error term of readmissions (dependent variable) for both equations (48). Wald test results show that the p-value is 0.0712, so we reject the null hypothesis at 28 | Page the 0.1 level of significance. There is a negative correlation of -0.68 between the errors in the main outcome (readmission) and the treatment variable (qualification of the provider) which is significant at 0.1 level (p=0.09), further supporting that the treatment variable (qualification of the provider) is endogenous. To test for the strength of our instruments, we used the significant coefficients associated with instrumental variables and an F statistic of the first stage, which is 20.05 greater than 10, and conclude that distance to the facility and day of the week when the client visited the facility are strong instruments (48). CHAPTER 3: RESULTS This chapter presents detailed results on descriptive and IV regression analysis. Firstly, there is a summary of the socio-demographic characteristics of participants and health system factors. Followed by the prevalence of readmissions by participants' socio-demographic characteristics and health system factors. The final presentation of results is on probit IV regression analysis of the final model. 3.1 Summary of the caregiver and sick child's socio-demographic characteristics The analysis was restricted to 1774 records of sick children. Table 3.1 shows the summary of the caregiver and child's socio-demographic characteristics. The sick children who were readmitted represents 31% of the study sample as shown in Figure 3.1. The proportion of male and female sick children was 52.4 and 47.6 respectively. Table 3.1 shows that the majority (94%) of caregivers who brought the sick children to the hospital were females and over seventy-five percent were mothers, the next common relationship of caregivers were grandparents (9.7%). The average age of caregivers and the sick children was 34 years (95% CI 33 – 36) and 21.7 months (95% CI 20.5- 22.9) respectively. Most caregivers attained secondary education (64.0%), followed upper primary education (26.5%). Sick children readmissions (N=1774) 69 % 31 % NOT READMITTED RE-ADMITTED Figure 3.1: Sick children readmissions Table 3.1: Summary of the caregiver and sick child's socio-demographic characteristics Variables n (%) or mean (95%CI) Socio-demographic characteristics Caregiver Age in years (n= 1774) 34 (33-36) Sex of Caregiver (n= 1774) Male 107 (6.0) Female 1667 (94.0) Age of child in months (n= 1774) 21.7(20.5- 22.9) Sex of child (n= 1773) Male 929 (52.4) Female 844 (47.6) Relationship of caregiver to a sick child (n= 1667) Mother 1256 (75.34) Father 56 (3.36) Aunt/Uncle 122 (7.32) 31 | Page Grandparent Other Sibling Highest level of education attained by caregiver (n=1599) Informal Primary Upper Primary Secondary Tertiary 162 (9.72) 14 (0.84) 57 (3.42) 15 (0.94) 113 (7.07) 423 (26.45) 1024 (64.04) 24 (1.50) 3.2 Summary of the provision and access to care characteristics Table 3.2 below details the provision and access to care characteristics. The majority of the providers were females (70.6%) with an average age of 38 years (95% CI 37.3-38.9). Over half of the providers who attended to the sick children were nurses or midwives (52.6, 39.7% were registered nurses or midwives and 5 % of the providers were medical officers or physicians and specialists (0.3%). Health care services were mainly sought at lower-level facilities (clinics -72.3%) and a smaller proportion were hospitals (9.2%). Most of the health facilities (87.4%) were public institutions. The average time of which health provided child health care services was 8.4 years (95% CI 7.7-9.14) and 33.8 % offered pre-service training to health care providers. Most caregivers (93.0%) were not part of a pre-payment plan scheme which means they were supposed to pay for the services directly from their pockets, the average amount of medical fees paid was 6.5 (95% CI 5.3- 7.6). The average time patients had to wait for the service provider was 202.0 minutes (95% CI 177.0-226.8). Table 3.2 Summary of health systems factors of provision and access to care Variables Health Provision Provider Age (n=1771) Provider Sex (n= 1774) Male Female Current qualification of the provider (n= 1774) Specialist Medical officer or physician Medical assistant Registered nurse or midwife Enrolled nurse or midwife Nursing assistant or auxiliary Number of years facility providing child health service (n=1310) Hours worked by service provider (n=1764) Type of health facility (n= 1774) Hospital Health centre Clinic Health facility managing authority (n= 1774) Public Public mission/NGO Private Health access Total fees paid for provider (n= 1553) Time waited for the provider (n= 1774) Part of pre-payment plan (n= 1774) No Yes Health facility pre-service (n= 1309) No Yes n (%) or mean (95%CI) 38 (37.3 -38.9) 521 (29.4) 1253 (70.6) 5 (0.3) 89 (5.0) 14 (0.8) 712 (39.7) 950 (52.6) 27 (1.5) 8.4 (7.7-9.1) 40.0 (40.3 – 41.0) 162 (9.2) 325 (18.3) 1287 (72.3) 1551 (87.4) 162 (9.1) 61 (3.4) 6.45 (5.3- 7.6) 201.96 (177-226.8) 1646 (93.0) 124 (7.0) 867 (66.2) 442 (33.8) 3.3 Prevalence of readmission by socio-demographic