THE UNIVERSITY OF ZAMBIA
SCHOOL OF MEDICINE
DEPARTMENT OF SURGERY

# PATTERNS OF PAEDIATRIC ORTHOPAEDIC PATHOLOGY IN ZAMBIAN CHILDREN SEEN AT THE UTH, ZIOH & THE FLYSPEC PROJECT

by

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## CERTIFICATE OF APPROVAL

This dissertation by Dr. Emmanuel Malabo Makasa entitled "PATTERNS OF PAEDIATRIC ORTHOPAEDIC PATHOLOGY IN ZAMBIAN CHILDREN SEEN AT THE UTH, ZIOH & THE FLYSPEC PROJECT" has been approved as fulfilling part of the requirements for the award of the Masters of Medicine Degree in Orthopaedics and Trauma Surgery by the University of Zambia.

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## DEDICATION

I dedicate this study to all those that will take up the challenge of research to fully illustrate the burden of paediatric musculoskeletal conditions in Zambia and from this, the nation will formulate evidence-based management protocols to adequately deal with this burden and reduce on the volume of the physically handicapped in our society.

**ACKNOWLEDGEMENTS**

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To you all, mentioned and not, I remain indebted forever for your support through your thoughts and words, what you did and what you did not do. May you all find happiness in this life.

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| | |
|---|---|
| **AIDS** | Acquired Immunodeficiency Syndrome. |
| **CSO** | Central Statistics Office. |
| **DALYS** | Disability-Adjusted Life Years. |
| **FLYSPEC** | Flying Specialist Project |
| **HIV** | Human Immunodeficiency Virus. |
| **JBJS** | The Journal of Bone and Joint Surgery. |
| **MUA** | Manipulation Under Anaesthesia. |
| **NSAID** | Non-Steroidal Anti-Immflamatory Drugs |
| **PMR** | Posteromedial Release. |
| **POP** | Plaster of Paris. |
| **SPSS** | Statistical Package for Social Sciences. |
| **UTH** | University Teaching Hospital. |
| **WHO** | World Health Organisation. |
| **ZIOH** | Zambian-Italian Orthopaedic Hospital. |

## ABSTRACT

**Background:** Musculoskeletal conditions are a common cause of long-term pain and physical disability affecting many people worldwide. Additionally, these conditions have an enormous economic and social impact on the individual, society and national health systems. Although the burden of disease due to musculoskeletal conditions is said to be on the rise in the developing world, the full extent of this burden remains unknown.

**Objectives:** To describe the patterns of musculoskeletal conditions seen in Zambian children aged less than 15 years and to asses limitations of access to orthopaedic services by estimating timing from onset to presentation and distance covered. The type of initial care at site of presentation will also be determined.

**Methods:** This was a hospital-based cross-sectional study done between April 2005 and May 2006. Relevant data on patient demographics, presenting musculoskeletal condition and treatment received was collected from medical records of 1246 patients at the University Teaching Hospital (UTH), Zambian-Italian Orthopaedic Hospital (ZIOH) and the Flying-Specialist (FLYSPEC) nationwide orthopaedic outreach. Included were patients aged less than 15 years who had a history being attended to by orthopaedic surgeons for a musculoskeletal condition. Those aged fifteen and above and those not attended to by orthopaedic surgeons despite them being aged less than fifteen and having a musculoskeletal condition were excluded from the study. Also excluded from analysis were patients that had two thirds of the key data missing from their medical record. From spreadsheets the data was imported into SPSS for analysis.

**Results:** Congenital abnormalities, other non-congenital deformities, and traumatic conditions were the most common pathology affecting the 1246 sampled children with prevalence rates of 0.49, 0.22 and 0.14 respectively. More males 762(61.2%) than females 484 (38.8%) had these conditions. Most patients 955 (76.6%) presented late at more than 3months from the onset of their condition with 509 (42.2%) having travelled for more than 10 kilometres to get to their treatment sites. 561 (45.4%) had been treated conservatively prior to their presentation to orthopaedics with another 471 (38.1%) having no record of having received any specific treatment.

**Conclusion:** Congenital abnormalities, non-congenital limb deformities and traumatic conditions were the most common musculoskeletal disorders. More males than females were afflicted. Most of these patients presented late to care and distance to health facility was strongly correlated to late presentation. Furthermore, at first presentation majority of these children received conservative or no specific treatment from the first-line health workers at local health centres.

