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# Prevalence and Determinant Factors of Exclusive Breastfeeding Practices among Mothers of Children Aged Less than 12 Months Attending Governmental Maternal and Child Health Clinics in Jijiga City, Ethiopia

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**Abstract**
Background: Breastfeeding is a natural food that serves as a complete source of infant nutrition for the first six months of life. Infants that are exclusively breastfed have a lower chance of becoming ill or dying from diarrhea and infections and are less likely to acquire pneumonia, meningitis, and ear infections than those that were not exclusively breastfed. Therefore, the aim of this study was to assess the prevalence and determinant factors of EBF practice among mothers of children aged less than 12 months. Methods: Institutional based cross sectional study was conducted among 361mothers with infants less than 12 months selected from two governmental hospitals. Descriptive statistics were employed to analyze the data by using SPSS version 21 statistical software. Result: Three hundred forty six (95.8%) practiced breastfeeding, 187 (54%) of mothers initiated breastfeeding within one hour after delivery, 138 (39.8%) initiated breastfeeding with in the period 1 hour to 1 day and the rest, 21 (6.1%) initiated within 1 – 3 days. ANC follow up, most 312 (86.4%) mothers were attend ANC during their pregnancy, 303 (97%) of mothers were getting Health education on breastfeeding and 181 (50.1%) delivered at home. Conclusion and Recommendation: The overall breast feeding practices among mothers' were high, Culture was found to influence the practice of exclusive breast feeding practice, the mothers practice on breast feeding their child on demand, and the continued breastfeeding practice were high and should be strengthened.

**Key Words:** Breastfeeding, Health Care Services, Initiation, Jigjiga

## 1. Introduction

### 1.1 Background

Exclusive breastfeeding(EBF) has been defined by the WHO as the situation where "the infant has received only breast milk from his/her mother or a wet nurse, or expressed breast milk and no other liquids, or solids, with the exception of drops or syrups consisting of vitamins, minerals, supplements, or medicines"(1). Breastfeeding is a natural food that serves as a complete source of infant nutrition for the first six months of life. It contains all the necessary nutrients provided in a bioavailable and easily digestible form, protecting both mothers and children against illnesses and diseases with immunological properties (2). Breast milk contains essential fatty acids needed for the infant's growing brain, eyes, and blood vessels and these are not available in other types of milk. Breastfeeding on demand at day and night at least 8 times in 24 hours will provide more milk as suckling

stimulates milk production (3). Infants that are exclusively breastfed have a lower chance of becoming ill or dying from diarrhea and infections and are less likely to acquire pneumonia, meningitis, and ear infections than those that were not exclusively breastfed (4). However, more than 85% of mothers worldwide did not follow WHO recommendation and only 35% of infants younger than four months was exclusively breastfed (7). Globally, almost half of the 10 million deaths of children younger than 5 years old every year are direct or indirect consequences of malnutrition. 41% of these deaths occur in sub-Sahara Africa and 34% in south Asia. Many of those deaths are associated with inappropriate breastfeeding practices (5, 6).

In Ethiopia national breastfeeding practices is poor because of traditional and cultural beliefs, low educational level, heavy workload of mothers, poor sanitary condition, poor maternal knowledge, age, parity, ANC service utilization and place of delivery. Ministry of health of Ethiopia has enhanced to optimal breastfeeding practice by developing training manuals and implementation guidance on breastfeeding. These have been incorporated into the primary health care system in line with the health extension program but breastfeeding practice remains far from global recommendation. EDHS2011 showed that the proportion of infants less than six months who received exclusive breastfeeding as 52% (7). Which improved slightly compared to EDHS2005 (49%) (8).

Despite a few local studies conducted in Ethiopia, no sufficient studies tried to assess the prevalence and determinants of breastfeeding practice in Ethio-Somali region. Therefore, the aim of this research was to assess the prevalence and determinant factors of EBF practice among mothers Ethio-Somali region, Ethiopia.

## 2. Methodology

### 2.1. Study Area

Jigjiga city is the capital city of Somali Regional state. It's located at 605 km to the east of the capital Addis Ababa. Jijiga city has a latitude and longitude of 09°41′N and 41°51′E with an elevation of 1079 meters above sea level. It is characterized by arid and semi-arid climate with an altitude and annual rain fall ranges between 900-1150masl and 450 to 550mm/year respectively with high evaporation and percolation. Based on population projection 2007 in to 2018 the population of the city is estimated to be 277,560 from which the male accounts 149,292 while female are 128,268. The annual temperature is varying from 25 to 32 degree centigrade. There are private and governmental health facilities in the city but majority of the city's population is served by the government-owned and operated health facilities. Currently, there are one referral hospital, two hospitals and two health centers owned by government.

### 2.2. Study Design & Period

Institutional based descriptive cross sectional study was conducted among women's having infants less than six months from February 2018 – May 2018.

**2.3. Source of population**: - were all mothers who were residents of jigjiga city. Study subject were all women having children aged 0-6 months during study period who met inclusion criteria.

### 2.4. Sample Size Determination

The sample size was estimated by using a single population proportion formula by Epi info. Based on the following assumptions: expected EBP prevalence (p), 52%, (EDHS2011), 95% CI±1.96, precision error (d) 5% and allowing 10% non- response rate. The total sample size was 422.

### 2.5. Eligibility criteria

**2.5.1 Inclusion criteria:** Mothers with their index child aged from 0 to 12 months who attend the MCH clinics
**2.5.2 Exclusion criteria:** Mothers who are acutely ill and unconscious and/or having acutely ill child will not be included in the study.

### 2.6. Sampling procedure

There are five governmental health facilities in Jigjiga city administration. Study subjects were obtained proportionally to the client flow from two hospitals selected randomly by using simple random sampling technique and all mothers with their index child less than 1 year who attend the selected government owned MCH clinics during the data collection period interviewed using convenience sampling technique until the predetermined sample size was obtained.

### 2.7. Data Collection Techniques

Data was collected using a self-administered questionnaire to the mothers by trained local data collectors who completed grade 10 and had previous experience. The questionnaire was adopted from different literatures and incorporated the local context, translated into local language (Af Somali). Training was given for data collectors and supervisor on collection technique and objective of the study, Questionnaire, sampling methods and securing informed verbal consent from the study participants for three day at jigjiga city by investigator. The questionnaire was pre-tested on 10% of total sample size at other district & the necessary arrangements & corrections were made to standardize & ensure its validity.

### 2.8. Data Analysis Technique

Data was cleaned, coded, and entered into Epi Data software version3.1 and exported to SPSS version 21 statistic software. Descriptive statistics such as frequencies, proportions, and measures of central tendency and measures of variation were used to describe the distributions of variables**.**

### 2.9. Variables

#### 2.9.1. Dependent Variables.

Exclusive breastfeeding practice

#### 2.9.2. Independent Variables.

- **Socio-demographic variables**- Age, marital status, residence, occupation, maternal educational status, ethnicity, religion, monthly income, educational status, information access, sex of the child and age of child
- **Health service related factors**- Attendance of antenatal care services, number of antenatal visits, Provision of advice on breastfeeding by healthcare staff during ANC and postnatal care service
- **Obstetrics and Medical variables**- Place of delivery, birth attendance, Mode of delivery, birth order, Parity and birth interval.

### 2.10. Operational Definition

- **Exclusive breastfeeding**- infant receives only breast milk within 24 hours proceeding to six months.
- **Ever breastfeeding**- Breastfeeding at any point of time since birth
- **Maternal and child health clinic-** refers to EPI, under five OPD, Postnatal clinic
- **On demand breast feeding-** breastfeeding greater than or equal to 8 times per 24 hours
- **Optimal breast feeding**- relates to adherence to standard recommendations such as initiation of breastfeeding within one hour, exclusive breastfeeding for 6 months and introduction of safe , nutritious, age appropriate complementary food around 6 months, on demand breast feeding and giving colostrums.
- **Pre-lacteal feeding**- feeding of an infant with something other than breast milk during the first three days of life.
- **Timely initiation of breast feeding- putting** the neonate on the mother's breast to suckle within one hour (including one hour).

### 2.11. Ethical clearance

Ethical approval for this study was obtained from the ethnical clearance committees of JJU. Official letter was written to Somali Regional Health Bureau and other concerned bodies to allow implementing the study. The objective and importance of the study was explained & informed consent was obtained from enrolled mothers. Privacy and confidentiality was ensured by omitting the names of the respondents from the questionnaire. Participants who were unwilling to participate in the study & those who went to quit from the study at any juncture were informed to do so without any restriction. Child care and nutritional advice was given to mothers by the data collectors during the data collection period.

## 3. Results

A total of 361 mothers' of children aged less than 24 months were included in this study and interviewed, yielding the response rate of 86%.

### *3.1. Socio-demographic characteristics of the Study population*

One hundred twelve (31%) of respondents were within the age group of 20-24 years, considered as productive age group, while, 22 (6.2%) being in the age ranges 35 and above years old. Majority of the respondents 321 (88.9%) were married, 27 (7.5%) were single, and the rest 9 (2.4%) and 4 (1.2%), were widowed and separated, respectively. Majority of the study subjects 325 (90.2%) were Muslim by religion and a substantial amount 317 (87.8%) were Somali by ethnicity. Above Half of the respondents 199(55.2%) were grade 1-8, illiterate 61 (16.9 %) and the rest 101 (27.9%) were grade 9 and above. Regarding their occupation of the interviewee, house wife were predominant 177 (49%), followed by 72 (19.9%) business woman/merchant, 69 (19.2%), government employee, and the rest 29 (8.2%), 9 (2.4%) and 5 (1.3%) were daily labor, private organization and others respectively. Regarding about sex of infants 189(52.6%) were female while 172(47.4%) were male. One hundred ninety nine (51.1%) of infants were 3-6months age group while 162(48.9%) were less than 3 months age group. Most of respondent 176(48.8%) earn 501-1000 Ethiopian Birr per month while 33(9.2%) of respondent earn more than 1000ETB per month (Table 1).

**Table 1: Socio-demographic characteristics of mother & infants attending at MCH**

| Variables | Frequency | Percent |
|---|---|---|
| **Mother's age** | | |
| 15-19 | 57 | 15.7 |
| 20-24 | 112 | 31 |
| 25-29 | 108 | 30 |
| 30-34 | 62 | 17.1 |
| 35+ | 22 | 6.2 |
| **Current marital status** | | |
| Married | 321 | 88.9 |
| Single | 27 | 7.5 |
| Widowed | 9 | 2.4 |
| Separated | 4 | 1.2 |
| **Religions** | | |
| Muslim | 325 | 90.2 |
| Orthodox | 31 | 8.5 |
| Protestant | 5 | 1.3 |
| **Ethnicity** | | |
| Somali | 317 | 87.8 |
| Amhara | 27 | 7.4 |
| Other | 17 | 4.8 |
| Mothers' educational level | | |

| | | |
|---|---|---|
| Illiterate | 61 | 16.9 |
| Primary (1-8) | 199 | 55.2 |
| Secondary and higher(9+) | 101 | 27.9 |
| **Mother's occupation** | | |
| Housewife | 177 | 49 |
| Government employee | 69 | 19.2 |
| Daily labor | 29 | 8.2 |
| Business woman | 72 | 19.9 |
| Private Organization | 9 | 2.4 |
| Other | 5 | 1.3 |
| **Infant sex** | | |
| Male | 172 | 47.6 |
| Female | 189 | 52.4 |
| **Age of infant** | | |
| Less than 3 months | 162 | 44.9 |
| 3-6 months | 199 | 55.1 |
| **Monthly income** | | |
| ≤500 | 103 | 28.5 |
| 501-1000 | 176 | 48.8 |
| >1000 | 33 | 9.2 |
| Don't know | 49 | 13.5 |

### 3.2 Obstetrics history and health care services

Majority of respondents 183 (50.6%) were pregnant two – four times, 42 (11.7%) were pregnant five and above times, and 136 (37.7%) were pregnant only one time.

Regarding ANC follow up, most 312 (86.4%) mothers were attend ANC, and the rest 49 (13.6%) were not attend ANC throughout their pregnancy. About frequency of ANC visit, out of three hundred twelve mothers who attend ANC 228 (73%) were attended one to four time, 84 (27%) attended four to eight times. Mothers who attend ANC 303 (97%) of them were getting Health education on breastfeeding. Regarding about the place of delivery, almost half 181 (50.1%) delivered at home while the remaining 181 (50.1%) were delivered in health facilities, 152 (42.1%) delivered at hospital and 28(7.8%) at health centre. Regarding about the mode of delivery majority 349 (96.6%) mothers deliver through vaginal and the rest 12 (3.4%) of mothers gave birth with C/S. One hundred eighty one (50.2%) of mothers were assisted by health professional during delivery, 126 (34.9%) were attended by their relatives, 54 (14.9%) were assisted by traditional birth attendants. Majority of mothers 336 (93.1%) had not received postnatal follow up.

**Table 2: Distribution of obstetrics and health care services of mothers Attending at MCH**

| Variable | Frequency | Percent |
|---|---|---|
| **Parity** | | |
| 1 | 136 | 37.7 |
| 2-4 | 183 | 50.6 |
| 5 and above | 42 | 11.7 |
| **History of ANC** | | |
| Yes | 312 | 86.4 |
| No | 49 | 13.6 |
| **Number of ANC visit** | | |
| 1-4 | 228 | 73 |
| 5-8 | 84 | 27 |
| >8 | - | - |
| Don't remember | - | - |

| | | |
|---|---|---|
| **Health education on BF during ANC** | | |
| Yes | 303 | 97 |
| No | 9 | 3 |
| **Place of delivery** | | |
| Home | 181 | 50.1 |
| Hospital | 152 | 42.1 |
| Health center | 28 | 7.8 |
| Mode of delivery | | |
| Vaginal | 349 | 96.6 |
| C/S | 12 | 3.4 |
| **Birth attendant** | | |
| TBA | 54 | 14.9 |
| Health professional | 181 | 50.2 |
| Relatives | 126 | 34.9 |
| **Postnatal follow up** | | |
| Yes | 25 | 6.9 |
| No | 336 | 93.1 |

Mothers were also asked about the information received during ANC visit. From those who had visited ANC facility, majority 303 (97.1%) were informed on BF at ANC visit. Among those mothers who were informed on BF, 158 (43.7%) were informed to breastfeed exclusively for six months and not to introduce pre-lacteal feeding and 162 (44.8%) of them were informed to initiate breast feeding within one hour and the rest 148(40.9%) were informed to breast feed during maternal or child illness.

**Table 3**: **Distribution to breastfeed exclusively for six months of mothers attending MCH**

| Variable | Frequency | Percentage |
|---|---|---|
| Breastfeeding for 2yrs | 142 | 39.3% |
| EBF for six months | 203 | 56.2% |
| No pre-lacteal feeding | 162 | 44.8% |
| Initiate BF within one hour | 148 | 40.9% |
| Bf during maternal or child illness | 71 | 19.6% |

### 3.3 Breast feeding practice

Majority of mothers 346 (95.8%) practiced breastfeeding while 15(4.2%) of mothers never practiced breastfeeding. For mothers who did not ever breastfeed, the perceived reasons were mother can't go back to work or school 6 (40%), breastfeeding is painful 3 (20%), those mothers who afraid breasts suck 3 (20%) breasts are too small to feed the baby 1 (6.6%), and bottle feeding is enough 2 (13.2%).

### 3.4 Initiation of breastfeeding

All the study subjects were asked whether they have ever breastfed or not and for those who had ever breastfed they were also asked the time of initiation of breastfeeding to their child. Almost of mothers 187 (54%) initiated breastfeeding within one hour after delivery, 138 (39.8%) of mothers initiated breastfeeding with in the period 1 hour to 1 day and the rest, 21 (6.1%) initiated within 1 – 3 days. The distribution of timely initiation of breastfeeding versus history of ANC visit was assessed, accordingly from the total mothers who attended ANC service, 171 (57.3%) of them initiated within one hour, 121 (39.1%) initiated within 1-24 hour, 11 (3.6%) initiated within 1-3 days. But from those mothers who did not attend ANC service 16 (32.6%) initiated within one hour and the rest 17 (46.9%), 10 (%) and 6 (20.5%) were initiated within 1-24 hour, 1-3 days and ever not breast feed their child respectively. As shown on the graph below, having history of ANC visit, higher proportion of mothers initiated BF within one hour but lesser proportion of them initiated after 1-24 hour. (Figure 2)

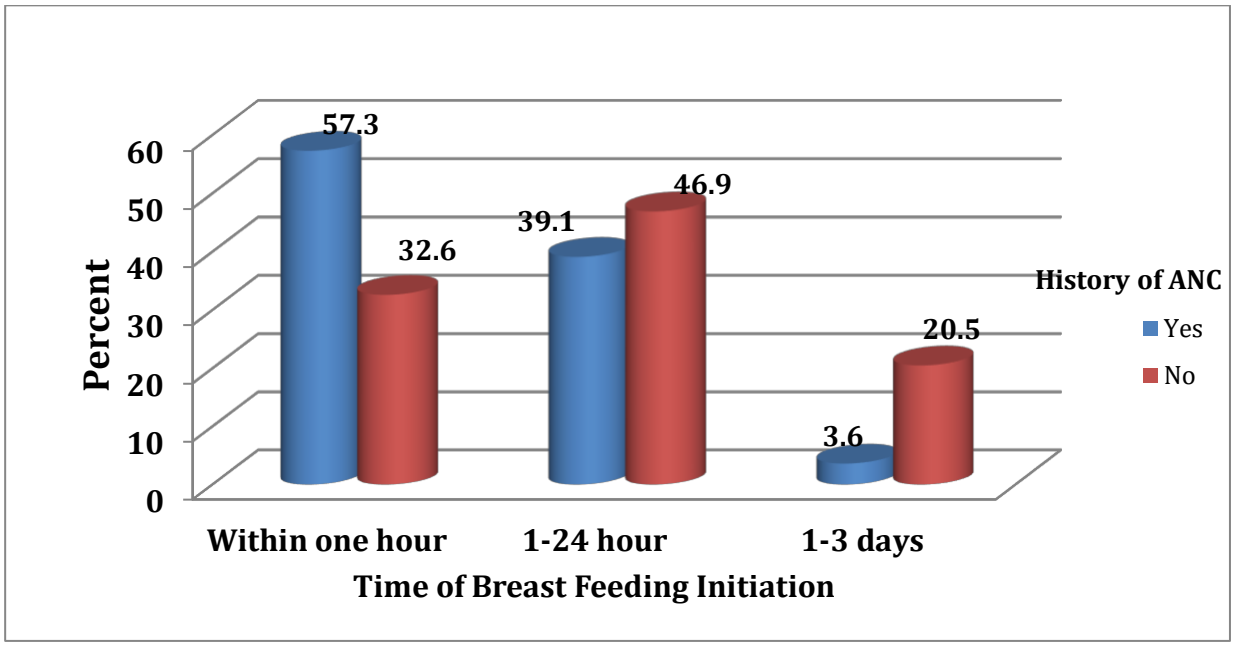


**Figure 1**. Mother's history of ANC by time of breastfeeding initiation

### 3.5 Colostrum and pre-lacteal feeding

Among mothers who practiced breastfeeding, 142 (41%) of them squeezed and threw the colostrum. Regarding the reason of throwing colostrum, most 76 (53.6%) believed it is dirty, 48 (33.8%) believed it creates abdominal pain to the baby and the rest 18 (12.6%) of mothers believed the baby was unable to suck.

Regarding pre-lactation 127 (36.7%) of mothers gave pre-lacteal food to their infants and the reason for introducing pre-lacteal feed 59 (46.5%) of them said it is due to culture/tradition, 28 (22.1%) reported maternal illness 22 (17.3%) mothers reported that creates child abdominal cramp, 18(14.1%) said Painful breast.
The common pre-lacteal food was butter reported by 55 (43.4%) mothers, followed by sugar solution 32 (25.2%), cow milk 22 (17.3%) and 18 (14.1%) were mentioned water. (Table 4)

**Table 4 Mother's breast feeding practice of infant and young children**

| Breast feeding practice of infant and young children | | Frequency | Percent |
|---|---|---|---|
| **Have you ever breast fed the child?** | Yes | 346 | 95.8 |
| | No | 15 | 4.2 |
| **If no, reason for not breastfeeding? (More than one answer is possible) (n=15)** | BF takes too much time. | - | - |
| | Can't go back to work or school. | 6 | 40 |
| | BF will make my breasts sag | 3 | 20 |
| | BF is painful | 3 | 20 |
| | My breasts are too small to breastfeed | 1 | 6.6 |
| | With bottle feeding | 2 | 13.4 |
| **How long after birth did you first put the Child to breast? (n=346)** | Within 1 Hour | 187 | 54 |
| | 1- 24hr | 138 | 39.9 |
| | 1-3days | 21 | 6.1 |
| **Did you give the child pre-lactation food/fluid?** | Yes | 127 | 36.7 |
| | No | 219 | 63.3 |
| **If yes, what did you gave him (her)? (n=127)** | Butter | 55 | 43.4 |
| | Sugar solution | 32 | 25.2 |

| | | | |
|---|---|---|---|
| | Salt solution | - | - |
| | Cow's milk | 22 | 17.3 |
| | Water | 18 | 14.1 |
| **306 What was the reason for introducing prelacteal feed (n=127)** | Breast milk insufficiency | - | - |
| | Culture/tradition | 59 | 46.5 |
| | Maternal illness | 28 | 22.1 |
| | C/S delivery | - | - |
| | Child abdominal cramp | 22 | 17.3 |
| | Painful breast | 18 | 14.1 |
| **Did you squeeze out and throw the first milk?** | Yes | 142 | 43.5 |
| | No | 204 | 56.5 |
| **Why didn't you give it for your child? (n=142)** | It is dirty | 76 | 53.5 |
| | It creates abdominal pain to the baby | 48 | 33.8 |
| | Baby was unable to suckle | 18 | 12.6 |

Regarding mother's time of breastfeeding practice, most 202(58%) mothers feed their child on demand, 108 (31%) reported that they feed on convenience and the rest 36 (11%) mothers feed when the child cries.

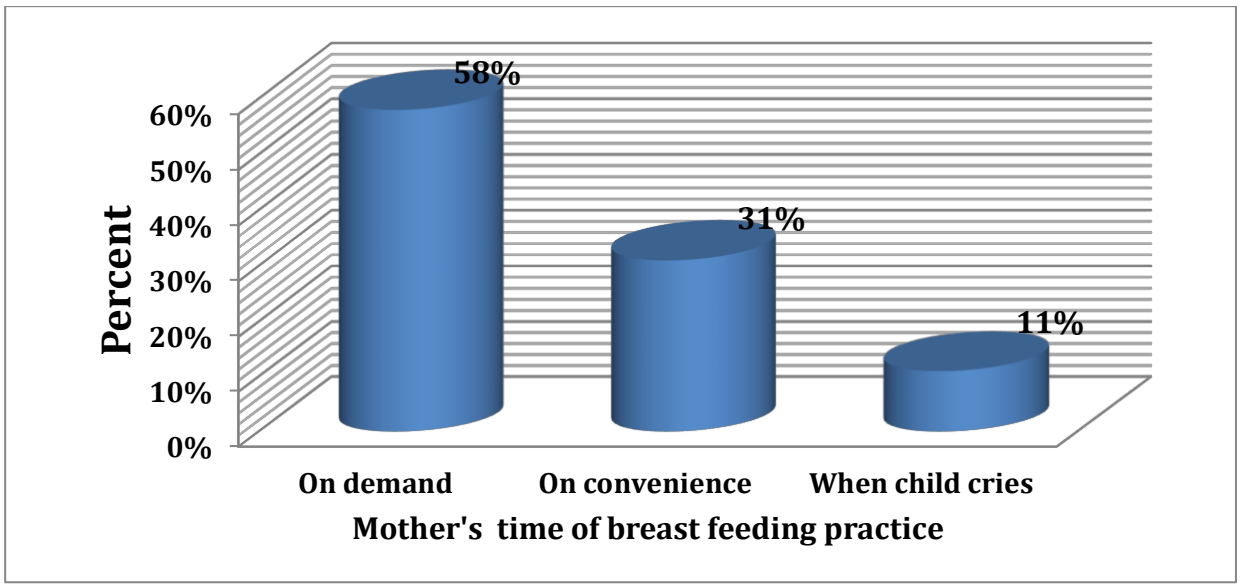


**Figure 2.** Mother's time of breastfeeding practice of infant and young children

### 3.6. Exclusive breastfeeding practice

Regarding exclusive breastfeeding, 128 (36.9%) of infants were exclusively breastfed and the rest 218 (63.1%) infants were not exclusively breastfed. Those two hundred eighteen mothers who introduced additional feeding were asked about the types of additional feeding 101 (46.4 %) introduced cow's milk, 67 (30.8 %) formula milk, 30 (13.7 %) porridge, 12 (5.5 %) sugar solution, and 8 (3.6 %) juice.

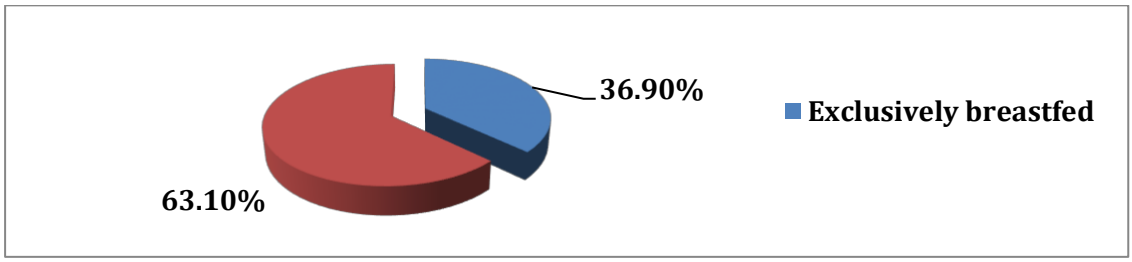


**Figure 3.** Mother's exclusive breastfeeding practice of infant and young children

### 3.7. Frequency and duration of breastfeeding

Respondents were asked whether they breastfed their child yesterday during the day or at night, 107 (52.4%) mothers feed and 97 (47.6%) were not feed. Among mothers who breastfeed their child 265 (76.6%) mothers feed almost for about more than eight times per day and the rest reported less than eight times per twenty four hours

From the total mothers who had ever breastfed their infant the continued breastfeeding for less than six months 154 (44.6 %), 6 to 12 months 113 (32.7 %), 13 to 24 months 68 (19.6 %) and for above 24 months was 11 (3.1 %). Regarding reason for breast feeding cessation were 127 (36.8 %) of mother reasoned out due to pregnancy, 166 (47.9%) of mothers reported that they felt it was time to stop, 41 (11.9 %) of mothers mentioned due to inadequate breast milk and the rest 12 (3.4%) of mothers reasoned due to maternal illness. Regarding with what utilities they use to feed their child, 23 (23.7%) use bottle, 18 (18.5%) feed using cup, 11 (11.4%) mothers use spoon, 39 (40.2%) not yet supplemented or weaned, and the rest 6 (6.2%) were use their hand/finger to feed the child.

**Table 5. Frequency and duration of breastfeeding practice of infant and young children**

| **Frequency and duration of breastfeeding** | | **Frequency** | **Percent** |
|---|---|---|---|
| At what age did the child stop breast feeding? | Less than six months | **154** | **44.6** |
| | 6 to 12 months | **113** | **32.7** |
| | 13 to 24 months | **68** | **19.6** |
| | $24^{+}$ | **11** | **3.1** |
| Reason of breast feeding cessation | Pregnancy | **127** | **36.8** |
| | Oral contraceptive use | **-** | **-** |
| | Felt it was time to stop | **166** | **47.9** |
| | Inadequate breast milk | **41** | **11.9** |
| | Maternal illness | **12** | **3.4** |
| What did you use to feed the child | Not supplemented or weaned | **39** | **40.2** |
| | Bottle | **23** | **23.7** |
| | Cup | **18** | **18.5** |
| | Spoon | **11** | **11.4** |
| | Hand/finger | **6** | **6.2** |

### 4. Discussion

This institution based descriptive cross-sectional study attempted to explore determinants of breastfeeding practice among mothers of children aged less than 24 months attending MCH clinics, in Jigjiga city, Somali Region, Ethiopia.

The dominance of breast milk over any other nourishment to infant and young children is clearly recognized, and over the years it has become more and more evident that it is the most ideal, safe and complete food that a mother can provide for their child. Breastfeeding will have the intended outcome if it is initiated timely, be exclusive for the first six months, pre-lacteal feed discouraged and colostrums provided to the neonate and continue on demand feeding up to two years.

In this study, it was found that 346 (95.8 %) of mothers had practiced breastfeeding. This result is more or less similar with the study in Ghana that shows 100%, Cameroon 98% and Ethiopian (96%) of mothers had breastfeeding practice (5,49 & 50,) But it is higher than the ever breastfeeding practice in Nigeria (82%), and ever breast feeding practice in United States of America (73.8%). This high rate of breastfeeding could be due to the fact that breast feeding is a norm in the society (25, 29).

Regarding timely initiation of breastfeeding, this study finding showed that 187 (54%) were initiated breastfeeding within one hour after delivery, almost 138 (39.9%) of them initiated breastfeeding with in the period 1 hour to 1 day and the rest 21 (6.1%) initiated within 1 – 3 days. This finding was higher than the study conducted in Turkey (35.2%); in Burkina Faso, (33.3%), in Chad (43.3%), and in Colombia (48.9%) (18). But lower than the study done in Eritrea (77.9%), Namibia, (80.9%) (28). The prevalence of timely initiation of breastfeeding in this study could possibly be explained in terms of higher proportion of mothers attended ANC which could be the important service delivery point to establish timely initiation of breastfeeding. In addition, majority of them delivered via normal vaginal delivery which could help them to initiate breastfeeding early.

Although Global strategy on infant and young child feeding recommends feeding colostrum and discourages pre-lacteal feeds, in this study two hundred four (59%) of mothers gave colostrums to their baby. This finding was lower than the finding in Nepal, 2005(22) where colostrum was given as the first fed in 86% of babies and south Gonder zone 85.6 %. (15). This finding higher than the data from Nigeria, 24% and consistent with the national finding in Ethiopia 45% of mothers provided colostrums for their babies (5, 26).

Regarding the prevalence of pre-lacteal feeding this study found that among mothers who practiced breastfeeding, 127 (36.7%) of mothers gave pre-lacteal food to their infants. Mothers were asked for the reason of throwing colostrums; 76 (53.6%) of them reported colostrum is dirty, 48 (33.8%) of them said it creates abdominal cramp and 18 (12.6%) mentioned that babies were unable to suckle the breast because of engorgement this is lower than study done in India revealed that pre-lacteal feeding (65.2%); Nigeria (75%); rural communities of Tigray (80%); Gursum, Somali region (79%), and consistent with Tigray regional (30.6%) but it is higher than the finding in south Gonder zone, Amhara region (11.1%). This might be due to cultural and traditional influence in the study area (5, 15, 17, 25 ). A study conducted in Gonder university hospital found that the commonest prelacteal food was Butter followed by sugar solution which is in agreement with this study finding the common pre-lacteal food was Butter 55 (43.3%) mothers, followed by sugar solution and cow milk 32 (25.2%). Tradition or culture was the most frequently mentioned reason 59 (46.5%) for the introduction of food for infants during the first three days after delivery followed by maternal illness 28 (22.1%), it was also consistent with study done in the rural communities of Tigray (32, 33). This study showed that the prevalence of exclusive breastfeeding was 128 (36.9%) infants in the age group 0-6months were exclusively breastfed which is lower than the WHO recommendations and the rest 218 (63.1%) infants were not exclusively breastfed. This finding is comparable with study done from India revealed that 7.8%, in Saudi Arabia (12.2%), Timor-Leste (30.7%), Nigeria (21.2%) and almost consistent with the finding of Ethiopian national prevalence (49%) and Adwa town, Tigray (41.8%) (20, 24, 25). The reason for this might be the result of the current policy implementation on the use of health extension workers in urban areas to promote breastfeeding (33, 34).

In this study mothers were asked about the frequency and duration of breastfeeding and it showed that on demand breastfeeding rate was found to be 202 (58%). This finding is less than study done in Kenya showed that the demand of breastfeeding was 90.6% of babies and with the study in rural communities of Tigray where on demand breastfeeding was 88% and the finding from Vietnam which was 96.7% (30, 31, and 33).

