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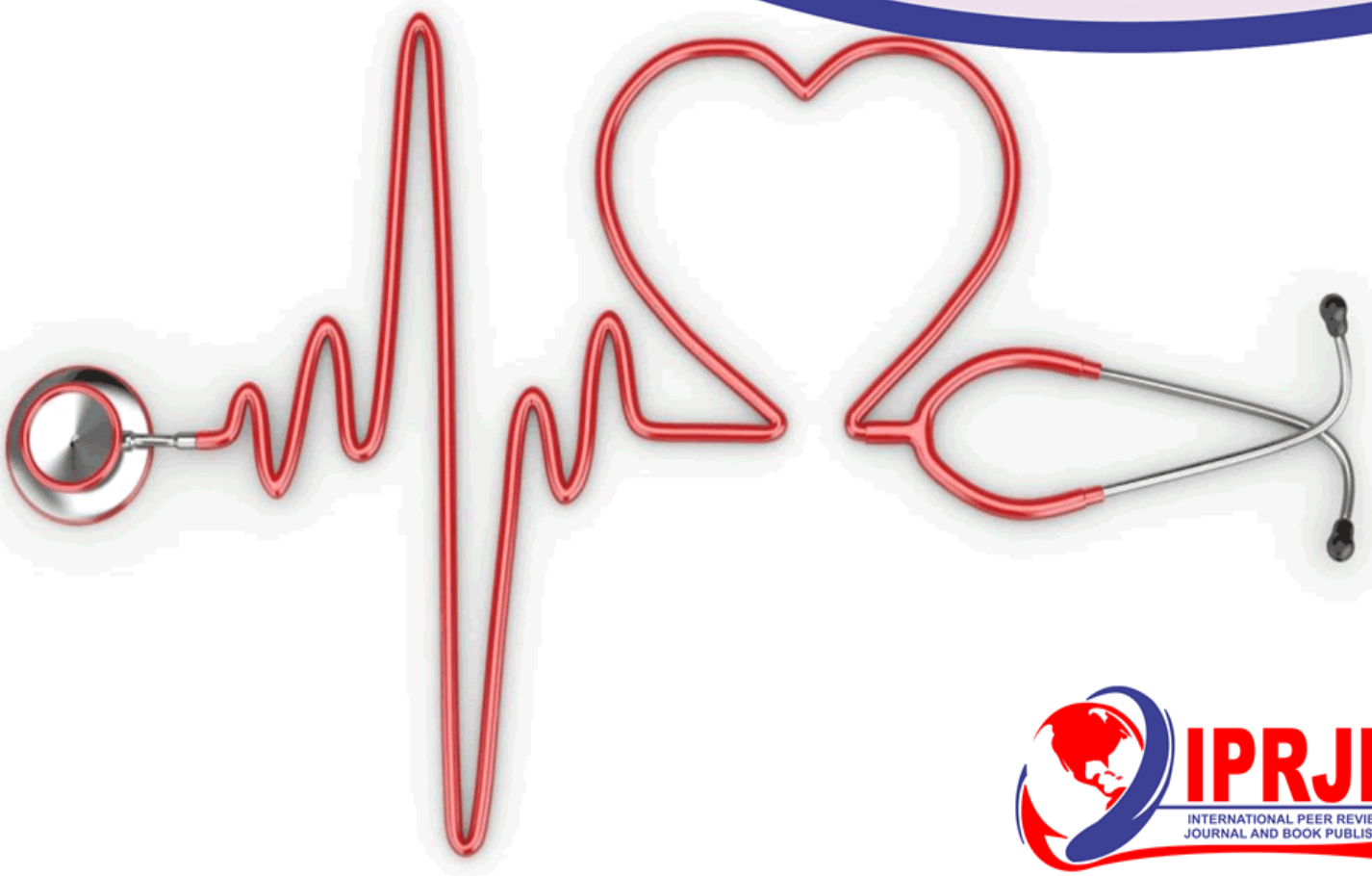

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Abstract

Purpose: The study sought to determine factors associated with non-compliance to bracing in clubfoot management among children under five years in AIC Cure International Children's Hospital, Kijabe, Kenya.

Methodology: The study adopted a cross-sectional descriptive design. It was carried out at AIC Cure International Children's Hospital, Kijabe, Kenya between April and August 2018. Both qualitative and quantitative methods were employed using a sample size of 174 participants. A semi-structured pre-tested questionnaire was used to collect data. Further, two focused group discussions were conducted, comprising of mothers with different characteristics. Quantitative data was entered for analysis using SPSS version 23.0. Descriptive, bivariate for example Chi square and multivariate for example regression statistical analysis was performed. Qualitative data from questionnaires was analysed through textual summaries was categorized and coded to match specific relevant research questions while data from FGDs was analysed using verbatim and a three-stage thematic approach. Presentation was done through frequencies, percentages, tables and charts.

Results: The proportion of non-compliance to bracing was 16.8%, and the cases of non-compliance to bracing were mostly reported in male children (89.3%), and mostly among children aged between 1-2 years of age (35.7%). Majority of the mothers (92.9%) received support from health professionals during the treatment. Gender of the child had a significant association with non-compliance with mothers of male children having 89.3% non-compliance as opposed to 10.7% non-compliance of mothers with female children. Majority of those who did not comply to bracing (81.2%) had college/university education and above. Distance to health facility, inability to meet transport costs and gender of the child had significant association with non-compliance to bracing.

Unique contribution to Theory, Practice and Policy: There is need to empower local facilities that is level 1 and level 2 to be able to manage conditions like clubfoot in order to avoid relapse or even permanent disability due to non-compliance. There is also need for detailed parent education on clubfoot bracing and importance of parent compliance.

Keywords: *Non-Compliance, Clubfoot, AIC Cure International Children's Hospital, Kijabe, Kenya*

1.0 INTRODUCTION

1.1 Background to the Study

Various studies have established the prevalence of clubfoot to be 1.1 per 1000 births. Among them is a multistate study carried out in the United States by Parker *et al.,* (2009) and a study carried out in Peru in South America by Melissa *et al.,* (2014). In Africa, the prevalence is slightly higher with a study carried out in Uganda showing a prevalence of 1.2 per 1000 births (McElroy *et al.,* 2015)) and another one carried out in Nigeria showing a prevalence of 3.4 in 1000 births (Ukoha *et al., 2011*).

Globally, 150,000 – 200,000 babies with clubfoot are born each year. Clubfoot occurs in about 200,000 babies each year worldwide. More commonly, it affects boys than girls. Up to 50% cases are bilateral (Bedford, 2009). (Zionts & Dietz, 2010). Historically, clubfoot has been treated with extensive and invasive surgeries. However, since the 1990s, the Ponseti method of treatment has repeatedly been proven to effectively treat clubfoot with only minimally invasive surgery (Morkuende, 2009). This method was invented by Dr. Ignacio Ponseti in 1940's hence the name ponseti. The ponseti method is ideally suited for the developing world in that it is inexpensive, non-surgical and trained paramedical personnel can complete the casting component. The method is usually done in two phases: serial casting or tenotomy phase and bracing phase. Serial casting or tenotomy corrects the deformity while bracing helps the foot/feet to stay in the corrected position for some time to avoid relapse that leads to recurrence of the clubfoot, and ensure successful outcome (Zionts & Dietz, 2010).