# CHAPTER 1

## INTRODUCTION

Musculoskeletal disorders have been reported as the most common[1] cause of severe long-term pain and physical disability affecting hundreds of millions of people around the world. Their economic and social impact on the individual, society, and the national health care systems is enormous.[1] In the year 2001, according to the World Health Organisation (WHO), injuries of all sorts killed 5.1 million people and accounted for 12% of the disability-adjusted life years (DALYS) lost worldwide, which was more than that lost because of tuberculosis (2.5%) diarrhoea (4.3%) and malaria (2.9%) combined and was twice as much as that lost to either the human immunodeficiency virus (6%) or cancer (5.2%).[2] With increasing national populations and changing lifestyles in the developing world of sub-Saharan Africa, most agree that the disease burden due to musculoskeletal disorders is most likely to increase dramatically over the next decade and beyond.[3,4] This calls for more attention and resources to be applied to measures that are aimed at mitigating the impact of musculoskeletal disease as well as to raise awareness and adequately quantify this disease burden. To be able to measure this projected increase in musculoskeletal morbidity, there is need for establishing baseline information on the disease burden which can then be continually updated at regular intervals. However, there is little specific epidemiologic data about the extent of the burden of musculoskeletal disease especially in developing countries.[5,6] While there is considerable funding for control of communicable diseases, there has been little attention paid to either the documentation, prevention or the treatment of musculoskeletal problems in developing countries[2,7]in the face of a reported ongoing epidemiological shift in disease burden away from infectious diseases and towards chronic non-communicable diseases.[8] It is for this reason that the World Health Organisation, in the year 2000, launched the "Bone & Joint Decade (2000 – 2010) to raise awareness of the increasing societal impact of musculoskeletal injuries and disorders.[9] In this last year of the Bone and Joint Decade, the patterns and profile of musculoskeletal disorders affecting Zambian adults and children are yet to be documented and the disease burden given by the WHO is only an estimate[2]. It is, therefore, the main objective of this study to describe the patterns of musculoskeletal disorders seen in Zambian children aged below 15 years. It is hoped that findings from this study will help raise awareness so that musculoskeletal disorders receive higher priority in national health strategy, training, research and management among clinicians and health policy makers.

**Rationale of the study:**

No epidemiological studies have been done in Zambia to date to illustrate the magnitude and patterns of musculoskeletal diseases affecting children. Nevertheless, two research projects are currently being implemented in the country on the management of congenital talipes equino-varus (club-foot). These are: Short term outcomes of the non-operative serial casting *Ponseti* [10] method that is underway at the outpatient clubfoot clinic-3 at UTH and at the Beit-Cure hospital and the other study is looking at the short term outcomes of the operative *posteromedial release*[11,12] (PMR) under the FLYSPEC program. Although both studies aim to establish best practice for management of clubfoot, they are only focussing on one of the orthopaedic conditions affecting children. The full scope of the paediatric musculoskeletal burden that Zambia is facing has not been documented let alone analysed. No study has been done in the past to show the range of paediatric orthopaedic pathology in the country and the treatment methods employed. This study will describe the patterns of paediatric musculoskeletal diseases seen in Zambian children aged below 15 years by

providing information on the range of prevalent orthopaedic diseases and other related epidemiological data on demographics. It will also assess the limitations to accessing orthopaedic services in this age group as well as document the type of initial care given to children with orthopaedic pathology at first presentation to the Zambian health system.

It is hoped that this study will shed more light on the prevalence of musculoskeletal disease in children and identifies gaps in knowledge on the orthopaedic care for this age group. With this information, future management strategies and research can be developed to improve the health and quality of life for children with musculoskeletal disorders as well as make Zambia's contribution to the objectives of the Bone and Joint Decade.

**Main Objective:**

To describe the patterns of paediatric orthopaedic pathology in Zambia children seen at the University Teaching Hospital (UTH), the Zambian Italian Orthopaedic Hospital (ZIOH) and on the FLYSPEC PROJECT's nationwide orthopaedic outreach.

**Specific objectives:**

1. To asses limitations of access to orthopaedic services by estimating time from onset to presentation and distance covered to get to initial treatment sites for children with orthopaedic pathology under the age of fifteen years.
2. To determine the type of initial care given to children with orthopaedic pathology at their primary sites of presentation by first line health workers in Zambia.