Similarly the continued breast feeding at one year and at two years in this study was 113 (32.7%) and 68 (19.6%) respectively. This finding was higher than the result from United State of America, where the continued breastfeeding rate at one year was 20.9% and, less than in Egypt where the continued breastfeeding rate at one year and at two years was 64.4% and 33.9% respectively (26, 31) Though breastfeeding is a common tradition in Ethiopia due to less urbanization where most of mothers become busy with different tasks.

**5. Conclusion**

This study touched tip of the ice-burg of breast feeding practice among mothers' of children aged less than 24 months attending maternal and child health clinics. The study reviled that the overall breast feeding practice among mothers' were high and should be appreciated. Though breast feeding is familiar to the communities, as nearly all the study mothers were informed to breastfeed exclusively for six months and not to introduce pre-lacteal feeding during ANC visit, but there is a gap and low coverage of exclusive breast feeding practice and few mothers initiate breastfeeding within one hour after delivery. Most of the mothers practice squeezed and threw the colostrums; provide pre-lacteal food to their infants because of culture/tradition. Culture/tradition was found to influence the practice of exclusive breast feeding practice in the study area. Whereas the study participant's practice on breast feeding their child on demand, and the continued breastfeeding practice were high.

**5. Recommendations**

- The Ethiopia Somali regional health bureau should strengthen the actions to empower women and promotion of exclusive breast feeding practice campaign are recommended to increase overall breast feeding practice among mothers.
- The Somali Regional Health Bureau should have to emphasize and promote an extensive health education programme to raise the level of mother's knowledge on breast feeding practice specifically about exclusive breast feeding, initiate breastfeeding within one hour after delivery and not to squeezed and threw the colostrum; and the Culture/tradition regarding pre-lacteal feeding to their infants
- Training should be considered by the woreda and regional health bureau to some selected mothers, traditional healers, traditional birth attendants and religious leaders to strength breast feeding practice and also to correct traditional inappropriate breastfeeding practices.

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**Abbreviations**

**ANC-** Antenatal Care
**BF-** Breastfeeding
**EBF-** Exclusive Breastfeeding
**EPI-** Expanded Program of Immunization
**FMOH-** Federal Ministry of Health
**HEW-** Health Extension Worker
**IF-** Infant Formula
**IYCF-** infant and young child feeding
**MCH-** Maternal and Child Health
**NGO**-Non-Governmental Organizations
**OC-** Oral Contraceptive
**OPD-** Outpatient Department
**PBF-** predominant Breastfeeding
**PNC-** Postnatal Care
**CS-** caesarean section
**SPSS**- Statistical Package for Social Science
**TBA-** Traditional Birth Attendant
**TIBF-** Timely Initiation of Breastfeeding
**UNICEF-** United Nations Children's Fund
**USAID**-United States Agency for International Development
**WHO-** World Health Organization

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**Competing interest**
We declare that there is no any competing interest

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# Mental Health Awareness of Child Abuse and Neglect (CAN); The Case Among Parents in Malaysia

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**Abstract**
This is a study on the state of awareness of Child Abuse & Neglect (CAN) from 2012 to 2017 among parents in Malaysia. The study background is based on cases to the Department of Social Welfare according to the various types of CAN. The results show over the years an increasing number of reports. The study finds evidence that it is not an uncommon phenomenon in the country, in particular, physical maltreatment, neglect, and emotional maltreatment. It can be concluded that it is very crucial that CAN cases be monitored and managed properly and follow-up actions can be taken to educate parents about CAN.

**Key Words:** Child Abuse and Neglect (CAN), Reported Cases, States in Malaysia

## 1. Introduction

Child abuse or maltreatment as defined by the World Health Organization (WHO) is "all forms of physical and/or emotional ill-treatment, sexual abuse, neglect or negligent treatment or commercial or other exploitation" (WHO, 1999). Child abuse and neglect (CAN) have broad implications such as "actual or potential harm to the child's health, survival, development or dignity in the context of a relationship of responsibility and trust or power" (WHO, 1999). In addition, the CAN long-term impacts are not only limited to the victim but also on family and society psychosocial consequences, juvenile misbehaviour, substance abuse and crime (Fry D, McCoy A, Swales D, 2012). CAN also have some potential to affect the state's economics. The economic impact of CAN is also considered substantial. WHO estimated that economic value of Disability Adjusted Life Year (DALY) lost increasing from 1.24% to 3.46% of Gross Domestic Product (GDP) across sub-regions in the Asia and Pacific region. If we update it to the year 2018 dollars, the estimated economic burden will be totalled up to US194 billion dollars. CAN implications to the victim, family, society and country as mentioned above, indicates the importance of preventing and responding to CAN at every level (Fang X, Fry DA, Brown DS, Mercy JA, Dunne MP, Butchart AR, 2015).

Malaysia had ratified the United Nation (UN) Convention of the Rights of the Child (CRC) since the year 1995. With this rectification, Malaysia recognises the universally accepted right of the child as contained within this convention. This mean, Malaysia also recognised the UN Convention on the Elimination of All Forms of Discrimination against Women (Department of Women's Affairs Malaysia, 1999). The Ministry of Women,

Family and Community Development have been tasked by the government of Malaysia to lead and coordinate any issues regarding women, family and children there on.

In the past, the public, often perceived cases of CAN as an isolated case rather than part of a widespread phenomenon. As a result, CAN do not receive universal attention until the late 1980s when a few high-profile CANs were highlighted and emphasised in the media (Mohd Yusoff, JZ, 2001). These appeared as the catalyst to motivate the Malaysian Government to introduce the Child Protection Act in the year 1991. Subsequently, the one-stop crisis centres were also set up in Government hospitals around Malaysia beginning the middle of the year 1998. These centres are functioned to provide services for victims of domestic violence, sexual assault and child abuse (Department of Women's Affairs Malaysia, 1999). In order to strengthen actions in cooping this phenomenon, in April 1998, the Government initiated a hotline (Mohd Yusoff, JZ, 2001). Later, in an attempt to deal more effectively with issues relating to children, the Government introduced the Child Act 2001 to supersede the Child Protection Act 1991.

The Child Act 2001 defined child abuse as "when the child has been or is at substantial risk of being physically or emotionally injured or sexually abused or neglected in terms of adequate care, food, shelter, clothing, medical attention, supervision and safety, or abandonment or others such as being on the street or used for begging by the parents or persons in charge of the child at any one time (Laws of Malaysia, Child Act 2001). Under the Child Act 2001 also, it is mandatory for doctors, family members and the public members to report all cases of suspected CAN to the relevant authorities. Data on reported CANs are compiled annually mainly by the Department of Social Welfare, the Royal Malaysian police, and various hospitals.

## 2. Literature Review

There are relatively limited studies on child abuse occurrence in Malaysia. The earliest child sexual abuse incidence study was published in 1996. Singh and Colleagues (1996) conducted a self-administered survey among 616 student nurses and trainees of Medical Assistants. Their survey indicated that about 6.8% of the respondents reported being sexually abused during the childhood of which 8.3% females and 2.1% were males. Less than 1% reported having experienced sexual penetration. Sexual abuse was reported to have begun under 10 years of age in 38.1% of the cases. About two-thirds of them were reported repeatedly abused, and one-third of them experienced abuse from more than one abuser. About 71.4% of the abusers were persons known to the respondents. A marked difference in incidence between ethnic groups was found where more Chinese reported being sexual abuse victims than Malay and Indian. However, it cannot be determined if this was a result of under-representation from Chinese respondents or under-reporting of other ethnic groups due to local socio-cultural limitations in disclosing abuse. Kamaruddin (2000) had cited several barriers to reporting of sexual abuse including societal discrimination against people who have been sexually abused, cultural taboos in relation to ‘losing face' and lack of specialised ‘one-stop' centres at the time for the sexually abused (Kamaruddin, 2000). Though the target sample of Singh et al. study may not be entirely reflective of the population due to the underrepresentation of Chinese and non-random sampling limiting the generalisability of the results, this study marked the beginning of systematic examination on the degree of the CAN at the population level in Malaysia.

Subsequent community-based studies had measured CAN among school students (Choo WY, Dunne MP, Marret MJ, Fleming M, Wong YL, 2011) (Ahmed A, Wan-Yuen C, Marret MJ, Guat-Sim C, Othman S, Chinna K., 2015), trainees in national service camps (Chan LF, Maniam T, Saini SM, Shah SA, Loh SF, Sinniah A, et al, 2013) and incarcerated youths (Ahmad A, Mazlan NH, 2014). Choo and colleagues (2011) conducted a cross-sectional survey among 1,870 students aged 16 years attending 20 randomly selected urban and rural secondary schools in the year 2005 in Selangor (Choo WY, Dunne MP, Marret MJ, Fleming M, Wong YL, 2011). In this survey, emotional and physical abuse were the most common forms of child abuse reported.

More recently, a separate cross-sectional study involving 3509 respondents of 10 to 12 years old children selected using a random sampling of public primary schools in Selangor estimated the incidence of parental physical and emotional maltreatment, parental neglect and teacher-inflicted physical maltreatment (Ahmed A, Wan-Yuen C, Marret MJ, Guat-Sim C, Othman S, Chinna K., 2015). Three-quarters of 10 to 12 years old

children reported at least one form of maltreatment, with parental physical maltreatment being most common. The prevalence of parental physical maltreatment (53%), approaches the upper end of the range of physical abuse recorded in surveys from other countries reported in East Asia and the Pacific region - from as low as 0.4% for very severe abuse to as high as 66.3% for moderate physical abuse (UNICEF EAPRO, 2012). Teacher-inflicted physical maltreatment was reported by 29% whilst approximately 1 in 5 children reported being emotionally maltreated. Males had higher odds of all types of maltreatment except for emotional maltreatment Ahmed A, Wan-Yuen C, Marret MJ, Guat-Sim C, Othman S, Chinna K., 2015).

## 3. Analysis

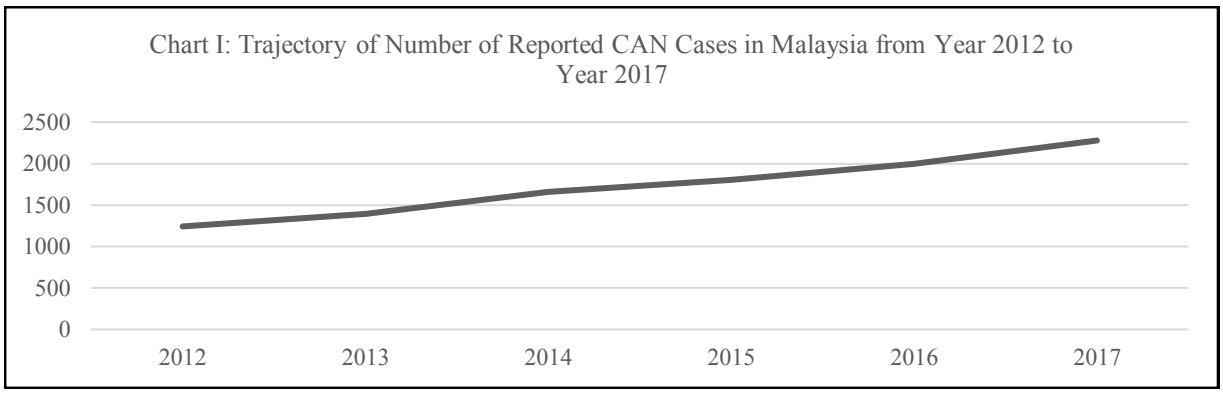
Table I below shows the annual data of reported CAN cases to the Department of Social Welfare according to the various types of CAN, showing increasing numbers of reports.

Table I: Total Cases of CAN Reported to Department of Social Welfare, Malaysia from 2004-2017 According to Type of Abuse

| Year | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| Abandoned | 121 | 98 | 26 | 68 | 53 | 63 |
| Neglect | 357 | 389 | 563 | 601 | 682 | 761 |
| Physical | 354 | 410 | 445 | 431 | 495 | 586 |
| Sexual * | 324 | 430 | 529 | 566 | 679 | 754 |
| Incest | NA | NA | 30 | 57 | 49 | 21 |
| Emotional | 32 | 32 | 63 | 77 | 50 | 45 |
| Others | 54 | 31 | 0 | 0 | 0 | 49 |
| Total | 1242 | 1390 | 1656 | 1800 | 1999 | 2279 |

Source: Department of Social Welfare, 2018
Note: *Excludes incest if figures for incest available
NA - Not Available

Next, in Chart, I below shows the trajectory of a number of reported CAN cases in Malaysia from the year 2012 to the year 2017 according to the various types of CAN, showing increasing numbers of reports.




The number of reported CAN cases in Malaysia as shown in Chart I above increased for almost double from 1242 cases in the year 2012 to 2279 cases in the year 2017.

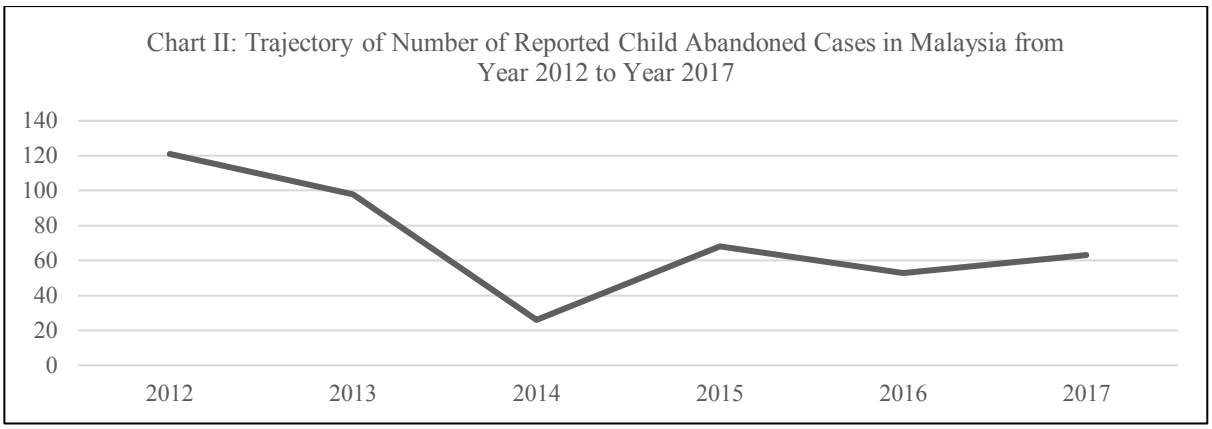



Chart II at the top shows the trajectory of a number of reported Child Abandoned cases in Malaysia from the year 2012 to the year 2017. The number of reported Children Abandoned cases decreased from 121 cases in the year 2012 to 98 cases in the year 2013 and further decreased to 26 cases in the year 2014. However, it increased to 68 cases in the year 2015 and to 63 cases in the year 2017.

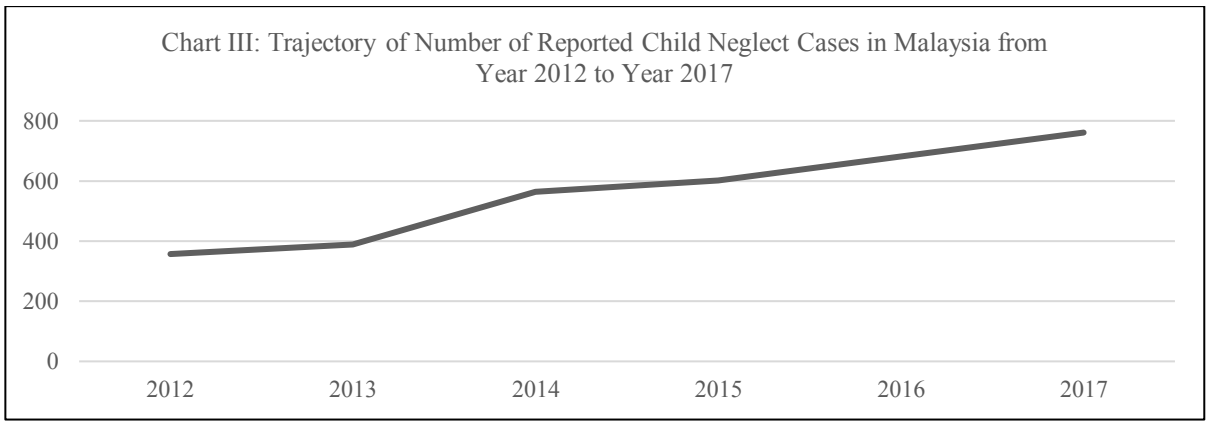
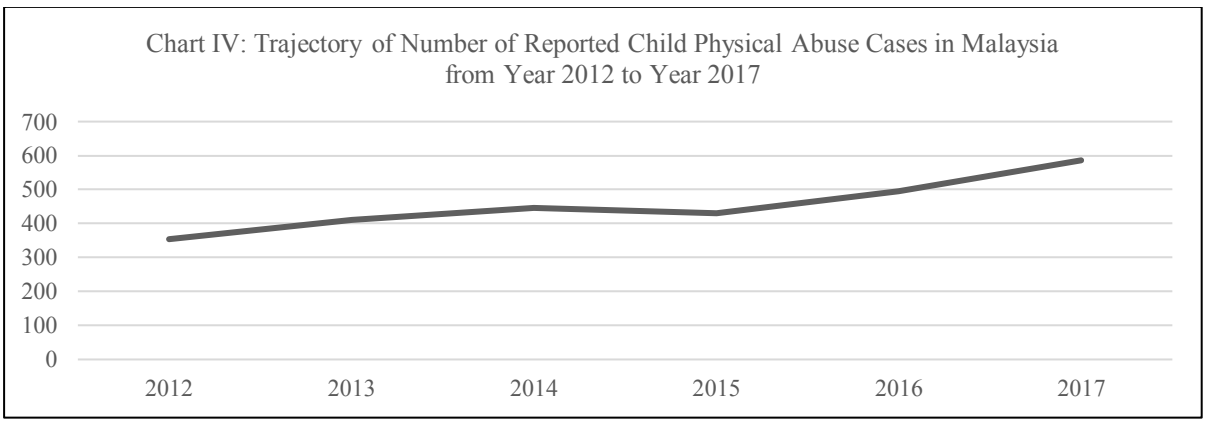



Chart III above shows the trajectory of a number of reported Child Neglect cases in Malaysia from the year 2012 to the year 2017. The number of reported Child Neglect cases increased from 354 cases in the year 2012 to 563 cases in the year 2014 and further increased to 761 cases in the year 2017.

In addition, Chart IV at the bottom below shows the trajectory of a number of reported Child Physical Abuse cases in Malaysia from the year 2012 to the year 2017. The number of reported Child Physical Abuse cases increased from 357 cases in the year 2012 to 431 cases in the year 2015 and further increased to 586 cases in the year 2017.




Next, Chart V shows the trajectory of a number of reported Child Sexual Abuse cases in Malaysia from the year 2012 to the year 2017. The number of reported Child Sexual Abuse cases increased from 324 cases in the year 2012 to 566 cases in the year 2015 and further increased to 754 cases in the year 2017.

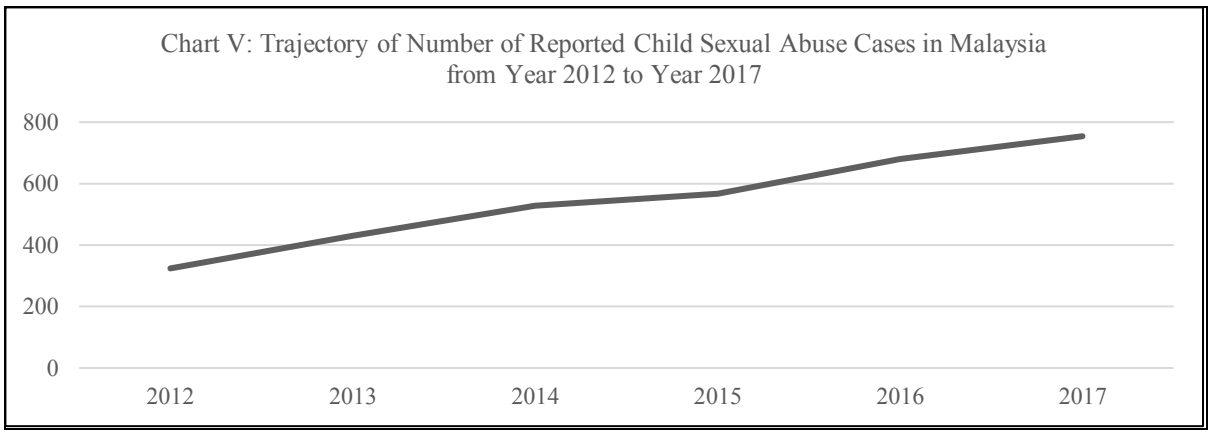



Chart VI shows the trajectory of the number of reported Child Incest Abuse cases in Malaysia from the year 2012 to the year 2017. The number of reported Child Incest Abuse cases were increased from no cases in the year 2012 to 30 cases in the year 2014 and further increased to 57 cases in the year 2017. However, the cases decreased to 49 cases in the year 2016 and further decreased to 21 cases in the year 2017.

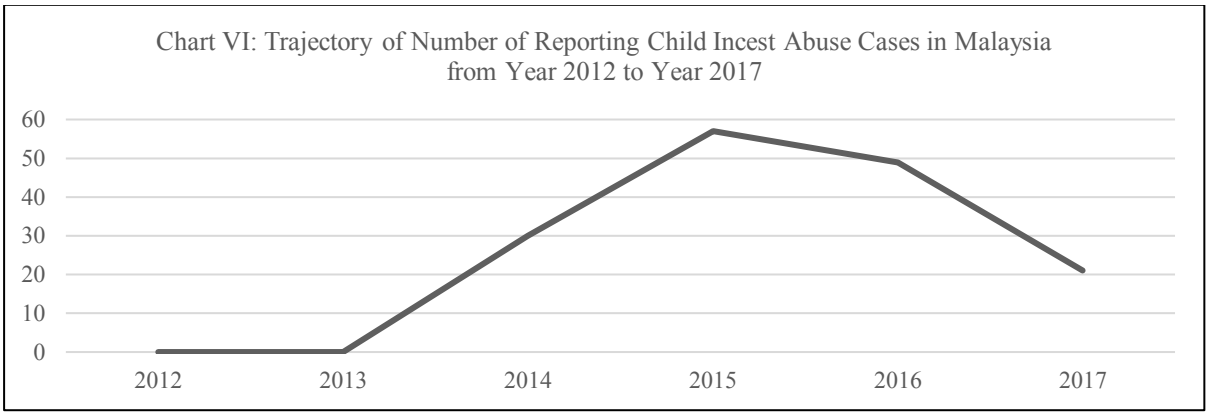



Chart VII show the trajectory of the number of reported Child Emotional Abuse cases in Malaysia from the year 2012 to the year 2017. The number of reported Child Emotional Abuse cases were increased from 32 cases in the year 2012 to 77 cases in the year 2015. However, the cases decreased to 50 cases in the year 2016 and further decreased to 45 cases in the year 2017.

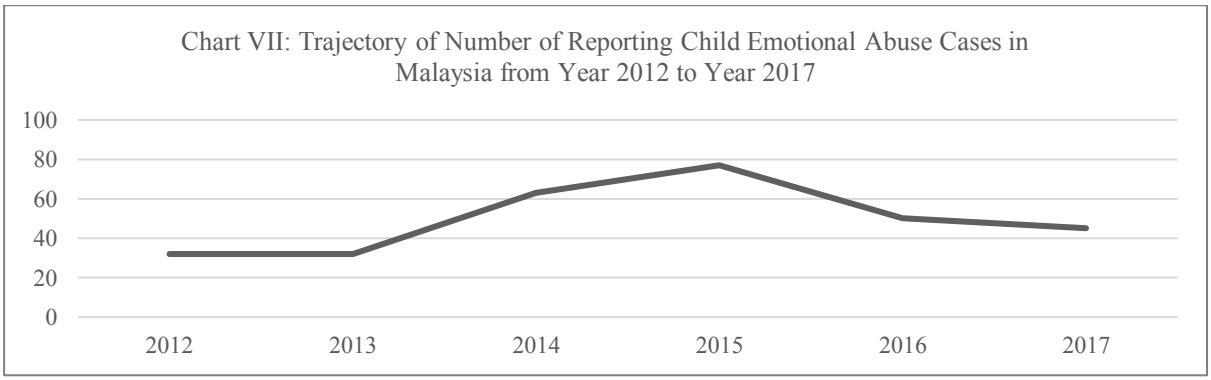
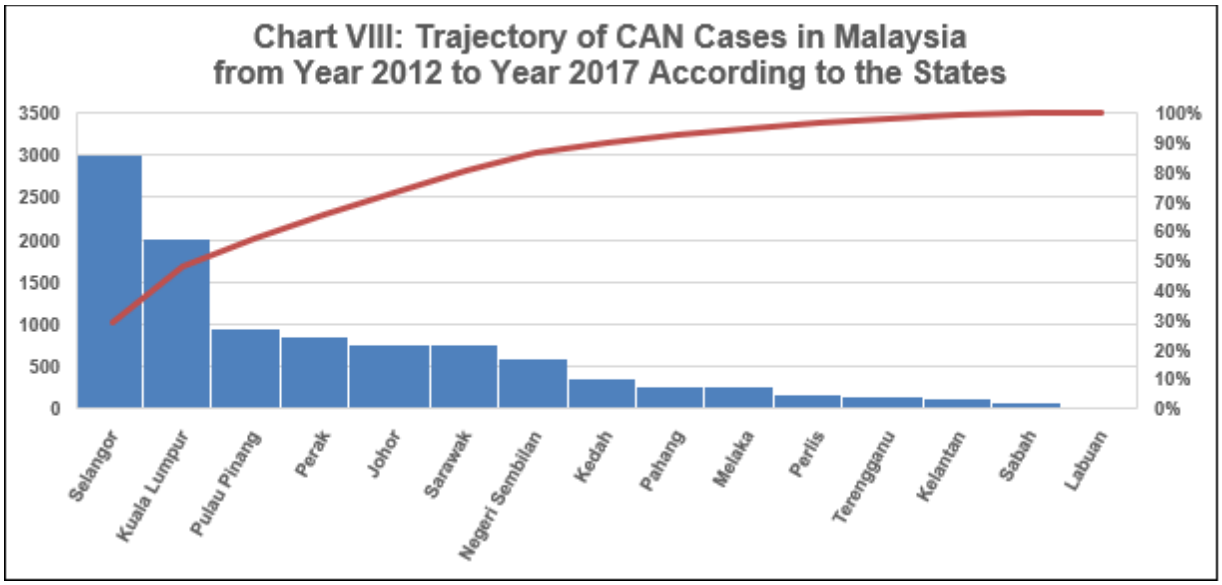



Table II: Total Cases of CAN Reported to Department of Social Welfare, Malaysia from the Year 2012 to the Year 2017 According to the States

| Year | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Total |
|---|---|---|---|---|---|---|---|
| Perlis | 21 | 16 | 26 | 30 | 44 | 27 | 164 |
| Kedah | 39 | 63 | 26 | 66 | 102 | 54 | 350 |
| Pulau Pinang | 130 | 131 | 154 | 131 | 184 | 216 | 946 |
| Perak | 80 | 131 | 145 | 172 | 147 | 185 | 860 |
| Selangor | 412 | 368 | 474 | 446 | 498 | 816 | 3014 |
| Kuala Lumpur | 269 | 153 | 287 | 415 | 435 | 444 | 2003 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Negeri Sembilan | 40 | 55 | 67 | 124 | 147 | 171 | 604 |
| Melaka | 24 | 65 | 64 | 26 | 31 | 55 | 265 |
| Johor | 115 | 156 | 126 | 115 | 91 | 163 | 766 |
| Pahang | 27 | 8 | 38 | 56 | 91 | 46 | 266 |
| Terengganu | 20 | 17 | 33 | 16 | 41 | 23 | 150 |
| Kelantan | 11 | 31 | 51 | 14 | 8 | 19 | 134 |
| Sabah | 17 | 19 | 21 | 0 | 0 | 19 | 76 |
| Sarawak | 36 | 176 | 144 | 189 | 180 | 41 | 766 |
| Labuan | 1 | 1 | 0 | 0 | 0 | 0 | 2 |
| Total | 1242 | 1390 | 1656 | 1800 | 1999 | 2279 | 10366 |

Source: Department of Social Welfare, 2018




As shown in Table II and Chart VII, for the year 2012 to year 2017, the State of Selangor recorded the highest CAN cases (3014 cases), followed by Kuala Lumpur (2003 cases) and Pulau Pinang (946 cases) and the lowest was Labuan (2 cases), Sabah (76 cases) and Kelantan (134 cases).

## 4. Conclusion

The prevalence figures reported in these studies support the observation that CAN is not an uncommon phenomenon in Malaysia, in particular, physical maltreatment, neglect, and emotional maltreatment. More importantly, child sexual abuse ("the involvement of a child in sexual activity that he or she does not fully comprehend, is unable to give informed consent to or for which the child is not developmentally prepared and cannot give consent") (WHO, 1999) is far more prevalent than actually reported to the authorities.

Due to this serious phenomenon, it is very crucial that CAN cases be monitored and managed properly. So much so, the study of the Awareness of CAN Among Parents in Malaysia will definitely determine the current awareness status of the parents, and consequently, follow-up actions can be taken to educate parents about CAN with a view of reducing the CAN case in Malaysia.

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# Comparable of Local Commercial *Bacillus thuringiensis* Against *Aedes aegypti* Larvae

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**Abstract**
DHF as vector-borne disease become a problem in the world. The most effective way for suppressing the incidence is killing the vector, *Aedes aegypti*. One of the ways is using a natural insecticide, local *Bacillus thuringiensis* (Bt). The study aimed to determine the efficacy of local Bt against *Aedes aegypti* larvae. The study was conducted by using an experimental design with 1.250 3rd and 4th instar larvae *Aedes aegypti* as a sample. The study consist of 19 groups, 6 groups of local Bt from Curugdago, 6 groups of local Bt from Setiabudi, 6 groups of Bactivec® (commersial Bt), and a group without larvicide. Each group consist of 25 larvae included in the glass of media with concentrations of 0.04; 0.03; 0.02; 0.01; 0.008; and 0.005 ppm. An observation was made after 24 hours of exposure by counting the number of dead larvae. Data were analyzed using probit analysis to determine LC50, LC90, and LC99. The study was conducted in Unpad Faculty of Medicine Microbiology and Parasitology Laboratory. The result of the study showed that local Bt could kill *Aedes aegypti* larvae with LC50, LC90, LC99 is 0.043; 0.153; 0.436 for local Bt from Curugdago and 0.104; 0.21; 0.809 for local Bt from Setiabudi. That value is higher if compared with Bactivec®, therefore, it can be concluded that local Bt has larvicide effect against *Aedes aepgyti* larvae, however, there is not as effective as commercial Bt.

**Key Words:** *Aedes* aegypti, *Bacillus thuringiensis*, efficacy, larvicide

## 1. Introduction

DHF is a disease caused by a viral infection which is transmitted through *Aedes aegypti*. DHF is the most developing vector-borne disease in the world, increased up to 30 times in the last 50 years. There are 50 million people infected every year, hundreds of them are severe cases, and 20.000 between them cause death.

Vector controlling is the first choice to break the transmission of DHF, one of which is by controlling the larvae, the immature form of the vector. Chemical control is popular in the community, but it is very likely to cause resistance from vectors, pollution to the environment, and also to humans and institutions that are not the target (Kumar, Wahab, Mishra, Warikoo, 2012). Therefore, another alternative is needed to control the disease, one of which uses biological control, namely by using *Bacillus thuringiensis* (Bt).

Currently, commercial Bt products have been widely circulated, one in the race, namely Bactivec®. However, there has never been a study whether local Bt, in which bacteria in the soil in the Curugdago and Setiabudi regions, has a larvicidal effect or not. Therefore, this study was conducted to determine the efficacy of local *Bacillus thuringiensis* as a larvicidal tool for *Aedes aegypti* larvae.

Bt is a gram-positive bacterium that can synthesize crystalline inclusion of parapora that has high toxicity to mosquito larvae but has very low toxicity to organisms that are not the target, hence these bacteria are not harmful to the environment and humans (Ibrahim, Griko, Junker, Bulla, 2010) (Poopathi, Tyagi, 2006). Bt can be found widely in the world, and its main habitat is the soil (Argôlo-Filho, Loguercio, 2014) (Yuningsih, 2007).