Clubfoot presents early in neonatal life and if not treated becomes more disabling with age. Neglected or inadequately corrected clubfoot can have a dramatic effect on the quality of life of the child. It causes physical impairments that result in decreased ambulation and inability to perform basic tasks such as carrying water, collecting food and going to school. This leads to dependency for activities of daily living with significant economic impact on the family. In addition, the structural differences in children with clubfoot are associated with social stigma, which has a psychological effect on the child (Ukoha *et al., 2011*). Rates of success with the Ponseti method have been reported to be as high as 95%, however, relapse rates are also high and present a significant problem in treatment. Relapses occur in 14-41% of patients, with some patients experiencing multiple relapses or treatment failure. The single factor most frequently associated with relapse is inadequate use of an abduction brace following the casting phase of treatment (Bedford, 2009).

Casting corrects most cases of the clubfoot, but clubfoot tends to relapse without proper care after the casting. A child therefore needs to wear a brace, commonly referred to as Foot Abduction Brace (FAB) that will prevent the leg from moving back to the incorrect position while the foot grows and develops. Children must wear the brace locking their feet in place 23 hours a day for the first three months. After three months, the time required begins to drop incrementally until age 4 or 5 when the gene that causes club feet is no longer active (Morcuende, 2009).

Relapses due to lack of compliance to the braces are a common occurrence among children with clubfoot up to the age of 5 years at this rate: 1st year 90%, second year 70-80%, third year 30-40%, 4th year is 10-15%, subsequent years are about 6%. Bracing is an essential part of the treatment of clubfoot and prevents relapses very effectively. Severity of the deformity at birth is not a reliable indicator of the odds of relapse, therefore almost all clubfoot patients are held to the same bracing protocols in order to provide them with the best protection against relapse (Staheli, 2009).

Scarcity of resources and inappropriate distribution of health care professionals between rural and urban regions add to problems of rehabilitation in developing countries. This has resulted in many patients in poor rural settings going without treatment or having to travel long journeys to urban areas for treatment. Patient compliance with treatment procedures is important for the therapeutic regimen to be effective. Without compliance, the therapeutic goals cannot be achieved, resulting in poor patient outcomes (Kawashima & Uhthoff, 2010).

1.2 Statement of the problem

Disability has emerged as a major public health problem worldwide. Physical disabilities are common in nations with disparate levels of socioeconomic development, among them clubfoot. Clubfoot causes physical impairments that result in decreased ambulation and inability to perform basic tasks such as carrying water, collecting food and going to school. This leads to dependency for activities of daily living with significant economic impact on the family. In addition, the structural differences in children with clubfoot are associated with social stigma, which has a psychological effect on the child. The family also carries the burden of providing for the disabled and is financially poorer. Non- compliance in health and especially to bracing during clubfoot management continues to be a public health concern not only to the concerned individuals that is the child, mother and relatives but also to governments due to the consequences that arise, specifically relapse. According to Morcuende (2009), the challenge of the Ponseti method begins when casting ends. Many Ponseti treatment programs have found bracing as the most difficult phase of treatment for parent to comply to. Failure to adhere means that recurrence of the clubfoot deformity is highly likely to occur. This can have a dramatic effect on the quality of life of the child. Further, relapse is frustrating for both parents and clinicians. It also results in considerable waste of parents' and service providers' resources, but most important it can lead to permanent disability of the affected children. Various studies have estimated rates of non-compliance regarding use of the brace from 32-61%, while a number of papers have described a range of causes of non-compliance (Jawadi, 2010).

2.0 LITERATURE REVIEW

2.1 Understanding clubfoot

Clubfoot (also called talipes equinovarus) is a general term used to describe a range of unusual positions of the foot usually present at birth (congenital). It is a common birth defect and is usually an isolated problem for an otherwise healthy newborn (Kawashima & Uhthoff, 2010).

True clubfoot is characterized by abnormal bone formation in the foot. It can be either bilateral or unilateral. Up to 50% cases are bilateral. Sometimes the feet of an infant appear abnormal at birth because of the intrauterine position of the fetus prior to birth. If there is no anatomic abnormality of the bone, this is not true clubfoot, and the problem can usually be corrected by applying special braces or casts to straighten the foot. True clubfoot is usually obvious at birth because a clubfoot has a typical appearance of pointing downward and being twisted inwards. Since the condition starts in the first trimester of pregnancy, the abnormality is quite well established at birth, and the foot is often very rigid. Uncorrected clubfoot in an adult cause only part of the foot, usually the outer edge, the heel, or the toes, to touch the ground. For a person with clubfoot, walking becomes difficult or impossible (Robertson & Corbett, 2013).

According to the founder of Ponseti method, clubfoot more commonly affects boys than girls with a male to female ratio of 2:1. Boo and Ong (2014) confirmed this in a study recently carried out in Malaysia where by the ratio of male to female was 2.5:1. The etiology of clubfoot remains unknown and is controversial, and numerous theories on causative factors are proposed. These include nerve lesion, muscle imbalance, muscular abnormality, vascular defect or neuromuscular defect (Wynne, 2012). However, according to Bedford (2009), in some cases, clubfoot is just the result of the position of the baby while it is developing in the mother's womb (postural clubfoot), but more often clubfoot is caused by a combination of genetic and environmental factors that is not well understood. Although long held proposals of intra-uterine compression as a causative factor is unsubstantiated, Wynne (2012) still claims feeling remains that mechanical pressure may be of some significance. Kawashima and Uhthoff (2010) claim interruption in the development of a normal foot during the ninth week of gestation might be responsible for the deformity. This hypothesis of a regional growth disturbance is supported by two observations. First, a disproportionate amount of type I fibres in the posterior and medial muscle groups which suggests the presence of a neural abnormality as muscle fibre types are neurally determined. Second, tendon sheaths of toe flexors and posterior tibial tendon have signs of cellular hypoplasia with smaller cell and cytoplasmic volume (Garg & Porter, 2012)

In a study on observations on the epidemiology of club foot in Polynesian and Caucasian populations, Cartlidge (2011) reported ethnic differences in CTEV occurrence with the lowest (0.6%) incidence among the Chinese population, the highest (6.8%) in the Polynesian region and a cumulative incidence of approximately one per 1000 live births among Caucasians. Further, he cited that studies on ethnic groups, populations, and families suggest a genetic component as one causative factor of congenital clubfoot. However, the mode of heritance does not follow a classic pattern and both genetic and environmental factors are probably involved: the presence of a genetically determined connective tissue defect and a transient deforming force is supposed to allow the mobile foot to be pushed into equinovarus position at a vulnerable time of its development (Boehm & Sinclair, 2007).

2.2 Clinical presentation of club foot

Each of the following characteristics may be present, and each may vary from mild to severe: the foot (especially the heel) is usually smaller than normal, the foot may point downward (Equinus), the front of the foot may be rotated toward the other foot (adduction) and the foot may turn in (eversion), and in extreme cases, the bottom of the foot can point up (hind foot varus). Clubfoot is painless in a baby, but it can eventually cause discomfort and become a noticeable disability (Mathias *et al.*, 2010). Left untreated, clubfoot does not straighten itself out. The foot will remain twisted out of shape, and the affected leg may be shorter and smaller than the other. These symptoms become more obvious and more of a problem as the child grows. There are also problems with fitting shoes and participating in normal play. Treatment that begins shortly after birth can help overcome these problems.