# CHAPTER 2

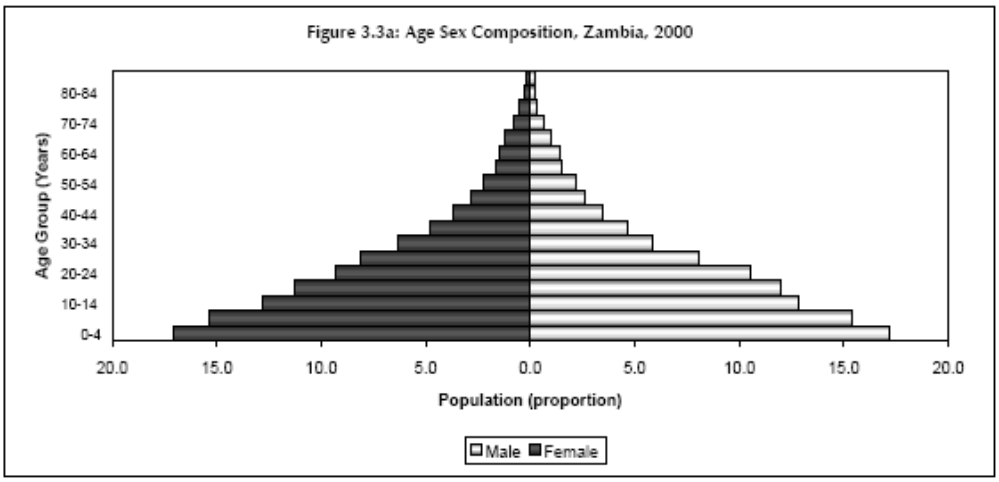
## LITERATURE REVIEW

The musculoskeletal system consists of bones, muscles, tendons, ligaments, joints, cartilage and other connective tissue. These components all work together to provide form, stability and movement to the human body.[13] Musculoskeletal conditions are a diverse group with regard to pathophysiology but are linked anatomically and by their association with pain and impaired physical function that may result in the inability to walk, sit, or even breathe, and have a substantial impact on the health of the affected individual.[1] Activities of daily living, such as social and work commitments are often restricted. The global burden of musculoskeletal disease in middle-income countries is reported to be large, growing and neglected.[2] In Africa generally and Zambia in particular, other health issues such as HIV/AIDS, Malaria, and Tuberculosis have continued to occupy the minds of governments and health professionals at the expense of chronic diseases such as musculoskeletal conditions in the last two decades. Musculoskeletal diseases are one of the major causes of physical disability around the world and to help address this, the Bone and Joint Decade - 2000 to 2010, was launched with the aim of improving the health related quality of life of people with musculoskeletal conditions.[14] Although one of the aims of the decade is to increase the recognition and understanding of the burden posed by musculoskeletal conditions, there is already enough data to show the size of the problem in developed parts of the world[15] while from large areas of the globe, especially the developing world, incidence and prevalence figures are rudimentary or lacking.[7] This is in the face of a reported ongoing epidemiological shift in burden away from infectious diseases and towards chronic diseases.[8] Zambia, like most parts of Africa, has a healthcare delivery system that is not fully developed such that it is almost non-existent especially in rural areas[22] and has a constrained referral system. This state of affairs contributes to childhood musculoskeletal conditions going

undiagnosed and untreated resulting in a handicapped adult population which is less productive. Other factors such as population growth, increased urbanisation, and changing life-styles (i.e. the increased use of cars and other machinery), has increased the musculoskeletal disease burden in the country. According to the Central Statistics Office's year 2000 national Census report, 38.8% of the 256,690 disabled persons in the country are physically handicapped (most common form of disability) with 17.2% being caused by injury, accidents and other forms of trauma.[16] Musculoskeletal conditions are under-appreciated[17] because they are rarely fatal, are considered irreversible, and are commonly associated with the aged. However, their economic impact on the individual is obvious[23]. Defining methods of measuring and monitoring these conditions, especially in children, will enable trends to be predicted and allow planning of research and development, training, and investment in health services delivery. Recognition of the burden of musculoskeletal conditions affecting children will result in greater awareness of the pervasive effects they have on individuals and of their cost to society. Thus, measuring and documenting this disease burden will help in ensuring they receive higher priority in health strategies. The application of agreed indicators will also allow these conditions to be monitored and interventions evaluated. In these ways, understanding the burden will ultimately improve outcome for individuals.

Research looking specifically at musculoskeletal conditions in children under the age of fifteen in Africa is scanty and has mostly been done with a broader perspective covering all general surgical conditions[7,18] and to the best of my knowledge, no such study has so far been done in Zambia. The Central Statistics Office of Zambia's latest population census report of 2000, indicates that Zambia has a *young* population with nearly half of the 9.9 million total population (45.3%) being below the age of 15 (See figure 1).

**Figure 1. Age/sex composition, Zambia, 2000.**




Source: CSO, 2000 Census of Population and Housing

Patient audits from the University Teaching Hospital show that children have been a major part of the surgical patient load comprising 83.76% of all orthopaedic admission from June 2003 to June 2004.[19] The increasing burden of musculoskeletal disease state of affairs is also reflected in the establishment of the Zambian-Italian Orthopaedic Hospital (ZIOH), a private hospital that was founded under the Cheshire Homes Society and the Beit-Cure Hospital to attend specifically to children with musculoskeletal disease. In addition, Children make up a large number of all cases attended to under the FLYSPEC[24] project; An orthopaedic specialist outreach to rural parts of Zambia. This finding is incidental because the project does not target mainly children and neither are the attending specialists mainly paediatric orthopaedic surgeons. It is therefore, the goal of this study to not only describe the patterns of the paediatric orthopaedic pathology seen in Zambia children, but also to assess patient access to orthopaedic care as well as document the type of initial treatment give to children with musculoskeletal conditions by first line health workers.