## 2. Methods

The study was conducted at the FK Unpad Microbiology and Parasitology Laboratory in March-May 2017 and has obtained permission from the Faculty of Medicine, Padjadjaran University and a statement of ethical feasibility from the Health Research Ethics Committee, Faculty of Medicine, Padjadjaran University with numbers 327/UN6.C10/PN/2017.

The study used an experimental design with research samples were *Aedes aegypti* larvae obtained from the Laboratory of Parasitology FK Unpad with inclusion criteria in the form of active III and IV instars and exclusion criteria in the form of dead larvae or turned into pupae or adult mosquitoes before testing. Based on WHO 2005, the sample size in larvacide research was 25 larvae for each test group so that in this study a total of 1,250 larvae were needed for 2 repetitions (WHO, CDC, 2005).

The independent variables of this study are various concentrations of local *Bacillus thuringiensis* (Bt), while the dependent variable is the number of deaths of *Aedes aegypti* larvae (LC50, LC 90, and LC99).

Local Bt was obtained from FK Unpad Microbiology Laboratory in the form of liquid preparations. The local Bt was obtained from the soil in the Curugdago and Setiabudi regions. Then the local Bt of liquid preparations was taken to the Unpad Central Laboratory for the freeze-drying process so that the resulting powder preparations from Curugdago local Bt and Setiabudi local Bt weighing 0.241 g and 0.040 g respectively.

All of the powder preparations from local Curugdago Bt and local Setiabudi Bt were mixed with aquabides of 2.4 ml and 4 ml respectively to produce a stock solution of 1% or 10,000 ppm. Then the stock solution is diluted to produce 10 ppm. Then taken in a row of 400 µl, 300 µl, 200 µl, 100 µl, 80 µl, and 50 µl with a micropipette then put into a plastic glass containing 100 ml aquabides and 25 *Aedes aegypti* larvae. The final concentration produced is 0.04 ppm; 0.03 ppm; 0.02 ppm; 0.01 ppm; 0.008 ppm; and 0.005 ppm. As a positive control, the six concentrations were made using Bactivec® which was commercial Bt and as a negative control. One plastic cup was only filled with 100 ml of aquabides and 25 *Aedes aegypti* larvae without local Bt or commercial Bt. Repetition was carried out 2 times, then larval death was observed after 24 hours of testing.

Then the data obtained is analyzed by probit with the Miller and Tainter method to determine LC50, LC90, and LC99. First of all, the percentage of dead larvae is converted to probit values using the probit transformation table, then log 10 concentration and probit values are made, then the percentage of larval mortality is 50%, 90%, and 99% transformed into probit values and substituted into the line equation curve regression, so that the values of LC50, LC90, and LC99 are obtained.

## 3. Results

Larvae mortality results after 24 hours of treatment can be seen in table 1.

Table 1. The Percentage of Larval Deaths

| Treatment | Concentration (ppm) | Number of larval deaths after 24 hours in the test- | | Average Number of Deaths | % Mortality |
|---|---|---|---|---|---|
| | | I | II | | |
| CRDG 2.01 | 0,04 | 15 | 15 | 15 | 60% |
| | 0,03 | 9 | 3 | 6 | 24% |
| | 0,02 | 7 | 11 | 9 | 36% |
| | 0,01 | 0 | 1 | 0,5 | 2% |
| | 0,008 | 1 | 0 | 0,5 | 2% |
| | 0,005 | 1 | 2 | 1,5 | 6% |
| STBD 3.01 | 0,04 | 3 | 1 | 2 | 8% |
| | 0,03 | 0 | 2 | 1 | 4% |
| | 0,02 | 2 | 0 | 1 | 4% |
| | 0,01 | 0 | 1 | 0,5 | 2% |
| | 0,008 | 2 | 2 | 2 | 8% |
| | 0,005 | 0 | 0 | 0 | 0% |
| Bactivec® | 0,04 | 24 | 24 | 24 | 96% |
| | 0,03 | 23 | 20 | 21,5 | 86% |
| | 0,02 | 20 | 20 | 20 | 80% |
| | 0,01 | 15 | 14 | 14,5 | 58% |
| | 0,008 | 3 | 3 | 3 | 12% |
| | 0,005 | 2 | 0 | 1 | 4% |
| Control - | 0 | 0 | 0 | 0 | 0% |

Furthermore, the data were analyzed using the probit analysis from Miller and the Tainter method, so that the log10 concentration curve and probit analysis were obtained, also the curve regression line equation is presented in Figure 1, Figure 2, and Figure 3. Then the probit larval mortality value was 50%, 90 %, and 99% is replaced by the line equation, so that LC50, LC90, and LC99 are obtained from each treatment presented in table 2.

Table 2. Probit Analysis Result

| Treatment | Concentration of Death | | |
|---|---|---|---|
| | LC50 | LC90 | LC99 |
| Curugdago Local Bt | 0,043 | 0,153 | 0,436 |
| Setiabudi Local Bt | 0,104 | 0,321 | 0,809 |
| Bactivec® | 0,013 | 0,029 | 0,056 |

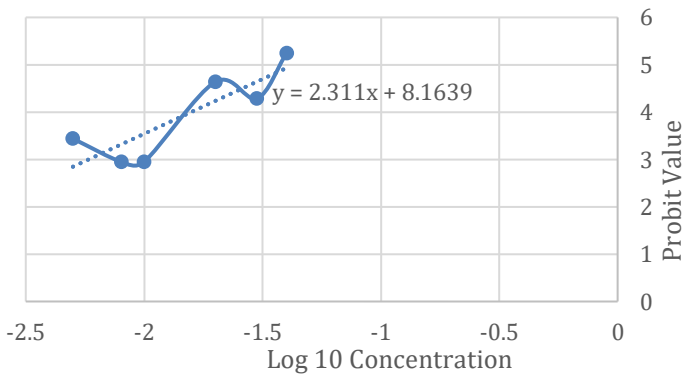


Figure 1. Log10 curve concentration and probit value of Curugdago local Bt

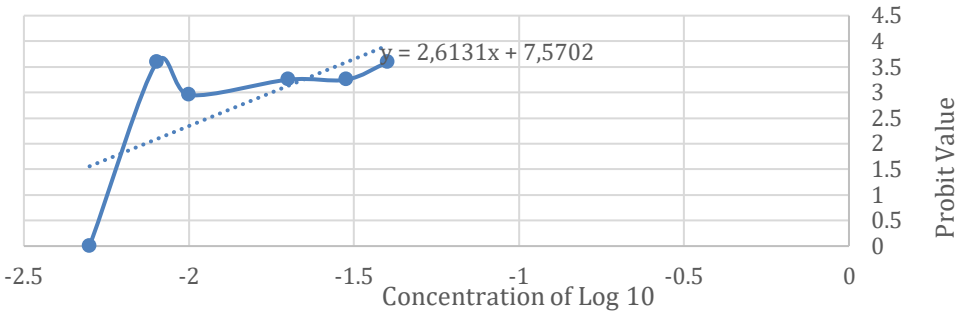


Figure 2. Concentration curve of Log10 and probit value of Setiabudi local Bt

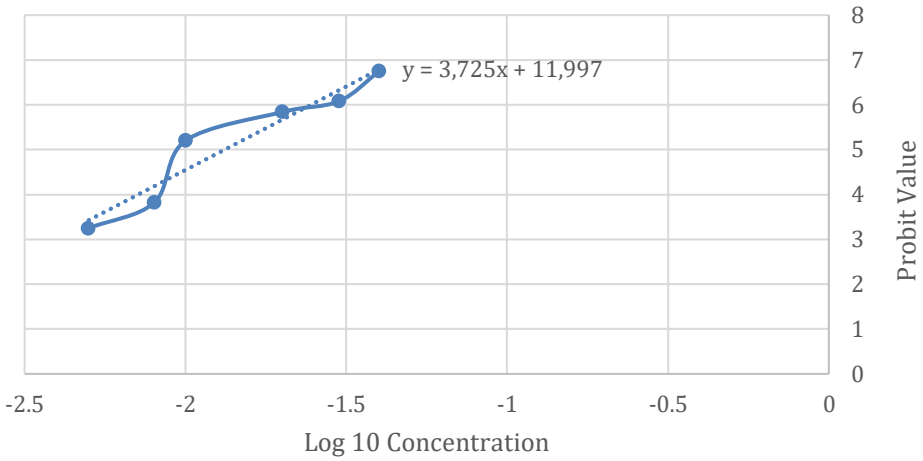


Figure 3. Log10 curve of Probit Bactivec® Concentration and Value

**4. Discussion**

*Bacillus thuringiensis* (Bt) is mainly found in the soil, in this study Bt was isolated from the soil in the Curugdago and Setiabudi regions. Bt liquid preparations underwent freeze-drying in advance to obtain Bt in powder preparations, because based on research conducted by Yusnita et al. Bt powder preparations are more potent than liquid preparations. It is because one of the stages is the deposition process with centrifugation at 4000 rpm for 15 minutes which result in partial rupture of the bacterial cell wall so that the cell contents, including paraspora crystal inclusions, can exit the cell (Anggraeni, Rahardianingtyas, Wianto, 2015).

When the crystalline inclusion of the paraspora is ingested and dissolved in the lumen of the alkaline midgut larvae, toxin activation occurs by proteases from which protoxin has been changed to the toxin. Then the fragment of the toxin binds to caderin receptors in midgut epithelial cells, forms an oligomeric structure, and binds to aminopeptidase receptors. After binding to secondary receptors, the structure can enter the membrane, forming pores and consequently lyse the cells. These conditions suitable for colonization, germination, and spore replication in hemolymph, causing septicemia, and death of larvae as the insect target (Palma et al. 2014) (Sanahuja, Banakar, Twyman, Capell, Christou, 2011).

Negative control in this study shows 0% mortality, so it can be concluded that the larval conditions are in good condition and can encourage other factors that cause larval death in the treatment group.

Curugdago and Setiabudi local Bt concentrations amounted to 0.043 ppm respectively; 0.153 ppm; 0.436 ppm and 0.104 ppm; 0.321 ppm; 0.809 ppm is capable of causing larval mortality of up to 50%, 90%, 99% after 24 hours exposure to *Aedes aegypti* larvae. Whereas Bactivec® requires a lower concentration, which is 0.013 ppm; 0.029 ppm; 0.056 ppm to kill 50%, 90%, 99% of the population of *Aedes aegypti* larvae. This shows that in this study, Bactivec® works more effectively with LC50, LC90, LC99 which is smaller compared to local Bt,

presumably this is caused by the reaction of the killing ability in the same larval midgut where the ability to kill local Bt requires a longer period of time than Bactivec®.[15] Besides that, differences in subspecies are important factors in determining the effectiveness of Bt, the Bactivec® is *Bacillus thuringiensis israelensis* while the local Bt subspecies are unknown. Therefore, further research is expected to be able to examine local Bt at the molecular level to identify its subspecies.

The results of this study are in accordance with Blondine Ch.P's study on the effectiveness of Vectobac 12 AS (BT H-14) and *Bacillus thuringiensis* H-14 which shows that local Bt has lower effectiveness than commercial Bt (Blondine, 2004).

The limitation of this study lies in the size of the different larvae when used due to the difficulty of finding *Aedes aegypti* larvae in one phase on a large scale at one time.

## 5. Conclusion

From this study it can be concluded that local *Bacillus thuringiensis* has a larvicidal effect on *Aedes aegypti*, although not as effective as commercial *Bacillus thuringiensis*, with LC50, LC90, LC99 which is 0.043 ppm; 0.153 ppm; 0,436 ppm for Curugdago local Bt and 0,104 ppm; 0.321 ppm; 0.809 ppm for the Setiabudi local Bt.

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# A Quantitative Descriptive Cross Sectional Study About Knowledge Levels of Drug Resistant Tuberculosis Among the Residents of Port Elizabeth, Eastern Cape Province, South Africa

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**Abstract**
Background: A high level of knowledge about Multi-Drug Resistant Tuberculosis is very important for TB prevention and control among community members. Objective: The aim of this study was to assess knowledge levels of Multi-Drug Resistant Tuberculosis among the residents of Port Elizabeth. Material and methods: A quantitative descriptive cross sectional study was conducted. The research sample consisted of 400 residents (190 males and 210 females) who were purposefully and conveniently selected in Port Elizabeth. Four point likert scale close-ended questionnaires were used to collect data. Results: The majority (56%) of the residents of Port Elizabeth had poor knowledgeable levels about Multi-Drug Resistant Tuberculosis. Secondly, more females and adults showed poor knowledge levels of Multi-Drug Resistant Tuberculosis than males and youth. Conclusion: Participants had poor knowledge and misconceptions about the disease. More adults and females were more vulnerable and at risk of infection than youth and males. There is a need for increased coverage and develop educational material in different languages that are appropriate for the various levels of literacy. The aims of the MDR-TB de-centralisation was to improve access and acceptability. Acceptability can be achieved if people have proper knowledge about the disease and hence a need to scale up education interventions, the involvement of the infected and traditional practitioners in the delivery of such interventions.

**Key Words:** Knowledge, Tuberculosis, Multi-Drug Resistant Tuberculosis and Tuberculosis

## 1. INTRODUCTION AND BACKGROUND

Tuberculosis (TB) is an infectious deadly contagious but preventable disease. The high incidence of TB globally is a cause for concern and a huge threat to public health (Kodisang, 2014: 12). According to the World Health Organization (WHO) in 2016, there were an estimated 10.4 million new TB cases in the world, and 10% was living with HIV. 95% were adults of whom 65% was males 74% of these people live in Africa, and almost 64% of the total was from seven countries (India, Indonesia, Philippines, Russia, Pakistan Nigeria, and South Africa) (WHO: 2017). In 2014, the 22 high TB burdened countries accounted for almost 83% of all the estimated new TB cases globally (WHO, 2017).

The emergence of Multi-Drug Resistant Tuberculosis (MDR-TB) further poses a more serious threat to control of TB worldwide. In 2016, there were an estimated 600 000 new cases of Rifampicin Resistant Tuberculosis (RR-TB) globally of which 490 000 had MDR-TB. About 47% of the RR-TB cases lived in India, China, and Russia. 129 689 people were notified as having started MDR-TB treatment in 2016 (WHO, 2017).

In SA, during the initial outbreak of the MDR-TB, the National Tuberculosis Program required that all Multi-Drug Resistant TB patients be hospitalised for an initial period of six months as required by the South African National Department of Health. The patients were admitted to isolation wards or hospitalised at the centralised MDR-TB site for a long period, and their discharge was dependent on the attainment of three culture-negative sputum that were taken a month apart. Challenges such as delayed treatment initiation, unavailability of beds, poor treatment, and infection control measures and pressure from human rights groups were some of the challenges that lead the passing of the de-centralisation and de-institutionalisation policy for management of MDR-TB in 2011. Its aims were to treat patients closer to their families, and thereby promote acceptance among community members while reducing costs associated with taking treatment. (South African National Department of Health, 2011).

In SA, KwaZulu-Natal (KZN) is the Province with the highest number of people infected with Multi-Drug Resistant-TB. It was in 2005 at the Church of Scotland Hospital in Kwa-Zulu Natal, Tugela Ferry where Extensive Drug Resistant Tuberculosis (XDR-TB) was first identified in SA with a mortality rate of 98% (Ahmed, Velayati & Mohammed, 2016: 253). The province of the Western Cape (WC) and the Eastern Cape (EC) are lying in the second and the third spot after Kwa-Zulu Natal with regard to the number of people infected with Multi-Drug Resistant-TB respectively (Ndjeka, 2014: 4; Kodisang, 2014: 2).

Port Elizabeth (PE) in the Nelson Mandela Bay Municipality (NMBM) is one major city in the EC, South Africa. TB was declared a crisis in the NMBM and in 2011, an announcement was made in the EP Herald that war against TB was lost in the NMBM (Ndabeni and Hayward, 2011: 12). One in 100 people is infected with TB in the NMBM. Secondly, 90% of those diagnosed with TB are also co-infected with HIV and or AIDS. NMBM has also recorded the second highest rates of HIV deaths after Mangaung (185.9 per 100 000) with (123.4 per 100 000 (Health-e, 2018). NMBM has a 3$^{rd}$ highest rate of TB treatment defaulters and also ranks among the ten worst metros in the country for deaths caused TB, TB cure and treatment success rate (Pillay, 2015: 2).

Previous TB control and prevention strategies were largely focussing on biomedical interventions. There is growing evidence that such interventions alone are not enough to curb the spread of this deadly disease. Researchers are also looking at the possibilities of including social aspects such as community or patient education and awareness. The literature also indicates that changes in socio economic status and improvements of patient knowledge and attitudes strengthen TB control. The WHO have also included education interventions as one of its priorities (Maharaj, Ross, Maharaj & Campbell, 2016 2).

Public knowledge about MDR-TB has been poorly researched despite the growing interest in socio-economic aspects of this disease. Accurate MDR-TB knowledge is of significance for curbing and preventing the spread of disease in the community. There is also an association between negative attitudes and low knowledge about a disease (Wang, Wada, Hoshi, Sasaki, Ezoe & Satoh, 2013: 64). Inadequate knowledge, erroneous beliefs, and misconceptions regarding TB is exacerbating its spread (Wieland, Weis & Yawn, 2012: 14).
Fear of social isolation, prejudice, stigmatization, and discrimination by family healthcare workers and community members also hinder TB prevention and control as they lead to treatment default, abandonment of treatment by those already diagnosed and non-disclosure of health status and delays in health seeking and diagnosis by community members (Ma, Ren & Wang, 2015: 312).

The National Department of Health has embarked on community outreach programs and intensive educational campaigns throughout the country both in rural and urban areas to try and educate people about TB and HIV and AIDS (Fana, Mayekiso & Gwandure, 2013: 64). If community members do not understand government policies and interventions on MDR-TB, they are less likely to accept the decentralised health projects in their communities. When people have a low knowledge, they are less likely to take advantage of the health facilities at

their communities and seek help for treatment of diseases like MDR-TB. Lack of knowledge about diseases is associated with negative attitudes towards diseases (Fana et al., 2013: 62).

In a study that was conducted to assess knowledge of Multi-Drug Resistant-TB among healthcare workers and patients, more than half of the respondents had poor knowledge, misconceptions and erroneous beliefs about Multi-Drug Resistant-TB (Malangu & Adebanjo, 2015: 4; Patle & Khase 2014: 51). Erroneous beliefs such as breaking of cultural rules that demanded sexual abstinence after death of a family member and lack of knowledge was also found among the respondents in a study that was conducted to assess knowledge, attitudes and perceptions of patients about TB and MDR-TB (Esmaeli, Ali, Agonafir, Desale, Yaregal, & Desta, 2013: 785; Edgington, Sekatane & Goldstein, 2002: 1075). Other studies reported misconceptions about causes of TB such TB being caused by witchcraft, 'evil eye' and Satan (Adebe, 2010: 4), cold weather (Gelaw, Genebo, Dejene, Lemma & Eyob, 2001: 387). A study carried out in Eastern Cape to assess stigma associated with TB in the era of HIV and AIDS found that TB was a highly stigmatised disease and that resulted in MDR TB patients being secretive and reluctant to visit a clinic for ongoing medication (Moller & Erstad, 2007: 117) .

It is also of significance to note that there is a problematic relationship between the knowledge of a disease and behaviour. There is a gap in research to explore knowledge and behaviour in relation to MDR-TB.
In SA, there are also few studies that explain why certain individuals are continuing to behave in ways that make them vulnerable to infection even after attending health education programme. There is not enough research that indicates the link between knowledge of MDR-TB and communities engaging in health protective behaviours (Fana et al., 2013: 59).

There is also a gap in the literature with regard to research on knowledge levels among the general population about MDR-TB. The number of TB related deaths is unacceptably high considering the fact that with timely diagnosis and correct treatment which is freely available at various public health centres or clinics in SA. Furthermore, almost all people infected with tuberculosis can be cured. The emergence of MDR-TB and its continuing spread despite the biomedical interventions and efforts to mitigate and curb its spread in society is also unacceptable. This paper addresses some of these challenges by undertaking a study to assess community's knowledge levels about this deadly, highly contagious but preventable disease in Port Elizabeth in the NMBM.

## 2. THEORETICAL FRAMEWORK

In this study, the researcher has chosen to use Knowledge, Attitude, Behaviour, and Practices (KABP) methodology. KABP is not a theoretical framework or philosophical paradigm, but a method used by public health researchers to assess the community's understanding and response to a disease. KABP studies are highly focused on evaluations that are used to measure changes in human knowledge, attitudes, and practices in relation to disease prevention. KABP studies tell us what people know about certain things, how they feel, and how they behave. In this study, only one aspect of the KABP methodology was considered, and that is, knowledge (K) of community members about MDR-TB (Nathalie, Leila, Claire, Nathalie, Caroline, & Josiane, 2013: 1011).

This study emerges because of the observed gap in literature and theory with regard to MDR-TB knowledge of residents of the PE in the Nelson Mandela Bay Municipality. This study assesses knowledge levels of MDR-TB among the residents of PE. This study also establishes Port Elizabeth's resident's MDR-TB knowledge according to age and gender.

## 3. RESEARCH METHODOLOGY AND DESIGN

### The study design

In this cross-sectional study, a descriptive, non-experimental research design with a quantitative approach was used to investigate knowledge levels about MDR-TB among residents of Port Elizabeth in the Nelson Mandela Bay Municipality, Eastern Cape, South Africa.

**The study setting**

**Figure 1: Eastern Cape District Municipalities**


Klopper (2013: 453).

Nelson Mandela Bay Municipality is the third largest and most densely populated district in the Eastern Cape Province, South Africa and has a population of about just over one million. The Nelson Mandela Bay Municipality has 60 wards and is made up of Port Elizabeth (48), Uitenhage and Despatch (12).
The unemployment rate is in the NMBM is 36%, 45, 3% Eastern Cape Province and 36.8% nationally. Female-headed households are at about 41%, and it is in Port Elizabeth, Kwa-Zakhele in the Nelson Mandela Bay Municipality where 98% of 580 households used bucket system and that 81% of them used paraffin as their source of energy (Statistics SA, 2013).

**Study participants and sampling**

The study participants were residents of Port Elizabeth in the Nelson Mandela Bay Municipality who were 18 years old above. The sample size was 422. It was calculated using the population of Nelson Mandela Bay Municipality 1 152 115 and statistical variables of 95% (CI), 5% significance interval and then factoring in a 10% non-response rate (384 + 38 = 422).
In this study, multi-stage sampling was used to select the research respondents. The sampling strategy was purposive at one level when only 48 Port Elizabeth wards from the list of the 60 wards in the Nelson Mandela Bay Municipality were selected for the study purpose. It was also random at another level when every 5$^{th}$ ward was selected from the list of the 48 Port Elizabeth wards until 10 wards were selected for the purpose of this study. It was also purposive at another level when the 18 years old and above research respondents were selected. It was also accidental or convenient at another level when data was collected in the 10 wards in those residential areas that were more accessible and closer to the researchers. 42 respondents were selected to participate in this study from each of the ten wards. Lastly, it was also accidental or convenient when data was collected from anyone that met the inclusion criteria, gave consent and was available in the house at the time of data collection.

**Research instrument and pilot study**

The researcher developed an English language questionnaire with the assistance of the research supervisor, health educator, and an MDR-TB specialist. The researcher collected data with the assistance of two research

assistants using these structured questionnaires. The first part of the questionnaire dealt with the socio-demographic details of the participants.
The second part dealt with knowledge of about the risk, severity, causes, transmission mode and prevention methods, diagnosis, treatment and management of Multi-Drug Resistant Tuberculosis. The ratings were as follows: strongly agree 1, agree 2, disagree 3 and strongly disagree 4. The scale of 1-4 was used in this study in order to prevent the respondents from choosing a neutral answer.

A pilot study was conducted in two wards in the Despatch/Uitenhage area to test the feasibility of the study, and that included the methodology, administration procedures, and the research instrument in order to check for inaccuracies and ambiguity. A sample of 63 individuals (15%) of the initially planned sample of 422 of the main study was included in the pilot study. These participants were excluded from the actual study.

The validity of the research instrument was checked through inter-ratter assessment of its usefulness in collecting the required information from the respondents. Adjustments were made on time required to complete the questionnaires. In order to assess the participant's knowledge of MDR-TB the respondents were asked to tick a response that represented their knowledge about the disease. The ratings were as follows: strongly agree and agree was made1 and disagree and strongly disagree was made 2. All correct answers yielded 1 point, and incorrect opinions and missing data yielded no points. The responses were then added together in order to yield a knowledge score that ranged between 0 and 25. High scores were an indication of high awareness and knowledge levels about Multi-Drug Resistant Tuberculosis. A score of 0 to 16 was categorised to be a poor knowledge score, and a score from 17 to 25 was categorised as a good knowledge score.

**Data analysis**

Data entry was carried out by the researcher and data was analysed using SPSS® statistical package for descriptive statistics. Data were summarised using descriptive methods such as frequency and range.

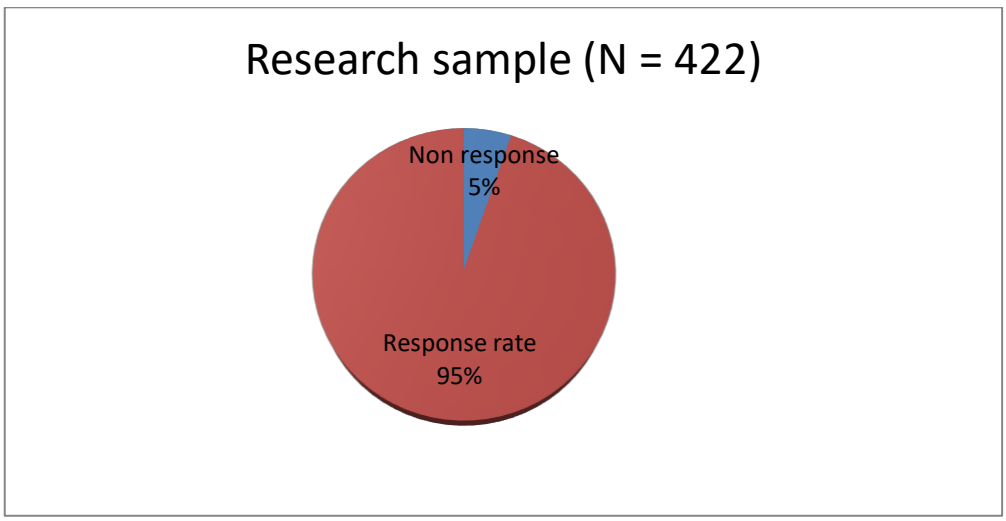
## 4. ETHICAL CONSIDERATIONS

This research study was approved by the Higher Degrees Ethical Committee for Research Involving Human Subjects of the University of Fort Hare (ethics number IJE 171SFAN01). All study participants gave consent before participating in the study to the researcher and the two research assistants.

## 5. RESEARCH RESULTS

**The response rate of the respondents**

**Figure 2: Response rate**

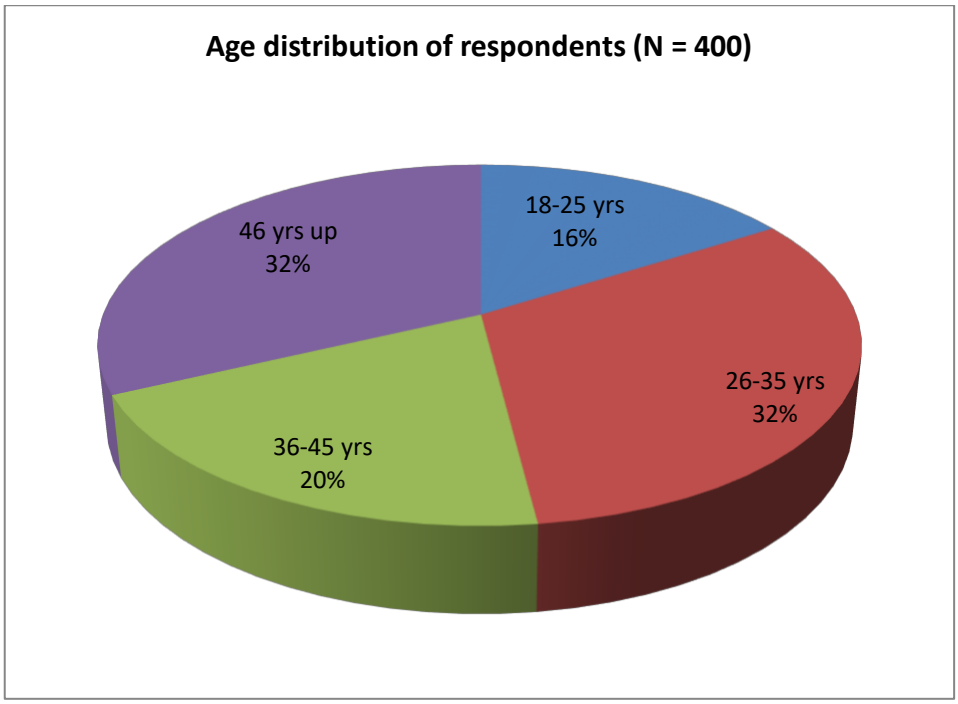



Field study (2016)

As shown in figure 2 the sample was 422. Of the 422, only 400 questionnaires were useable and that amounted to a response rate was 95%. 22 questionnaires were incomplete as some of the respondents decided to withdraw from the study or refused to give consent and that constituted a 5% non-response rate.

**Age of the respondents**

**Figure 3 Age of the respondents**




Field study (2016)

As illustrated in figure 3 the results show that the respondents with the ages between 26 to 35 years and 46 years and above were equally represented at 32%. The respondents with the ages between 18 to 25 years were the least represented in this study. This is common in most studies which are conducted during the day as it is expected that the vast majority of youth are of school going age and therefore at various educational institutions, while others are beginning to work.

**Table 1: Socio-demographic characteristics of the respondents**

| Variables | Frequency | Percentage |
|---|---|---|
| **Gender** | | |
| Males | 190 | 47% |
| Females | 210 | 53% |
| **Race** | | |
| African | 270 | 68% |
| Coloured | 93 | 23% |
| Indian | 12 | 3% |
| White | 25 | 6% |
| **Marital status** | | |
| Single | 218 | 54% |
| Married | 114 | 29% |
| Widow | 48 | 12% |
| Divorcee | 20 | 5% |
| **Educational status** | | |
| No formal education | 41 | 10% |

| | | |
|---|---|---|
| Primary education | 150 | 37% |
| High school education | 86 | 22% |
| Tertiary education | 123 | 31% |
| **Employment status** | | |
| Employed | 150 | 37% |
| Unemployed | 250 | 63% |
| **Family monthly income** | | |
| R 4999 and less | 233 | 58% |
| R 5000 – R9999 | 71 | 18% |
| R 10000 – R14999 | 61 | 15% |
| R 15000 and up | 35 | 9% |
| **Type of settlement** | | |
| Formal settlement | 224 | 56% |
| Informal settlement | 176 | 44% |
| **Number of family members in the household** | | |
| 1 – 2 | 100 | 25% |
| 3 – 4 | 253 | 63% |
| 5 – 6 | 47 | 12% |
| **The main source of drug-resistant TB information** | | |
| Healthcare workers and teachers | 56 | 14% |
| Family members and friends | 86 | 22% |
| Television and radio | 137 | 34% |
| Television, radio, and internet | 121 | 30% |

Field study (2016)

Table 1 shows that majority of the respondents in this study were Africans, females, unemployed and single. Table 1 further indicates that the majority of the research subjects in this study earned R 4 999 ($357) and less per month. Most of the participants in this study were also residing informal settlement and were staying with three to four family members in their house. Table 1 also reveals that most (10%) and (37%) of the respondents respectively had no formal education and finished primary education. Most of the respondents also indicated that television and radio was their main source of MDR-TB information.