factors Table 3.3 below presents the prevalence readmissions by of socio-demographic factors. The proportion of sick males and females that were readmitted was 32.3 % and 30.6 % respectively; there is no association between sex and readmission status (p=0.631). About 34.6% and 31.2% of caregivers of sick children who were readmitted were males and females respectively, there is no was evidence of statistical significance (p= 0.487). The mean age of children who were readmitted (22.9 months) was not significantly different from the mean age of children who were not readmitted (21.9 months). The relationship between the caregiver and the sick child was associated with the readmission of a child (p<0.001). Lastly, the educational level attained by the caregiver was not associated with readmission status (p-value = 0.229). The mean age of caregiver of the readmitted sick child (35.3 years) was not significantly different (p= 0.537) from the mean age of caregivers whose children who were not readmitted (34.4 years). Table 3.3. Prevalence of readmission by socio-demographic factors Variable Sex of Child Male Female Total (n) Readmission Yes (n= 556) n (%) / mean (CI) 131 (51.2) 125 (48.8) 256 No (n= 1218) n (%) / mean (CI) 282 (50.4) 278 (49.6) 560 Total (n) P-Value 413 403 816 0.631 Sex of Caretaker Male 16 (6.3) 30 (5.4) 46 0.487 Age of Child (in months) Caregiver Age in years Relationship of caregiver to the sick child Female 240 (93.7) 530(94.6) 770 Total (n) 256 560 816 23.3 (21.1-25.5) 21.7 (20.4-23.0) 816 0.198 30.7 (29.6-31.8) 29.7(28.8-30.7) 816 0.537 Mother Father Sibling Aunt/Uncle Grandparent Other Total (n) 215(84.0) 11 (4.3) 2

(0.8) 16 (6.2) 9 (3.5) 3 (1.2) 256 411(73.4) 12(2.4) 31(5.5) 50 (8.9) 51 (9.1) 5(0.9) 560 626 23 33 66 60 8 816 <0.001 Highest level of education attained by caregiver Informal 1 (0.4) 2(0.4) 3 0.230 Primary 14 (5.5) 45(8.0) 59 Upper primary 65 (25.4) 122 (21.8) 411 Secondary 171 (66.8) 385 (68.8) 556 Tertiary 5 (2.0) 6 (1.1) 11 Total (n) 256 560 816 3.4 Prevalence of readmission by Provider characteristics Table 3.4 below shows the prevalence of readmissions by provision and access to care factors relationship. The sex of the provider was associated with readmissions (p=0.031). A high proportion of readmitted sick children were attended by male providers (35.5%) compared to female providers (29.6%). The mean age of the provider with readmissions was lower (36.9 years) than the mean age with providers with no readmissions (38.7 years), [this difference was statistically significant \(n=0.005\)](#). The qualification of the provider was not associated with readmissions (p=0.808). Most children who were readmitted were attended by medical officers/ physicians (38.2%), followed by the registered nurse or midwives (31.9%) and enrolled nurse or midwives (30.4%). The managing authority of the health facility was not associated with readmissions (p=0.435). Although there was consistently a lesser proportion of children readmitted across the three facility types (hospital, health centre and clinics) compared to children not readmitted, [this difference was statistically significant \(n=0.052\)](#). The mean hours worked by the service provider per week were similar for readmitted (40.7) and non-readmitted (40.7) children. The mean number of years of facilities providing child health services was lower for readmitted children (7.6) than non-readmitted children (8.8). Readmissions were higher for children on a prepayment plan (42.7%) than those with no prepayment plan (30.5%), [however, this difference was not significant \(n=0.149\)](#). A majority (71.2%) of sick children who were readmitted were not on a follow-up visit (a revisit for the same illness at the same facility) and 28.9% were on a first visit (a referral from another facility for the same illness), there was a very significant (p=0.000) association to readmission status. Distance to the health facility was not associated with readmissions (p=0.602). Many sick children were readmitted to facilities closest to them. Table 3.4: Prevalence of readmission by health system factors of provision and access to care Readmissions Variable Sex of provider Male Female Total (n) Provider Age Yes (n=556) n (%) /mean (95%CI) 80 (31.3) 176 (68.8) 256 39.0 (37.5-40.4) No (n=1218) n (%) /mean (95% CI) 109 (19.5) 451 (80.5) 560 41.2(40.2-42.1) Total (n) P-Value 189 627 816 0.031 816 0.005 Current qualification of the provider Specialist Medical officer or physician Medical assistant Registered nurse or midwife Enrolled nurse or midwife 1(0.4) 14 (5.5) 3(1.2) 109(42.6) 126(49.2) 2 (0.4) 16(2.9) 1 (0.2) 251 (44.8) 281(50.2) 3 30 4 360 407 0.808 Nursing assistant or auxiliary Total (n) 3(1.2) 256 9 (1.6) 560 12 816 Health facility managing authority Public Public Mission /NGO Private Total (n) 233 (91.0) 16 (6.3) 7(2.7) 256 508(90.7) 36(6.4) 16 (2.9) 560 741 52 23 816 0.435 Type of health facility Hospital 36(14.1) 42(7.5) 78 0.052 Health centre 40 (15.6) 121 (21.6) 161 Clinic 180 (70.3) 397 (70.9) 577 Total (n) 256 560 816 Hours worked by service provider Number of years facility providing child health service