2.3 Diagnosis of clubfoot

Clubfoot is usually diagnosed after a baby is born, although the problem may first be spotted during the routine ultrasound scan carried out between 18 and 21 weeks of pregnancy (Zionts and Dietz, 2010). According to Parker *et al.*, (2009), diagnosis of the problem usually serves as the first step of the treatment process, which may be followed by steps to obtain an assessment, diagnosis and treatment. Further, Parker *et al.*, (2009) indicates that research has also shown that early recognition of disease especially in children determines the treatment responses or interventions that can be employed. It is said that due to the structural nature of

clubfoot, the deformity is easily recognized from birth by either traditional birth attendants in villages or professional doctors and midwives in public and private health facilities attending to mothers during delivery of these children (McElroy *et al*, 2015).

On the other hand, it is the parent's instinct to investigate the health and status of a newborn. Clubfoot that becomes so evident after birth can easily be identified by parents especially the mother during her routine observation and assessment of the infant. However, it is suggested that lack of awareness by the parents/ caregivers about the disease and not knowing where to go for treatment, causes delays in early seeking of treatment for the patient (Nogueira *et al*, 2013). Similarly, McElroy *et al*, (2015) assert that owing largely to lack of awareness of the condition, illiteracy and geographical inaccessibility to health facilities with services for treating clubfoot, many parents in Uganda do not seek-out treatment early. Rehabilitation care is still a new approach in Uganda and due to a lack of awareness about the availability of rehabilitation services and the rehabilitation potential, parents, especially those in rural areas living far away from health facilities, seek alternative treatment or sometimes do nothing for the impairment of the child (McElroy *et al*, 2015).

2.4 Management of clubfoot

Bracing is a critical component of the current standard of treatment for clubfoot. Adherence to the bracing protocol is the main factor for the long-term success of the treatment since it prevents relapses. Relapses due to lack of compliance to the braces are a common occurrence among children with clubfoot up to the age of 5 years at this rate: first year 90%, second year 70-80%, third year 30-40%, fourth year is 10-15%, subsequent years are about 6%. The consequences of non-compliance to bracing do not only affect the babies with club foot and their families, but they also have a far reaching effect on society, since ill health is the leading cause and consequence of poverty in developing nations (Lu *et al.*, 2010).

Successful management of clubfoot has established that the Ponseti method is the most popular method for the treatment of clubfoot (Bedford, 2009). The use of a foot abduction brace (FAB) after initial correction is essential to avoid recurrence. The FAB should be worn for 23 hours per day in the first 3 months followed by wearing the brace at night-time and during naptime for 3–4 years, as recommended by Ponseti (Jawadi, 2010). This requires a significant commitment from the family. Compliance with the brace protocol is crucial, and relapses occur mostly because of parental non-compliance (Akintayo *et al.*, 2012).

2.5 Burden of club foot

Various studies have established the prevalence of clubfoot in the world to be approximately 1.1 per 1000 births. Among them is a multistate study carried out in the United States by Parker *et al.*, *(*2009) and a study carried out in Peru in South America by Melissa *et al.*, (2014). In another study carried out among children in Nnamdi Azikiwe University Teaching Hospital, (NAUTH), Nnewi Anambra State, Nigeria, the records of 12,464 patients aged between one day and 2 years were reviewed over a six-year period (2004-2010). A total of 43 patients had congenital clubfoot with an incidence of 3.4 per 1,000. Twenty-four males (0.19%) and 19 females (0.15%) had congenital clubfoot. There was statistically significant difference ($P<0.05$) between the incidence in males and females with the males recording a higher value (Ukoha *et al., 2011*).

Prevalence of clubfoot in Kenya has not been established since not many studies on clubfoot have been carried out. However, in one study done in Kenya, caretakers of 5559 children (54% female) were surveyed in 1909 households, 56% of which were rural, 31% suburban and 13% urban. The overall prevalence of congenital malformations was 6.3 per 1000

children, amounting to 54–120 DALYs per 1000 children, depending on the life tables used. The most prevalent condition in the survey was clubfoot, whereas spina bifida had the highest burden of disease. There were a total of 110,336 live births; 56,779 (51.5%) male and 53,557 (48.5%) female. The total number of babies with foot deformities reported from the maternity units of all eight centers was 290, a proportion of 2.6/1000 live births. After examination of all babies with foot deformities at the clubfoot clinics by orthopedic officers or orthopedic surgeons, 131 were diagnosed as clubfoot. This represents 45% of infants with a foot deformity recognized at the maternity unit and referred (Victor & Dan, 2013).

2.6 Factors associated with non-compliance to bracing

2.6.1 Maternal practices

Educational level of parents could be a contributing factor to the recurrence of clubfoot deformity after correction according to Mohammad *et al.,* (2016) who reported that low maternal educational level led to non-compliance to bracing which generally led to recurrence of clubfoot. However, in a study by Ayman *et al.,* (2015) in Saudi Arabia, no significant correlation was found between brace use and parents' monthly income or their level of education. Nogueira *et al.,* (2013) observed that physicians cited a lack of education as a major cause of non-compliance because very little time was spent explaining the bracing process and its importance to parents. Additionally, few physicians (34%) had any kind of written information available for parents regarding the brace. Although some physicians attributed this to low literacy and comprehension levels among parents, there is still a place for written materials in order to solidify information provided orally during the patient consultation. A study done in China by Lu *et al.,* (2010) recorded that many caretakers of clubfoot patients have not even completed middle school, especially in rural areas. This educational gap is believed by those interviewed to make it difficult for caretakers to understand each step of the treatment, leading to non-compliance. For example, some caretakers discontinue treatment after casting because they do not understand the purpose of the brace. They see the results of casting and believe that the patient is cured. Secondary illness for example a cold causes other caretakers to temporarily discontinue use of the brace, which may then be forgotten. Three out of eight sets of parents from a focus group were worried about their children's comfort during treatment and difficulty holding their child with a brace. Since its inception, the Ponseti method has proven to be effective in the treatment of idiopathic clubfoot in greater than 95% of cases. Iftikhar *et al.,* (2014) reiterated that compliance with the post-correction abduction bracing protocol is critical to avoid clubfoot recurrence.

Ayman *et al.,* (2015) further reported that unilateral clubfoot was a significant risk factor for non-compliant parents compared to bilateral clubfeet and that Parents with 3 or more children had more non-compliance (66.7%) compared to those with less than 3 children. In addition, according to the study, all non-compliant parents reported that their babies cried during the application of the brace in contrast to 25% of the complaint parents. Majority of non-compliant parents (94.4%) reported being “fed up” with using the brace.

2.6.2 Social economic factors

Socio-economic factors have been shown to be a major hindrance to access to health care services in most resource-poor settings. In a study conducted in Karachi, Pakistan, the major reason for poor and non-compliance was low income, unaffordability of time and cost for regular follow-up. 16.67% of the parents who participated in the study had inconsistent use of braces due to delay in re-procurement of Foot Abduction Braces once the child had outgrown

the shoe (Iftikhar *et al.,* 2014). However, when a couple of dozen pairs of all shoe sizes were arranged and provided free/partially free of cost, as charity or donations, this significantly improved compliance and encouraged parents to continue the treatment. Another study carried out in Mbarara Regional Hospital and Mulago Hospitals in Uganda also found a significant association between compliance and transport costs to the facilities, distance travelled and family support (Kazibwe & Struthers, 2009). Other challenges highlighted in the study include the need to improve the communication skills between clinicians offering treatment to children with clubfoot and their parents.