# CHAPTER 3

## METHODS

Through a retrospective hospital-based cross-sectional study done between April 2005 and May 2006, relevant data on patient demographics, presenting musculoskeletal condition and initial treatment received was collected from medical records and case notes of 1246 patients at the University Teaching Hospital (UTH), Zambian-Italian Orthopaedic Hospital (ZIOH) and the Flying-Specialist (FLYSPEC) nationwide orthopaedic outreach. At the UTH patient records were obtained from the C21/C22 in-patient wards and the Clinic-3 out-patient clinic registry. Upcountry hospitals visited under the FLYSPEC PROJECT included Kaleni-Hill in Mwinilunga district, Mukinge in Kasempa and Chitokoloki in Zambezi for North-western Province. In Western Province, Lewanika General Hospital in Mongu was the site, while Kabwe General Hospital in Kabwe was the site for Central Province. Monze Mission Hospital in Monze was the FLYSPEC site for Southern Province, St.Francis Hospital in Katete the site for Eastern Province, while Northern Province had Mbala District Hospital, Kasama General Hospital and Chilonga Mission Hospital in Mpika district.

### Inclusion Criteria:

Included in this study were all patients aged less than 15 years who had a history of being attended to by orthopaedic surgeons and orthopaedic trainee registrars for a musculoskeletal condition.

### Exclusion Criteria:

Those aged fifteen and above and those not attended to by orthopaedic surgeons despite them being aged less than fifteen and having a musculoskeletal condition were excluded from the study. This was for purposes of having a guaranteed accurate orthopaedic diagnosis for each

patient. Also excluded from analysis were patients that had at least two of the three key data (patient demographics, orthopaedic diagnosis and initial treatment received) missing from their medical record. The attending orthopaedic team at all these sites was composed of the same group of consultant orthopaedic surgeons and orthopaedic trainee registrars. From spreadsheets the data for a total sample size of 1246 patients was imported into SPSS for analysis.

Ethical clearance was obtained from the University of Zambia Research Ethics Committee and permission was obtained from the University Teaching Hospital, the Zambian-Italian Orthopaedic Hospital and the FLYSPEC Project for the use of patient medical records. The relevant patient demographic and medical information was captured through an evaluation form (see appendix 1). Specific identifiers such as patient names were left out of the data collected to maintain confidentiality. Patients' file numbers were used to ensure no duplication of those seen on subsequent follow-up visits.

# CHAPTER 4

## RESULTS

A total of 1500 patients had been recruited for this study during the study period. 254 were excluded due to insufficient data in their medical records as stated in the exclusion criteria leaving a sample size of 1246 patients for analysis. The variables capturing data obtained from the subject evaluation forms were then grouped into two – i.e. demographic information and clinical orthopaedic information. Table 1 shows the study groups' demographic information while figure 2 presents clinical orthopaedic pathology information of the patients.

**Table 1. Distribution of the patients' demographic variables, *n = 1246***

| Variable | | *f* | *% of total* |
|---|---|---|---|
| • *Gender* | | | |
| Female | 484 | 1 | 38.8 |
| Male | 762 | 1 | 61.2 |
| • *Subject Age* | | | |
| <1yr | 209 | 1 | 16.8 |
| 1 – 5yrs | 497 | 1 | 39.9 |
| 6 – 10yrs | 312 | 1 | 25.0 |
| 11-14 yrs | 228 | 1 | 18.3 |
| • *Pt.[1] place of treatment (site)* | | | |
| UTH | 141 | 1 | 11.3 |
| ZIOH | 298 | 1 | 23.9 |
| FLYSPEC | 807 | 1 | 64.8 |
| • *Pt. category* | | | |
| Follow up | 267 | 1 | 21.4 |
| New patient | 979 | | 78.6 |
| • *Approximate Distance travelled by pt.[1]* | | | |
| <5km | 228 | 1 | 18.3 |
| 5 – 10km | 378 | 1 | 30.3 |
| >10km | 640 | 1 | 51.3 |
| • *Province of pt. attendance* | | | |
| Copperbelt (*no site*) | 00 | 1 | 0.0 |
| Central (*1 site*) | 10 | 1 | 0.8 |
| Eastern (*1 site*) | 146 | 1 | 11.7 |
| Lusaka (*2 sites*) | 401 | 1 | 32.2 |
| Luapula (*no site*) | 04 | 1 | 0.3 |
| Northern (*3 sites*) | 307 | 1 | 24.6 |
| North-western (*3 sites*) | 180 | 1 | 14.4 |
| Southern (*1 site*) | 80 | 1 | 6.4 |
| Western (*1 site*) | 118 | 1 | 9.5 |

*Pt.[1]=patient*

The variables used to capture the patients' demographic data, shown in table 1 above, included the following;

(i). *Gender* (male and female)

(ii). *Age* was sub divided into those that are less than one year, those between one and five years, six to ten years and those above ten years.