Part of pre- payment plan 40.8(40.3- 41.3) 40.8 (40.5-41.1) 816 7.9 (6.8-9.0) 9.1(8.2- 9.9) 816 0.935 0.041 Yes No Total (n) 10 (3.9) 246(96.1) 256 32(5.7) 528(94.3) 560 42 774 816 0.149 Type of visit First visit Follow up Total (n) 218(88.6) 38 (11.4) 256 549 (98.7) 11(1.3) 560 767 49 816 0.000 Distance to the facility Yes 216 (84.4) 546 (97.5) 762 0.602 No 40 (15.6) 14 (2.5) 54 Total (n) 256 560 816 3.5 Determinants of readmissions using IV analysis Table 3.5 [presents the results of estimated probit and IV-probit models](#). The first column of table 3.5 shows the regular probit coefficients (which does not account for endogeneity) (48), where the explanatory variable have either positive or negative effect on the outcome of interest(readmission/revisits). The results show that conducting pre/ in-service training for child health care provision positively affects the probability of a sick child being readmitted, this is relative to no trainings, although marginally significant (p=0.077). The negative coefficients health center (-0.3997) and clinics (- 0.3426) show reduced probabilities of readmissions or revisits, this is relative to the hospital, which is the base, both marginally significant (p=0.05). The results also show that there is an increased chance of readmission if the child is on a follow-up visit when compared to those who had not sought any health service before, the coefficient of a follow-up visit is positive (1.1083) and statistically significant. A follow-up visit is defined as a visit in which a child would have sought treatment services from a different health service provider before visiting the facility, either from a different health facility, faith, or traditional healers. The age of caregiver coefficient of -0.003 (p-value 0.098) shows a negative effect on the chances of readmissions. [We do not find any statistically significant effect on](#) the levels of our key variable of interest: health care provider qualification. [It is important to note that the probit model](#) results outlined do not take into account the endogeneity problem. The study intended to measure the effect of health care provider qualifications on the probability of readmissions. There is potential for bias because there are other unobservable factors that influence the qualifications of health care providers available at any given health facility. This potential statistical bias often found when using observational data (as used in this study) from the unmeasured confounders is mediated [through identifying and specifying an instrumental variable, which may represent a "natural experiment" affecting treatment](#) (qualification of health care provider). The first-stage and second-stage regression results from the instrumental variable probit estimator are displayed in the fourth and third columns of Table 3.5 below. These models rule out the hypothesis of reverse causality bias in the probit estimates. In the first stage model, [the first stage estimates an expectation of the endogenous variable](#) (qualification of provider) [conditional on measured confounders and](#) the instrumental variables: the region where the health facility is located, the day of the week when the child visited the clinic and the distance to the facility. The [second stage model then predicts outcomes as a function of the estimated treatment values from the first-stage, measured confounders, and potentially other control variables](#). The presence of instrumental variables makes these models more reliable for establishing causality. [The first stage estimates the prediction of the treatment variable](#) (qualification of healthcare professional) using the IVs (the region, day of visit, and distance to the facility) and other covariates. Two of the three instruments are strong as they are [sufficiently correlated with the endogenous treatment variable](#): day of visit and distance to the facility are both positively correlated and statistically significant (p < 0.05). In addition, the F test greater than 10 (F = 20.05). The results in the fourth column of Table 3.5 show all covariates of qualification of provider have the theoretically expected signs and most are statistically significant at one, five, and ten percent levels. The exception being the age of the caregiver and the type of visit, both do not have any statistically significant effect on the qualification of the provider. The second stage IV -probit model results are displayed [in the third column of Table 3.5](#). This model takes the predicted values of the endogenous variable (qualification of the provider) from the first stage into the main equation of interest. In addition, this second stage retains variation in treatment variable (qualification of the provider) predicted from the instruments, which means all the variation is driven by the instruments, and the link between the treatment variable and other unobserved variables is broken. This controls the endogeneity of the qualification of the provider on the probability of readmission (our outcome of interest). The Wald test (p-value = 0.071) and the correlation coefficient (-0.6814) both