In countries where the majority of the population lives in poverty, most families are severely limited in their capacity to fund their own health care. CURE Clubfoot Kenya (CCK) program has observed in various programs high dropout rates for those who have started the treatment process but lack funds for continuing casting (Victor & Dan, 2013). Experience indicates that even in countries where clubfoot clinics are being operated at governmental facilities most patients are expected to pay for the treatment and/or the supplies and that in many cases neither the hospitals nor the patients can afford to fund clubfoot treatment (Gupta *et al.,* 2008)

2.6.3 Societal practices

The present study and reports by Kawashima and Uhthoff (2010) and Morcuende (2009) find no significant relationship of relapse with age at presentation, previous unsuccessful treatment, complexity or intrinsic severity of the deformity, number of casts required for correction, ethnicity or family history of clubfoot. Kawashima and Uhthoff (2010) and Avilucea *et al., (*2009) however, have reported some relationship of cultural factors coupled with the distance from the site of care and caretakers ' tolerance to increased incidence of relapse, recurrence, partial compliance and non-compliance. In an interview with parents, the cultural factors and the distance to travel was the second highest reason for inconsistent use of FAB and non-compliance (Iftikhar *et al.,* 2014). The cultural factors were more apparent among parents from higher societies. They discontinued FAB while attending festivals and parties, often did not re-apply FAB on that night, some discontinued on religious holidays and with this relaxation, the child avoided to wear FAB again.

A rare and unique cultural barrier to the Ponseti method was explained by a physician in Ho Chi Minh City. There was a belief that what others saw as a deformity, the family, with the affected child, saw as a “gift” or talent. By removing the deformity, the child would no longer be gifted and special. In Vietnamese culture, the grandparents have great weight in decision-making, and parents show respect by following their wishes. In this specific tradition, the child with clubfeet was the first-born male of the eldest son of the grandfather. As such, the child was seen as the sole carrier of the grandfather's bloodline, and any danger – tenotomy included – leading to the death of the child would effectively end the bloodline (Wu *et al.,* 2012).

Study done in New Mexico (Avilucea *et al.,* 2009) observed that, the Native American families who lived a distance from Albuquerque were more likely to follow native traditions, speak their native language in the home, and utilize native healers in addition to modern medicine. While families of all ethnicities frequently reported, when their child had a recurrence of deformity, that they did not perceive the abduction orthotics as an important component for ongoing success in the treatment of their child, interviews with some of the rural Native American families in this study parents revealed there often exists a notion of shared responsibility within an interdependent family system which can result in many family members sharing childcare. A strong connection existed with traditional

spiritual and natural healing practices, and the family may have consulted with a medicine man or native healer. This was also evident in Nigeria with Morcuende (2009) reporting that culture and religious practices were crucial factors in Nigerians' health-seeking behaviors. A few of the parents recounted attributing their baby's malformation to God's will, punishment from God, or to witchcraft. Ponseti providers commented that these mindsets and beliefs resulted in poor health-seeking behaviors among parents because they would conclude that western medicine could not confront spiritual matters. Thus, some would turn to faith healers, herbalists and bonesetters (Morcuende, 2009).

Large family size was another cultural factor that influenced parental health-seeking behaviors. Physicians reported that age of presentation to Ponseti clinics and the compliance of parents to treatment protocols and follow-up appointments were influenced by the number of children present in their households or the number of children desired by the parents. Nigeria Demographic and Health Survey (2008) established that 42.9% of men and 39.8% of women who already had three children planned to have another child sometimes in the future.

2.6.4 Practices of health professionals

For most medical conditions, correct diagnosis and effective medical treatment are essential to a patient's survival and quality of life. A significant barrier to effective medical treatment, however, is the patient's failure to follow the recommendations of his or her physician or other healthcare provider. Patient non-adherence (also referred to as non-compliance) can take many forms; the advice given to patients by their healthcare professionals to cure or control disease is too often misunderstood, carried out incorrectly, forgotten, or even completely ignored. Non-compliance carries a huge economic burden. Yearly expenditures for the consequences of non-compliance have been estimated to be in the hundreds of billions of US dollars (Leslie *et al.*, 2012). Patients must therefore be given the opportunity to tell the story of their unique illness experiences. Knowing the patient as a person allows the health professional to understand elements that are crucial to the patient's adherence: beliefs, attitudes, subjective norms, cultural context, social supports, and emotional health challenges, particularly depression. Physician–patient partnerships are essential when choosing amongst various therapeutic options to maximize compliance. Mutual collaboration fosters greater patient satisfaction, reduces the risks of non-compliance, and improves patients' healthcare outcomes (Boardman *et al.*, 2011).

According to Branch (2012), the interpersonal dynamics of the physician–patient relationship play an important role in determining a variety of patient outcomes including patient adherence to their treatment recommendations. Patients who feel that their physicians communicate well with them and actively encourage them to be involved in their own care tend to be more motivated to adhere. Additionally, when physicians and patients agree on how to involve patients in their care, adherence is improved. Cohesive partnerships and effective interpersonal communication make it possible for patients and physicians to work together to help patients follow mutually agreed-upon recommendations. Successful communication between physicians and patients promotes greater patient satisfaction with medical care, which in turn fosters higher levels of adherence (Boehm and Sinclair, 2007).

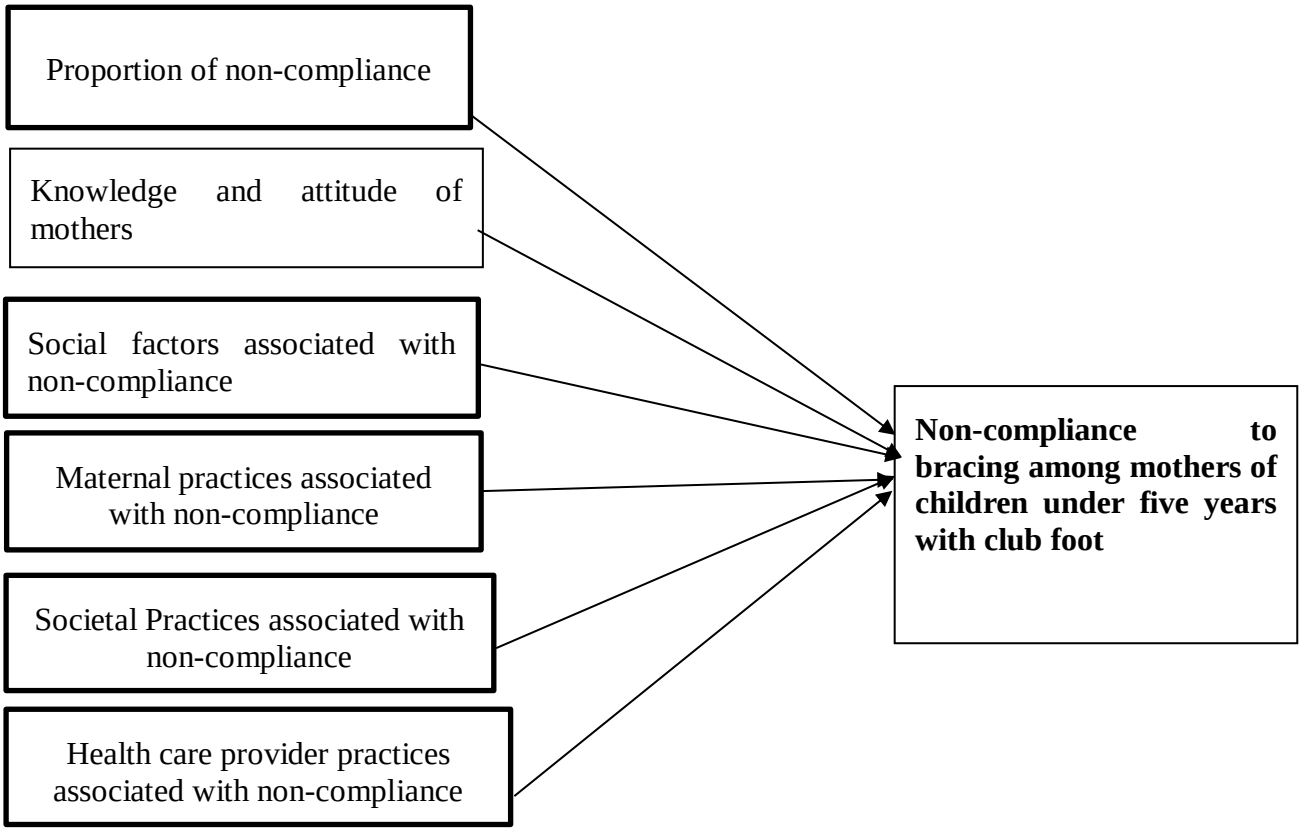
Patients' trust in their physicians is essential to their emotional disclosure and is therefore a crucial component of the patient–physician relationship. Patients must believe that their physician is someone who can understand their unique experience of being a patient, and someone who can provide them with reliable and honest advice. Trusting relationships between physicians and patients can greatly affect patient outcomes. For example, it has been shown that physicians who promote trust in the therapeutic relationship, who have effective