**Respondents' knowledge levels of Multi-Drug Resistant Tuberculosis**

**Table 2: Respondents knowledge levels of Multi Drug-Resistant Tuberculosis**

| Variables | Female N = 210 | | Males N = 190 | |
|---|---|---|---|---|
| | Freq. | % | Freq. | % |
| 1. Statement relating to causes, perceived severity and risk of MDR TB | | | | |
| a. Bacteria resistant to Rifampicin and Isoniazid | 191 | 91 | 172 | 91 |
| b. Anyone can be infected by MDR-TB | 135 | 64 | 125 | 66 |
| c. Dust, smoking, poverty and drinking alcohol cause MDR-TB | 62 | 29 | 62 | 33 |
| d. The incorrect and incomplete treatment regimen | 133 | 63 | 122 | 64 |
| e. MDR-TB is dangerous and a problem in my area | 210 | 100 | 190 | 100 |
| | **146** | **69** | **134** | **71** |

| Variables | Female N = 210 | | Males N = 190 | |
|---|---|---|---|---|
| | Freq. | % | Freq. | % |
| 2. Statements relating to signs and symptoms of MDR-TB | | | | |
| a. Weight loss and loss of appetite | 185 | 88 | 170 | 89 |
| b. Cough that lasts longer than 3 weeks | 186 | 89 | 154 | 81 |
| c. Nightmares and hallucinations | 158 | 75 | 141 | 74 |
| d. Chest pains and shortness of breath | 166 | 79 | 147 | 77 |
| e. Coughing up of blood | 210 | 100 | 190 | 100 |
| | **181** | **86** | **160** | **84** |
| 3. Statement relating to the transmission of MDR-TB | | | | |
| a. Witchcraft | 135 | 64 | 125 | 66 |
| b. Through the air when infected coughs & sneeze | 180 | 86 | 165 | 87 |
| c. Hereditary and spread through blood | 197 | 94 | 175 | 92 |
| d. Through hugs and handshake with the infected | 24 | 11 | 22 | 12 |
| e. Touching items in public spaces or areas | 80 | 38 | 83 | 44 |
| | **123** | **59** | **114** | **60** |

| Variables | Female N = 210 | | Males N = 190 | |
|---|---|---|---|---|
| | Freq. | % | Freq. | % |
| 4. Statements relating to prevention of MDR-TB | | | | |
| a. Cover mouth & nose when coughing & sneezing | 172 | 82 | 163 | 86 |
| b. Avoid close contact for a long period with infected | 189 | 90 | 166 | 87 |
| c. By avoiding hugs and handshakes | 49 | 23 | 55 | 29 |
| d. By opening windows and wearing musk | 125 | 59 | 107 | 56 |
| e. Taking traditional medicine & herbal remedies | 106 | 50 | 100 | 53 |
| | **128** | **61** | **118** | **62** |
| 5. Statements relating to MDR-TB diagnosis and treatment | | | | |
| a. MDR-TB infected remain infectious while on and after completion of treatment | 149 | 71 | 141 | 74 |
| b. MDR-TB treatment is provided freely at designated DR-TB centres | 191 | 91 | 179 | 94 |
| c. Psychosis vision and hearing loss are side effects of DR-TB treatment | 72 | 34 | 69 | 36 |

| | | | | |
|---|---|---|---|---|
| d. Treatment duration for DR-TB is 6 to 12 months | 63 | 30 | 61 | 32 |
| e. MDR-TB treatment outcomes are evaluated by sputum tests and chest X-rays | 191 | 91 | 159 | 84 |
| | **133** | **63** | **122** | **64** |

Field study (2016)

Table 2, presents data relating to knowledge of causes and perceived severity of risk, signs and symptoms, transmission, prevention, diagnosis treatment and management of MDR-TB. Overall, Table 2 reveals poor knowledge levels of MDR-TB among the respondents of this study. The results show that the respondents were knowledgeable of the severity of risk, causes, signs, and symptoms of MDR-TB. The findings also show poor knowledge levels about the transmission, infection prevention, diagnosis methods and the treatment and management of MDR-TB.

The findings in Table 2 illustrates that only a few respondents (31%) knew that dust, smoking, poverty and drinking alcohol were not the causes of MDR-TB whereas (63%) and (91%) respectively knew that incorrect regimen and bacteria resistant to Isoniazid and Rifampicin caused of MDR-TB.

The results in Table 2 also shows that the majority of the respondents knew that loss of appetite and weight, coughing of blood, coughing for more than three weeks and chest pains were the signs and symptoms of MDR-TB. Study participants also knew that nightmares and hallucinations were not signs and symptoms of MDR-TB.

The research results in Table 2 reveals that the majority of the respondents knew that MDR-TB was transmitted through the air when an infected person coughs or sneezes .The results also indicate that more than a third of the participants in this study believed that MDR-TB was transmitted through witchcraft.

Table 2 further indicates that the majority of the respondents in this study knew that covering mouth when coughing or sneezing, avoiding close contact with the infected for long periods and the opening of windows and wearing of the mask were some of the infection prevention methods for the spread of MDR-TB. About 51% and 26% of the respondents respectively knew that traditional and herbal remedies and avoiding hugs and kisses were not MDR-TB prevention methods.

Lastly, the results in Table 2 also show that a quarter of the study participants knew the side effects and the duration of MDR-TB treatment. The results also show that the majority of the respondents knew that MDR-TB infected were not infectious when on and after treatment completion.
Table 2 reveals that overall, male respondents showed higher scores than female respondents on knowledge of the causes and the perceived severity and risk of MDR-TB. Yet it also illustrates that female participants were more knowledgeable and aware with regard to the signs and the symptoms of MDR-TB than the male participants. The research results further show that all the study participants knew that coughing up blood was another sign and symptom of tuberculosis.

Table 2 indicates that male respondents were more knowledgeable and aware of transmission mode and methods of MDR-TB than female respondents even though female respondents showed that they were more aware and knowledgeable about the transmission of MDR-TB. Females did note that TB is not hereditary and not spread through blood.

Male respondents showed better MDR-TB prevention knowledge than females. More males knew that covering mouth and nose when coughing and sneezing was a method of preventing the spread of MDR-TB. More male respondents also knew that traditional medicine & herbal remedies and avoiding hugs and handshakes were not appropriate methods for the prevention of infection and spread of MDR-TB. The results also show that more females were more aware and knowledgeable about avoidance of close contact for long periods, opening of windows and wearing of the mask when with infected as infection prevention methods than males.

Lastly, male respondents showed higher scores than females on knowledge of diagnosis, treatment, and management of MDR-TB. More males knew treatment duration for MDR-TB, MDR-TB treatment side effects such as psychosis vision and hearing loss compared to females. More males than females knew that MDR-TB treatment was provided freely and that those in treatment were not infectious during and after treatment completion. More female than males knew that sputum test and chest X-rays were MDR-TB treatment outcomes evaluation methods.

**Knowledge of MDR-TB according to age**

**Table 3: Knowledge of Multi-Drug Resistant Tuberculosis according to age**

| Age | Number of respondents | Right answers | Percentage | Wrong answers | Percentage |
|---|---|---|---|---|---|
| **18 – 35 years** | 192 | 106 | 55% | 86 | 45% |
| **36 – 68 years** | 208 | 70 | 34% | 138 | 66% |
| **Total** | **400** | **176** | **44%** | **224** | **56%** |

Field study (2016)

Table 3 illustrate that youth showed high scores of knowledge of MDR-TB than adults.

**Knowledge of MDR-TB according to gender**

**Table 4: Knowledge of Multi-Drug Resistant Tuberculosis according to gender**

| Gender | Number of respondents | Right answers | Percentage | Wrong answers | Percentage |
|---|---|---|---|---|---|
| **Male** | 190 | 88 | 46% | 102 | 54% |
| **Females** | 210 | 88 | 42% | 122 | 58% |
| **Total** | **400** | **176** | **44%** | **224** | **56%** |

Field study (2016)

Table 4 illustrates that more male than females showed greater knowledgeable of MDR-TB.

## 6. DISCUSSION

The emergence of Drug-Resistant strains of Mycobacterium tuberculosis has become a major threat to public health. SA as a member state to the WHO needs to work towards the achievement of the WHO new targets of achieving 100% decline in incidence and deaths due to TB by 2035 and towards the Sustainable Development Goals (SDG) of ending TB by the year 2030.

If the above targets are to be met, community members must possess appropriate knowledge with regard to the causes of MDR-TB, its sign and symptoms, transmission, prevention and treatment modes, and methods so that they can be able to take appropriate actions to control and prevent the spread of this disease.

The results of the present study illustrate that some of the community members lacked proper knowledge about MDR-TB. 56% of the residents of Port Elizabeth showed poor knowledge levels of MDR-TB. Secondly, more females (58%) and adults (66%) had poor knowledge levels of MDR-TB than males (54%) and youth (45%). In

line with the above findings less than half of the respondents showed good knowledge of MDR-TB (Javed, Tahir, Hashmi, & Jamil, 2016: 1; Malangu & Adebanjo, 2015: 1). Literature shows that studies assessing knowledge of MDR-TB were mainly conducted among health care workers, patients and few assessments were done among community members (Malangu & Adebanjo, 2015: 1).

These findings are discouraging considering the fact that SA is one of the recipients from the Global Fund to fight the spread of TB and HIV and AID in Africa (Fana et al., 2013: 69). Lack of knowledge about MDR-TB can also be as the results of low literacy levels that were evident among the research respondents. The findings show that 47% of the respondents possessed educational levels below high school education. Acquiring MDR-TB related knowledge might be a challenge to those with low literacy levels. Low literacy or educational levels are associated with poor or inadequate knowledge of disease (Gelaw, 2016: 9). Comprehensive TB knowledge is associated with high education, while uneducated people and those with primary education had high odds of low knowledge, due to inability to acquire MDR-TB related information (Abebe & Demissie, 2012: 1).
The majority of the respondents in this study were unemployed (63%), and many reported living on with 3 to 6 members if a house (75%), having monthly family income of less than R 4999 (58%) and less than half lived in informal settlement (44%) and possessed educational levels below high school education (47%). The above socio-demographic characteristics show that many participants were economically and socially vulnerable.

The adoption of positive health-related behaviours such as treatment adherence, being in a well-ventilated area, and avoidance of contact for long periods with MDR-TB infected might prove difficult for some of the research respondents due to the above mentioned socio-demographic characteristics. TB is mainly found in areas where there are high levels of poverty, overcrowding and among malnourished populations (Kalichman, Watt, Sikkema, Skinner & Pieterse, 2012: 959).

The study results also indicate that some of the study participants had erroneous beliefs, misconceptions, and distorted information about the causes, signs and symptoms, transmission mode, prevention, diagnosis and treatment methods of MDR-TB. Almost a third of the respondents in the present study did not believe that anyone could be infected with MDR-TB. This is in line with other studies that have shown that distorted risk perception makes society susceptible to infection (Natalie et al., 2013: 1122).

The research results show that the majority of respondents knew that MDR-TB caused by bacteria resistant to rifampicin and isoniazid and incomplete and incorrect treatment regimen. In line with the above findings, bacteria (Maharaj, Ross, Maharaj & Campbell, 2016: 3) cause MDR-TB. Some of the respondents believed that MDR-TB was transmitted through witchcraft. TB suspects usually present themselves late to seek medical assistance because they first seek assistance from traditional healers as they believe that they are capable of curing TB (Haasnoot et al., 2010: 903) and that TB was caused by witchcraft, evil eye and Satan (Adebe et al., 2010: 3).

The study also revealed that some of the respondents believed that they could prevent themselves from being infected with MDR-TB by taking traditional medicine and herbal remedies. In line with the findings, respondents indicated that they consult traditional healers and make use of herbal and traditional remedies to treat TB (Bati et al., 2013: 734).
Some of the respondents believed that MDR-TB was a hereditary disease and that it was transmitted through the blood in the family.

Similar to the above findings respondents indicated that MDR-TB was created in their body, they were not infected by anybody or inside the body of their family members and that, they could not use drugs to treat it (Burtscher, Van den Bergh, Toktosunov, Angmo, Samieva & Arechaga, 2016: 7).

Some of these beliefs can also be attributed to the fact that MDR-TB is a transmitted through the air and people can stay for a long period before latent infection became active. Furthermore, delay in health-seeking also increases the risks of infection among close contacts and therefore by the time one gets diagnosed too many people are already infected within the same family. Some of the respondents had a false belief that MDR-TB infected people were infectious while they were on treatment and after completion of treatment. Patients in

KwaZulu-Natal also developed false beliefs that TB was incurable like HIV and AIDS as they witnessed deaths of other patients daily in hospitals (Naidoo, Taylor & Jinabhal, 2007: 48). In a study conducted in a high burdened country to assess knowledge and attitudes about MDR-TB and Extreme Drug Resistant Tuberculosis (XDR-TB), it was revealed that students had a false belief that XDR-TB was non-curable (Javed et al., 2016: 6).

Such beliefs can also be attributed to lack of appropriate knowledge among the respondents, and misinterpretation of observations made from health care workers such as isolation of infected or TB suspects, wearing of masks and washing of hands when dealing with patients as compliance measures to nosocomial infections prevention or control policies. The lack of treatment adherence, abandoning of treatment when people feel better leads to relapse and reactivation of infection.

Knowledge about the duration of treatment is of significance as it might assist in ensuring treatment adherence even when patients are feeling better and increases early intervention to stop the spread of the disease. Javed et al., (2016: 4) and Kansal, Behera & Sarin (2014: 30) respectively revealed that 20% and 49.34% of the respondents knew the duration of MDR-TB treatment. This was similar to the results of this study where only 31% of the respondents knew the duration of MDR-TB treatment.

Knowledge of TB drugs side effects can also assist in ensuring that the infected do not stop taking their medication but rather adhere to it and report on time to healthcare workers the adverse drug reactions for proper advice. MDR-TB treatment is worse than the disease itself (Burtscher et al., 2016: 11). It is also among the most painful treatments regarding side effects and duration (Isaakidis, Rangan, Pradhan, Ladomirska, Reid & Kielmann, 2013: 1131).

Surprisingly, the study results illustrated that more males than females respondents showed greater or good awareness and knowledge of MDR-TB and that is in agreement with a study conducted in India (Konda, Melo & Giri: 566). Men have greater public involvement than women and hence greater exposure to TB. It is also a social norm for women to be homebound while men are interacting with the outside world (Gelaw, 2016: 9). These findings can possibly be attributed to the changes in the curriculum and the introduction of subjects such as life orientation or sciences. They can also be attributed to the cultural beliefs that have placed more emphasis on educating boys than girls (Nkomazana, 2008: 92).

In contrast to the above findings, studies that were previously conducted have revealed that females were more aware and knowledgeable than males (Fana et al., 2013: 59). Females are said to seek health care services more often than men do, and that exposes them to more health-related information than men. It is also stated that men are more reluctant to accompany their pregnant wives to the healthcare centres (Makhunga-Ramfolo et al., 2011: 9).

These findings are in contrast to previous studies, which revealed that youth generally showed health risk behaviours or practices (Gwandure & Mayekiso, 2011: 35).

**Limitations**

There were limitations in making inferences about the meaning of the research results.
The study was conducted in Port Elizabeth, in the NMBM, and therefore a generalisation of the findings to other residential areas provincially and nationally is limited. Secondly, there were limitations in making inferences about the meaning of the research results because this study was descriptive in nature. Thirdly, since the sample was not chosen at random, but through convenience sampling, the sample was not representative of the population that was being studied. The selection bias resulted in over or under-representation of certain groups, as some of the residents who were studying and working were left out of this study as it was carried out during weekdays and those who left their places of residence early and returned late from work and school were missed out in this study.

**Recommendations**

Based on the findings of this study, it is recommended that MDR-TB health education interventions and awareness campaigns are intensified. Future education interventions should focus on addressing misconceptions and erroneous beliefs about Multi-Drug Resistant Tuberculosis. More attention should be placed on health education campaigns, and interventions should be directed at adults and females. Research also reveals that empowering women is like empowering the whole community. Health promotion initiatives and program coverage should be extended to include places where most people spend most of their time (schools, shopping malls, churches, and sports clubs).

In delivering such programs, health educators together with People living with MDR-TB should be used to facilitate the learning process and offered an opportunity to interact with others and offer first-hand information about their lived experience. Such interaction could assist in increasing the general awareness and knowledge levels about different types of MDR-TB and also in creating cues for action and promote adaption of positive health behaviours and actions and thereby assist in curbing the spread of Multi-Drug Resistant Tuberculosis. Health educators can also work together with community health nurses, community leaders, TB and HIV and AIDS volunteers, spiritual or faith and traditional health practitioners in the dissemination of knowledge about MDR-TB in the Nelson Mandela Bay Municipality and the Eastern Cape at large.

**Conclusion**

This research assessed knowledge levels of MDR-TB of Port Elizabeth residents. The pattern of respondent's responses was shown using descriptive statistics. In this study, the majority of respondents had poor knowledge levels of Multi-Drug Resistant Tuberculosis. Secondly, adults and females had poor knowledge levels of MDR-TB compared to youth and males. Many respondents are considered to be high risk and vulnerable. The respondents are also highly susceptibility to MDR-TB infection because of their living conditions. Furthermore, the results indicate gaps in knowledge levels about MDR-TB, which could make them vulnerable to MDR-TB infection. The results of this study indicate that some of the research respondents were not aware of the side effects of MDR-TB drugs. These findings highlight the need for education about MDR-TB treatment and its side effects. The deficiency in knowledge about MDR-TB among the adults and female research respondents highlight their vulnerability to infection and health risk.

Inadequate knowledge and misconceptions about prevention and transmission of MDR-TB are a threat to the successful control and prevention of the spread of this deadly but preventable disease. The success of the de-institutionalisation and de-centralisation policy in promoting acceptance among community members largely depend on them having appropriate knowledge non-discriminatory or judgemental attitudes towards the MDR-TB infected. All community members need to be aware of how to protect themselves. MDR-TB information and programs that culturally sensitive should be provided to community members using different media or methods in order to enlighten them and dispel misconceptions and erroneous beliefs with regard to MDR-TB. The efforts of the TB control program will be fruitless if community misconceptions about the risk, causes, transmission, prevention, and management of MDR-TB are not properly dealt with.

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**Authors' contributions**

The authors contributed equally to this work.

**Competing interest**

The authors have no competing interest to declare

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# Likely Health Impacts of Climate Change in Guyana: A Systematic Review

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**Abstract**
As anthropogenic inputs continue to drive climate change towards a "tipping point" of increasingly severe consequences, associated research has become more important than ever. Even if mitigation efforts are successful in slowing, or even halting, climate change progression, changes have already been triggered that will be felt for decades; the health impacts of these changes will be felt in most populations around the world and will threaten the well-being of billions. Further, it has been suggested that these impacts will be experienced differently, especially depending on geography. As such, it is crucial for location-specific analysis of the potential consequences of climate change to take place. This study constitutes a systematic review of the health consequences that can be expected in Guyana specifically, the results of which are of some relevance to Latin American more generally. Relevant documents selected for full review underwent quantitative and qualitative data analysis. From this analysis, six thematic categories emerged: i) dengue and malaria, ii) other infections, iii) flooding and waterborne diseases, iv) food and water shortages, v) respiratory issues, and vi) natural disasters. These represent the most likely and most severe health consequences that may be exacerbated by climate change impacts in Guyana. Despite these insights, a knowledge and research gap in this field is evident, and a call is made for further research and policy action to better understand and prepare for the upcoming challenges climate change will present.

**Key Words:** Guyana, Caribbean, South America, Health Impacts, Climate Change, Malaria, Dengue, Diarrhea, Flood

## INTRODUCTION

Despite any political or public controversy that might still exist, the overwhelming scientific consensus is that anthropogenic factors (i.e., human inputs) have resulted in changes to our climate. By burning fossil fuels, we release greenhouse gas, primarily carbon dioxide ($CO_2$), which traps heat within the atmosphere (Cambell-Lendrum, Corvalan, & Neira, 2007). In the past century, the Earth's temperature has increased by approximately 0.8 degrees Celsius, with 75% of that change coming in the past three decades (Cambell-Lendrum, Corvalan, & Neira, 2007). There is great concern that we are on the verge of a "tipping point," which would occur if temperatures were to rise more than 2$^{o}$C above pre-industrial levels. This would create a situation where climate change became self-sustaining and uncontrollable, with the consequences becoming increasingly severe (Parry et al., 2001). By 2100, temperatures are expected to increase another 1.4 to 5.8 degrees, sending us over this

threshold (People's Health Movement, 2005).

Even if mitigation efforts are successful in slowing, or even halting, climate change progression, changes have already been triggered that will be felt for decades; the health impacts of these changes will be felt in most populations around the world and will threaten the well-being of billions (Costello et al., 2009). Categories of impact most commonly associated with climate change include extreme weather events, thermal stress, shifting patterns of infectious disease, and water and food insecurity (Costello et al., 2009; McMichael, Woodruff, & Hales, 2006). While predictions of these impacts are well-documented, the differential experience of various populations remains poorly understood. This is problematic, given that the greatest burden of health impact is likely to fall on the worst off, as it is the poorest populations that have the least capacity to adapt to these changes. In 2000, for example, the WHO has found that, while the developed countries of North America, Europe, and Australia experienced 8.9 disability-adjusted life years (DALYs) per million population due to climate change impacts on health, those in Latin America suffered 188.5 DALYs per million population (#8). This suggests there is a need for further study of how climate will impact particular geographic locations and ethnic groups; this study explores this gap in the understudied population of Guyana.

Guyana is located on the north-eastern coast of South America. Numbering under 800,000 and shrinking, the Guyanese population is split into five major groups: Amerindians, Africans, Indians, Europeans, and Chinese. The Amerindian population makes up almost 10% of the overall population (Government of Guyana Bureau of Statistics, 2002). Each ethnicity or social group, Amerindians prime among them, may reflect particular vulnerabilities to environmental changes. To better understand the state of current thought on this matter, we conducted a review of the literature in order to identify and explore emerging climate-related concerns likely to impact the Guyanese population.

## METHODS

### Systematic Review

A systematic review is a summary and assessment of the state of knowledge in relation to a particular topic or research question. Long established in health sciences, systematic reviews have been increasingly used in climate change research, and differ from more traditional literature reviews in three key ways (Ford and Pearce, 2010). First, research questions are clearly structured and used to inform document review and facilitate the selection of relevant research. Second, key search terms and document inclusion and exclusion criteria are fully documented. Typical climate change literature reviews do not provide detail on their review procedures, making it difficult to replicate the study, validate its conclusions, or examine its comprehensiveness. Lastly, a systematic review of relevant publications allows for both quantitative and qualitative analysis of research trends.

### Review Process

To assess the likely health impacts of climate change in Guyana, we identified and reviewed publications relating to climate change and health in both Caribbean and South American countries. Relevant publications were identified from four different international databases: Pubmed, CAREC/PAHO/WHO, Google Scholar, and Web of Science. For each database, the same search strategy was applied, involving Boolean combinations of keywords: climate, health, and geographic search terms, as outlined in Table 1.

Table 1. List of search terms employed in database search strategy.

| Climate search terms | Health search terms | Geographic search terms |
|---|---|---|
| Climate change<br>Global warming | Health<br>Health impact<br>Population health | Caribbean<br>South America<br>Guyana |

Specific terms used for each database and the number of publications produced are included in Table 2.

Table 2. Search Strategy Specifics

| Database | Terms | # Finds | # Useful finds |
|---|---|---|---|
| PubMed | Climate change + health + Caribbean | 15 | 1 |
| | Climate change + population health + South America | 15 | 1 |
| | Health impact + climate change + Caribbean | 2 | 1 |
| CAREC/PAHO/WHO | Climate change + health + Guyana | 364 000 | 3 |
| | Global warming + population health + South America | 2 650 000 | 1 |
| | Climate change + population health + South America | 3 730 000 | 1 |
| Google Scholar | Global warming + health + the Caribbean | 19 600 | 2 |
| | Impacts of climate change on the health of Guyana | 25 300 | 1 |
| | Climate change + health + Caribbean | 79 400 | 1 |
| Web of Science | Climate change + Guyana | 23 | 1 |
| Total | | 6868355 | 13 |

**Data Analysis**

Given the cell counts (n=13), inferential statistics were not feasible. Hence, qualitative data analysis was conducted using latent content analysis in order to identify key themes describing the relationship between climate change and health in Guyana within the selected publications. To do this, all publications selected for full review were read through, in order to detect key patterns, themes, and categories. This facilitated the establishment of six key thematic categories, within which coding categories were created. Two researchers then independently reread every publication in-depth and coded. Thereafter, the coded text was retrieved, evaluated, and compared with the quantitative analysis to identify key characteristics of climate change health impacts in Guyana.

**RESULTS**

**Search Results**

The initial search produced 6 868 355 documents. Of these, only 13 articles (numbered 1-13 in our inventory in Table 3), none of which were themselves systematic reviews, were identified as appropriate and of relevance to our research question, thus being retained for full review. Due to the number of documents obtained in the initial search, the inclusion of an inventory of publications excluded was not feasible.

Table 3 – List of reviewed articles

| Numerical identifier (#) | Citation |
|---|---|
| 1 | Jury, M.R. (2008). Climate influence on dengue epidemics in Puerto Rico. International Journal of Environmental Health Research, 18(5), 323-34. |

| | |
|---|---|
| 2 | Githeko, A.K., Lindsay, S.W., Confalonieri, U.E., & Patz, J.A. (2000). Climate change and vector-borne diseases: A regional analysis. Bulletin of the World Health Organization, 78(9), 1136-47. |
| 3 | Ortíz, P.L., Pérez, A., Rivero, A., León, N., Díaz, M., & Pérez, A. (2008). Assessment of human health vulnerability to climate variability and change in Cuba. MEDICC Review, 10(2), 31-48. |
| 4 | Hales, S., Edwards, S.J., & Kovats, R.S. (2003). Impact of health on climate extremes. In McMichael, A.J., Campbell-Lendrum, D.H., Corvalán, C.F., Ebi, K.L., Githeko, A.K., Scheraga, J.D., & Woodward, A (Eds.), Climate change and human health: Risks and responses (pp. 79-102). Geneva: World Health Organization. |
| 5 | Patz, J.A., Githeko, A.K., McCarty, J.P., Hussein, U., Confalonieri, U, & De Wet, N. (2003). Climate change and infectious diseases. In McMichael, A.J., Campbell-Lendrum, D.H., Corvalán, C.F., Ebi, K.L., Githeko, A.K., Scheraga, J.D., & Woodward, A (Eds.), Climate change and human health: Risks and responses (pp. 103-32). Geneva: World Health Organization. |
| 6 | Sookdeo, A. (2008). Guyana report on climate change and health [PowerPoint slides]. Retrieved from http://www.carec.org/ |
| 7 | Githeko, A.K., & Woodward, A. (2003). International consensus on the science of climate and health: The IPCC third assessment report. In McMichael, A.J., Campbell-Lendrum, D.H., Corvalán, C.F., Ebi, K.L., Githeko, A.K., Scheraga, J.D., & Woodward, A (Eds.), Climate change and human health: Risks and responses (pp. 43-60). Geneva: World Health Organization. |
| 8 | Campbell-Lendrum, D.H., Corvalán, C.F., & Prüss-Ustün, A. (2003). How much disease could climate change cause? In McMichael, A.J., Campbell-Lendrum, D.H., Corvalán, C.F., Ebi, K.L., Githeko, A.K., Scheraga, J.D., & Woodward, A (Eds.), Climate change and human health: Risks and responses (pp. 153-8). Geneva: World Health Organization. |
| 9 | Epstein, P.R. (2005). Climate change and human health. New England Journal of Medicine, 353, 1433-6. |
| 10 | Moreno, A. R. (2006). Climate change and human health in Latin America: Drivers, effects, and policies. Regional Environmental Change, 6(3), 157-164. doi: 10.1007/s10113-006-0015-z |
| 11 | Pelling, M. (1999). The political ecology of flood hazard in urban Guyana. Geoforum, 30(3), 249-61. |
| 12 | Costello, A., Abbas, M., Allen, A., Bell, S., Bellamy, R., Friel, S., et al. (2009). Managing the health effects of climate change. The Lancet, 373(9676), 1693-1733. |
| 13 | Narayan, K. (2006). Climate change impacts on water resources in Guyana. (2006). Climate Variability and Change-Hydrological Impacts, 308, 413-7. doi:10.1080/09603120701849836 |


The health risks and impacts associated with climate change, extracted from the included papers, are summarized below into six emergent thematic categories: (i) dengue and malaria, (ii) other infectious diseases, (iii) health issues relating to flooding, (iv) food and water shortages, (v) respiratory issues, and (vi) natural disasters:

**(i) Dengue and malaria**

Dengue and malaria concerns were the most common health issues reported as likely to become more severe under changing climatic conditions in Guyana. Ten publications included analyses of the association between climate change, dengue fever, and malaria; 7 dealt with climate change and malaria (#2-8), 3 with dengue (#9, 10, 12). There was considerable overlap in the published studies, with an overarching theme for consideration being the impact of climate change on mosquito populations. A WHO bulletin (#2) notes that the "most widespread and severe climate-sensitive and vector-borne disease in South America is malaria" and "new

breeding sites for vectors may arise due to increasing poverty in urban areas and deforestation and environmental degradation in rural areas." This was echoed by another WHO report (#6), that cited a "statistically significant relationship between El Nino and the malaria epidemic in Guyana."

Similar trends have been reported in numerous South American countries, including Columbia, Peru, and Venezuela (Gagnon, Smoyer-Tomic, & Bush, 2002). The suggestion is that changes in temperature and rainfall, with increases occurring in many locations, will lead to increases in vector density and transmission potential (#3, 5). Hurricanes and other climate-related weather events may lead directly to such increases, evidenced in 1998 by soaring incidence rates of dengue fever and malaria following six feet of precipitation in Central America over three days due to Hurricane Mitch (#8). Similarly, after rain and three cyclones inundated Mozambique for six weeks, incidence of malaria increase fivefold (#8). However, El Nino may also "act indirectly by causing changes in water storing practices brought about by disruption of regular supplies" (#5). It appears the changing weather patterns in Guyana, and South America more generally, will influence mosquito populations, potentially increasing risk of endemic vector-borne diseases like malaria and dengue.

**(ii) Other infectious diseases (schistosomiasis, chagas, leishmaniasis, diarrheal diseases)**

Concerns also exist regarding a range of infections other than malaria and dengue, which may similarly increase due to the shifting environmental conditions caused by climate change. A total of 8 articles (#2-8, 10) were found that addressed these concerns, a strikingly low number given the broad variety of maladies included under this umbrella category, ranging from neglected tropical diseases such as schistosomiasis and leishmaniasis to water contamination illnesses such as cholera and diarrheal disease. It should also be noted that all but one of these articles (#10) overlaps with those discussed in the previous section, covering malaria and dengue fever. This points to a lack of specific analysis targeting a single health issue; the current state of the literature deals more commonly with over-arching reviews of the variety of health risks associated with climate change, preempting as much depth of analysis as might otherwise be possible. Also, of the 8 articles relevant to these issues, five (#2, 4, 5, 7, 8) were WHO global risk assessments that broke down the estimated burden across geographic regions. Of the other 3, one dealt with Cuba (#3), and one with Latin America (#10); only one focused specifically on Guyana (#6) and was a set of Powerpoint slides from 2008. This further indicates the knowledge gap present in Guyana climate change and health research.

With respect to diarrheal diseases, it has been found that incidence rates increase significantly with increased temperature, with mixed findings regarding the relationship between incidence and humidity or precipitation (#8). These associations have been elucidated over daily, seasonal, and annual time periods, suggesting long-term climatic change will lead to significant changes in diarrheal rates, especially amongst the worst off. Checkley and colleagues (2000), for example, found that, while controlling for seasonal variation, daily hospital admission rates for a paediatric diarrheal disease clinic in Lima, Peru increased 8% per 1$^{o}$C temperature increase, indicating that severe cases of child diarrheal disease increase with temperature. Meanwhile, another study focused on Pacific islands found a significant increase in overall diarrhea rates associated with temperature increase, with rates increasing 3% per 1$^{o}$C temperature increase, and with rainfall conditions either higher or lower than average (Singh et al., 2001). In fact, after floods, diarrheal diseases were expected to be the most severe health risk exacerbated by climate change in Latin America (#8).

**(iii) Health issues relating to flooding**

While diarrheal diseases were the most commonly referenced disease other than malaria and dengue fever, it was also noted that heavy rainfall events had the potential to carry contaminants into water supplies, indirectly increasing incidence, not only of diarrheal diseases but other waterborne illnesses such as cholera (#4). Such findings have also been reported in the wake of extreme precipitation in the United States (Curriero, Patz, Rose, Lele, 2001). The WHO predicts that "climate-related ecological changes may enhance primary and secondary transmission of cholera in developing countries, particularly among populations settled in low-lying coastal areas in the tropics"; this suggests that Guyana will be at elevated risk of such a burden (#10). Meanwhile, at the other extreme, the reduced availability of fresh water during droughts could lead to decreases in hygiene-related practices, increasing chances of infections such as trachoma (#4).