statistically significant at 10% level show that the current qualifications of the provider is endogenous therefore IV methods can be preferred than probit models. Conducting pre/in-service child health service training has a positive significant effect (p= 0.031) on the probability of readmission of a child. The coefficients of type of facility indicate that both health center (-1.276) and clinic (-1.24) have a negative effect compared to the hospital because they are smaller, more negative, than the coefficient of the hospital, furthermore, the two coefficients are so close that we might not need to separate the levels of health facilities. Follow-up visits have a positive (1.191) and significant (p=0.00) effect on the readmission of a child, a child may seek treatment from another health care provider or an informal health service provider. The number of hours worked by service providers and the age of the caregiver had no significant effect on the readmission status of the child. The qualification levels of the health care service provider show a non-significant negative effect on the chance of having a child readmitted; the exception being the medical officer and assistant which are significant at a 5 percent level. Naturally, highly qualified health service providers are highly competent having good knowledge and technical skills that lead to correct patient care management and good health outcomes. aid delivery of high-quality services. Finally, we observe that the direction of coefficients for both the probit and IV probit are in the same direction. If we prefer the IV- probit coefficient, we will accept it at p = 0.1 level of significance and the probit coefficient (-1.409) is significant at neither p <0.01. Health facility conducted pre/in-service child health service training Type of facility where service was provided Type of visit Hours worked by service providers Age of the caregiver 40 | P a g e Probit IV Probit 2nd 1st 0.14 0.219 -0.076 (-0.077) (-0.041) (-0.102) -0.099 -0.448 0.316 (-0.097) (-0.06) 0 1.1 1.189 -0.084 0 0 -0.396 0.002 0.013 -0.009 (-0.767) (-0.245) (-0.038) -0.003 -0.004 0.001 Provider category Region in which the health facilities are located (-0.098) (-0.089) -0.021 1.036 (-0.659) (-0.132) -0.008 (-0.443) Day of the week Distance to the facility Observations Log likelihood Pseudo R-squared Wald test of exogeneity p-value F-test first stage 1270 -747.8 0.0369 1270 -2218.3 3.25 0.0712 (-0.193) 0.038 (-0.148) 0.18 (-0.01) 15.47 3.6 Checking for robustness and interpretation of models To check for [robustness of our results](#) in relation [to the assumptions made and the](#) method proposed, we conducted marginal effect analysis as shown in table 3.6 below. The overall probability of readmission for the same illness is 0.3 for both probit and IV-probit models, said differently there is a 30% chance that the sick child will have a subsequent visit to the health facility. Marginal effects show that pre/ in-service child health services training increased the probability of readmission by 4.9% and 5.1% for probit and IV-probit models respectively, and this association was significant for both models at p=0.1. This sounds counterintuitive, as training is expected to have a negative effect on the chances of readmission. The probit and IV probit models

estimates a 0.1 % decrease in the probability of readmission, this effect is statistically significant at one percent level. Finally, our variable of interest is showing that there 0.1 % [change in the probability of readmission](#) for every variation [in the level of](#) qualification of the health service provider. The effect is [only](#) statistically [significant for the](#) IV probit model [at a 10 percent level](#). Variable Probit IV-Probit Health facility conducted pre/in-service child health service training 0.049 0.051 -0.08 -0.072 Type of facility where service was provided -0.034 -0.041 -0.096 -0.284 Type of visit 0.38 0.378 0 -0.001 Hours worked by health providers 0.001 0.001 -0.767 -0.672 Age of the caregiver -0.001 0.001 -0.098 -0.147 Current qualification of the provider -0.007 0.01 -0.659 -0.01 Pr(readmission) = 0.3 ***g <0.01. ***p<0.05. **p<0.1 CHAPTER 4: DISCUSSION 4.1 Introduction This chapter details the results, conclusions, and recommendations based on the study objectives. The study sought to identify the determinants of hospital quality using child revisits as a proxy outcome in Namibian health facilities. The first two objectives were descriptive: firstly, to describe the socio-demographic characteristics of sick children and their caregivers, secondly to describe the health system factors of health facilities in Namibia. These objectives are addressed in the previous chapter. 