communication and "bedside manner", and who express compassion for their patients succeed in fostering cooperation and patient compliance with a variety of preventive and treatment recommendations. Compliance rates have been found to be nearly three times higher in primary care relationships characterized by very high levels of trust coupled with physicians' knowledge of the patient as a whole person. In fact, patients' trust in their physician has been found to far exceed many other variables when it comes to promoting patients' satisfaction with their care (Jahng *et al.*, 2010).

Further, studies have found that both patient satisfaction and patient adherence are enhanced by patients' involvement and participation in their care. The behavior of physicians and patients tends to be reciprocal when they strive toward partnership. Patients who want to be more involved tend to ask more questions and display more confidence, and physicians who are willing to sustain collaborative relationships with their patients tend to act in ways that prompt their patients to be involved and active (Leslie *et al.*, 2012).

2.4 Conceptual Framework

Fig 1: Conceptual Framework



3.0 RESEARCH METHODOLOGY

The study adopted a cross-sectional descriptive design. It was carried out at AIC Cure International Children's Hospital, Kijabe, Kenya between April and August 2018. Both qualitative and quantitative methods were employed using a sample size of 174 participants. Ethical approval was sought from KNH/UON Ethical Review Committee before data collection. Permission to collect data was sought from AIC Cure International Children's Hospital. A semi-structured pre-tested questionnaire was used to collect data. Further, two

focused group discussions were conducted, comprising of mothers with different characteristics. Quantitative data was entered for analysis using SPSS version 23.0. Descriptive, bivariate for example Chi square and multivariate for example regression statistical analysis was performed. Qualitative data from questionnaires was analysed through textual summaries was categorized and coded to match specific relevant research questions while data from FGDs was analysed using verbatim and a three-stage thematic approach. Presentation was done through frequencies, percentages, tables and charts.

4.0 FINDINGS

4.1 Characteristics of the respondents

4.1.1 Socio-Demographic Characteristics of the Study Respondents

The sample population had 174 respondents of which 173 returned filled questionnaires. Therefore, the response rate was therefore 99 percent. The participants' age ranged from 18 years to 64 years, the mode was 30 years, median 30 years and the mean age was 30.52 ± 2.54. More than three quarters of the respondents 134(77.5%) were less than 35 years, of which 55(31.8%) were between 30-34 years, 33(19.1%) were between 18-24 years and 4(2.3%) were between 50-64 years

Regarding marital status, approximately 82% were in marital union with 21(21.1%) being single at the time of the study. Majority 165(95.4%) were Christians and almost three-quarter of respondents 138(79.8%) were multipara in which 63(36.4%) had 3-5 deliveries and 6(3.5%) had delivered more than 5 times (grand-multipara) (Table 1)

Table 1: Socio-Demographic Characteristics of Respondents

Characteristics	Frequency	Percent
Age in complete years		
18-24 years	33	19.1%
25-29 years	46	26.6%
30-34 years	55	31.8%
35-39 years	24	13.9%
40-44 years	4	2.3%
45-49 years	7	4.0%
50-64 years	4	2.3%
Marital status		
Single	21	12.1%
Married	141	81.5%
Divorced	10	5.8%
Separated	1	0.6%
Religion affiliation		
Christian	165	95.4%
Muslim	8	4.6%
Parity		
1-2 children	104	60.1%
3-5 children	63	36.4%
More than 5 children	6	3.5%
Highest level of education		
No formal education	1	0.6%
Primary education	40	23.1%
Secondary education	78	45.1%
Tertiary education	54	31.2%

4.1.2 Socio-Economic Characteristics of the Respondents

Approximately 28% of respondents had no income generating activity of which 71(41.0%) were self-employed and 35(20.2%) were salaried employees. The results further show that majority of respondents 110(63.6%) had monthly income of Ksh 5000 or less (table 2)

Table 2: Socio-Economic Characteristics of the Respondents

Characteristics	Frequency	Percent
Employment status		
Student	3	1.7%
Unemployed	45	26.0%
Employed	35	20.2%
Self-employed	71	41.0%
Farmer	18	10.4%
Pensioner	1	0.6%
Monthly income		
No income	48	27.7%
Less than Ksh 2000	20	11.6%
Ksh 2000-5000	42	24.3%
Ksh 10000-20000	36	20.8%
Ksh 20000-50000	17	9.8%
More than Ksh 50000	10	5.8%

4.2 Characteristics of the Child

More than half of children in the study 115 (66.5%) were between 1-5 years of age and almost 63% of children in the study were males. Amongst all respondents interviewed, 35 (20.2%) had a relapse while 135 (79.8%) were first time patients with clubfoot. 99 children (57.2%) had bilateral clubfoot (Table 3).

Table 3: Characteristics of the Child

Characteristics	Frequency	Percent
Age		
1-6 months	30	17.3%
7-9 months	28	16.2%
1-2 years	75	43.4%
2-5 years	40	23.1%
Gender		
Male	108	62.4%
Female	65	37.6%
Limb with clubfoot		
Right	42	24.3%
Left	32	18.5%
Both	99	57.2%
Nature of clubfoot		
First time	138	79.8%
Relapse	35	20.2%
Birth order of child with clubfoot		
First born	75	43.4%
Second and third born	75	43.4%
Fourth born and above	23	13.3%

4.3 Health of Child during Delivery

Majority of the children, 169(97.7%) were born with clubfoot. Apart from club foot, 19(11.0%) had other medical conditions (Figure 1)