(iii) The *site* where the patients were attended to were either, the

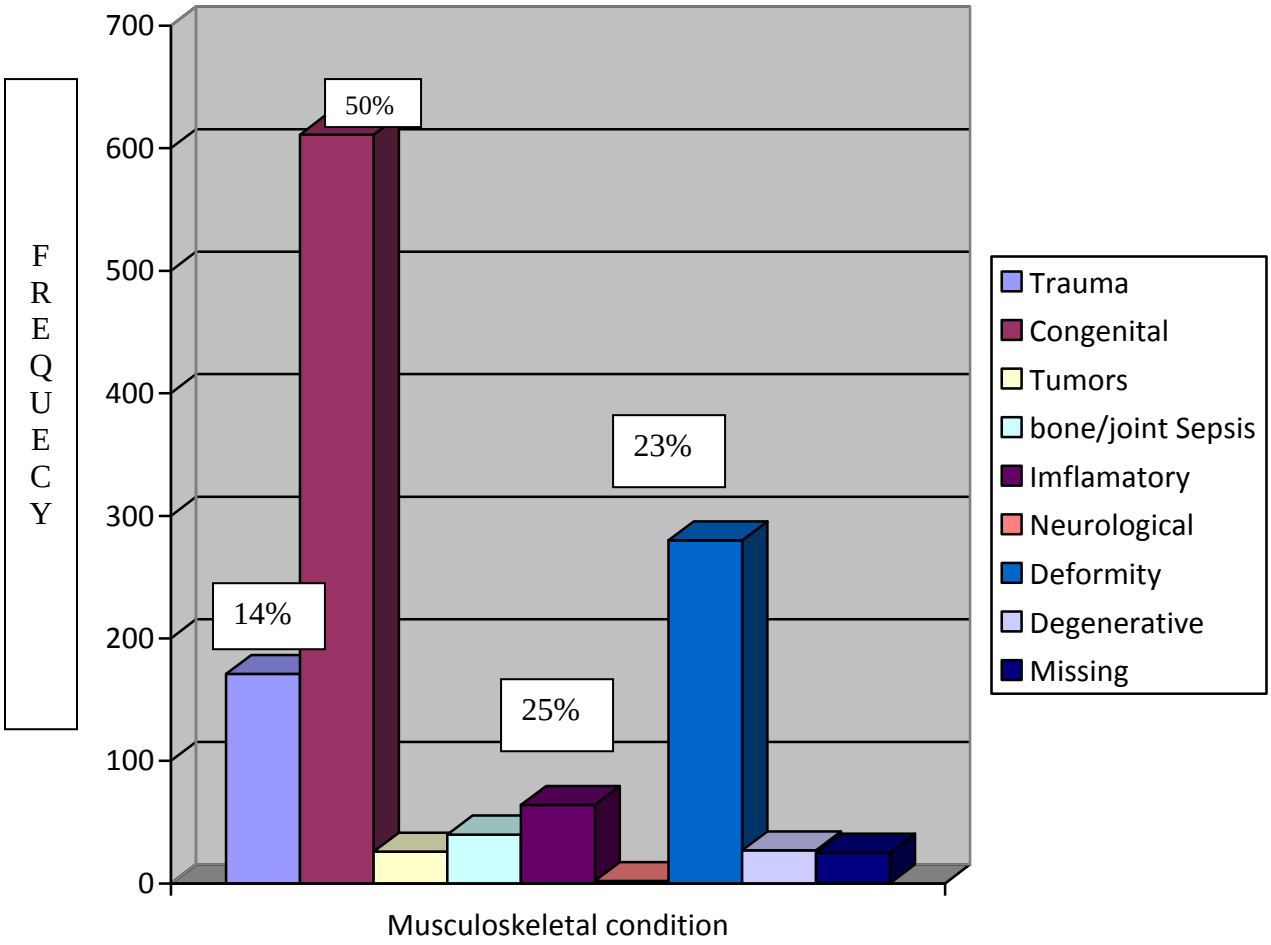
University Teaching Hospital, the Zambia Italian Orthopaedic Hospital or via The FLYSPEC Outreach to the provinces.

(iv) The *patient category* (new patient or follow-up patient)

(v) The approximate *distance* covered by the patients to get to the different sites of treatment was sub-classified into three. Those that resided within 5 km of the treatment site, those covering between 5km to 10km and those that travelled more than 10km.

(vi) The *province* within which the patients were attended to was based on the nine political administrative provinces of the Republic of Zambia.

**Figure 2. Distribution of orthopaedic pathology among patients. N = 1,246**




**25 patients had data only about their diagnosed orthopaedic pathology missing and so were included in the study. This was equivalent to 2.0% of the study sample.*

The variables that captured data on the patterns of orthopaedic pathology among the study population included the following;

(i). Trauma (which included mostly long bone fractures), 171 (14.0%)

(ii). Congenital abnormalities (such as club-foot and arthrogryposis), 611 (50.0%)

(iii). Tumours of the musculoskeletal system (i.e. malignant or benign), 26 (2.1%)

(iv). Bone and Joint sepsis, 40 (3.3%)

(v). Inflammatory conditions (such as juvenile rheumatoid arthritis), 64 (5.2%)

(vi). Condition of neurological origin (especially cerebral palsy), 2 (0.2%)

(vii). non-congenital deformity causing conditions (like perthies Disease, Scoliosis), 280 (23.0%)

(viii). Degenerative conditions (e.g. osteoarthritis secondary to Sickle Cell Disease, non specific AVN, Rickets and osteogenesis imperfecta), 27 (2.2%)

Thus, the specific diagnosis made by the attending orthopaedic surgeon for each patient was categorised into one of the above sub-groups (figure 2.)