4.2 Prevalence of readmission by socio-demographic factors The third objective of the study sought to determine the prevalence of readmissions/revisits and distribution by associated factors in hospitals of Namibia. Amongst the socio-demographic factors investigated were; sex of child, sex of caregiver, age of the sick child, level of education of caregiver, age of caregiver, and the relationship of caregiver to the child. All these factors show no statistically significant relationship with the outcome (readmission), except for the relationship of the caregiver to the child. The relationship of the caregiver to the child had a significant effect (at one percent level) on the readmissions, this substantiates the notion from other studies that caregiver relationships are related to improved health outcomes (reduced mortality, improved health status, and reduced distress) (51). Therefore, the caregiver relationship to recipient of health care is an important factor to be considered in the health outcomes the sick children. Further exploration of the effect may be considered in future studies to give a comprehensive analysis. 4.3 Prevalence of readmission/revisits by health provider factors The third objective also sought to look at the prevalence of readmissions/revisits by provider factors. Findings show that the sex of provider was associated with readmissions at five percent level, the effect of age of the provider on readmissions was statistically significant at one percent level, the number of years the health facility has been offering service, the type of facility, and type of visit by the sick child significant influence the readmission status of the child. Other factors such as distance to the facility, hours worked by the health care provider, managing authority did not show any significant difference in the readmission status of the child. These findings suggest that health care provider characteristics contribute significantly to the health outcomes of the sick child, and as the fourth objective, this study further investigated the effect of health care provider qualifications on and other associated factors on the quality of care using IV modeling techniques. 4.4 Causal effect of the qualification of health care provider on readmission/revisits Concerning the fourth objective, the results of this study show the causal effect of the qualification of the health care professional provider on the probability of a child being readmitted for the same illness. Out of the six levels of provider qualifications, only two show a significant effect on the outcome of interest (readmissions), the two are medical officer/physicians and medical assistants. The two are the highest qualification after the medical specialist, the low patient volume (0.3%) seen by specialist was a drawback in establishing the statistical significance. However, it is plausible that specialised qualification contributes to high-quality performance which leads to improved health outcomes. Furthermore, results of the IV marginal effect show that if a child is managed by a qualified provider there is minimal chance of readmission (probability is 0.1%). The association change may be indicative of the abundance of qualified healthcare workers within the Namibian health care 44 | P a g e system as supported or argued by the health ministry of the country (38). In the 2009 service provision assessment report the proportion of health care facilities with at least one qualified health care worker in hospitals was 100%, 96% in health care centres, and 98% in clinics which means that the facilities have an available skilled workforce. According to the NHFP of Namibia: the country's workforce situation is above the WHO benchmark of 2.5 health workers per 1000 population; there are 3.0 health workers per 1000 population, specifically 1.2 952 for doctors, 1.704 for registered nurses, among others. While there seems to be a low burden especially amongst nurses who are the largest players within the health system there is a very unequal distribution with most health workers concentrated in urban areas and a high percentage found in the private sector in particular in private clinics. These disparities in the distribution of the health workforce on the system in Namibia call for the policymakers to address issues of health care provider capacity through post-qualification trainings. Other than basic training achieved, for maintenance of knowledge levels and technical competence health service providers must continually be exposed to current and new information. Literature shows that the presence of qualified staff contributes to improved health outcomes amongst patients (24). Our study also showed that having health care providers trained before (pre-service) they started offering child health services or on the job (in-service) is negatively associated (-0.076 IV-probit model) with the probability of child readmission. According to the 2009 Namibia Health Facility Census (HFC), 87 percent of facilities were offered routine staff training during the 12 months preceding the survey (18). We can conclude that having health care workers who are knowledgeable on using existing guidelines may better assess and treat sick children with a high level of sensitivity and specificity thus contributing to a reduction in the probability of readmission. These findings are consistent with previous studies; provision of care consistent with clinical practice guidelines has 45 | P a g e been associated with lower readmission rates in children and adults with various conditions (52-54). Other evidence also shows that inadequate knowledge or reported practice for detecting and managing some common diseases affecting children occurred less frequently in teaching hospitals than non-teaching hospitals (26). This reinforces the need for staff to be continually trained and updated on current guidelines for standard assessment and treatment for most common disorders for which children are not provided care (26). We finally note from the results that if the child had previously visited another health care provider (whether informal or formal) the probability of readmissions is increased by 38%. Extensions to this analysis could study this is an important finding, with a possibility of using an instrumental approach. 