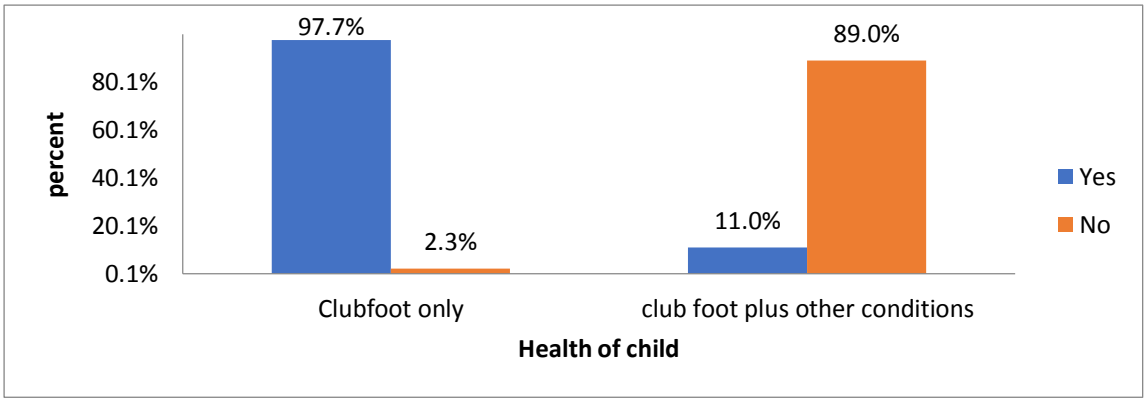


Figure 1: Health of Child during Delivery

4.4 Specific Health Conditions

Among the children with other medical conditions, 12(63.2%) had chest problem and 6(31.6%) had cerebral palsy (table 4)

Table 4: Specific Health Conditions of the Child

	Frequency	Percent
Specific health conditions		
Chest problem and spina bifida	4	21.1%
Spina bifida only	2	10.5%
Hydrocephalus only	1	5.3%
Cerebral palsy only	3	15.8%
Chest problem only	2	10.5%
Chest problem and cerebral palsy	1	5.3%
Chest problem, spina bifida and cerebral palsy	1	5.3%
Spina bifida and cerebral palsy	1	5.3%
Hydrocephalus and chest problem	4	21.1%

4.5 Compliance to Bracing among the Respondents

4.5.1 Proportion of Compliance to Bracing

Figure 2 shows that 29(16.8%) of respondents didn't comply to the bracing

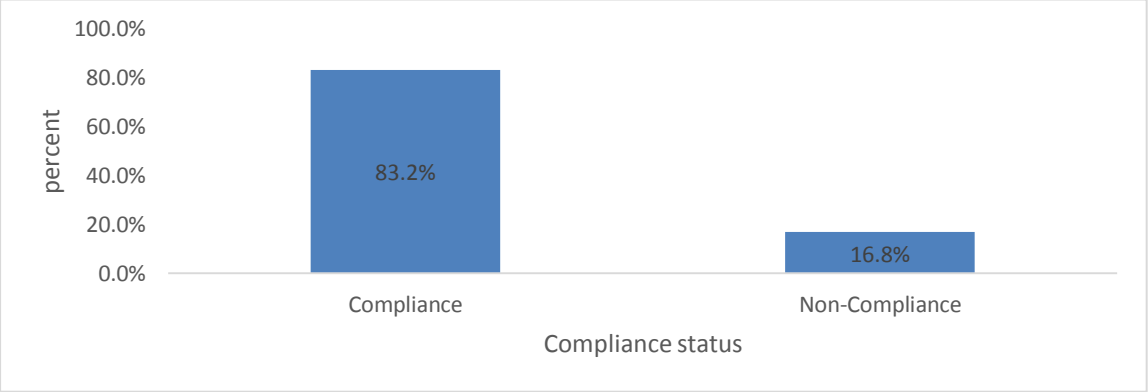


Figure 2: Proportion of Compliance to Bracing

Few respondents reported that in cases of unilateral clubfoot, the brace is set at 75 degrees of external rotation and 45 degrees of external rotation on the normal foot. In bilateral cases, the braces are set at 70 degrees of external rotation on each foot. The participants advocated that the bar should be of sufficient length to ensure the heels of the shoes are at shoulder width.

4.5.2 Socio-Demographic Factors and Non-Compliance to Bracing

On bivariate analysis, the cases of non-compliance to bracing increased with increase in chronological age of the caretakers however there was no significant association (p=0.346). On caretaker's education level, cases of non-compliance to bracing was high among respondents with formal education however there was no significant association (p=0.053) (table 5).

Table 5: Socio-Demographic Factors and Non-Compliance to Bracing

	Compliance	Non-compliance	Chi square	p-value
Age			6.736	0.346
18-24 years	26(11.7%)	7(25.0%)		
25-29 years	35(24.1%)	11(39.3%)		
30-34 years	47(32.4%)	8(28.6%)		
35-39 years	22(15.2%)	2(7.1%)	df 6	
40-44 years	4(2.8%)	0(0.0%)		
45-49 years	7(4.8%)	0(0.0%)		
50-64 years	4(2.8%)	0(0.0%)		
Marital status			3.513	0.319
Married	121(84.0%)	20(71.4%)		
Divorced	8(5.6%)	2(7.2%)	df 3	
Separated	1(0.7%)	0(0.0%)		
Single	14(9.7%)	6(21.4%)		
Parity			1.588	0.452
1-2 Children	88(60.7%)	16(57.1%)		
3-5 children	51(35.2%)	12(42.9%)	df 2	
More than 5 children	6(4.1%)	0(0.0%)		
Religion affiliation			0.480	0.488
Christian	139(95.9%)	26(92.9%)	df 1	
Muslim	6(4.1%)	2(7.1%)		
Highest level of education			7.681	0.053
No formal education	0(0.0%)	1(3.6%)		
Primary	35(24.1%)	5(17.9%)	df 3	
Secondary	62(42.8%)	16(57.1%)		
University	48(33.1%)	6(21.4%)		

4.5.3 Socio-Economic Factors and Non-Compliance to Bracing

On analysis of socio-economic characteristics, the study found that none of the variables were significantly associated with non-compliance to bracing (Table 6)

Table 6: Socio-Economic Factors and Non-Compliance to Bracing

Factors	Compliance	Non-compliance	Chi square	p-value
Occupation			2.653	0.753
Unemployed	37(25.5%)	8(28.6%)		
Student	3(2.1%)	0(0.0%)		
Employed	27(18.6%)	8(28.6%)	df 5	
Farmer	15(10.3%)	3(10.7%)		
Self Employed	62(42.8%)	9(32.1%)		
Pensioner	1(0.7%)	0(0.0%)		
Monthly income			6.400	0.269
No income	40(27.6%)	8(28.6%)		
Less than Ksh 1000	14(9.7%)	6(21.4%)		
Ksh 1000-9000	35(24.1%)	7(25.0%)	df 5	
Ksh 10000-19000	30(20.7%)	6(21.4%)		
Ksh 30000-39000	17(11.7%)	0(0.0%)		
More than Ksh 39000	9(6.2%)	1(3.6%)		
Distance to health facility			6.327	0.042
Not far	15(10.3%)	3(10.7%)		
Moderately far	82(56.6%)	9(32.1%)	df 2	
Very far	48(33.1%)	16(57.2%)		
Afford transport			7.635	0.006
Yes	113(77.9%)	15(53.6%)	df 1	
No	32(22.1%)	13(46.4%)		
Pay for bracing			6.101	0.014
Yes	7(5.5%)	5(17.9%)	df 1	
No	137(94.5%)	23(82.1%)		

Long distances to hospitals and expensive transport make management difficult. Sickness, either in the child or some other family member may interfere with treatment. Relatives may not be supportive. They may disown the child, feeling that it is from another family line and suggest that the child is cursed.