To assess limitations of access to orthopaedic services among the study population, the variable of "Time from onset of musculoskeletal condition to presentation for treatment to orthopaedic surgeon" was measured under the following sub categories;

(i). Less than 1 month *(acute)*

(ii). 1 to 3 months and *(delayed)*

(iii). Greater than 3 months *(neglected)* as shown in table 3 below.

**Table 2. Time from onset of condition to presentation of patient. N = 1,246**

| *Time in months* | *f* | *% of total* |
|---|---|---|
| < 1 month (Acute) | 129 | 10.4 |
| 1 – 3 months (Delayed) | 125 | 10.0 |
| >3 months (Neglected) | 955 | 76.6 |
| *Pts missing data | 37 | 3.0 |

**Pts=patient (number of patients whose data on only this variable was missing, a negligible 03.0 % to Influence the overall result).*

Table 4 categorises the study population based on the types of treatment received before presentation to orthopaedic surgeons. The distribution was such that 471 (37.8%) patients received no form of treatment before presentation to orthopaedics even when they initially did seek treatment from the local health facility. This being a cross-sectional study that

reviewed patient medical records, reasons for this lack of any form of treatment could not be captured for analysis or discussion. 9 (0.7%) received different forms of traditional treatment ranging from tattooing to bloodletting. 561 (45.0%), comprising mostly trauma patients, had received some form of conservative treatment such as physiotherapy, manipulation under anaesthesia (MUA) and POP application or Non steroidal anti-inflammatory drug treatment (NSAID). 195 (15.7%) had some form or surgical operation while 10 (0.8%) had this data missing.

**Table 3. Previous treatment received by patients. N = 1246**

| ***Type of previous treatment received*** | ***f*** | ***% of total*** |
|---|---|---|
| Nil | 471 | 37.8 |
| Traditional | 9 | 0.7 |
| Conservative | 561 | 45.0 |
| Surgical | 195 | 15.7 |
| *Pts missing Data | 10 | 0.8 |

*Pts = patients ***Nil****=no previous treatment received,* ***Traditional****= different forms of traditional treatment such as tattooing & bloodletting,* ***Conservative****=physiotherapy, MUA+POP, antibiotics or NSAID,* ***Surgical****=different surgical operations.*

In assessing if distance from the different sites providing orthopaedic services to the patients' residences was a factor in determining how early or how later they presented for treatment, the respective demographic variables were presented as shown (in table 5) below. The distributions of the different demographic variables were then presented in table 6 as they related to the types of musculoskeletal conditions observed in the study population as shown.

**Table 4. Distribution of distance covered by subject to seek orthopaedic attention against time of onset of musculoskeletal condition to presentation for treatment.**
**N = 1,246**

| Distance covered | Time from onset to presentation*(f)* | | |
|---|---|---|---|
| | *<1month* | *1-3months* | *>3months* |
| *<5km* | 36 | 21 | 161 |
| *5-10km* | 48 | 36 | 282 |
| *>10km* | 45 | 68 | 509 |
| **Missing* | - | - | 40 |

**40 patients had data on either one or both of these variables missing*

**Table 5. Distribution of demographic variables "Sex", "Age" and clinical variable "Previous treatment" by musculoskeletal condition. N = 1246.**

| Condition | Sex[1]*(f)* | | Age[2]*(f)* | | | | Previous treatment[3]*(f)* | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Male* | *Female* | *<1 Year* | *1 - 5 Years* | *6-10 Years* | *11-14 Years* | *Nil* | Trad[4] | *Con[5]* | *Surg[6]* |
| *Trauma* | 112 | 59 | 6 | 29 | 72 | 64 | 83 | 2 | 73 | 12 |
| *Congenital* | 384 | 227 | 193 | 290 | 88 | 40 | 193 | 5 | 274 | 137 |
| *Tumours* | 12 | 14 | 0 | 1 | 13 | 12 | 17 | 0 | 9 | 0 |
| **Sepsis* | 21 | 19 | 1 | 8 | 15 | 16 | 24 | 0 | 14 | 2 |
| *Inflammatory* | 40 | 24 | 3 | 12 | 25 | 24 | 34 | 1 | 20 | 8 |
| *Neurological* | 1 | 1 | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 0 |
| *Deformity* | 158 | 122 | 4 | 141 | 85 | 50 | 103 | 0 | 145 | 27 |
| *Degenerative* | 19 | 8 | 0 | 7 | 7 | 13 | 9 | 1 | 12 | 5 |
| *Missing* | 25 | | 25 | | | | 34 | | | |

** Bone & Joint sepsis, Nil=no previous treatment, Sex[1](25 missing), Age[2] (25 missing), Previous treatment[3] (34 missing), Trad[4]=traditional, Con[5]=Conservative, Surg[6]=Surgical.*

# CHAPTER 5

## DISCUSSION

Having excluded 254 patients from the initial 1,500 left us with a nationwide representative sample of 1246 patients that was entered for analysis in this study. These patients were drawn from all clinical sites offering specialist orthopaedic services in Zambia with the exception of the mining region of the copperbelt province. The copperbelt province is not covered by the FLYSPEC orthopaedic outreach and has orthopaedic surgeons based at the privately owned mine hospitals.