**(iv) Food and water shortages**

There are a number of avenues through which climate change can disrupt both food and water systems, creating or exacerbating shortages that will be felt most strongly amongst vulnerable populations. Water supplies for domestic, agricultural, and industrial uses, for example, rely upon a combination of surface and ground freshwater sources; both will be severely compromised by continuing sea level rise (#13). Sea level rise will lead to flooding of coastal lands, resulting in salination and contamination of both freshwater resources and agricultural lands, as well as the potential loss of nursery areas for fishing (#12). Additionally, rising temperatures will further constrain farmer's crop yields, with estimates suggesting half of the world's population could face severe food shortages by the end of the century (#12). These shortages will be most catastrophic in areas like Guyana that rely heavily on agriculture for sustenance and have the least capacity to adapt to changing conditions.

**(v) Respiratory issues**

One health risk that receives less attention than those previously mentioned, but has been an area of concern for some higher income countries, is the effect climate change will have on respiratory issues like asthma, with the concern being that it could increase incidence while exacerbating and worsening outcomes associated with asthma. While no articles were found that explored this association in Guyana specifically, research has shown that, in Caribbean islanders, respiratory irritants are present in the form of dust clouds from Africa's expanding deserts that are swept across the Atlantic (#9). This phenomenon is accelerating due to widening pressure gradients over warming oceans (#9). As a result, not only will higher temperatures risk worsening outcomes from respiratory distress, but the increased amounts of respiratory irritants in the Caribbean and Latin America, Guyana included, risks increasing rates of illnesses such as asthma.

**(vi) Natural disasters**

Natural disasters are influenced by short- and long-term averages and variability in weather conditions and are expected to become more frequent and more severe as climate change increases weather variability (#8 ref 51, 52). The most likely increases will be coastal flooding, due to sea level rise, and inland flooding and mudslides do to more common episodes of extreme precipitation (#8). Natural disasters are already responsible for a significant burden of disease worldwide, and the problem continues to increase (#8). Though estimates vary widely due to uncertainty, the relative risk of flood deaths in Latin America attributable to climate change by the year 2030 is expected to be as high as 4.43 for inland areas, and 4.20 for coastal areas (#8). Guyana may be in a particularly precarious position, given that approximately 90% of its population is "at risk from the contemporary flood hazard and the potential impacts of climate change and sea level rise" (11). This is due in part to the fact that 90% of the population, and 75% of its GNP-producing activities, are located along the North Atlantic coastal plain, a strip of land 200 km long that is seldom wider than 15 km, resulting in both the population and the national economy being extremely vulnerable to coastal flooding (#11).

**DISCUSSION**

The results of this review suggest that Guyana, and South American countries more generally, are at a high risk of adverse health consequences resulting from climate-related impacts. Such consequences may manifest in the form of communicable and non-communicable diseases, as well as direct injury, malnutrition, and economic instability resulting from resource shortages and disaster events. In all, the most striking finding arising from this review has been the overall lack of current knowledge and study of upcoming climate challenges in South America, of particular concern given the broad range of potential consequences that have been catalogued. These impacts can be expected to result in substantial morbidity and mortality, creating a strain on health resources and the public health system as a whole.

There are a few limitations to this study that are worth noting. First, it is possible that a broader research sample size could have been obtained via snowball sampling, where references from articles identified as appropriate would be retrieved for review, as well. In addition, certain articles may have been overlooked as a result of the

search strategy neglecting to included specific health issues, such as "malaria," and "flood." While this may have produced a wider search net, it was concluded that such an approach was unlikely to yield new information not included in the original article, particularly due to the dearth of information in this field. Second, information was sought exclusively from countries of Latin American origin. This decision was made in recognition that it would result in the exclusion of potentially relevant health trends and predictions from other countries, including some countries in Africa and the southern United States, which have ecological factors comparable to those of Guyana.

One avenue for future study is improved surveillance relating to the identified health consequences in Guyana specifically, as it is clear that those consequences have received insufficient emphasis to date. It would be valuable, for instance, to examine the differential burden of climate change impacts experienced by the various Guyanan ethnic groups, as identification of high-risk populations would allow targeted resource management to reduce vulnerability. The establishment of a quality surveillance and primary health information system is also crucial to meeting future challenges, as are region-specific predictions relating to climate change and disease exposure. Further, as is becoming the case in countries with well-documented climatic impacts, research must be tied to adaptive action designed to reduce the adverse consequences of climate change related to health and other sectors. Communities and countries must share knowledge and adaptation strategies, while national governments must coordinate to develop early warning systems and preparedness plans.

While lower-income countries like Guyana have not been responsible for emissions, they are likely to suffer a disproportionately high health burden resulting from the resulting climatic changes. Adaptive action taken now, such as disease vector control and fortification of the coastal economy to reduce flood vulnerability, could help to reduce and prevent a variety of losses in the future. Management of the health impacts of climate change will require intersectoral action and collaboration, for which substantial knowledge and understanding is required.

## CONCLUSION

While a range of serious health consequences has been documented, little is known regarding specifics of what can be expected and what can be done to mitigate or adapt to these changes. It is an unfortunate truism that countries likely to experience a high burden of climate-related impacts are also those wherein the least climate research is being conducted. Having highlighted six key, evidence-based mechanisms of climate-related harm, this review has identified key avenues in need of further research and action.

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# Socio-Cultural Analysis on Baduanjin Qigong: Form and Techniques of the Chinese Traditional Exercise System

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**Abstract**
Qigong is a traditional Chinese exercise system which has many forms and techniques used, applied for health benefits from ancient times to contemporary societies. Globalization and widespread of cultural elements internationally have contributed positively for Qigong practice's being known more in the West. There are many researches that have been conducted on medical, health aspects of practicing Qigong. In this article the subject is Baduanjin Qigong (Eight Section Brocade) and its socio-cultural dimensions which is going to be discussed from several views. A comprehensive model of Baduanjin will be given and this can be functional to practitioners of Asian martial arts, Traditional Chinese Medicine (TCM) and also academics in social sciences, humanities and cultural studies.

**Keywords:** Neigong, Qigong, Baduanjin, TCM (Traditional Chinese Medicine), Chinese Martial Arts, Meridians, Sociology of Culture

## 1. Introduction

Qigong[1] is a traditional exercise system of "energy work" which has been practiced in Chinese civilization for over 5000 years (Holder) (Jahnke, 2010: 2). It is an "internal art" (Neigong, 內功) and focuses on TCM's (Traditional Chinese Medicine) cultural and philosophical concepts of meridians, acupuncture, Etc. rather than to be a heavily physical exercise. Because of this reason the practice and techniques associated with Qigong are "soft", emphasizing smooth and harmonious movements.

**Image 1:** An ancient illustration shows a Qigong technique (Holder)

[1] Qigong with traditional Chinese characters: 氣功

Baduanjin (八段錦) is among the most common and widely used forms of Qigong (besides 5 Animals Form) and has a known historical background going back to the Song Dynasty (10th-13th Century), with much older origins. It has evolved, changed from some aspects when we look at to the ancient manuscripts and contemporary applications. However, it should be admitted that there is a lot common in all forms and variations of Baduanjin in conceptual level.

In this article, we are going to focus first on "energy" (Chi or Qi) aspects of Qigong, its socio-cultural representations and interdisciplinary analyses on this traditional exercise system. After that, we will focus more particularly on Baduanjin. Our article will provide a philosophical, socio-cultural and practical understanding of Baduanjin Qigong. The results of this research can be followed in two lines: 1. In academic way, Baduanjin can be investigated further through an interdisciplinary perspective (sociology, philosophy, Chinese studies, Asian studies, health sciences, Etc.) 2. On a practitioner level, based on the techniques provided here you can continue your Qigong practices for possible health benefits.[2]

**Image 2:** with Sifu Peter Ziboce (in Hong Kong)

Before going further, this can be right time to mention the Neigong experience of the author of this article: although my background in internal martial arts (Tai Chi Chuan, Xingyiquan, Yiquan) and Qigong is coming from lineages of several sifus (masters), two of my teachers, Sifu Shi Dan Qiu and Sifu Peter Ziboce have had a major role in my learning the theory and concepts of traditional Chinese arts. My study and training under Sifu Peter Ziboce in Hong Kong have opened important doors theoretically and philosophically towards understanding Qigong in general, Baduanjin particularly.

## 2. Qigong as a traditional system focusing on "energy"

Qigong is defined as a practice "cultivating a relationship with energy - becoming aware of the energy that circulates and flows through your being" (Draffan, 2009: 3). Of course what we call "qi" would be considered, analyzed and perceived different from medical, biological, sociological and socio-cultural views and methodologies. The same phenomenon has different variations and appearances in prisms of different disciplines.

In Chinese culture, from history to contemporary days, Qigong has had thousands of different forms, based on various teachers and traditions; "Some of these forms were designed for general health-enhancement purposes" while some others "for specific TCM diagnostic categories. Some were originally developed as rituals for spiritual practice, and others to empower greater skill in the martial arts" (Jahnke, 2010: 2-3). Traditional Chinese Medicine (TCM) and martial arts have been two dominant fields for Qigong practitioners.

[2] For this practice or any kind of exercise you should consult your physician regarding if you can do it or which kind of physical activity suits best for your needs. Author has no responsibility for the results of your physical exercises. Baduanjin Qigong and all kinds of Neigong or other exercises must be practiced under the guidance of qualified and certified instructors. Readers of this article can contact via my email address for participating the Qigong Workshop where I will teach, in 2019 Summer, Istanbul.

Qigong is considered as "an ancient Chinese self-healing mind-body exercise and it contains meditation, breathing, body posture, and gentle movement" (Chan, 2014: 2). From these aspects "meditation" and soft physical activity take place at the same time in this system. As it is well known, usually when meditation is thought (for instance in Zen) a non-moving, mostly sitting concentrations are understood. Of course, even in Zen or other Buddhist ways there are different, moving variations of meditation. However, the most common one is seated meditation. Qigong is combining meditating, breath activities and body movements.

According to Chinese traditional way of thinking and philosophy Qi is understood as "the energy and natural force that fills the universe" and "three major powers" have been accepted to exist in the universe: heaven, earth and man (Yang, 2016: 93). Qigong is trying to improve "the cultivation of balance and harmony of Qi, positively influencing the human energy complex (Qi channels/pathways) that functions as a holistic, coherent, and mutually interactive system" (Jahnke, 2010: 3). This "interactive" model creates also interaction between practitioner, heaven and earth, at least in philosophical conceptions of the tradition.

Yong Tai Wang (University of Texas at Tyler) and his colleagues stated that "considerable scientific evidence supports the health benefits of practicing Tai Chi and Qigong in various populations with differing characteristics such as age, gender, and occupation in NIH[3] Research Report" (Wang, 2017: 1). There is a significant amount of medical & health studies publications on benefits of Qigong. In this article we will mention some of them to give an idea, which can be also covered in other researches on medical sociology. However, our main point will be to provide coherent knowledge of Baduanjin.

A qualitative research on elder Tai Chi and Qigong practitioners showed that each person "had his or her own unique experience of Taiji and Qigong there were strong commonalities" among practitioners interviewed: "All began with motivations related to physical problems and concerns, and, all reported significant functional improvement"; they also said "experiencing benefits in at least three other dimensions, and all reported integrated mind-body experiences that were, in their own subjective assessments, powerful and unexpected" (Yang, 2011: 9). Finally all respondents of the research "felt that these complex integrative experiences were the most important and meaningful outcome of their participation in Taiji. And so as they practiced Taiji and experienced more complex benefits, their motivations to continue shifted accordingly" (Yang, 2011: 9). These results of the research shows perceived and individually experienced satisfaction of Nei Gong practice.

Qigong as "an art of moving qi/chi (vital life energy) through the body, releasing energy blocks, and eliminating causes of illness and imbalance" (Chyu, 2011: 6) has been used for complementary cure of several health problems, including arthritis. Scientific researches show that Qigong and similar exercises "may reduce arthritic pain, enhance physical functioning and flexibility, and improve self-efficacy and quality of life in OA patients" (Chyu, 2011: 8). Another problem on which there is healing influence of Qigong is chronic fatigue syndrome (CFS). In 2010, 1441 adults with CFS symptoms recruited for a research (Li, 2015: 2). The study showed that Qigong helped people suffering from CFS-like illness. Comparison between a Qigong practicing group and the control group proved that Qigong practice contributes positively to the health (Li, 2015: 5). When Qigong is practiced for a while the participants had "a significant decrease in negative physical symptoms" and this result is very "consistent with the results of previous studies, which have found similar effects of Qigong on physical health among patients with chronic illnesses and with CFS-like illnesses (Li, 2015: 5). This is just another example among many which show positive health contributions of Qigong practice.

The "energy theory" of TCM and related cultural elements has two contributing components: the concept of yin&yang and five elements idea/theory. TCM is related to these concepts and seeking balance, harmony between internal organs which represent different parts of this whole picture (Klein, 2017: 3). Meridians are channels of "Qi circulation" and they include "12 major meridians and 8 curious meridians". Modern science showed "schematics of the major meridians and the direction of flow paths have been generated by recording micro electrical differentials at points on the skin identified as acupuncture points" (Klein, 2017: 3), which is an advanced contribution to TCM.

[3] National Institutes of Health, USA https://www.nih.gov

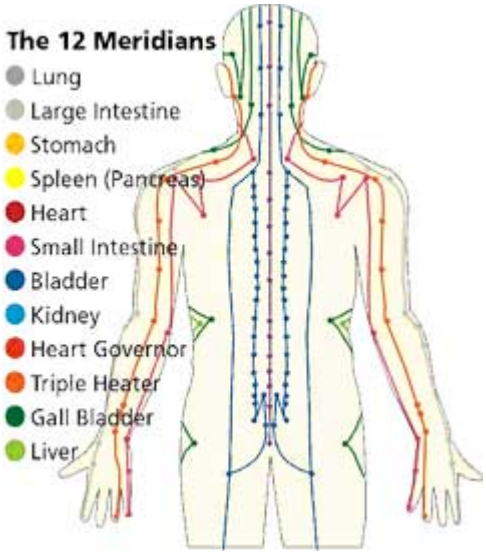



**Image 3:** 12 major meridians[4]

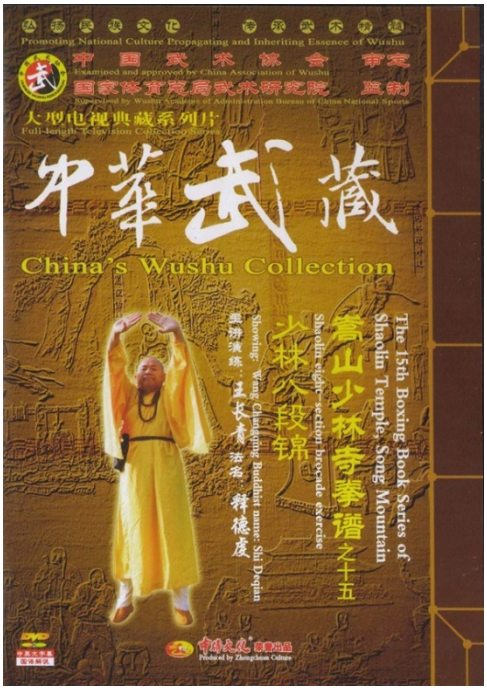
Taoist and Buddhist philosophies, traditions have Qigong elements for health benefits in their socio-cultural production of meaning, life and society. Even the most common Qigong forms such as Baduanjin take place in both Taoist and Buddhist temples like Shaolin and Wudang. Since it has ancient origins in Chinese civilization it is possible to understand the existence of Qigong in other, different lines of culture, religion and philosophy.

Wu I-Ying, as a modern scholar and Qigong practitioner in Taoist way stated: "I am aware of qi as a vital energy that is inherent, implicit and necessary in my body and movement and particularly related to a state of being" (Wu, 2014: 3). She also explained that "According to Daoist qigong, the physical and spiritual join together in movement as one entity" which cause practitioner to feel "sense of qi by being in the in-between"; in this "in-between state of qi" a practitioner may be aware of his/her muscles', bones' and nervous system's working, after the feeling of an "unknown sense", which is "like an alternative material shifting" in the body (Wu, 2014: 70). Of course what is felt can be differed from one person to other ones, however the general frame of the experience would be not so different in essence.

Taoist way of thinking and Qigong practice overlap from several aspects. Taoist Qigong has a holistic approach and mentions three sources of energy in body. These are: 1. "light" (Qi) which can take place symbolically between two eyes, "upper dan tian" as the third eye, it is about "wisdom" in Tao; 2. "light" can be around the abdomen, "lower dan tian" and may direct to the feeling of calmness; 3. "light" can be the heart, "middle dan tian", which can contribute to awareness (Wu, 2014: 80-81). Qigong is practiced as a way to harmonize these energies holistically, create balance inside human body, mind and his/her existence in the universe. Qigong exists of organized, meaningful and physically relaxing movements which match with higher philosophical concepts in a psychological level. It is an exercise system emerged sociologically, conveyed through generations historically and spread socio-culturally in contemporary world.

Buddhist temples, especially Shaolin Temple also have Baduanjin in their curriculum. Since Shaolin Kung Fu is a highly external art and requires a lot of hard physical exercises, the gentle and soft nature of Qi cultivation in Eight Section Brocades Qigong create a good balance towards harmonization between external and internal powers. Shaolin Kung Fu masters even created and published great instructional DVD's to promote and teach Baduanjin.

[4] "Meridians in Traditional Chinese Medicine?", Acupuncture & Massage College AMC-Miami, Florida, https://www.amcollege.edu/blog/what-are-meridians-in-traditional-chinese-medicine-tcm (retrieved: 09.10.2018)



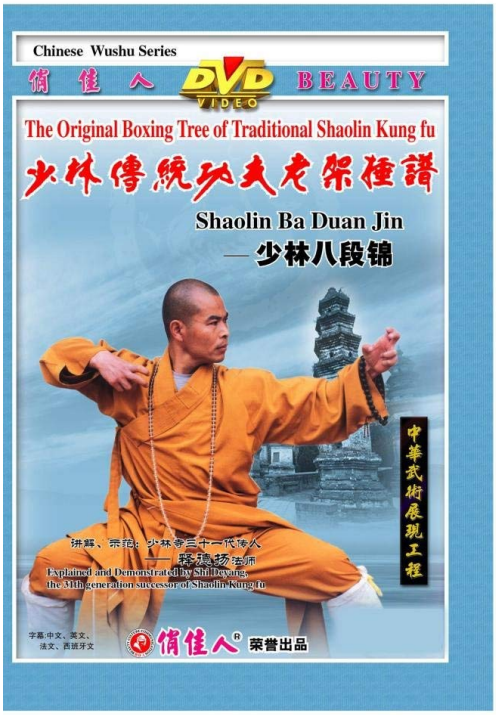




**Image 4-5:** DVD covers of Shaolin Baduanjin

Songshan Shaolin Eight-Section Brocade Exercise DVD of Master Shi DeQian (published by Zhongchuan Culture) and Shaolin Baduanjin DVD of 31st generation successor Master Shi Deyang (published by People's Sports Video Publishing House) are among important, original, historical records of how kind of Baduanjin practices and different variations have been preserved in Shaolin Temple. What we see from the performances of the masters both in Taoist and Budhist lineages there is a lot common in Baduanjin. Chinese civilization and culture have had flexibility towards interaction, exchange and sharing knowledge, wisdom and arts between different traditions. This freedom of "knowledge flow" has enriched the civilization in thousands of years.

### 3. Eight Section Brocade's Importance

Baduanjin (八段錦) can be translated into English as Eight Section Brocade and it is a physical/therapeutic practice of Qigong. The historical records of Qi and meridian related health exercises were existing in very early times, in an ancient text called "The Internal Medicine of Emperor Huang" (黃帝內經). Generally Baduanjin has eight parts/sections which are called as Jin (錦, Brocade). This practice has continued "for generations, it has been taught and learned and passed down, for it is easy to learn with good effects" (Lee, 2005: 4-5). Besides Indian Yoga maybe it is among one of the most common traditional health exercises.

"Baduanjin" was mentioned in history during the Northern Song Dynasty. According to Hong Mai's Yi Jian Zhi, Li Shi-Ju (Emperor's Head Secretary) spent a long time as practicing some exercises inherited from Taoist monks: stretching hands and expanding body as imitating birds and bears. He was practicing the form called Eight Section Brocade. This text is a historical document on Baduanjin's existence and practice since the Song Dynasty for health benefits. There have been both sitting and standing variations of Baduanjin all during its history. When we look at to the ancient texts standing forms were "recorded in The Chapter of Wonders, Pivot of Dao (道樞·眾妙篇, Dao Shu, Zong Miao Pian, Song Dynasty)" and sitting forms mentioned "in The Ten Books of Daoist Practices (修真 十書 Xiu Zhen Shi Shu, Ming Dynasty) or The Methods of Curing (活人心法, Huo Ren Xin Fa, Ming Dynasty)" (Lee, 2005: 5). As a living tradition Baduanjin has arrived until today.

A healthy life is much related to physical activity and flexibility. It is emphasized that an improvement in body's flexibility can contribute positively to "physical power" and "physical coordination ability". Baduanjin exercise is beneficial in terms of physical flexibility and it "highlights the unification of physical movement and the

mind, with great attention paid to the connotation of physical exercise" (Li, 2014: 4). The choreography of form requires memorization and this is a positive contribution to memory. The smooth and soft movements are also very peaceful and resting for mind.

In 2000's many important health sciences researches have been conducted on benefits of Baduanjin. Six studies (with 611 participants) reported between 2011-2015 have shown that Baduanjin Qigong exercise practice has contributed positively to the participants' quality of life based on highly reliable assessment models such as WHOQOL[5], EORTC-QLQ-C30[6] besides several other ones (Zou, 2017: 9) (Image-6). There is a significant progress of Baduanjin practitioners compare to non-practicing individuals.

| Study or subgroup | Baduanjin Mean | Baduanjin SD | Baduanjin Total | Control Mean | Control SD | Control Total | Weight | Std. mean difference IV, random, 95% CI |
|---|---|---|---|---|---|---|---|---|
| Hu and Gu, 2014 | −14.15 | 10.55 | 55 | −1.31 | 11.61 | 54 | 17.0% | −1.15 [−1.56, −0.74] |
| Li et al., 2015 | 0.75 | 5.9 | 101 | 0.68 | 5.27 | 105 | 18.1% | 0.01 [−0.26, 0.29] |
| Liu et al., 2014 | −14.76 | 14.21 | 48 | −8.58 | 11.21 | 47 | 17.0% | −0.48 [−0.89, −0.07] |
| Y. Liu et al., 2012 | −25.4 | 35.58 | 33 | −15.61 | 41.02 | 36 | 16.4% | −0.25 [−0.73, 0.22] |
| Wang, 2011 | 0 | 0.05 | 27 | 0.055 | 0.014 | 35 | 15.4% | −1.57 [−2.15, −0.99] |
| Xiu, 2015 | −16.2 | 15.5 | 36 | −2 | 5.7 | 34 | 16.0% | −1.19 [−1.70, −0.68] |
| Total (95% CI) | | | 300 | | | 311 | 100.0% | −0.75 [−1.26, −0.24] |

Heterogeneity: $\tau^2 = 0.36$; $\chi^2 = 44.33$, df = 5 ($P < 0.00001$); $I^2 = 89\%$
Test for overall effect: $Z = 2.87$ ($P = 0.004$)

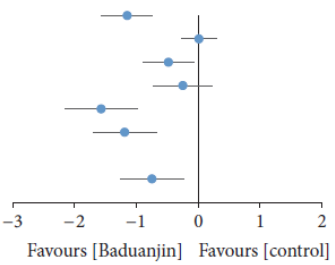



**Image 6:** The effect of Baduanjin practice on quality of life (Zou, 2017: 9)

Baduanjin Qigong, besides general life quality, also contribute positively to flexibility, physical power, performance, strength, physical balance, sleep quality, blood pressure and respiratory system (Zou, 2017: 9-12). In Turkey there is a visible interest for "acupuncture". As it is well known, acupuncture is a practice of TCM (Traditional Chinese Medicine). Since Baduanjin Qigong is also a part of TCM, we hope that our MD's (medical doctors), physical therapists and all related professionals place more importance to this traditional exercise system which deserves for sure.

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Cultural sociology has shown "the remarkable durability and continuity of a single culture structure over time that is able to reproduce itself discursively in various highly contingent contexts" (Alexander, 2003: 154). Cultural sociology, in its study of "culture structures" claims "social life is governed by a series of codes, which in essence are drivers of how people interpret and understand both aspects of their personal everyday life and the role of governments, media, firms and other organizations. These codes, learnt through growing up in a culture, are the frames for social action. In essence, they provide a type of working language for understanding social life" (Back, 2012: 38). Martial arts and traditional exercises are also components of "social life" with their own "codes" which are "the frames for social action" inherited through generations. Globalization process have created a suitable basis for spread of Qigong as a part of modern social life. The evolution and preservation of Baduanjin Qigong and its cultural codes need to be analyzed from interdisciplinary perspective.

## 4. Baduanjin Practice and Techniques

Forms, techniques and performance principles of Baduanjin Qigong may be varied according to lineage, tradition, region (in China or otside), school (Shaolin, Wudang or other ones), sifu (teacher) and many other factors. However, regardless which kind of Baduanjin you take there is something common still to call it and characterize as "Eight Section Brocade". Max Weber defined ideal-type as "a sort of measuring stick that captures the most rational and most essential components of any social thing"[7]. Therefore, our illustrating Baduanjin here is like a way to capture "the most essential components" of this Qigong model, which is a socio-

[5] WHOQOL (The World Health Organization Quality of Life), https://www.who.int/mental_health/publications/whoqol/en (retrieved: 12.10.2018)
[6] EORTC-QLQ-C30 (European Organisation for Research and Treatment of Cancer, Quality of Life of Cancer Patients Questionnaire), http://qol.eortc.org/questionnaire/eortc-qlq-c30 (retrieved: 12.10.2018)
[7] See "Ideal-types", http://routledgesoc.com/category/profile-tags/ideal-types (retrieved: 12.10.2018)

historical phenomenon, beyond a simple "social thing", practiced and involved millions of people from ancient times to contemporary world. What is described and explained here may be perceived as the essence of Baduanjin, without rejecting other possible ways of practice.

**Wu Ji: beginning posture**

Baduanjin Qigong (8 Section Brocade), like Tai Chi Chuan and many other Chinese exercise systems, starts with Wu Ji (in simplified Chinese: 无极) posture. Literally it means "no pole" or "without any pole" which can be interpreted as emptiness and not being based or dependent on anything stable. It has a strong philosophical background in Taoism and it can be seen as a way of having no form, no pattern and hence no limitation.

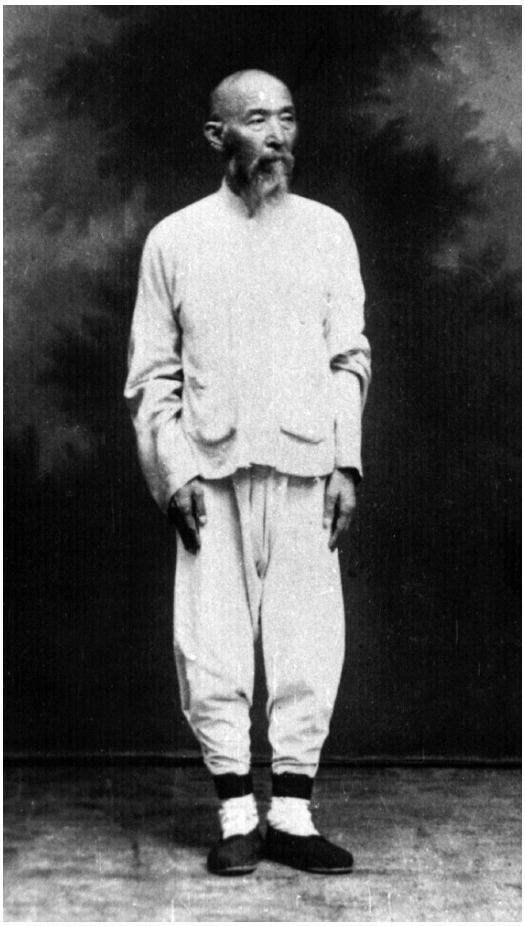

**Image 7:** Master Sun Lutang (1860-1933) in Wuji posture

When we look at to different Chinese internal arts we can see slight differences of how to perform this posture. However, the essence of Wuji may be considered almost the same in theoretical and philosophical levels: a stance / posture of emptiness, being ready to next movements and a meditative mindset focusing on dantian[8]. This posture should be conducted with straight body alignment, without bending in any direction. The feeling of being hung to the sky from baihui point (top of head) and grounded to the earth from bottoms of feet is important. Practitioner has to realize and visualize an energy flow between earth and sky via channeling his/her body. Legs should be slightly bent from knees which means not all weight concentrated on knees. A more elastic flow of body weight has to be maintained. In bottoms of feet weight not focused on heels. Body's weight has to be divided equally to both legs. Wu Ji can be a stance with shoulder width open feet. In any way of practicing Qigong shoulders have to be relaxed, hands relaxed in both sides in Wu Ji posture and breath normal and smooth. As my teacher Sifu Shi Dan Qiu said "relax does not mean collapse". So, always feeling and remembering like hung from baihui point to up, towards sky is crucial. In Neigong focus has to be on dantian in general. Chin is tuck backward, teeth closed and tongue is pressed to roof of the mouth.

[8] Where we mention here as dantian is also called "lower dantian" and energetic center of body in TCM.

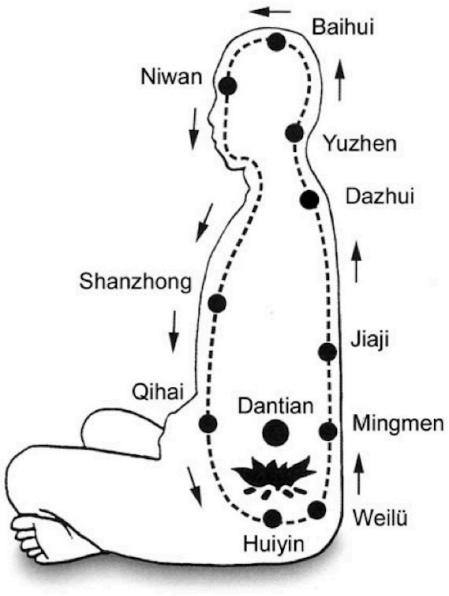


**Image 8:** Dantian and energy flow[9]

Wu Ji can be also considered as a way of meditation and exercise itself. That means a practitioner can stay in Wu Ji posture, feel "qi" flow, meditate and relax as much as he/she can do. The important point on Chinese internal martial arts and exercise system is that it is not about speed and do many things in short, intensive times. The time, space and mode of Chinese internal arts are pretty different than Western style sports or exercises. Just standing, remaining still, doing nothing is already a challenging way of practice for these arts. Even there is another system, called Zhan Zhuang (站桩) which can be translated as "pile standing", "tree standing" and only established as a model based on non-moving postures. From a typical Western mindset it would not look like an exercise at all. Zhan Zhuang is affiliated with Yiquan (意拳), another Chinese internal martial arts and we will focus on this topic in another article.


**Image 9**

[9] https://taiji-forum.de/qigong/stilles-qigong-jinggong (retrieved: 12.10.2018)

**Pressing Up to the Heavens with Two Hands**[10]

**双手托天理三焦 (Two hands hold heavenly Sanjiao**[11]**, triple warmer meridian)**

This form can be also titled as "two hands hold up heavens". From Wu Ji position (if heels touching) feet are to be separated from each other, with soft and flowing movement, shoulder width. Right foot can be stable and left one to move leftward in this movement. After this two hands are coming in front of dantian, as if holding an invisible energy ball. Palms are looking upward, left and right fingers are apart from each other around a fist (closed hand) distance. Then practitioner moves his/her palms upward slowly and smoothly. On chest level palms start to rotate inward 180 degree. Two hands continue to push towards sky. Arms and hands create a circular, symmetrical shape. When we arrive to top we should wait a short moment and then open hands to sides, go down slowly. This is completions of one time movement. Traditionally, in some schools it is done eight times. However, it depends on practitioner's time and needs. It can be four, eight or any times required. Inhale and exhale are done smoothly, slowly. In different schools there are varied preferences. One of the possible principle can be when movement is closing, getting close to body, we can inhale; when it is opening, going towards outside of body we can exhale. Of course, by the time, when movements are practiced regularly a natural flow of breath would be settled. The same breathing method can be applied in all eight movements of Baduanjin.