The influence of distance becomes hard-hitting when considered together with lack of transport and bad roads, which contributed toward indirect cost of visit to health facilities. Parents/caretakers who travelled short distances reported that they were able to get to the health facility with ease and were more compliant to treatment. Most mothers were reported to cover long distances from home to the health facility in pursuit of their children's treatment.

4.5.4 Child Demographic Characteristics and non-compliance to bracing

The cases of non-compliance to bracing were mostly reported in male children 25(89.3%), however there was significant association with child gender (p=0.001) (Table 7)

Table 7: Child Demographic Factors and Non-Compliance to Bracing

Factors	Compliance	Non-compliance	Chi square	p-value
Gender			10.274	0.001
Male	83(57.2%)	25(89.3%)	df 1	
Female	62(42.8%)	3(10.7%)		
Age			2.100	0.552
1-6 months	25(17.2%)	5(17.9%)		
7 - 9 months	21(14.5%)	7(25.0%)	df 3	
1 - 2 years	65(44.8%)	10(35.7%)		
2 - 5 years	34(23.5%)	6(21.4%)		
Leg with club foot			4.312	0.116
Right	38(26.2%)	4(14.3%)		
Left	29(20.0%)	3(10.7%)	df 2	
Both	78(53.8%)	21(75.0%)		
Born with club foot			0.791	0.374
Yes	141(97.2%)	28(100.0%)	df 1	
No	4(2.8%)	0(0.0%)		

4.6 Knowledge and Attitude of Respondents on Bracing

4.6.1 Level of Knowledge

More than half of the respondents 109(62.8%) were knowledgeable on bracing while 64(37.2%) were not knowledgeable as shown in Figure 3. This means they had an understanding of why, how and when to do bracing.

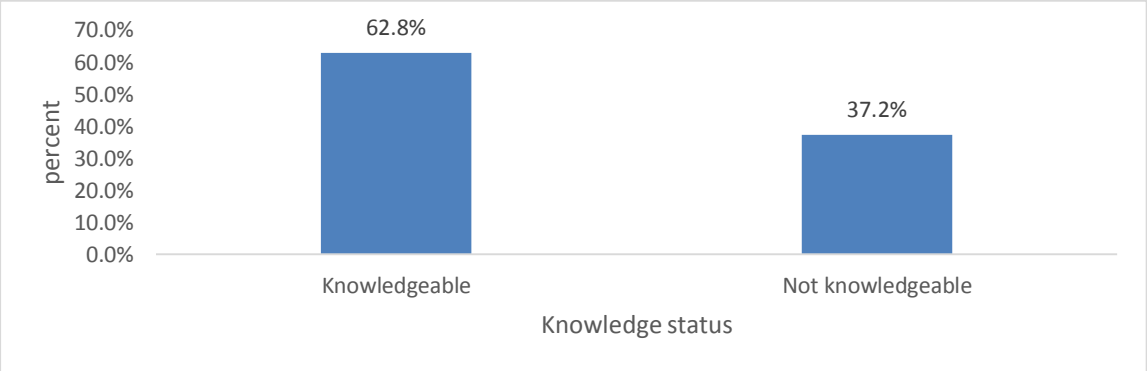


Figure 3: Level of Knowledge

4.6.2 Respondents Knowledge and Non-Compliance to Bracing

On the bivariate analysis on knowledge and non-compliance, table 8 shows that respondents who were not knowledgeable on bracing were more likely to fail to comply with bracing, however the variable is significantly associated with non-compliance to bracing

Table 8: Respondents Knowledge and Non-Compliance to Bracing

Factors	**Compliance**	**Non-compliance**	**Chi square**	**p-value**
Level of Knowledge			8.632	0.026
Knowledgeable	96(66.2%)	13(46.4%)	df 1	
Not knowledgeable	49(33.8%)	15(53.6%)		

4.6.3 Attitude of Respondents towards Bracing and Non-Compliance to Bracing

For this research, positive and negative attitude were regarded as eager to learn more on bracing and applying brace without being pushed or reminded and not bothered much about bracing and have to be pushed or reminded to brace their children respectively.

Table 4.9 shows that negative attitude of respondents towards bracing was more likely to lead to non-compliance, however, attitude was not significantly associated with non-compliance. The attitude was determined by the respondents responses during the FGDs. 57.9% of the responses indicated that it was important to brace and they were determined to apply the braces without being pushed until when advised otherwise by a health professional, while the remaining 42.1% explained that bracing was tiresome and even uncomfortable for their children. Among the 42.1%, some said they at times forgot to put on the brace until when reminded by their spouse or another relative.

Table 9: Attitude of Respondents towards Bracing and Non-Compliance to Bracing

Factors	Compliance	Non-compliance	Chi square	p-value
Attitude status			1.241	0.302
Positive attitude	84(57.9%)	7(25.0%)	df 1	
Negative attitude	61(42.1%)	21(75.0%)		

4.6.4 Attitude of Respondents on Health Professionals

Most of respondents 148(85.5%) and 146(84.4%) said they receive enough information from health professionals and that the Health Professionals are friendly respectively. However, the variable was not significantly associated with non-compliance (table 10).

Table 70: Attitude of Respondents on Health Professionals

Attitude	Compliance	Non-compliance	chi square	p-value
Enough information			0.001	0.978
Yes	124(85.5%)	24(85.7%)	df 1	
No	21(14.5%)	4(14.3%)		
Friendliness of Health Professionals			0.044	0.833
Yes	122(84.1%)	24(85.7%)	df 1	
No	23(15.9%)	4(14.3%)		
Health Professionals demonstration of bracing			0.197	0.657
Yes	142(97.9%)	28(100.0%)	df 1	
No	3(2.1%)	0(0.0%)		

4.6.3 Support Offered by Health Professionals

Majority of the mothers 157(90.7%) received professional support of which 26(92.9%) failed to comply with bracing. Health professional support was not associated with non-compliance to bracing (table 11)

Table 11: Support Offered by Health Professionals

Support	Compliance	Non-compliance	chi square	p-value
Health Professionals patience in treatment			0.519	0.471
Yes	127(87.6%)	26(92.9%)	df 1	
No	17(12.4%)	2(7.1%)		
Health Professionals support in treatment			0.049	0.826
Yes	131(90.3%)	26(92.9%)	df 1	
No	14(9.7%)	2(7.1%)		

4.6.4 Support Offered by the Spouse

Slightly more than three-quarter 114(87.7%) of respondents received support from their partner mostly financial support 106(93.0%). This support was not significantly associated with non-compliance to bracing (table 12)

Table 12: Support Offered by the Spouse

	Compliance	Non-compliance	chi square	p-value
Support from spouse			0.186	0.666
Yes	114(87.7%)	20(90.9%)	df 1	
No	16(12.3%)	2(9.1%)		
Spouse accompany mother to clinic			0.035	0.851
Yes	97(74.6%)	16(72.7%)	df 1	
No	33(25.4%)	6(27.3%)		

Most participants (n=13) mentioned that on several occasions, mothers were chased away from their matrimonial home after giving birth to a child with clubfoot. Similarly, men were also seen to blame the family of the mother for bringing disability in to their family.