**Sex and Age distribution of patients***:*

Based on the gender variable, there were more males than females among the study population (Ratio of males to females, 1:1.6). This is different from what I expected to find based on the Zambian census report[16] (figure 1) where male to female proportions in this age group are equal. However, as expected, only in trauma was a significant gender difference observed (112 males as opposed to 59 females) that could be attributed to differences in behaviour and activity between girls and boys in this age group. When the patients were broken into the different age categories, majority of the patients, 497 (39.9%), were aged between 1 and 5 years.

**Site of attendance by orthopaedic surgeons***:*

Most of the study patients were attended to by orthopaedic surgeon in the private sector-807(64.8%) through FLYSPEC and 298 (23.9%) at the ZIOH while only 141(11.3%) were attended to at the public tertiary level University Teaching Hospital. The small number of patients treated at the UTH, in a way, reflects the continuously deteriorating orthopaedic service provision at the University Teaching Hospital which is also the national referral centre. The centre currently experiences a chronic lack of theatre time for orthopaedic

surgeons and shortages of surgical supplies and implants. This is in the face of a seemingly increased proportion of children with musculoskeletal conditions as exhibited by the large proportion of new patient 979 (78.6%) compared to those being followed up 267 (21.4%).

Though private, orthopaedic services under the FLYSPEC Project are free for patients, just like is the case in the public hospitals, because the project is donor funded. Only those attended to at the ZIOH pay privately, or through a health insurance. Thus for most of the patients in this study, cost was not an issue that could have affected their health seeking behaviour, except in terms of transport to the health facilities.

**Distance travelled by patients:**

Approximately half of the sampled patients 639 (51.3%) indicated having travelled more than ten kilometres on foot or by bicycle to get to the site where they received their orthopaedic care. This result reflects the limited current distribution of orthopaedic services in the country. Patients normally have to travel out of their home town in order to access the orthopaedic services offered at the UTH, ZIOH or through the FLYSPEC outreach to the sites listed in table 1. To get to these treatment sites, most patients travel on foot or bicycle because of the poor road network and non-availability of public transport especially in the rural area.

**Province of attendance by orthopaedic surgeons***:*

Lusaka remains the main site where most of the children are attended to by orthopaedic surgeons. This is most likely because Lusaka, besides having a larger population[16], projected at 1,697,730 in 2008, also hosts the three hospitals offering orthopaedic services to which patients from the rest of the country are referred. In addition, the FLYSPEC outreach sites are not equally distributed per province around the country with some provinces such as the north-western province having more sites (Mukinge-Hill, Chitokoloki and Kaleni-Hill) relative to, say, the eastern province with one site (Katete only) to which all patients in the

province travel to. The number of sites visited under FLYSPEC per province is not based on the size of the population per province nor the geographical size of the province. Rather, it's simply based on those sites that are willing to host the orthopaedic team and work under the terms of site visits as outlined by FLYSPEC.

Nevertheless, both North-western province (180 patients) and Eastern province (146 patients) had relatively equal numbers of patients. The reason for this is not clear and further research is necessary to answer this observation.

**Time from onset of condition to presentation***:*

Three quarters of the sampled population, 955 (76.6%), presented after a period of more than three months from the time of onset of their musculoskeletal condition (table 3). Such a presentation, clinically, would be considered late as it would be more than 12 weeks for those that had suffered a traumatic experience. According to the Time of union-Perkin's timetable as outlined by Volpin & Gorsky[12], upper limb fractures in children will have united by three weeks while those of the lower limb will have united by six weeks. Thus, most of the patients present with mal-unions and sometimes delayed-union or even non-union (*neglected-trauma*) which results from the suboptimal treatment of fractures and dislocations.[25] Neglected trauma is challenging to the orthopaedic surgeon as it is difficult to operate on and does not yield the best of results clinically or functionally in the affected individual. Although it needs confirmation through research, the late presentation of patients at health facilities could also be resulting from the relatively poor health referral system that exists in Zambia, a situation which is compounded by the limited availability of health facilities offering orthopaedic care. This view point on the causes for late presentation by patients is also supported by the information in table 5 which shows that, those that presented after three

months from the onset of their musculoskeletal condition were not only the majority but also that most of them travelled distances in excess of 10km to get to the health facilities.

The levels of skills to manage musculoskeletal conditions in first line health workers in currently unknown. Besides the basic formal career training, no additional skills training is done on a large scale and regularly in Zambia for health workers except for a few that have been taught the basic non-operative fracture management through the Surgical Society of Zambia.