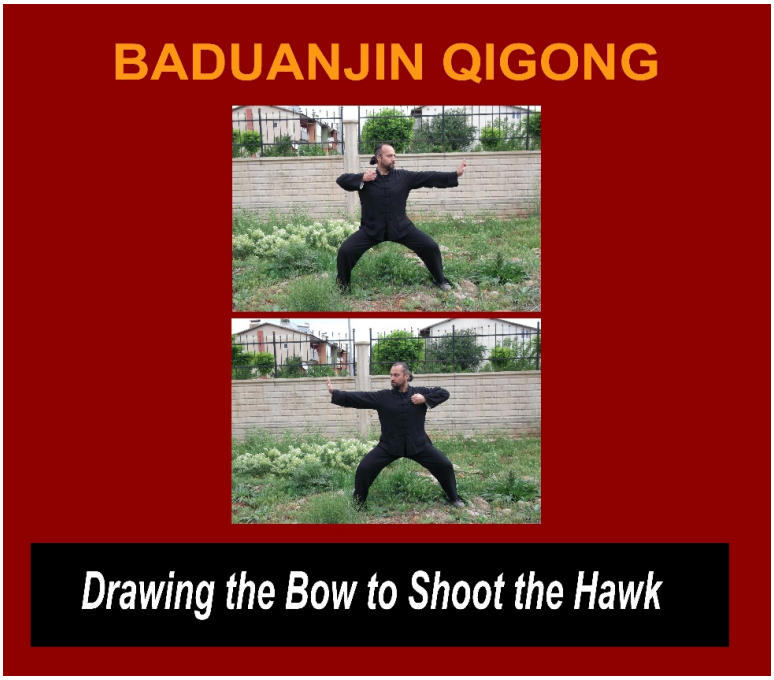


**Image 10**

**Drawing the Bow and Letting the Arrow Fly**

**左右开弓似射雕 (Drawing the bow towards left and right to shoot the eagle)**

The order of movements can be various in Baduanjin depending on school, lineage and tradition or just preference of teacher. In our analysis the second movement is "drawing the bow to shoot the hawk". We should also keep in mind that the technique of imitating to draw a bow and shoot a bird (hawk, eagle, Etc.) can be slightly different from each other in multiple schools. The way, Tao is not to be lost in doctrinal details. In this movement, generally in Baduanjin and all kinds of Qigong, Neigong, Etc. essence is more important than appearances and variations. This is better always remember. Practicing regularly is more important than to talk

[10] English titles of each movement is taken from Master Michael P. Garofalo's work on Baduanjin (http://egreenway.com/taichichuan/esb.htm , retrieved: 12.10.2018) Chinese characters of form can be found on Changchun University of Traditional Chinese Medicine's website: http://www.jlhtcm.com/index.php?m=article&a=index&cid=50&id=4346 (retrieved: 02.10.2018)Global Research Identifier Database page of the university: https://www.grid.ac/institutes/grid.476918.5 (retrieved: 02.10.2018)

[11] See http://lieske.com/channels/5e-sanjiao.htm (retrieved: 02.10.2018)

details and separations. At the end of the day Qigong is a "physical" exercise and written or spoken words cannot take its place.

This movement in performed on the stance called Ma Bu (horse stance). This stance can be wide, narrow, high or low. Health conditions and abilities of individuals determine which is the best to perform. This movement can be done to left and right sides respectively, four times each side, total eight times. Performance is slow, relaxed and flowing again. Hands can be crossed on chest level, then arching arms like drawing a bow and visualize/imagine an arrow is going outward to the target. Face is turned to the direction arrow to go. Eyes look towards imaginary target. The mindset can be like negative qi (energy) is thrown out with sending arrow outward. Symbolism is a principle applicable to this section and other movements of Baduanjin. Although as a physical exercise it helps body in beneficial way, with this symbolism it may also provide psychological catharsis.


**Image 11**

**Separating Heaven and Earth**

**调理脾胃须单举 (Regulating spleen and stomach with single hand lifting)**

"Seperating heaven and earth" is a movement of Baduanjin performed standing up, feet are shoulder width apart from each other. The feeling of connection between baihui (top of head) point and sky needs to be remembered here and all parts of Eight Section Brocade Qigong.

In this movement at the beginning hands are cupping on each other on dantian level, palms upward. Then, left hand and right hand are separated, left is going upward as if pushing to sky and right is going downward like slowly pressing toward ground. The visualization can be like separating a mass existing of energy emerged in front of us. Practitioner has to imagine that his/her palms are touching something and separating it. Also, it can be visualized that by this movement inner channels are cleansed and energy freed to flow better.

After left hand reaches to top the direction changes, left palm is going down and this time right palm is going up in the same manner. This movement continues until we reach four times each side. Our general breathing mechanism can be applied in this movement as well. All movements should be realized in a calm and slow way. Qigong is a practice which requires to keep "speed" out. Anybody interested in speed better practice either external Kung Fu or western sports such as tennis.


**Image 12**

**The Wise Owl Looks Backward**

**五劳七伤往后瞧 (Looking backward to heal five wearies and seven injuries)**

The fourth movement of Baduanjin Qigong can be named as "wise owl gazes backward". This is also a movement to perform towards left and right, four times each side and eight total. As shown in photo, this movement is done on shoulder width open feet.

Animal imitation takes place in Baduanjin Qigong and other internal or external arts. Even there is a Qigong form, 5 Animal Qigong, which is merely based on imitation of animal movements. This is not really that much dominant in Baduanjin. Animal imitation is an important part of Chinese traditional Kung Fu, Neigong, Qigong, Etc. It can be found in Shaolin Kung Fu, Taoist martial arts and Qigong systems. Chinese people observed animals in ancient times, tried to find health benefits of physical exercises derived from their movements and possible fighting, self-defense techniques to be taken from different animals, even from insects, such as Praying Mantis.

"Wise owl gazes backward" requires closing body and opening towards sides with hands, meantime turn neck and head to the respective side like an owl. In this movement, not only head is turned, also eyes are rolled to see backward imitating an owl. As usual to all movements divided as left and right, this is practiced four times each side as well


**Image 13**

**The Big Bear Turns from Side to Side**

**摇头摆尾去心火 (Shake head and sway tail to dispel heart fire)**

"Big bear turns from side to side" is another imitative movement of Baduanjin Qigong. This movement begins on Ma Bu (horse stance). Then upper body makes a circular movement from right to left, when body arrives to far left, right leg is straight, left leg is bent and eyes looking to right foot direction. Both hands rest on thighs during this movement.

Breathing is without any rush, slow and natural. After one side is complete we do the same movement in the other direction. The important principle in this movement is that body has to turn in circular way from waist. Mostly upper body manages movement. Based on abilities and limitations of practitioner circular spin has to be as wide as possible. Feet are stable in this movement, keeping same distance between each other.


**Image 14**

**Touching the Toes then Bending Backwards**

**两手攀足固肾腰 (Two hands climb from feet to up to solidify kidney and waist)**

This is a stretching exercise which has several versions in different Qigong schools. The main idea is that first touching your toes, then your hands (right and left, palms inward) are going upward as sliding on calf, thighs and finally reach to waist. When you reach to your waist both hand can do a circular massage few times and then to bend backward.

One of the nubs of practicing this movement is that legs and knees must be straight, stretched while you try to reach toes. If you cannot reach toes with stretched knees, then you needs to go downward as much as you can. Bending knees to be able to reach toes is among common mistakes of this technique. In traditional Chinese martial arts and exercise systems there is no room to unhealthy strain of your body, creating harms and injuries. As much as you can do is perfectly suitable to the spirit of Qigong. This movement can be practiced eight times.


**Image 15**

**Punching with an Angry Gaze**

**攒拳怒目增气力 (Punching with angry eyes to increase strength)**

Qigong and in this research Baduanjin should be understood and analyzed as health preservation systems. Although sometimes, some particular techniques or stances may resemble martial arts, or practitioners of Qigong are usually practicing Chinese martial arts as well (Xingyiquan, Taijiquan, Liuhebafa or external arts) at the same time, we should clearly admit and express that Qigong is not a martial system at all. Therefore, we should consider and comprehend Qigong techniques profoundly with their proper inner meanings.

This movement is done on horse stance. Although physically it looks like we are hitting out eight punches (divided as left and right) actually these are ways for energy cultivation, concentration and direction. Focus is on dantian, once one punch is going outward the other one is catching a small energy ball with a circular, spinning motion and goes back to dantian. Movement is continuous, flowing and without any tension. There is neither hitter nor a hit one, just we can talk about the dance of energy visualized. Baihui point's connection with sky, feeling of being pulled upward are crucial again.


**Image 16**

**Shaking the Body**

**背后七颠百病消 (Shake the body to leave a hundred diseases back)**

The final technique of Baduanjin is "bounce on the toes" which is practiced as rising on toes and then drop body on heels to ground eight times. Fingers of both hands are clamped together on back of waist. When body is rising upward palms are pressing down. In the moment of dropping body weight downward practitioner has to visualize that his/her all negative qi is dropped as well. Negativity is going, he/she is becoming more peaceful, harmonized and attuned with energy of the universe. Body is stretched upward and then left down. In moment of "drop" it should be practiced not as a way of "collapse". Even when body is left down still it should be vigorous. It is a very dynamic exercise preparing practitioner to close Baduanjin Qigong.

**Closing**

After completing Baduanjin, Eight Section Brocade Qigong, we come to Wu Ji position again. It is equally beginning and ending. Emptiness and readiness. Appearance and disappearance. Where there is no pole, circular, moving and harmonizing. On Wu Ji stance slowly we open our hands both sides upward as if catching a big energy ball staying in front of us. We cover the visualized, imaginary ball elliptically and then both hands are going downward, toward dantian. When hands reach dantian they can stay there for a while. Alternatively, after reaching dantian we can go to Wu Ji position again and finish Qigong practice. On Wu Ji it is possible to stay for some time in meditative mood. Wu Ji is used as standing meditation in Neigong. This is the closing of Baduanjin Qigong.

## 5. Conclusion

Qigong is as traditional Chinese exercise system which has been practiced for thousands of years. Baduanjin is among the most common forms of Qigong. Baduanjin (Eight Section Brocade) takes place both in Taoist and Buddhist cultural environments of China.

We have discussed that Baduanjin, its cultural codes and practice have spread internationally with the process of globalization. Researches in health studies have shown the importance and positive contributions of Eight Section Brocade to individuals. As a complimentary physical therapy it is highly recommended for several health benefits.

In this research, besides the social and cultural aspects of Baduanjin Qigong a comprehensive instructional model is given as well. Chinese arts, especially the internal ones (Neigong) are very keen and open to slight modifications based on needs, abilities and skills of practitioner. These are not strict exercise systems to perform without considering what really an individual can do. Of course there is a traditional heritage, always better to keep it original and not decayed. However, without giving a negative effect on this inheritance, optimum changes in practice for maximum positive contribution to people's health is possible, when these are committed properly by specialists.

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# Do all Inguinal Hernias Need Surgery?

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**Abstract**
Background: For hernias that aren't painful, choosing watchful waiting instead of immediate surgery isn't tied to any long-term health problems. Many patients who took a wait-and-see approach with the groin bulges ended up eventually getting surgery when their hernias grew too big or started causing pain. Methodology: Watchful waiting were followed up at 6 months and annually and watched for hernia symptoms; repair patients received standard open tension-free Lichtenstein repair and were followed up at 3 and 6 months and annually. Results: Watchful waiting is an acceptable option for men with minimally symptomatic inguinal hernias. Delaying surgical repair until symptoms increase is safe because acute hernia incarcerations occur rarely.

**Keywords:** Inguinal Hernia, Watchful Waiting, Mesh, Lichtenstein Repair

## Introduction

Groin hernia is one of the most common worldwide afflictions of adults, especially men (Rutkow I, Robbins AW 1998). Although the idea of repairing inguinal hernias by reconstructing the posterior wall of the inguinal canal with prosthetic materials goes back to the first half of the 1950s (Bendavid R 1989) (Lichtenstein H 1987), it was established in the middle of the 1980s definitely with the so-called "tension-free" technique proposed by Lichtenstein in 1984, and now considered the gold standard for the management of inguinal hernia (Amid PK, Shulman AG, Lichtenstein H 1995) (Lichtenstein IL, Shulman AG 1986).

The recordings of medical history include discussions about effective means of treatment (Amid PK, Shulman AG, Lichtenstein IL 1996). In the United States, approximately 500,000-750,000 herniorrhaphies are performed each year. It was the most common surgical operation performed by general surgeons in the USA in 1991. The results are direct costs for the surgical procedure and significant indirect costs because of time away from normal activities (Fitzgibbons RJ jr., Jonasson O, Gibbs JO, et al. 2003).

## Natural history

The natural history of an untreated inguinal hernia is poorly understood with almost no modern data available. This is because of the commonly held opinion that all inguinal hernias should be repaired when diagnosed to prevent the complication of intestinal obstruction and/or strangulation of incarcerated contents (Nyhus LM 1993). Many surgeons recommend routine herniorrhaphy who do not herniorrhaphy because of the belief that the longer an inguinal hernia goes un-repaired (Cunningham J, Temple WJ, Mitchell P, et al. 1996) ( Koontz AR

1963). Epitomized the prevailing attitude towards non-operative strategies for inguinal hernia management when he wrote: “There are very few cases in which nonoperative mechanical devices are necessary or desirable. They are timid people who do not to face up to the realities of any situation. The operation is so simple that it is, by all means, the method of choice (Neuhauser D 1977) (Bendavid R 1998).

This opinion has been questioned because, in fact, the risk of a major complication such as obstruction and/or strangulation is probably lower than the 2-6% risk often quoted in older textbooks.

However, patients on watchful waiting have a 68% chance to get operated in the future because of the hernia becoming symptomatic. This risk is even greater for older patients. A watchful waiting strategy also seems to for ratio: 1.59, 95% confidence interval (Bendavid R 1998) (Fitzgibbons RJ jr., Giobbie-Hurder A, Gibbs JO, et al. 2006). For these patients, the strangulation risk is 0.55% at 4 years of follow-up. Even for older patients, a programmed surgical repair for asymptomatic hernias is more logical. There are very few patients that are unfit for a mesh hernioplasthy under local anesthesia (Barkun J, Neville A, Fitzgerald GW, et al. 2008) (Fitzgibbons RJ jr., Giobbie-Hurder A, Gibbs JO, et al. 2006) (O’Dwyer PJ, Chung L 2006). On the other hand, I wouldn't force an old, frail, asymptomatic patient to have repair if he was thoughtful about an operation. In the end, it all depends on the patient's general conditions, comorbidities, and willingness to get operated (Fitzgibbons RJ jr., Jonasson O, Gibbs JO, et al. 2003).

The rationale for surgery in an inguinal hernia is the treatment of current or future symptoms, and not to prevent incarceration (Amid PK, Shulman AG, Lichtenstein H 1995).

I think patients should be operated as soon as possible. In doing so because we can protect side effects due to an incarcerated hernia; bowel, appendix necrosis due to compression, torsion of the ovary (Malek S, Torella F, Edwards PR, 2004).

I think it is important to consider the potential side effects and complications of surgery when advocating surgical interventions. Some patients experience disabling levels of pain following surgery and if a patient is without symptoms, are they willing to take the risk of 10-15% for pain 6 months after surgery (Poobalan AS, Bruce J, Smith WC, et al. 2003) (Aasvang E, Khlet H, 2005)?

For each surgeon to be able to answer your question fully, he/she must acquire a realistic view of his/her personal results. All surgeons are not equal. By some surgeons, the risk for prolonged postoperative pain will be significantly lower than 10%, while by others that risk will by far exceed 15% (Heise CP, Starling JR 1998) (Nyhus LM, Klein MS, Rogers FB 1991).

Recent studies showed that monitoring patients, instead of them having immediate elective surgery, did not raise the risk of strangulated hernia. So probably a policy of "watchful waiting" could be adopted when the hernia is painless, not growing, without complications and when the patients do not demand the repair (Neumayer L, Giobbie-Hunder A, Jonasson O 2004).

“Watchful waiting” is a term adapted for scientific follow-up, not for routine clinical practice. How many doctors out here would refuse an operation for an asymptomatic hernia, and then follow that patients with regul are not just recurrence, but also failure return visits? And for how long? We don't need to be "watchful," the patients will come back when symptoms become more bothersome (Berliner SD 1984).

The strangulation rate for non-operative management is slow in the medium to long-term, and therefore this is not necessarily relieved by surgery with a "failure rate" of 10-20% in most series in terms of chronic post-op pain as quoted above (failure, in my opinion, is not just recurrence, but also failed to relieve symptoms) (Starling JR, Harms BA, 1989) (Heis CP, Starling J 1998).

Overall, since the benefit of repair is quite small, any increase in operative risk due to patient comorbidity should result in the patient being counselled against operative repair in my opinion, especially if the hernia is not symptomatic (Turaga K, Fitzgibbons RJ, Puri V 2008).

For symptomatic hernias, a repair is still a valid option, as long as the patient is willing to accept as part of informed consent that there is at least a 10% chance of ongoing symptoms after surgery (Lichtenstein IL, Shulman AG 1986, Fitzgibbons R 86th Annual Clinical Congress, Chicago 2000) (Shulman AG, Amid PK, Lichtenstein IL 1992).
The words "the end" on the hernia surgery will never be written. In literature, each of us can find articles to support their ideas. Is for this reason that the experience still has a vital role (Rutkow IM, Robbins A 2001) (Wantz G 1989).

When I was a young surgeon, and prosthetic surgery hernia was at the beginning, I worked all patients with a hernia I saw. Young people with small asymptomatic hernias, elderly people with large symptomatic herniations, women with a small or large femoral hernia or inguinal hernias. Then, one day a young women of thirty-eight years old operated on for asymptomatic femoral hernia, within a few days after the procedure, began to suffer inguinal neuralgia and told me that since he had been operated on, his discomfort was significant enough to prevent her from normal daily activities, which did not happen before the surgery. Since then, bearing in mind that the complication rate of the inguinal hernia patients is less than 2/1000 patients-year (follow-up of 4 years) and the rate of post-herniorrhaphy neuralgia is about 11% two years after surgery. I work only symptomatic hernias and have adopted a policy of Watchful Waiting that was never given any particular problems in a personal series of more than 1000 procedures.

These figures were based more on speculation rather than scientific fact given that hernias are usually repaired when diagnosed making it impossible to do a population-based study to determine risk rate.

Neuhauser D 1977 found two diverse groups of patients allowing him to ascertain the actual risk of a hernia accident better. The first group consisted of 8,633 patients enrolled in Paul Berger's truss clinic in Paris described in an 1896 publication. This was an important database for looking at natural history because Bassini's method(33) had yet to be widely adopted and therefore elective herniorrhaphy was rarely done. Berger kept records on his truss patients and enumerated untoward events. There were a total of 242 accidents that translated into a yearly risk of 0,0037. Neuhauser's second group came from unpublished data from Cali, Colombia where it just so happens that almost no elective hernia repairs were performed. He found the annual risk of a major complication for this group to be 0,00290. Using such data, it can be estimated that an 18-year-old man has a 0.272-lifetime risk of strangulation and a 75-year-olds risk is 0,034.

Not only is the accident risk low but the operative mortality for the treatment of such an accident may have been overstated in the past. The operative mortality for patients undergoing an operation for an inguinal hernia complicated by obstruction has traditionally been quoted at between 0.1 and 0.2 % which is at least 10 times greater than the mortality for elective herniorrhaphy (Amid PK, Lichtenstein IL 1998).

Neuhauser looked at Medicare discharge data on 84,995 patients from 1971 specifically examining ICD code 550 (an Inguinal hernia without obstruction) and code 552 (an inguinal hernia with obstruction). He found the mortality to be .00519 and .0469 respectively. This confirmed the 10-fold increase in mortality for patients presenting with intestinal obstruction when compared to non obstructed patients but must be interpreted in the light of the extremely low overall mortality compared to the 0.1-0.2 considered. Based on Neuhauser's incidence, the life expectancy in 1971, and the operative mortality rates for uncomplicated and complicated hernia repair in the Medicare population in 1971, he felt that for patients' 65 years old, the elective operation has a higher loss of life than no operation (Giaetta E, DeCian F, Cuneo S, et al. 1997).

To summarize, despite popular wisdom to the contrary, it may be that patients with inguinal hernias can safely delay surgical treatment in favor of careful, watchful waiting (WW) as the method of management for their hernia. The question is moot in the symptomatic patient because the indication for surgery is discomfort, not the prevention of complications. But what about the patient with an asymptomatic or minimally symptomatic hernia (Amid PK 2003)(McVay CB, Anson BJ, 1940) (Read RC New York: Springer-Verlag 2001)?

At the same it has become clear that the risk of complications of an untreated hernia as well as the operative mortality for caring for complications of an untreated inguinal hernia has been overstated, it is now realized that inguinal herniorrhaphy results in greater morbidity than has previously been appreciated.

**Complications related to the Herniorrhaphy**

The recurrence rate has been brought down to a minimum using modern hernioplasty techniques. Various groin pain syndromes may usually developed from scar tissue, reaction to prosthetic material or incorporation of nerve in staples or suture material during repair of the hernia. Chronic postoperative groin pain occurs without regard to the type of repair of the hernia. The nerves that are usually involved are the ilioinguinal nerve, the iliohypogastric nerve, and both the genital and femoral branches of the genitofemoral nerve and the lateral cutaneous nerve of the thigh. The former two are especially prone to injury during a conventional herniorrhaphy while the latter is most damaged during laparoscopy. A femoral nerve injury is extremely rare and is usually the result of a gross technical misadventure. This is fortunate because of the motor component of this structure. Randomized study by Cunningham from Canada, postoperative groin pain is probably more common than generally appreciated. In this series, at one-year post surgery, 62.9% of patients had groin pain, and 11.9% of those patients rate the pain as moderate to severe. Treatment is difficult with many patients failing all measures. The situation is compounded when workman's compensation issues cloud the picture. The first thing that must be ruled out is a recurrent hernia. This can be difficult. A sonographic examination may be helpful. When the operation is the only alternative, scar lysis, and neurolysis and/or neurectomy are performed. A recent report suggests that some might be improved by prosthesis removal.

Ischemic orchitis and testicular atrophy may be the results of the blood supply of the testicle are compromised during herniorrhaphy. Orchitis is defined as postoperative inflammation of the testicle occurring within one to two days after surgery. Clinically the patient has painful enlargement of the testicle that is hard in consistency and associated with a low-grade fever. The pain is severe and may last several weeks. Ischemic orchitis is most likely due thrombosis of the veins draining the testicle due to dissection of the spermatic cord. This condition may progress and result in testicular atrophy that takes several months to develop. Not all patients with ischemic orchitis will develop testicular atrophy because, fortunately, the testicle has a good supply. In fact, the occurrence is quite unpredictable, as most patients who develop testicular atrophy do not have a history of any testicular problems associated with the index herniorrhaphy. Vice versa, the vast majority of patients with testicular problems as an immediate complication of their herniorrhaphy go on to recovery without atrophy. Bendavid studied the incidence of testicular atrophy at the Shouldice Hospital. He found 19 patients out of 52,583 primary inguinal hernia repairs (0.036%) and 33 patients out of 7,169 recurrent inguinal hernia repairs (0.46%).

Bleeding can occur producing a wound or scrotal hematoma. This is usually the result of delayed from the cremasteric, internal spermatic or branches of the inferior epigastric vessels. Injuries to the deep circumflex artery, the corona mortis or the external iliac vessels may result in a large retroperitoneal hematoma.

Osteitis pubis seems to have disappeared as a complication following the elimination of sutures through the periosteum. With a laparoscopic repair, staples are used to attach the mesh to Cooper’s ligament, which may sometimes produce osteitis. The more liberal use of prosthetic material during conventional herniorrhaphy and the routine use with laparoscopy has made the discussion of complication related directly to foreign material more timely. Tissue response, which is variable from person to person, can be so intense that the prosthetic material can be deformed by contraction. Intestinal obstruction or fistulization is possible by erosion especially if there is physical contact between the intestine and the prosthesis.

Infection is rarely seen for prostheses used for groin hernia repair in contradistinction to ventral herniorrhaphy. The reason for this is not clear. When infections do occur, they can occasionally be treated with drainage and prolonged antibiotic , but usually, the prosthesis must be removed. Rejection because of an allergic response is possible but extremely rare. What patients call rejection in their histories usually is the result of infection.

**Conclusion**

It's necessary to tailor the treatment recommendation for the individual patient. I think watchful waiting for patients with small asymptomatic or minimally symptomatic hernias with two caveats: 1. The patient must understand the symptoms of incarceration/strangulation and the potential need for an emergent operation if that occurs; and 2. If the patient notices the hernia enlarging, I ask them to return to the clinic to be reevaluated, as a large inguinal-scrotal hernia is more challenging to operatively repair

**Summary**

A strategy of watchful waiting is a safe and acceptable option for men with asymptomatic or minimally symptomatic inguinal hernias. Acute hernia incarcerations occur rarely, and patients who develop symptoms have no greater risk of operative complications than those undergoing prophylactic hernia repair.

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# Assessment of Menstrual Hygiene Practices and its Associated Factors among Adolescent Students in Batu High School in Batu Town, East Shewa, Ethiopia: A Descriptive School-Based Cross-Sectional Study

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**Abstract**
Background: Menstrual hygiene management has not received adequate attention in the reproductive health sectors in developing countries which in turn contribute to poor menstrual hygiene practices in these countries. Objectives: To assess menstrual hygiene practices and associated factors among adolescent female students in Batu high schools in Batu town, East Showa, Ethiopia. Methods: A descriptive school-based cross-sectional study was conducted from May 25 to June 25, 2017, G.C, in Batu Town. A total of 310 adolescent's girls 'were participated in the study. Participants were selected by systematic sampling technique in every Kth = 9th. Result: Majority 218 (79.6%) of the adolescents have heard about menstruation before menarche, and the main sources of information about menstruation were 166 (60.6%) from friends. Majority of the participants 183(66.8%) practiced good menstrual hygiene, and 250 (91.2%) of adolescent girls were using sanitary pads as menstrual absorbent, while 10 (3.6%) were using a piece of clothes. A significant association was found between residence (P=0.001), parents' educational status (P=0.008), religion (P=0.001), family monthly income (P=0.019), types of sanitary materials (P=0.006) and menstrual hygiene practices. Conclusion and Recommendation: This study has highlighted the need of adolescent girls to have accurate and adequate information about menstruation and its appropriate management. Formal as well as informal channels of communication such as mothers, sisters, and friends, need to be emphasized for the delivery of such information.

## BACKGROUND

A woman goes through several developmental milestones that greatly influence her reproductive health. Menarche, which is the establishment of menstruation, is one of these milestones. Menstruation is part of the female reproductive cycle that starts when girls become sexually mature at the time of puberty. It is a phenomenon unique to the females. During a menstrual period, a woman bleeds from her uterus via the vagina. The menstrual rhythm depends on the hypothalamus-pituitary-ovarian function whereas the amount of blood loss depends upon the uterine contraction. The menstrual period lasts from three to seven days. Each period commences approximately every 28 days if the woman does not become pregnant during a given cycle. A deviation of two or three days from the twenty-eight-day rhythm is quite common (Aid, 2009, Desalegn T, 2009). The human body experiences many physiological changes in its transition from childhood to adulthood.

Adolescence is the period between 10 and 19 years; a period of transition marked by physical, psychological and biological changes. The onset of menarche is arguably the single most important event during this transition for women, yet because of various social and cultural factors, it is a traumatic and uncomfortable time for girls. Menstrual hygiene is fundamental to the dignity and well-being of women, the social-cultural practices, and the lack thereof continues to disrupt girls' school attendance(Aid, 2009, Desalegn T, 2009, Ghattargi CH, 2005). Menstrual hygiene refers to personal hygiene during menstruation. This includes bathing at least once a day, wearing clean and regularly changed undergarments and using proper absorbent materials like pads and tampons which are also changed regularly. However, issues related to menstruation and its practices are still foggy due to taboos and socio-cultural restrictions resulting in adolescent girls remaining uninformed of the technical facts and hygienic practices to keep good health that is why sometimes it results into adverse health outcomes (USA Report, 2005).

Good menstrual hygiene practices are essential during menstruation; they include 1) regular change of clothing and underwear; 2) change of hygienic pads every three to four hours; 3) daily showering, especially in instances of dysmenorrheal; 4) adequate washing of genitalia after each voiding of urine and/or feces; 5) continuing normal routine and daily activities (e.g., going to school, doing physical exercise), and 6) maintaining a balanced diet with plenty of fruits and vegetables rich in iron and calcium(Fund, 2008). Despite these recommendations, menstrual hygiene practices are poor in developing countries. Lack of knowledge and poor personal hygienic practices during menstruation can lead to various gynecological problems in the reproductive life of girls like reproductive tract infections and inflammatory disorders (Sumpter C, 2013). Using unclean materials, insertion of unclean materials into the vaginal canal, use of highly absorbent tampons, frequent vaginal douching, and lack of hand-washing have been suggested to increase the risk of infection. Yet in many communities, these potentially harmful practices are common amongst the adolescent girls (House S, 2012). In one study, a higher prevalence of morbidities was found in women using unclean soaking material during menstruation, but it was not statistically significant. This study also reported that the three symptoms, urinary tract infection, vaginitis, pelvic inflammatory disease complexes were found to be more in women not washing genitals daily (Suneela G, 2001).

Poor menstrual health management (MHM) in schools has been shown to cause adolescent girls to worry and humiliation, contribute to monthly absenteeism and lead to poor performance in schools. United Nations children's fund (UNICEF) estimates that about 1 in 10 school-age African girls do not attend school during menstruation or drop out at puberty because of the lack of clean and private sanitation facilities to manage their menstruation hygienically(UNICEF, 2005). Menstrual hygiene needs to be addressed holistically and in context as a package of services that includes voice and space to talk about the issue, adequate water, privacy, facilities for washing and disposal of used sanitary pads. There is also a need for both men and women to have a greater awareness of good menstrual hygiene practices. However, in most parts of the world, it is considered as a taboo and rarely talked about. It has also been largely neglected by the society and other, sectors focusing on sexual and reproductive health, and education. As a result, the practical challenges of menstrual hygiene are made even more difficult by socio-cultural factors and millions of girls continue to be denied their rights to water and sanitary health, education, dignity, and gender equity (Kamath R, 2013).

Poor menstrual health management in schools has been shown to cause adolescent girls to worry and humiliation, contribute to monthly absenteeism and lead to poor performance in schools. Ignorance about menstrual issues is prevalent not only amongst schoolgirls but also in organizations and communities. Therefore, adolescent girls need the support and guidance of parents and health workers to facilitate healthy life practices. Increased knowledge about menstruation right from childhood may raise safe practices and may help in mitigating the suffering of millions of women (Shukla, 2005a). Equipping adolescent girls with adequate information, and skills on menstrual hygiene and its management are seen as empowering them with knowledge which enhances their self-esteem and academic performance (Action: 2000). However, as per my literature search, there is no publication found about menstrual hygiene and its associated factors among female students in the study area. Therefore, the aim of this study is to assess the practice of menstrual hygiene and associated factors among female students in Batu high school in Batu Town Oromia regional state, Ethiopia.

## METHOD AND MATERIAL

A descriptive school-based, cross-sectional study design was employed from May 25 to June 25, 2017, G.C, among 310 systematically selected female students from the governmental school of Batu high school. The schools were selected purposively. Then, the students were further stratified based on their grade. Students from each grade were selected proportionally to their class size. Finally, a systematic sampling technique was applied to select individuals in each grade from the list of students' name in their respective grades. The participant was selected every $k^{th}$ interval

$$K= N/n = 2,368/274 = 9^{th}$$

The study area was undertaken among the adolescent girls' in Batu high schools in Batu town, East shawa Ethiopia. Batu town is situated eastern part of Oromia regional state in East Shoa Zone, 160 km from Addis Ababa the capital city of Ethiopia and 120 km from Adama capital city of the regional state. It had three urban Kebeles. Based on the central statistical agency population projection for the 2009 EFY, a total population of 64157. In the town, there are four high schools (4). One government and three non-governments high school.

The sample size is determined using single population proportion formula with the following assumptions: A 95 % confidence interval and 72 % good menstrual hygiene practice from the previous study conducted in northwest Ethiopia (Desalegn T, 2009), marginal error 5 %, and5% non-response rate were added to the total sample. Accordingly, the sample size of 310 was obtained.