4.5 Limitations The ability to adjust for severity is limited when using observational data because of the inadequacy of clinical information, however, they are widely and readily available to guide research on preliminary quality measures of hospital care. We failed to account for other variables that can be associated with the quality of health services and readmissions. The unobserved factors include actual distance, co-payment of services, location, and capacity of the health facility where health services were provided. We recommend that future studies of quality of health services use data obtained from diverse sources other than survey data collected for service provision assessment only, they can further explore the use of medical expenditure records maintained by hospital administrative departments, clinical records maintained by health care professionals, and direct observations of the health care worker-patient encounter. Each source of data produces a different view of the quality of care and variables such as distance, the severity of illness, availability of resources and administrative costs can be measured and controlled (55). Furthermore, we 46 | P a g e recommend refinement of the service provision assessment tool to collect precise data on additional variables which can be used for extended analysis. 4.5 Strengths The main strengths of this study were the use of country patient-level data which minimizes the effects of unobserved confounders. We found that who, where, and how health services are delivered in health facilities are associated with poorer patient outcomes in line with other observational studies of quality service and patient outcomes. This includes all those studies which used other health service delivery data and various statistical or mathematical techniques. Although it is possible that the severity of illness of children who accessed services at health centres, clinics, or hospitals might differ in unobservable characteristics, our study showed that, that if any, the health centres and clinics offer services to patients with lower socioeconomic status. For example, we discovered that sick children treated at low-level facilities (health centres) had low socioeconomic status (93% had no pre-payment plan- no medical aid cover), which is mainly associated with poor outcomes such as readmissions. CHAPTER 5: CONCLUSION AND RECOMMENDATIONS This study offers insights into factors affecting readmission as proxy indicator of hospital quality. There is statistical significance of socio-demographic and health system factors. The most significant finding of this study was the prevalence of health provider-related factors within the healthcare system and these are of interest from a policy perspective. The factors mainly lie within the influence of hospital personnel. Therefore, the readmissions are preventable and can be linked to the quality provided by the hospital and the hospital care professionals. In the Namibian context, factors such as health care provider characteristics (age, sex, and qualifications), the type of visit, type of facility, and the number of years the hospital has been offering child care services, had a significant effect on the probability of readmission. From the results of the IV-probit model, we conclude that if health policies are directed toward improving the skills of health care providers then the quality of health care will be improved. Patient case management from highly skilled technical staff will ensure that there is closer adherence to evidence-based guidelines for patient care thus ensuring that quality of care is incorporated into a dimension of all health services. Future research can focus on instrumenting other factors which had a significant effect on the outcome of this study. REFERENCES 1. Berenson J, Shih A. Higher readmissions at safety-net hospitals and potential policy solutions. Issue Brief (Commonw Fund). 2012;34:1-16. 2. Blumenthal D. Quality of care—what is it? Mass Medical Soc; 1996. 3. Campbell SM, Roland MO, Buetow SA. Defining quality of care. Social science & medicine. 2000;51(11):1611-25. 4. Al-Assaf A, Assaf RR. Managed care quality: a practical guide: CRC press; 1997. 5. Gowrisankaran G, Town RJ. 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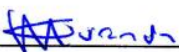
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