**Distribution of musculoskeletal conditions***:*

This study found that the three commonest musculoskeletal conditions affecting Zambian children below the age of 15 years are congenital abnormalities, non-congenital limb deformities and conditions arising from traumatic experiences with prevalence rates of 0.49, 0.22 and 0.14 respectively in the sampled study population (figure 2 & table 2). This is different from what Mijiyawa et al[26] found in Togolese children where bone and joint infection was found to be the commonest condition (43%). In this study, congenital abnormalities commonly affected the lower limbs (78.6%) with congenital talipes equino-varus (club-foot) being the commonest in this category. The frequency of congenital musculoskeletal conditions was approximately equal among boys and girls (table 6). Most of the children with congenital conditions presented to orthopaedic

surgeons between the ages of 1year and 5 years (290 or 47.5%) and majority of these had received either no form of treatment at all (31.7%) or were treated conservatively with physiotherapy, MUA and POP (45.0%) prior to their presentation. Conditions arising from trauma ranked third, affecting mostly the boys (65.5%) with majority being older than the age of 6 years as was expected (table 6). This could be attributed to their risky behaviour and increased physical activity at this age.

## LIMITATIONS OF THE STUDY

This being an observational study, it has limitations in the accuracy and completeness of the information extracted from the patient medical records besides the other limitation associated with this type of study design. Only in a few instances was data on a single variable and for a few individuals missing and the percentage of persons affected were small as indicated on each table/figure and, therefore, could not affect the validity of the results.

# CHAPTER 6

## CONCLUSION

The results of this study indicate that congenital abnormalities, non-congenital limb deformities and traumatic conditions are the commonest musculoskeletal conditions affecting Zambian children aged below 15 year with prevalence rates of 0.49, 0.22 and 0.14 respectively. These conditions seem to occur in males more than females, though further detailed research is needed to confirm this finding. Most of these paediatric patients present as late as after three months from the onset of their conditions and one of the factors that could be attributed to this late presentation, according to the study findings, is that majority of them travel long distances in excess of ten kilometers to seek medical help. Furthermore, at first presentation these children receive little or no specific orthopaedic treatment at all from the first-line health workers at local health facilities. To change the status quo and improve outcomes of musculoskeletal conditions among children in Zambia, it is my opinion that there is need for bringing orthopaedic services closer to the people through implementation of some of the recommendations that I have given below.

## CHAPTER 7

## RECOMMENDATIONS

1. There is need to assessing the skills of first line health worker in management of common musculoskeletal conditions in the country and improving them through training if they are found to be inadequate.

2. There is also need to find out the contributors to late musculoskeletal patient presentation at health facilities so that these can be addressed. Identified in this study was the limited and mal-distribution of sites offering orthopaedic services that are located far away from the needy population.

3. Another area that could greatly improve on patient management outcomes is to assess levels of awareness in the community of sites where they could receive orthopaedic care and if this is found to be low, increase it through public awareness campaigns.

4. The is need for a focused government policy to distributing graduates from the M.Med (ortho) program to the provincial hospitals from which increasing specialist orthopaedic outreach to rural areas can be made. This will contribute to reducing delays in patient presentation by reducing the distances that patients will travelled as well as improve the skill of local first-line health workers in the management of paediatric musculoskeletal conditions through local training.

5. There is also need for increasing the number of health personnel attending to the common orthopaedic conditions such as by introducing cadres like orthopaedic clinical officers (on the same lines as the licentiate clinical officers program) to attend to patients at first and second levels of healthcare in Zambia as is the case in Malawi[20]to improve on orthopaedic service delivery nationwide.

6. Equally important is the need for equipping existing health facilities countrywide, at least at provincial hospital level, with orthopaedic equipment and appropriate medical-surgical supplies to adequately deal with the musculoskeletal disease burden.

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**APPENDIX 1**

**PATIENT EVALUATION FORM**:

1. Residential Address……..

2. Age/Sex…….

3. File Number……..

4. Patient Category (a) follow-up patient…….

(b) New patient…….

5. Hospital where treated……..

© UTH ward C22……..

(d) UTH Clinic-3……

(e) ZIOH/Cheshire Homes……

(f) ZIOH/FLYSPEC……..

(g) FLYSPEC/ Rural Hospital……..

6. Province where treated……..

7. Orthopaedic diagnosis……

8. Type of condition (h) Trauma……..

(i) Congenital…….

(j) Tumour…….

(k) Bone/Joint Sepsis……

(l) Inflammatory……

(m) Neurological……

(n) Deformity……

(o) Degenerative……

9. Site on body……

10. Side of body…….

11. Time from onset to presentation for treatment (p) < 1 months……

(q) 1 – 3 months…….

® > 3 months…….

12. Previous Treatment Received (s) Nil…….

(t) Traditional…….

(u) Conservative (MUA/POP/Physio/NSAID……

(v) Surgical…….

13. Approximate distance travelled to get to hospital offering orthopaedic services

(w) < 5km…….

(x) 5 – 10km……..

(y) > 10km……