The data was collected using a structured questionnaire. The questionnaire consists of two sections; the first section contains socio-demographic characteristics and the second section contains questions related practices regarding menstrual hygiene, sources of information about menstrual hygiene, and others associated factors. All high school female students in regular programs who have started menstruation were included in the study.

Data was collected by grade ten completed female data collectors. Content validity was ascertained in consultation with the guide and experts in the field of public health. Reliability of the tool was established by pre-testing the questionnaire. This helps to ensure the clarity, ordering, consistency, and acceptability of the questionnaire. After this, the questionnaire was ready after necessary corrections and training were given for data collectors for 3 days at the time of data collection. During data collection, the questionnaire was checked for completeness on a daily basis by the data collector themselves and the supervisors. The completed questionnaire was also rechecked by the principal investigators to maintain the quality of data.

After data collection, each questionnaire was checked for completeness, then coded and entered into Epi-info version 3.5.1 and exported to SPSS for Windows version 20 for cleaning, editing, and analysis. The collected data was cleaned, checked for its completeness, categorized, coded and analyzed using the Statistical package for social sciences (SPSS) version 20.0. The result was interpreted and presented using appropriate tables, graphs, and charts.Crosstabs(Chi-square) was used to observe the association between dependent and independent variables. P-values less than 0.05 were considered as statistically significant. In order to confirm the ethical and legal standard of the investigator, approval was obtained from the ethical review board of Harar Health Science college. The survey was commenced after written consent obtained from Batu high school.

## RESULTS

### SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS

A total of 274 students provide valuable information and which makes the response rate of 100%. The age range of the participants was 13-19 years, 159 (58 %) were in between 13-15 years of age, and a mean age of participants was 15.72years with standard deviation (SD) of +1.32year. From the total respondents, 159(58%) participants were from 9th grade and 115 (42%) from 10th grade. Most, 182 (66.4%) of them were from the Oromo ethnic group, and 89 (32.5%) were Orthodox Christians. Two hundred six (75.2%) of the participants

were from the urban area. Regarding the educational level of their parents, 222 (81%) of the parents of the participants were able to read and write. The majority, 212 (77.4%) of the respondents' families earned 500 to 1500ETB per month, and the most common source of income for the parents was from a trade. Majority of the respondents 166 (60.6%) were experienced menarche at the age of 13 years (Table 1).

Table 1: Shows description of demographic characteristics of adolescent female students in Batu High school in Batu Town, East Showa Ethiopia, 2017

| Variables | Category | Number | Percentage |
|---|---|---|---|
| Age | 13-15 | 159 | 58.0 |
| | 16-18 | 91 | 33.2 |
| | >18 | 24 | 8.8 |
| Residence | Urban | 206 | 75.2 |
| | Rural | 68 | 24.8 |
| Ethnicity | Oromo | 182 | 66.4 |
| | Amhara | 64 | 23.4 |
| | Tigre | 10 | 3.6 |
| | Others | 18 | 6.6 |
| Religion | Muslim | 94 | 34.3 |
| | Orthodox | 89 | 32.5 |
| | Protestant | 73 | 26.6 |
| | Others | 18 | 6.6 |
| Grade level | Grade 9 | 159 | 58.0 |
| | Grade 10 | 115 | 42.0 |
| Parents educational status | literate | 222 | 81.0 |
| | Illiterate | 52 | 19.0 |
| Family monthly income(ETB) | 500-1500 | 212 | 77.4 |
| | 1501-2500 | 40 | 14.6 |
| | 2501-3500 | 14 | 5.1 |
| | >3500 | 8 | 2.9 |
| Age at menarche | 12 | 10 | 3.6 |
| | 13 | 166 | 60.6 |
| | 14 | 89 | 32.5 |
| | >=15 | 9 | 3.3 |

SOURCE OF INFORMATION ABOUT MENSTRUAL HYGIENE MANAGEMENT

Majority 218 (79.6%) of the participants were aware of menstruation before menarche and166 (60.6%), 78 (28.5%), 19 (6.9%) and 11 (4%) were from, friends, elder sister, mothers, and teacher respectively (Figure 1).

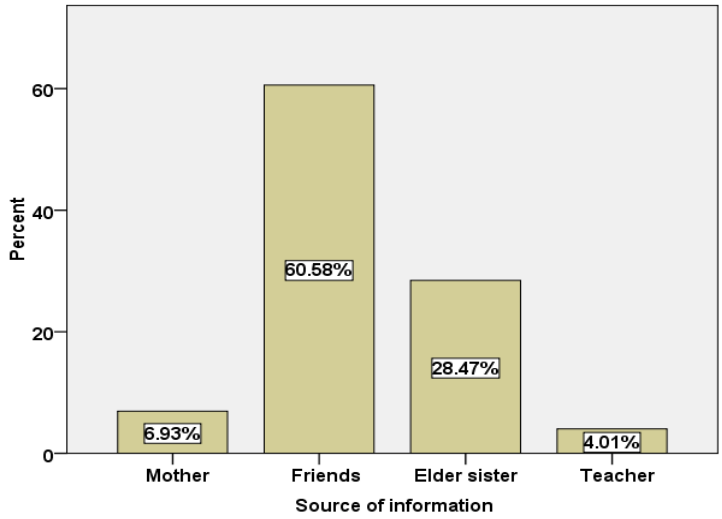


Figure1: Bar chart, distribution of the source of information regarding menstruation among adolescent female students in Batu High school in Batu Town, East Showa Ethiopia, 2017.

MENSTRUAL HYGIENE PRACTICE OF RESPONDENTS

The participants use different types of hygienic menstrual materials.Around250 (91.2%) of adolescents use sanitary pads as menstrual absorbent, while 10 (3.6%) were using a piece of clothes. Regarding the frequency of changing the menstrual protective materials, 160(58.4%) of participant's change used sanitary materials properly (three or more times a day). The rest of the participants practiced menstrual hygiene unsatisfactorily (change sanitary materials less than required). Again it was found that only 21 (7.7%) girls used water and antiseptic for cleaning the external genitalia, while a majority of girls used water and soap. Majority242 (88.3%) participants disposed their used sanitary materials into latrines, while 18 (6.6%) burying it and 31 (11.3%) wash and reuse pads. Most of the girls who reused the cloth during menstruation,15 (48.4%) dried the cloth inside the house, 11 (35%) dried outside the house in the sunlight while 5(16%) dried it outside the house without sunlight. A majority of the study subjects 197 (71.9 %) preferred to change the absorbent at home in the toilet. However, 19 (6.9%) changed the absorbent at their schools in the toilet (Table 2). Overall 183(66.8%) of the respondents had good hygienic practice during menstruation while only 91(33.2%) had poor practice.

Table 2: Menstrual hygiene management among adolescent female students in Batu High school in Batu Town, East Showa Ethiopia, 2017

| Hygienic practices | Category | Number | Percentage |
|---|---|---|---|
| Types of sanitary materials used | Piece of clothes | 10 | 3.6 |
| | Sponge | 6 | 2.2 |
| | Cotton wool | 8 | 2.9 |
| | Sanitary Pad | 250 | 91.2 |
| The frequency of changing sanitary materials | Change daily | 10 | 3.6 |
| | Changes 2 times daily | 104 | 38.0 |
| | Changes 3 times and above | 160 | 58.4 |
| A place to change used pad | At home in the latrine | 197 | 71.9 |
| | At home in a separate room | 49 | 17.9 |
| | At school in separate room | 9 | 3.3 |
| | At school in the female latrine | 19 | 6.9 |
| Disposal of sanitary materials after use | Burying | 18 | 6.6 |
| | Disposed of in toilet wastes | 242 | 88.3 |
| | Disposed on an open field | 14 | 5.1 |
| The practice of genital washing | Yes | 265 | 96.7 |
| | No | 9 | 3.3 |
| Medium used to wash genitalia | Water and antiseptics | 21 | 7.7 |

| | | | |
|---|---|---|---|
| | Soap and water | 131 | 47.8 |
| | Only water | 122 | 44.5 |
| Reuse the pad | Yes | 31 | 11.3 |
| | No | 243 | 88.7 |
| Places of drying used clothes in case of reuse | Outside the house in sunlight | 11 | 35 |
| | Inside the house | 15 | 48.4 |
| | Outside without sunlight. | 5 | 16 |
| Changing sanitary materials at school | Ye | 97 | 35.4 |
| | No | 177 | 64.6 |

**RESTRICTION AND REACTION PRACTICED DURING MENSTRUATION**

Majority 210 (76.6%) of the respondents did not practice any restrictions. However, 64(23.4 %) of them did not attend any religious functions or visit the holy place, and 44(16.1%) girls were absent from schools during menstruation. Even though most of the respondents had heard about menstruation, a large majority of the participants showed varied reactions to their first menstruation. Principal emotions associated with menstruation included bad mood 174 (63.5%), stressed 37 (13.5%), worried28 (10.2%), ashamed 25 (9.2%) and lack of confidence10 (3.2%) (Figure2).

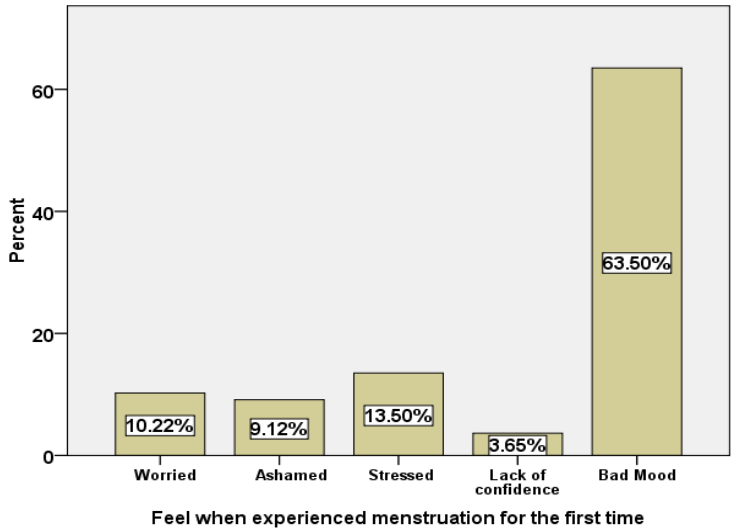


Figure 2: Reaction of the respondents to their first menstruation in Batu high school in Batu town, East Showa Ethiopia, 2017

AVAILABILITY AND FACILITIES FOR MENSTRUAL HYGIENE MANAGEMENT IN THE SCHOOL

Almost all of the student's mentions as school facilities are currently inadequate to manage their menses safely. All the respondents' school has enough water sources, but there was a continuous interruption of water supply in the school. All the respondents were reported as there were gender-segregated latrines in the school but it lacks hand washing facilities with soap. All the respondents were reported as there was no changing room/washroom for girls; sanitary protection materials were not available in case of emergency, and no sites were prepared for disposal used sanitary protection materials.

ASSOCIATION BETWEEN SELECTED VARIABLES AND THE PRACTICE OF MENSTRUAL HYGIENE

An attempt was tried to assess the factors that are affecting the practice of menstrual hygiene management practice. In this study factors that are associated with menstrual hygiene practice are a residence, religion, parents' educational status, family monthly income and types of sanitary materials used.

Eighty-two percent of adolescents who live in the urban had good menstrual hygiene practice than students who live in the rural area ($\chi2$= 8.034, P=0.001). There is a statistically significant association between religion and practice of menstrual hygiene ($\chi2$=9.232, P=0.001). There was a statistically significant association between the good practice of menstrual hygiene and parents' educational status ($\chi2$= 7.454, P=0.008). There was also a statistically significant association between the good practice of menstrual hygiene and family monthly income (3.918, P=0.019). Seventy percent of adolescent's students these using sanitary pads had good menstrual hygiene practice than students these using other types of sanitary materials ($\chi2$= 4.539, P=0.006).

Table 3: Association between selected variables and practice of menstrual hygiene among adolescent female students in Batu High school in Batu Town, East Showa Ethiopia, 2017

| | Menstrual Hygiene Practice | | $X^2$ | $d_f$ | P-value |
|---|---|---|---|---|---|
| Variables | Good | Poor | | | |
| Residence | | | | | |
| Urban | 169(82.0%) | 37(18.0%) | 8.034 | 1 | |
| Rural | 14(20.6%) | 54(79.4%) | | | 0.001 |
| Religion | | | | | |
| Muslim | 71(75.5%) | 23(24.5%) | 9.232 | 3 | 0.001 |
| Orthodox | 69(77.5%) | 20(22.5%) | | | |
| Protestant | 36(49.3%) | 37(50.7%) | | | |
| Others | 7(38.9%) | 11(61.1%) | | | |
| Parents educational status | | | | | |
| literate | 175(78.8%) | 47(21.2%) | 7.454 | 1 | 0.008 |
| Illiterate | 8(15.4%) | 44(84.6%) | | | |
| Family monthly income(ETB) | | | | | |
| 500-1500 | 2(25.0%) | 73(34.4%) | 3.918 | 3 | 0.019 |
| 1501-2500 | 12(85.7%) | 10(25.0%) | | | |
| 2501-3500 | 30(75.0% | 2(14.3%) | | | |
| >3500 | 139(65.6%) | 6(75.0%) | | | |
| Types of sanitary materials used | | | | | |
| Piece of clothes | 4(50.0%) | 76(30.4%) | 4.539 | 3 | 0.006 |
| Sponge | 3(50.0%) | 8(80.0%) | | | |
| Cotton wool | 2(20.0%) | 3(50.0%) | | | |
| Sanitary Pad | 174(69.6%) | 4(50.0%) | | | |

## DISCUSSION

Prior awareness regarding menarche and menstruation among girls is generally low in most of the cultures. In the present study, it was found that 79.6% % of the participants had prior knowledge about menstruation before menarche and the main sources of information about menstruation 60.6% were from friends and other sources of information were, 28.5%, 6.9% and 4% from elder sister, mothers, and teacher respectively. This finding is not comparable with a study conducted in India, Kolkata in which only 42.1% girls had prior knowledge about menstruation before menarche, the main source of knowledge being mother and sister 45% (Sudeshna R, 2012). The possible reasons for the difference might be due to silence, cultural taboos' in society. This indicates better communication between mothers and school girls on menstruation and menstrual hygiene practices in the present study. It is desirable that each and every girl child should be aware of menstruation, which is an important event at the threshold of adolescence and ideally before the attainment of menarche. Before bringing

any change in menstrual practices, the girls should be educated about the facts of menstruation, physiological implications, about the significance of menstruation and about proper hygienic practices with a selection of disposable sanitary menstrual absorbent.

The varied reactions to menarche may depend on the extent to which the girls have been prepared for menstrual hygiene practices. In the present study, principal emotions associated with menstruation included bad mood at63.5% and stressed 13.5%. This finding was similar with others study findings conducted in India (Ghattargi CH, 2005, Shukla, 2005b). These negative feelings associated with menstruation could be because of participants not being psychologically prepared for attaining menarche. This could also be a reflection of the culture and taboos in the society regarding menstruation. Many restrictions were imposed on the girls in the present study, 64(23.4 %) of them did not attend any religious functions or visit the holy place, and 44(16.1%) girls were absent from schools during menstruation. This is very similar to the study conducted in India where not performing religious rituals was found to be the most common restriction observed, and 16 % of the girls reported school absenteeism (al.. 2008). The hygiene-related practices of women during menstruation are of considerable importance, as they affect their health by increasing their vulnerability to infections, especially infections of the urinary tract and the perineum (Omidvar S, 2010).In the present study,250 (91.2%) of adolescent girls were using sanitary pads as menstrual absorbent, while 10 (3.6%) were using a piece of clothes. In a similar study done in India 342 (91.2%) girls use an only napkin (readymade sanitary pads) during menses while 05 (1.3%) girls use only rag cloths (Sudeshna R, 2012).

Regarding the drying of the reused cloth, it is observed that most of the girls who reused the cloth used during menstruation 15 (48.4%) dried the cloth inside the house, 11 (35%) dried outside the house in the sunlight while 5(16%) dried it outside the house without sunlight. This finding was consistent with others study findings reported (Aid, 2009, Desalegn T, 2009, Ghattargi CH, 2005). This might be menstruation is considered as dirty and meant to be hidden which reflects the taboos found in the society. In the present study regarding hygienic practices during menstruation131 (47.8%) of the participants reported that cleaning of external genital with soap and water was present whereas in a study done in India it was 78.4 %(Sudeshna R, 2012). This difference might be due to socioeconomic factors. Regarding the frequency of changing of the menstrual protective materials, 160(58.4%) of practiced menstrual hygiene satisfactorily (change sanitary materials property three or more times a day). The rest of them practiced poorly or changing sanitary materials inadequately, which is less than required (three times a day). In India, a previous finding in the frequency of changing sanitary materials shown 39.8% changed sanitary pad or cloth twice a day, 29.5% three times a day and 21.7% once a day which similarly shown very poor practice with current study(Fehr, 2010). There is a risk of infection by using super absorbency materials and if changed infrequently. We can minimize or avoid the risk by not using tampons, or by alternating between tampons and pads during the period (Adhikari P, 2007).

This study on disposal technique showedthat88.3%participants disposed their used sanitary materials into latrines, while 6.6% burying it and 11.3%wash and reuse pads. Study on Nigerian schoolgirls showed the various methods that students used for disposing of used menstrual absorbents include disposal with domestic wastes 71.2%; burning 24.3%; burial 4.3% and flushing in toilet 0.3% (Lawan, 2010). A study conducted in Saoner, Nagpur district showed that majority of the girls 52.2% burned, 39.79% threw it with the routine waste, and 6.72% used other methods of disposal [24]. A study was done in adolescent schoolgirls in Navi-Mumbai also reported 96.38% girls disposed of the sanitary pads in the house-dustbin while3.01% and 0.61% girls disposed of it by the roads idea and latrine respectively (Nemade D, 2009). From this, it can be said there is an improper disposal technique.

Good menstrual hygiene practice includes the use of sanitary pads, changing the pads three times a day, changing the pads during the night, not reusing pads, taking special baths during menses, washing the genital area during every visit to the toilet, and not wearing bloodstained dresses. Overall 66.8% of the respondents had good hygienic practice during menstruation while only 33.2% had poor practice. The finding of this study was lower than studies conducted in Amhara regional state, Ethiopia and Northwestern Nigeria which were 90.9 % and 88.7 %, respectively(TK., 2014, Lawan, 2010). This implies that not all respondents that had good knowledge of menstruation and menstrual hygiene practiced it.

However, this finding is higher than the study done in Nepal which indicated that only 12.9% of the study participants practice good menstrual hygiene (SapkotaD1, 2013). In the present study, a significant association was observed between residence and level of practice. Eighty-two percent of adolescents who live in the urban had good menstrual hygiene practice than students who live in the rural area ($\chi 2$= 8.034, P=0.001). This finding is similar to the study done in Kano Northwestern Nigeria (Lawan, 2010). Significant associations between family income and menstrual hygiene practices were observed in the current study which is congruence with the study done in Karachi Pakistan where the study found an association between the income and menstrual hygiene practices (Ten, 2007).

## CONCLUSION

This study has highlighted the need of adolescent girls to have accurate and adequate information about menstruation and its appropriate management. Formal as well as informal channels of communication such as mothers, sisters, and friends, need to be emphasized for the delivery of such information. In view of the vital role of the mothers, it is very important that the mother is armed with the correct and appropriate information on reproductive health so that she can give this knowledge to her growing girl child

## RECOMMENDATIONS

- The government should give special emphasis on the provision of proper disposal kits and continuous water supply in the school.
- It is very important that the mothers should have the correct and appropriate information on menstrual hygiene to give their knowledge to their girl children since they are the main source of information about menstruation.
- It is essential for the Ministry of education to incorporate menstrual hygiene management education in the curriculum to improve their knowledge and practice.
- Health professionals should educate the community about menstruation to avoid restrictions during menstruation and to educate the girl child about good management of menstrual hygiene.
- Different stakeholders should be involved in developing Information, Education, and Communication for promoting positive attitudes towards management of menstruation and related problems among the adolescent girls.
- Further research with qualitative methods is especially recommended as this is a sensitive issue needing a study for adolescents' better understanding of menstrual hygiene practice.

### List of Acronyms and Abbreviation

**MHM:** Menstrual Hygiene Management**, RTI**: Reproductive tract infections**, UNICEF:** United Nations Children's Fund, **WASH:** Water, Sanitation and Hygiene, **WHO:** World Health Organization

### Consent for Publication

Not applicable

### Availability of Data and Materials

This is a research article

### Competing Interests

We declare that we have no competing interests.

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None

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**Authors' Contribution**

FB, ML, and MT conceived the study, participated in the design, data analysis and interpretation of the result. FB involved in data acquisition, writing the draft manuscript as well as making all the changes as suggested by the coauthors. ML and MT critically reviewed the manuscript. All authors read and approved the manuscript.

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# Oral Motor Difficulties and Speech Intelligibility in Bangla Speaking Children with Down syndrome

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**Abstract**
Background: Many children with Down syndrome have low intelligibility due to oral motor problems and some related factors. Purposes: The present study was conducted to find out the oral motor difficulties and speech intelligibility in Bengali speaking children with Down syndrome. Methods: A cross sectional study was carried out by a structured parental questionnaire with an Intelligibility Context Scale (ICS). Among 82 children with DS comprising 42 boys and 40 girls took part in this study. Results: The Maximum (41.5%) age range was 9-13 years old (41.5%) where a greater percentage (82.9%) of children with DS had delayed speech and most of them developed one word at 3 years old. The majority (40.7%) of the DS was reported with large or big tongue. Results also indicated that a high percentage of the children with DS had not a good oral motor movement. However, there were significant relationship (P=.019<0.05, .010<0.05, .003<0.05) between oral motor difficulties with lip, tongue, and jaw movement, but there was not a significant relationship between gender and intelligibility scale. Highly significant relationship (P= 0.000<0.05) was found between oral motor difficulties and speech intelligibility and positive co-relation (P= 0.040<0.05) initiated between age and speech intelligibility score. Conclusion: A high prevalence (72%) of oral motor difficulties was found in Bangla speaking children with DS & oral motor control, speech delay and oral cavity structure were the responsible factors to interrupt speech intelligibility.

**Keywords:** Down syndrome, Intelligibility context scale (ICS), Oral motor difficulties, Oral cavity structure, Speech delay

## 1. Introduction

Bangladesh is a densely populated country. About 160 million people currently live in this country & 15% population is involved with disabilities, according to the World Bank estimates (Universal periodic Review of Bangladesh 2013). Down syndrome is one of that & most common identifiable chromosomal disorder in Bangladesh (Afrin, 2015). It is an intellectual disability occurring approximately 1 in 700 in live birth. A person of any race, socio-economic status or geographic location can have a child with DS (Parver, 2010). Speech intelligibility refers to the understandability of speech, the match between the intension of the speaker & the response of the listener & the ability to use speech to communicate effectively in everyday situations (Pascoe, 2017). Many children with DS have difficulty with speech intelligibility. Speech intelligibility depends on oral motor skill and verbal apraxia (Kumin, 2006). Children with DS have difficulties of oral motor activities & apraxia of speech. Oral motor skill is considered by oral structure & its fruitful function that refers to the movement of muscles of the face & oral area, especially the movements related to speech. Individual with DS has anatomical & physiological differences in the mouth & throat area which make more difficult to make precise movement. Structural anomalies like a small oral cavity with a relatively large tongue & a narrow high arched palate are mostly seen in a DS. This affects feeding, cup drinking, chewing & swallowing solid foods & speech. Some anatomical differences that are seen include low muscle tone & weak oral facial muscle. Two

factors like oral motor skills & oral motor planning skills (childhood verbal apraxia) affects speech intelligibility. Oral motor planning (OMP) skills refer to the ability to combine & sequence sounds into words, phrases & sentences. Difficulty with OMP skill is referred to as childhood verbal apraxia. Symptoms like inconsistency in phoneme, a limited repertoire of phoneme, presence of automatic phases, difficulty in spontaneous speech, difficulty combining & sequencing phonemes, struggling production of speech & non speech tasks & speech rhythm difficulties are present in children with DS (Kumin, 2006). Speech sound disorder includes articulation disorders in which a child has trouble physically producing a sound or sounds. By age 5 most of the child's speech should be understood and by age eight, children should be able to say all sounds correctly (Human hearing speech center). Articulation errors are described as a substitution, omission, addition & a distortion (Albertini, 2010). Parents reported evidence of difficulties classified as oral motor skills, motor programming skills and specific speech skills. Children experienced greater difficulty with sentence and in conversing than with single words. Intelligibility problems were more frequent when the child was conversing with unfamiliar adults. All individual with DS may be difficult to understand at least some of the time. It is also possible that poor speech intelligibility affects productive language performance (Kumin, 1994). Speech intelligibility is measured by a promising scale. The ICS shows potential new measure of functional intelligibility. Parents completed the 7-items ICS which rates the degree to which children's speech is understood by different communication partners (Parents, immediate family, extended family, friends, acquaintances, teachers and strangers) on a 5 point scale (McLeod et al., 2012). On the contrary, there is neither an assessment tool in Bengali language nor any research on OM or SI, although there is a huge demand not only for individuals with DS but also for normally developing children. There is an insufficient article in this area in Bangladesh on my topic. There is a need for more research in order to understand the nature of speech disorders observed in individuals with DS & to design appropriate therapy methods. Thus, I have selected this topic to find out the status of the intelligibility of speech among the children with DS and the relevant factors that influencing the intelligibility of speech. This research examined to determine OM difficulties and SI in children with DS through a study about parent's opinion.

## 2. Methodology

It was a descriptive Cross-sectional study conducted among 82 parents of DS children & data was collected from different Government and Non government institute situated in Dhaka city. Study was carried out over five months from October 2017 to February 2018. In this research parents were asked to describe speech properties according to the ICS scale (McLeod et al., 2012) which is translated & adapted into Bangla with the help of the department of communication disorders, University of Dhaka under supervision of a respective Professor. Seven ICS items to be answered on a four scale Likert type grading & ranging from always, frequently, sometimes to never. Purposive sampling technique was used and data were collected through face to face interview with the interviewer-administered structured questionnaire. Higher scores for the scales indicate better speech intelligibility. Investigator took an academic permission letter which was approved by the chairman of the Communication Disorders Department, University of Dhaka. Permission was also taken from the study area of Beautiful Mind, Uttara; Tory Foundation, Lalmatia; Sid Trust, Shaymoli; Jatiya Protibondhi Unnayan Foundation (JPUF) situated in northern Dhaka city. After getting permission from the authority, the investigator started data collection from the Parents of children with DS. The collected data were checked thoroughly and strictly for any error or information missing and then analyzed by using the statistical software named "Statistical Package for Social Science" (SPSS-22).

## 3. Results

**Table 1: Socio demographic characteristics of the sample (N=82).**

Analysis of the socio-demographic characteristics and table 1 shows that age range 9 to 13 years old were maximized (n=34, 41.5%) & mean age of the children with DS was 10.73 (±3.7688). Among them (N=82) male & female DS were nearly same & the majority of the participant's religion was Islam (n=77, 93.9%) & most of the participants (n=75, 91.5%) lived with single family having less than 5 family members (n=75, 87.8%).

| Variables | (n) | (%) |
|---|---|---|
| **Age of the children with DS** | | |
| 4-8 Years | 25 | 30.5 |
| 9-13 Years | 34 | 41.5 |
| 14-18 Years | 23 | 28.0 |
| **Mean Age±SD=10.73±3.7688** | | |
| **Gender** | | |
| Male | 42 | 51.2 |
| Female | 40 | 48.8 |
| **Religion** | | |
| Islam | 77 | 93.9 |
| Hindu | 3 | 3.7 |
| Christian | 1 | 1.7 |
| Buddhism | 1 | 1.7 |
| **Family Member** | | |
| <5 member | 75 | 87.8 |
| ➢ 5 member | 10 | 12.2 |
| **Family Types** | | |
| Single Family | 75 | 91.5 |
| Nuclear Family | 7 | 8.5 |

**Table 2: Information related variables to speech (N=82).**

Regarding the analysis of information related to speech, maximum (n=68, 82.9%) children had no hearing problem, more than two third (n=68, 82.9%) of the children with DS had history of speech delay, more than one third (n=27, 32.9) of the participants first speaking age was 3 years, followed by 19.5% in 5 years & 22.0% was greater than 5 years. More than half (n=56, 68.3%) of the children was reported slow speech rate & a greater percentage (56.9%) of the children had absent swallowing, sucking, eating, & drinking difficulty during their infant as shown in table 2.

| Variables | (n) | (%) |
|---|---|---|
| **Hearing problem** | | |
| Present | 5 | 6.1 |
| Absent | 68 | 82.9 |
| Undiagnosed | 9 | 11.0 |
| **Speech Delay** | | |
| Yes | 68 | 82.9 |
| No | 14 | 17.1 |
| **First Speaking Year** | | |
| 2 Years | 4 | 4.9 |
| 3 Years | 27 | 32.9 |
| 4 Years | 17 | 20.7 |
| 5 Years | 16 | 19.5 |
| ➢ 5 Years | 18 | 22.0 |
| **Speech Speed** | | |
| Fast Speech | 12 | 14.6 |
| Slow speech | 56 | 68.3 |
| Normal speech | 14 | 17.1 |
| **Following Difficulty in Infant** | | |
| Sucking Difficulty | 14 | 12.8 |
| Swallowing Difficulty | 15 | 13.8 |
| Eating Difficulty | 16 | 14.8 |
| Drinking Difficulty | 2 | 1.8 |
| No Difficulty | 62 | 56.9 |

**Table 3: Oral Motor Control Related Variables**

Revealed that maximum (n=48, 40.7%) children with DS had large or bigger tongue & more than one third (n=29, 35.4%) of the children was reported with low facial muscle tone as shown in table 3.

| Variables | (n) | (%) |
|---|---|---|
| **Oral Cavity Structure** | | |
| Small Oral cavity | 18 | 15.3 |
| Large or Big tongue | 48 | 40.7 |
| Narrow arch plate | 3 | 2.5 |
| High arch plate | 21 | 17.8 |
| No problem | 28 | 23. |
| **Low Facial Muscle Tone** | | |
| Yes | 29 | 35.4% |
| No | 40 | 48.8% |
| Not Diagnosed | 13 | 15.9% |

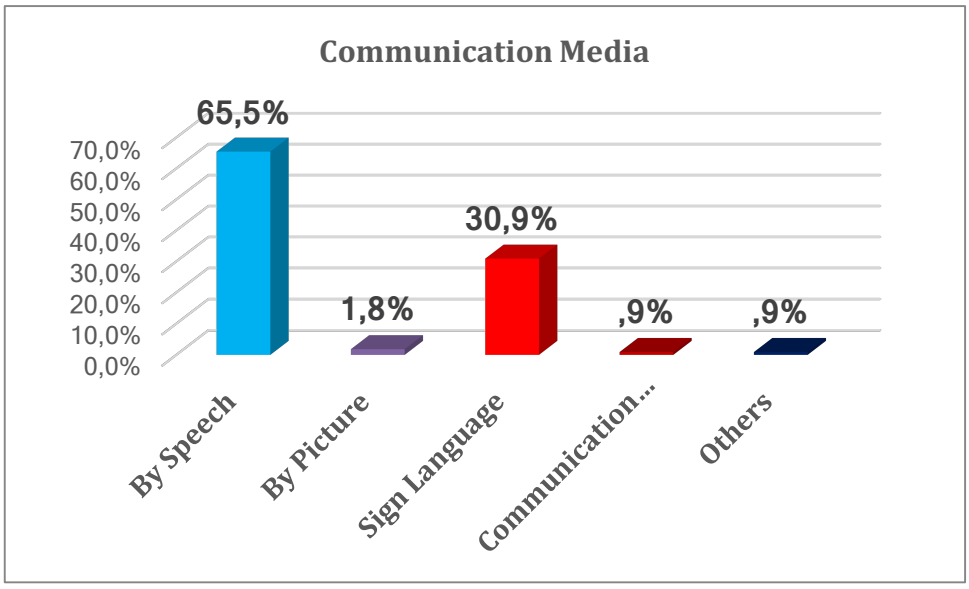


**Figure 1: Communication media of the children with DS**

Regarding communication media of the children with DS, Maximum (65.5%) had speech communication & some of them (30.9%) had a communication by sign language where 1.8% by picture, 0.9% by communication Board, & 0.9% by others as shown in figure1.