4.6.5 Support Offered by the Relative

Most of respondents 144(83.2%) receives support from relatives of which 124(85.5%) complied with bracing and 20(71.4%) failed to comply with bracing, however there was no significant association (table 13)

Table 83: Support Offered by the Relative

	Compliance	Non-compliance	chi square	p-value
Relatives support			3.339	0.068
Yes	124(85.5%)	20(71.4%)	df 1	
No	21(14.5%)	8(28.6%)		
Expose child to relatives or friends			1.167	0.280
Yes	126(86.9%)	23(82.1%)	df 1	
No	15(13.1%)	5(17.9%)		

4.6 Discussion of Findings

A total of 20 mothers were engaged in a FGD in order to provide an insight of attitude of bracing among mothers of children under 5 years with club foot. The first FGD involved 9 first time mothers and the second FGD involved 11 mothers who have had other children previously.

Majority of the respondents (n=15) did not agree with the believe that clubfoot is a curse by a relative or a supernatural power. Rather, they understood that this is a medical condition which could be managed. One mother said *"Club foot ni ugonjwa tu kama malaria na unaweza tibiwa ukifuata maagizo ya daktari (Translation: Club foot is a disease just like*

Malaria and it can be managed if you follow doctor's advice)". (M2a) while another one said, *"There are other parents with some traditional and superstitious thought about clubfoot, it is not a big deal, my child is almost getting well. He walks almost properly" (M5a)*

The other respondents (n=5) mentioned that on several occasions, mothers were chased away from their matrimonial home after giving birth to a child with clubfoot because it was thought to be a curse. *"Some women are accused of giving birth to a cursed baby when the baby has club foot and they are chased away" (M11b).*

In another aspect, men were also seen to blame the family of the mother for bringing disability in to their family when a child with clubfoot is born. *"I know of a mother of a child with clubfoot who was divorced because the father cannot accept that he is the father and considers his wife as unfaithful." (M2a).* One participant highlighted that some ladies cannot get married if the clubfoot is not treated*: "Untreated, a girl with clubfoot may become pregnant without getting married. The girl cannot marry as she is considered cursed. Mother will not bring the child for treatment" (M10b).*

On further probe as to why some mothers of children with club foot do not seek treatment, the responses varied such as: some believe that the condition will resolve with time, some fear the plaster cast and think it can cause further harm to the legs of their children, others believe the plaster cast acquires lice, a few believe there is nothing that can be done to the condition and that hospital is just waste of time and money while others feared that their children will be taken to a theatre for a surgical operation.

Asked whether they viewed clubfoot as a burden, majority thought it was a condition just like any other and they had got used to it so to them it was not a burden However, quite a few had some concerns, especially because of the distance and costs incurred in travelling to seek treatment. This was expressed by responses such as:*"…okay coming to this place all the way from Nyahururu is not easy, it takes time and money. At times it's a burden, though when I see my child getting better I feel good" (M7a). "There is a mother who used to come all the way from Garissa. She would travel for twelve hours and she made it to the end" (M1b).*

"There are still patients who have problems to afford fare and some end up relying on well-wishers to provide transport" (M3a). It was reported that the influence of distance becomes hard-hitting when considered together with lack of transport and bad roads, which contributed toward indirect cost of visit to health facilities. Mothers who travelled short distances reported that they were able to get to the health facility with ease and were more compliant to treatment.

Most of the mothers did not have a problem in carrying their braced children in public even when uncovered. Some mothers contradicted some believe that mothers are ashamed of exposing the braces in public by saying *"…but the child is mine, will they treat him if I don't? there is no reason to be embarrassed of exposing the braces. That is medicine just like any other!" (M8a). " I hear there are some mothers who are afraid to undress their children in public, when it's hot I put him a t-shirt only and then the braces. Why should I be embarrassed?" (M6b)*

Mothers who had other children apart from the one with club foot reported that at times it was tricky to give full attention to this one child because other children also needed to be attended to. One mother said; *" at times I have also to attend to other children and I find myself skipping clinic days, especially when there are school meetings for the other children or when the other children are not feeling well. I am a single mother and I cannot leave the*

rest unattended to when they are sick" (M3b). Another one said, " the others also need me, though I try to give more attention to her"(M10b)

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

This study was conducted among mothers to determine factors associated with non-compliance to bracing in club foot among children under five years and come up with the following conclusions:

Although 83.2% of the mothers complied with bracing, 16.8% did not due to inconvenience or irritability of the child when braced, fear of looking different from peers, clothes not fitting properly, or discomfort. This is significantly a large proportion of non-compliance since it indicates that 16.8% of the children with club foot could be at a risk of developing a permanent disability as a result of club foot, which is a public health risk.

The study found that 62.8% of mothers had knowledge of how many hours in a day they are supposed to brace their children, the importance of bracing, what to do when a child cries upon bracing, how to check whether the brace had fitted well in the shoe and what age to stop bracing their children. The rest (37.2%) did not exhibit knowledge of these issues which is key in complying to bracing. This poses a risk to their children since lack of knowledge could easily lead to non-compliance and a result relapses or even permanent disability to the children.

On attitude of mothers towards bracing, slightly more than half the respondents (57.9%) had a positive attitude towards bracing which was arrived at by finding out that they were eager to learn more on bracing, they applied braces without being pushed or reminded and that they had no challenge exposing their braced children in public. However, the remaining % were not bothered much on bracing, had to be pushed or reminded to brace their children and expressed that at times they were embarrassed to expose their braced children in public. This needs to be addressed because being positive is the cornerstone of success in managing all conditions or diseases.

Distance to health facility and inability to meet transport costs were significantly associated with non-compliance. More than half the respondents (57.2%) reported that they travelled a long distance to get to the study site, as far as Garissa in Northern Kenya and that the distance was a hindrance since at times they could fail to attend clinics or not be able to pick a replacement brace when the child had outgrown a brace.

Majority of the mothers (92.9%) received support from health professionals during the treatment. However, majority of them, they formed the majority of those who did not comply to bracing (92.9%) clearly indicating that health professional support was not associated with non-compliance.

Gender of the child had a significant association with non-compliance. Mothers of male children had 89.3% non-compliance as opposed to 10.7% non-compliance of mothers with female children. Also, majority of mothers who did not comply (35.7%) to bracing had children aged 1-2 years. There was noted high rate of non-compliance (75%) among mothers whose children had bilateral club foot.

Majority of those who did not comply to bracing had College/University education and above (81.2%). This disputes the thinking that non-compliance can be attributed to low education

level. However, this could also be attributed to the fact that majority of the respondents in the study (73.3%) had College/University education.

5.2 Recommendations

The study recommended Empowerment of local facilities that is level 1 and level 2 to be able to manage conditions like clubfoot. Distance and inability to meet transport costs were significantly associated with non-compliance to bracing, with 57% of the respondents who did not comply indicating that they came from very far distances, and that the distance coupled with inability to meet transport costs were factors contributing to non-compliance.

Government of Kiambu should come up with strategies of having support groups for mothers of children with clubfoot. This will help demystify that clubfoot is a curse and enable mothers interact and learn from each other on how to manage the condition. This will also facilitate tracing and follow up by health care workers.

National Government should come up with policies to create programs and allocate resources for early diagnosis and management of clubfoot at the initial stages of children lives, which will help in reducing the chances of children having permanent disabilities because of clubfoot.

Detailed parent education on clubfoot bracing and importance of parent compliance should be enhanced. This is because regardless of having secondary and college/university education, 81.2% of the respondents did not comply to bracing. This could be attributed to the approach or language used by health workers to educate mothers on bracing, or busy working schedules for the working mothers, whose rate of non-compliance was (60.7%)

Further research: Large-scale studies, particularly with prospective design, should be undertaken to have more in-depth knowledge on determinants of non-compliance among mothers in other parts of the country.

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