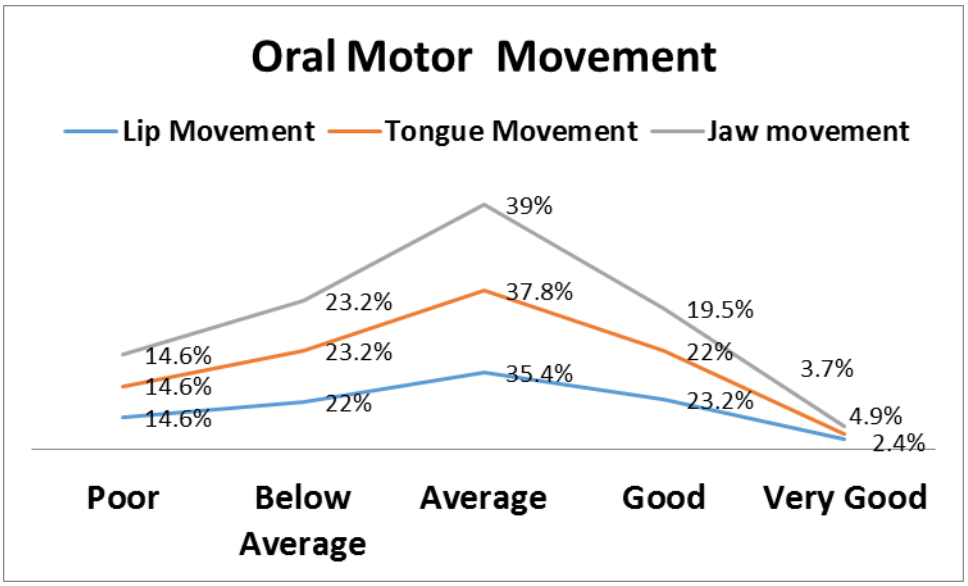


**Figure-2: Oral Motor Movement of the children with DS.**

Figure 2 revealed that among the children (N=82), the maximum was reported average level of lip (39%), tongue (37.8%), & jaw movement (35.4%) whereas very few (3.7%, 4.9%, 2.4%) of them were very good in oral motor movement that measured by Likert scale.

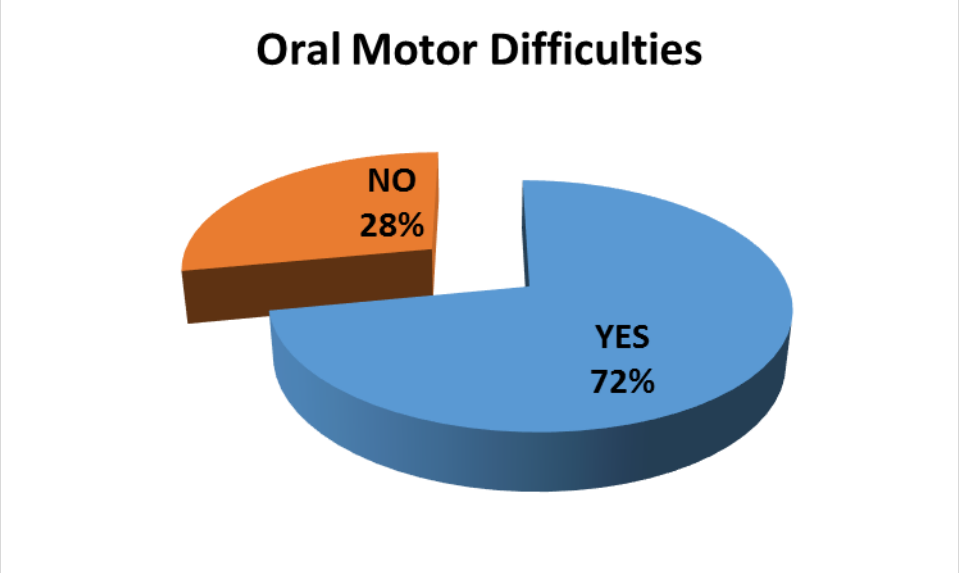


**Figure-3: Prevalence of oral motor difficulties**

The current study found 72% prevalence of oral motor difficulties among the children with DS.

**Table 4 Intelligibility in Context Scale (ICS Scale)**.

According to ICS scale (McLeod et al. 2012) based on parents perception, maximum parents usually (30.5%) & always (35.4%) understand of his/her child, whereas most of the DS was reported sometimes (30.5%, 32.9%) understand by immediate & extended members of the individual family. The majority of the children (30.5%) with DS were indicated sometimes understand by his/her friend & rarely (32.9%) understand by other acquaintances. About 43.9% teachers understand to speech usually & less than half (40.2%) of the strangers never understand to the speech as shown in table 4.

| ICS Question | Never | Rarely | Sometimes | Usually | Always |
|---|---|---|---|---|---|
| ***Do you understand your child*** | *1(1.2%)* | *12 (14.6%* | *15 (18.3%)* | *25(30.5%)* | *29 (35.4%)* |
| ***Do Immediate members of your family understand your child*** | *11 (13.4%)* | *13 (15.9%)* | *25 (30.5%)* | *22 (26.8%)* | *11 (13.4%* |
| ***Do Extended members of your family understand your child*** | *12 (14.6%)* | *23 (28.0%)* | *27 (32.9%)* | *13 (15.9%)* | *7 (8.5%)* |
| ***Do your child's friend understand your child*** | *17 (20.7%)* | *21 (25.6%)* | *25 (30.5%)* | *10 (12.2%)* | *9 (11.0%)* |
| ***Do other acquaintances understand your child*** | *22 (26.8%)* | *27 (32.9%)* | *19 (23.2%)* | *10 (12.2%)* | *4 (4.9%)* |
| ***Do your child's teacher understand your child*** | *10 (12.2%)* | *6 (7.3%)* | *16 (19.5%)* | *36 (43.9%)* | *14 (17.1%)* |
| ***Do Strangers understand your child*** | *33 (40.2%)* | *29 (35.4%)* | *12 (14.6%)* | *4 (4.9%)* | *4(4.9%)* |

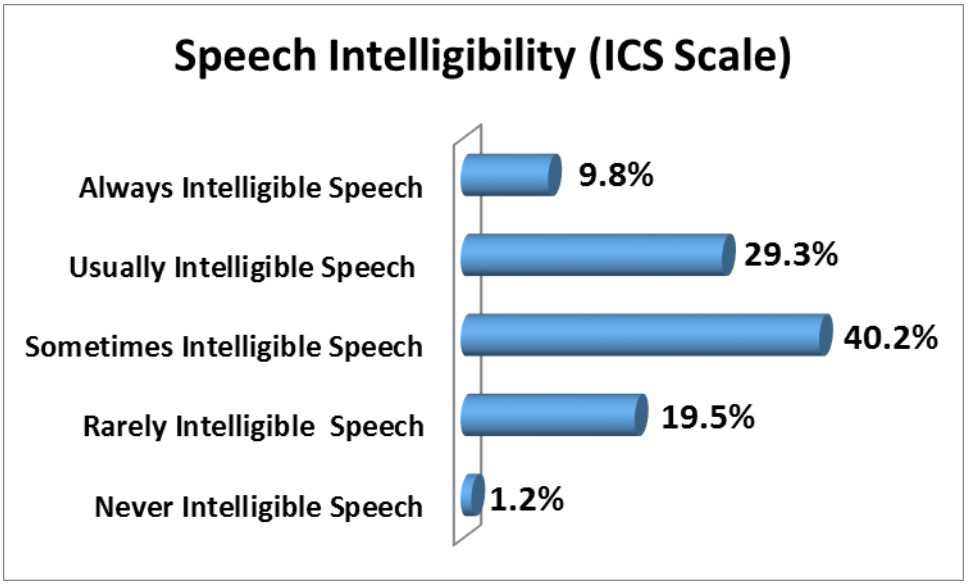


**Figure-4: Speech Intelligibility of the children with DS.**

The Study revealed that the majority (40.2%) of the children with DS was reported to sometimes speech intelligible as shown in figure 4.

**Table 5- Distribution of Total Intelligibility Context Scale (ICS)**

| Total Score (ICS) | Number (n) | Percent (%) |
|---|---|---|
| *7* | *1* | *1.2* |
| *8* | *4* | *4.9* |
| *10* | *2* | *2.4* |
| *11* | *3* | *3.7* |
| *12* | *3* | *3.7* |
| *13* | *3* | *3.7* |
| *14* | *1* | *1.2* |
| *15* | *4* | *4.9* |
| *16* | *2* | *2.4* |
| *17* | *6* | *7.3* |
| *18* | *1* | *1.2* |
| *19* | *6* | *7.3* |
| *20* | *4* | *4.9* |
| *21* | *10* | *12.2* |
| *22* | *2* | *2.4* |
| *23* | *5* | *6.1* |
| *24* | *2* | *2.4* |
| *25* | *8* | *9.8* |
| *26* | *3* | *3.7* |
| *27* | *4* | *4.9* |
| *30* | *1* | *1.2* |
| *33* | *3* | *3.7* |
| *35* | *4* | *4.9* |
| *Total* | *82* | *100.0* |
| | *Mean±SD= 20.23±6.904* | |

In this study, among 82 children with DS, mean total score was 20.23 (±6.904) out of 35 where score 21 was the highest number (n=10, 12.2%) and minimum score was 7 (n=1, 1.2%) as shown in table 5.

**Table 6: Average Score of Intelligible Context scale (ICS)**

| Average Score | Number (n) | Percent (%) |
|---|---|---|
| **1 to 2 AS** | 17 | 20.7 |
| **2 to 3 AS** | 33 | 40.2 |
| **3 to 4 AS** | 24 | 29.3 |
| **4 to 5 AS** | 8 | 9.8 |
| | **Mean±SD=2.86±.994** | |

In this study, among N=82 children with DS, the mean average score was 2.86 out of 5 which indicated that children with DS had sometimes intelligible (McLeod et al. 2012) of speech by others as shown in table 6.

**Table 7- Association between Oral Motor Difficulty and Related Variables**

| Variables | Oral Motor Difficulty | | $\chi^{\surd}$ | df | P value |
|---|---|---|---|---|---|
| **Age (In Years)** | Yes | No | | | |
| *4-8 Years* | *18(72.0%)* | *7(28.0%)* | *.107* | *2* | *.948* |
| *9-13 Years* | *25(73.5%)* | *9(26.5%)* | | | |
| *14-18 years* | *16(69.6%)* | *7(30.4%)* | | | |
| **Sex** | | | | | |
| *Male* | *31(73.8%)* | *11(26.2%)* | *1.47* | *1* | *.701* |
| *Female* | *28(70.0%)* | *12(30.0%)* | | | |
| **Child's speech delay** | | | | | |
| *Yes* | *53(77.9%)* | *15(22.1%)* | *7.08* | *1* | *.008** |
| *No* | *06(42.9%)* | *08(57.1%)* | | | |
| **Lip Movement** | Yes | No | *11.76* | *4* | *.019** |
| *Poor* | *11(91.7%)* | *1(8.3%)* | | | |
| *Below Average* | *17 (94.4%)* | *1 (5.6%)* | | | |
| *Average* | *18(62.1%)* | *11(37.9%)* | | | |
| *Good* | *10(52.6%)* | *9(47.4%)* | | | |
| *Very Good* | *3(75.0%)* | *1(25.0%)* | | | |
| **Tongue Movement** | | | | | |
| *Poor* | *12(100.0%)* | *0(0.0%)* | *13.1* | *4* | *.010** |
| *Below Average* | *17(89.5%)* | *2(10.5%)* | | | |
| *Average* | *20(64.5%)* | *11(35.5%)* | | | |
| *Good* | *9(50.0%)* | *9(50.0%)* | | | |
| *Very Good* | *1(50.0%)* | *1(50.0%)* | | | |
| **Jaw Movement** | | | | | |
| *Poor* | *12(100.0%)* | *0(0.0%)* | *15.93* | *4* | *.003** |
| *Below Average* | *18(94.7%)* | *1(5.3%)* | | | |
| *Average* | *19((59.4%)* | *13(40.6%)* | | | |
| *Good* | *8((50.0%)* | *8(50.0%)* | | | |
| *Very Good* | *2(66.7%)* | *1(33.3%)* | | | |

p-value reached from chi-square. Mark represents a significant association of Oral Motor Difficulties with speech delay (p-value .008), lip (p-value 0.019), tongue (0.010), & jaw (0.003) movement

**Table 8- Association between Intelligibility Context Scale & Oral Motor Difficulties.**

| ICS Scale | Oral Motor Difficulties | | $\chi^{\surd}$ | df | P Value |
|---|---|---|---|---|---|
| | **Yes** | **No** | | | |
| ***Never Intelligible Speech*** | *1 (100.0%)* | *0(0.0%)* | | | |
| ***Rarely Intelligible Speech*** | *15(93.8%)* | *1(6.3%)* | *23.093* | *4* | *.000** |
| ***Sometimes Intelligible Speech*** | *28(84.8%)* | *5(15.2%)* | | | |
| ***Usually Intelligible Speech*** | *14(58.3%)* | *10(41.7%)* | | | |

| | | |
|---|---|---|
| ***Always Intelligible Speech*** | *1(12.5%)* | *7(87.5%)* |

Mark (*) represents that there was highly significant relation between OMD with SI (p-value 0.000).

**Table 9: Correlation between Age and ICS total score**

| | | Age of the children with DS | Total Score (ICS Scale) |
|---|---|---|---|
| **Age of the children with DS** | ***Person Correlation*** | *1* | *.227* |
| | ***Significant (2- tailed)*** | | *.040** |
| | ***N*** | *82* | *82* |
| **Total_Score** | ***Person Correlation*** | *.227* | *1* |
| | ***Significant (2-tailed)*** | *.040** | |
| | ***N*** | *82* | *82* |

***Correlation is significant at the 0.05 level (2-tailed)**

Here p= (.040<0.05) indicated that there is a positive correlation between age and ICS total score.

**Table 10-Treatment Related Variables**

Revealed that more than half (56.1%) of the children with DS did not take speech therapy & those who were taken (63.9%) speech therapy had better prognosis than before as shown in table 10.

| Taken Speech Therapy | (n) | % |
|---|---|---|
| ***Yes*** | *36* | *43.9* |
| ***No*** | *46* | *56.1* |
| **Status after taking speech Therapy (n=36)** | | |
| ***No Change*** | *13* | *36.1* |
| ***Better than Before*** | *23* | *63.9* |

## 4. Discussion

Many Children with DS have difficulty with speech understanding and fluency. The present study based on parent's perspective to learn more about some specific factors that affects speech intelligibility. Reduced speech intelligibility brings an extensive problem for the children with DS (Bacley, 2000). The study revealed that more than half (72%) of the children with DS were affected by oral motor difficulties where male suffered more than female, but earlier study found that 60.2% of parents had been given a diagnosis of oral motor difficulties (Kumin, 2006) which is similar to compare this study & Togramm (2015) found that one third (37.9%) of the children with DS were diagnosed OMD by their families. The present study revealed that most of the children with DS produced first word at 3 & >5 years of old which indicated their delayed onset of speech and more than half (68%) of children were reported for delaying speech by their parents. Almost all parents had been living with single family (91%) where members of each family had <5 (88%) which might be a reason of child's delayed speech. More than half (68.3%) of the children with DS had slow speech rate and less than one fourth (17.1%) was found normal speech. Previous study (Berglund, 2001) found that only 12% of children with DS produced one word at one year old. However, another study found 90% of three years old & 94% of five years old produced one or more words and 73% of five years old children produced 50 or more words which are very similar to this study. Kumin (2001) stated that lower intelligibility found those children who began to speak after age 5. Another study Togram (2015) found the beginning of the speech of DS was 17.6% present at 3 years onwards, 14.1% at 4 years onwards, 6% stated 5 years onwards & 3.1% answered 6 years onward. About 32.9% of children did not speak & the mean age of first speaking word was 2.4 years. Families of children with DS stated that the onset of speech was late for their children (around 5 years). But in this study, the mean age of first speaking words was 3.21 years, which was minor dissimilarity from previous study. Previous study (Kumin,

1994) found that the children with DS experience conductive hearing loss which directly influenced their speech and language difficulties, but the present study initiated that maximum (82.9%) children with DS had no hearing problem & 11.0% children with DS was undiagnosed with hearing problem. Another study (Kumin, 2006) found that about half of children with DS had never found hearing difficulty. On the other hand Togram (2015) found almost all the children (90.3%) were not to have any hearing problems by reporting with their families. It is known that a greater intelligibility is associated with increased chronological age, (Pascoe, 2017) but present study revealed that there is a weak positive correlation found between age and SI. There was no significant relationship between sexes with SI. Earlier study found (Togram, 2015) that there was a significant relationship found between speech intelligibility and age ($r= 0.317$, $p< 0.01$) which indicated that older children were better levels of speech intelligibility. There were some influencing factors for speech intelligibility, such as low muscle tone, oral cavity structure, oral motor control etc. Study also revealed that about half of children with DS had no facial muscle tone and about one fourth of children had not diagnosed their low facial muscle tone & previous study revealed the same result. In this study, about 23.4% of the children with DS did not have low muscle tone. The study also initiated that female is sometimes more intelligible speech than male, on the other hand Timmins (2009) stated that the DS intelligibility bigger from 72%-76% & from 59%-65% of female and male participant correspondingly which is similar with this study. More than half of the children with DS had no difficulty in sucking, swallowing, eating and drinking difficulty & very few of them (1.8%) had a drinking problem, less than one fourth of the children had eating, swallowing, & sucking difficulty, but the other study found that babies with DS do not experience any difficulties during swallowing both liquid and solid foods and nearby half if the subjects were noted not to go through any troubles while eating (Togram, 2015). In this study, oral motor control measured by lip, tongue, and jaw movement. Current study found that the lip movement status of the children with DS had 14.6% of poor, 22% of below average, 35.4% of average, 23.2% of good, and 2.4% of very good. On the other hand, tongue movement status was 14.6% of poor, 23.2% of below average, 37.8% of average, 22.2% of good, & 2.4% of very good. Study also stated that jaw movement of the children with DS had 14.6% poor, 22.0% below average, 35.4% average, 23.2% good & 4.9% very good. All oral movements were assessed on a Likert scale. Highest percentage showed in the average movement of lip, tongue, and jaw movement. Results of this study indicated that children with DS had been suffering with their oral motor control & there was a significant relationship initiated between OMD with lip, tongue & jaw movement (P=.019*, 010*, .003*). On the other hand, there was no significant relationship found between OMD with age (P= .948> 0.05) and (P= .701> 0.05) gender. Another study stated that speech problem is embedded in such factors like anatomy and motor control (Kent, 2012). Communication media of the most children with DS was by speech (65.5%) and by sign language. An Earlier study found (Togram 2015), speaking (47% n=150), mimes and gestures (46.7% n=149) and others (63% n=20) communication forms used by children with DS. Past study (Martin, 2009) stated that individual with DS speech production related to differences in oral structure like a small oral cavity with a relatively large tongue & a narrow high plate. Current study found that among the children with DS, most of them had large or big tongue (40.7%), less than one fourth (15.3%) had a small oral cavity, very few (2.5%) had a narrow arch plate, 17.8% had a high arch palate and 23.7% did not have any oral cavity problem. Study revealed that there was a significant relationship was found between oral motor difficulties and Speech Intelligibility. From this association it could be said that those who had an oral motor problem had been suffering speech intelligibility. In this study, Intelligibility Context scale (ICS) showed that only parents understand their child's speech always (35.4%) & most of the time (30.5%**)** comparing to the others parameters in Likert scale. Immediate members like Brother, Sister, Grandfather, Grandmother understands their child sometimes and most of the time & it is about 30.5% & 26.8%. Uncle and Cousin of their family understand your child sometime and rarely & it is about 32.9% & 28.0%. Friends sometimes & rarely understand their child and it is about 30.5% and 25.6%. Other acquaintances never and rarely understand their child and it is about 26.8% and 32.9%. On the other hand teachers usually understand their child and it is about 43.9%. Strangers understand their child rarely (35.4%) and never (40.2%). In this study, parents and teachers understood most of their child's speech and it was always 30.5% and usually 35.4% compared to the other group. Study revealed a mean total score was 20.23 along with 35 and the mean average score was 2.86 among 5 which indicated that the children with DS sometimes speech intelligible with others. According to ICS Scale (McLeod et al. 2012) it could be said that DS had speech intelligibility trouble and it was very difficult to understand for strangers, but conversely close relation to the children who always track them, easily understand about their speech. ICS Scale (McLeod et al., 2012) is a subjective measurement scale by which easily measured children with DS intelligibility speech. Study revealed that near about half of the children with DS did not treat with speech

therapy. Most of them who was taken speech therapy got outcome better than before (63.9%). On the other hand previous study mentioned that most individuals with DS were benefited more from therapy focusing on motor planning training (Science Daily 2016).

## 5. Conclusion

It is concluded that children with DS has the highest prevalence of OMD as well as difficulty with understandable speech. Maximum children with DS have not good lip, tongue and jaw movement. There was a highly significant relationship found between OMD with SI. Some factors are responsible for OMD and speech intelligibility. A large number of children with DS were reported by the parents that sometimes of their children's speech understandable by others, but parent understanding status was fairly good than others. A positive correlation found between the ages with SI which indicated as speech intelligibility brings better according to their chronological age. A number of children did not take speech therapy and those who were treated with speech therapy were reported better prognosis.

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**Abbreviation**

**DS:** Down syndrome
**SI:** Speech Intelligibility
**OM:** Oral Motor Planning
**OMD:** Oral Motor Difficulties
**ICS Scale:** Intelligibility in Context Scale

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# Prevalence of Human Immunodeficiency Virus Infection Among Pregnant Women: Are We Winning the War?

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**Abstract**
The Human Immunodeficiency Virus (HIV) prevalence in prenatal clinic indicates that the gap in HIV prevalence between sub-regions of Africa is not reducing but widening. No evidence suggests that pregnancy accelerate the progression of HIV infection to AIDS in women, but pregnancy in HIV infected mothers are more likely to result in prematurity, intrauterine growth retardation, spontaneous abortion, and prenatal death. The aim was to determine the prevalence of HIV infection among pregnant women attending a rural primary health center for care. The study was designed as cross-sectional survey and case series using 80 pregnant women, randomly selected among those attending Antenatal care in a primary health center in Local Government Area in Rivers State, Nigeria. Descriptive method was used to represent the characteristics of the subjects and the differences in HIV infection among subjects analyzed using frequencies and percentages. The findings showed that out of 80 subjects studied; (14%) were HIV positive, (86%) were HIV negative; knowledge of risk factors identified were unprotected sex with sex partner/s (39%); existence of other sexually transmitted infection (33%); sharing of sharp instrument (17%); transfusion of unscreened blood (11%). Conclusion, the majority of the women had good knowledge of awareness on HIV infection and control using medication; which is a sound basis for the epidemiology, outcome, and effectiveness in prevention and control of HIV/AIDS in such a rural setting, considering socio-demographic factors. Awareness creation on risk factors of HIV/AIDS, lifestyle changes and adherence

**Keywords:** Prevalence, HIV, Pregnancy, Ante-Natal Care, Primary Health Centre, Awareness, Control

## 1. INTRODUCTION

Human Immunodeficiency Virus (HIV) infection, with its high rate and consequences, is a socio-economic disaster for most developing countries and having a potential to reverse health and development gain (WHO, 2010). Depending on socio-economic and gender disparity, women are at high risk of the infection and have had few options for providing for their families and children affected by HIV, due to their parental illness or death. The trend in HIV prevalence in the prenatal clinic indicate that the large gap in HIV prevalence between sub-regions of Africa is not reducing but widening (Cherinet et al., 2013). However, no substantial evidence

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suggesting that pregnancy accelerate the progression of HIV infection to AIDS in women, but pregnancy in HIV infected mothers are more likely to result in prematurity, intrauterine growth retardation, spontaneous abortion, and prenatal death. Therefore, it is important to note that without sustainable strategic interventions, the rate of HIV mother-to-child transmission (MTCT) will continue to increase in its range from 25% to 40% as reported by the Joint United Nations Programme on HIV/AIDS in 2010.

Prevalence in epidemiological point of view is a statistical concept referring to the number of cases of a disease or characteristics of a disease that are present in a particular population group of interest at a given time.

Antenatal care is a care pregnant mother receives from health care professionals during pregnancy in an antenatal clinic, aimed at providing increased continuity of pregnancy care to reducing pregnancy-related morbidity as well as associated HIV infection among pregnant women, as to improve pregnancy outcome.

A pregnant woman who is HIV positive can transmit the virus to others when infected blood or vaginal fluids come in contact with broken skin or mucus membrane. Though cause of AIDS is HIV, but some factors may increase the chance of developing it, such as: having unprotected sex; transfusion of blood infected with HIV; sharing of sharp objects infected with HIV; vertical transmission of HIV from infected mother to child during pregnancy/delivery process; having other sexually transmitted infection/s.

Quite importantly, report had shown that HIV epidemic drivers for pregnant women include; inadequate primary prevention and family services for women living with HIV, particularly those in the rural areas driven by fear of discrimination and stigmatization from city/urban settings; inadequate prevention of mother-to-child transmission (PMTCT) of HIV coverage, particularly the rural communities; low early infant diagnosis (EID), noting peculiarity of rural setting in terms of trained and qualified clinical manpower, adequacy of equipment for testing at 6weeks of age of child; breastfeeding practices, particularly mixed feeding practices and cultural practices, for instance, wife inheritance.

Available literatures showed that globally, the estimate for HIV prevalence among pregnant women of all ages remained at 3.6% in the year 2009 (Joint United Nations Programme on HIV/AIDS, 2010). Pooled data for all countries in sub-Saharan Africa indicated that HIV prevalence among pregnant women declined in trend from 6.5-5.3% from 2003 to 2012 (Eaton *et al*. 2014). In Nigeria, a report from 2001 to 2010 indicated a seemly gradual and steady decline in the trend of HIV prevalence among pregnant women attending antenatal clinics from 5.5% in 2001; 5.0% in 2003; 4.1% in 2005 and 4.1% in 2010 (FMH, 2012). However, reports from further studies indicated an upward trend in HIV prevalence of 4.9% in Bayelsa in 2013 (Ibrahim, Owoeye and Obilahi, 2013); 8.83% in Nnewi in 2014 (Okafor, Dinmoke and Udigwe, 2014) and slightly lower (8.3%) in Jos in 2016 (Charles, *et al*. 2016).

Nevertheless, in 2014 about 1.2million pregnant women were living with HIV in Nigeria and Nigeria is 1 of only 4 of the 22 priority countries with an HIV testing rate of less than 20% among pregnant women (National HIV and AIDS Sentinel Seroprevalence Survey, 2014). It is therefore, necessary to determine the prevalence of HIV infection among pregnant women attending Antenatal care in a typical rural primary health centre that is operationally designed to serve about 70% population in midst of culturally influenced factors and stigma to form basis for scientific opinion about our winning the war against HIV/AIDS in the light of vision 90-90-90 by 2020 (just 2years away) target on antiretroviral treatment services in Nigeria, targeting about 3.4 million estimated HIV infected persons, pregnant women inclusive. This means that by the year 2020, 90% of all people living with HIV should know their HIV status; 90% of all persons diagnosed with HIV will receive sustained antiretroviral treatment, and 90% of all persons receiving antiretroviral treatment will have durable suppression of the viral load, to reduce new incidences and reduce the prevalence of HIV.

### 1.1. Aim of the Study

The study aimed to determine the prevalence of HIV infection among pregnant women attending Antenatal care in a typical rural primary health center and to investigate the level of knowledge and awareness on risk factors of HIV infection among pregnant women in such rural setting.

## 2. MATERIALS AND METHODS

### 2.1 Research Design

The design used for the study was cross-sectional survey and case report method, aimed at determination of the prevalence of HIV infection as well as knowledge and awareness on risk factors of HIV infection among pregnant women attending ANC in the study area.

The inclusion criterion was all pregnant women attending ANC at the primary health center in the study area, while the exclusion criterion was the removal of any subject with difficulty in extracting complete information required for the study. See the schematic diagram of the design in figure 1.

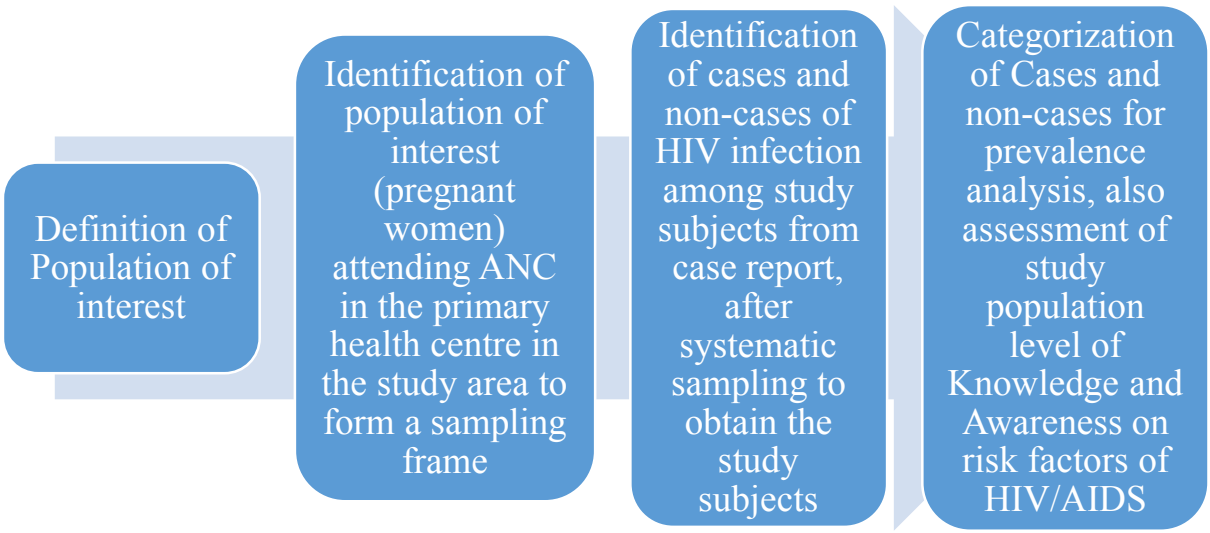


**Figure 1 Schematic Diagram of Cross-Sectional Study (Observational Study)**

### 2.2 Area of Study

This research work was carried out in a rural setting of Kegbara Dere community in Gokana Local Government Area of Rivers State, Nigeria. It is situated between longitudes $7.01^0$ and $7.\ 07^0$ E and latitudes $4.08^0$ and $4.2^0$ N of the Niger Delta area of Nigeria, bounded by B. Dere and Biara communities, in the North; Kor and Bomu communities in the South; Bera community in the East; Onne in Eleme Local Government Area in the West. The community has government primary and secondary schools, shell petroleum development facility and a primary health center among other socio-economic facilities.

### 2.3. Study Population

The population used in this study was pregnant women in Kegbere Dere community in Gokana Local Government Area of Rivers State, Nigeria. From census figure of 2006, the total population of Kegbara Dere stands at 15,269. Therefore, 5% of the total population constitutes pregnant women (NPHCDA, 2012), translating to 0.05X15,269 = 764 pregnant women as an estimation in the study area and forming the basis for the sampling frame at the health facility.

#### *2.3.1 Determination of Sample Size*

The sample size for this study was based on the formula for systematic sampling method.

$$N = \frac{Z^2pq}{d^2} \quad \text{..... Eq. 1}$$

Where N= Required Size of sample

Z= Level of statistical certainty chosen or confidence interval:

For 95%; Z= 1.96;

d= degree of accuracy desired = half the confidence interval

p= estimated level/prevalence/coverage rate being investigated

For prevalence of 5%; Z= 1.96 rounded up to 2 and applying equation 1, we have

$$N = \frac{2^2 \times 0.05 (1 - 0.05)}{0.05^2} = \frac{4 \times 0.05 (0.95)}{0.0025}$$

$$= \frac{0.19}{0.0025} = 76$$

To make up for coverage error, the sample size was rounded up to 80 by adding 4 (5.2% of 76). This sample size represents about 10% of the study population which is quite significant and so findings suitable for generalization.

**2.4 Sampling Procedure**

The sampling procedure used was systematic random sampling method where every other name/person from the names of all pregnant women attending ANC at the primary health facility as listed and arranged in order (sampling frame) were picked or selected for the study. On the whole, 80 pregnant women were selected and used for the study.

**2.5 Instrument for Data Collection**

The instruments used for data collection was set of structured questionnaires. The items were based on demographic characteristics, knowledge, and attitude of the study population as it had to do with risk factors of HIV/AIDS. Also, used was existing medical/health records covering a period of 6months (January – June 2017) which were reviewed to determine the HIV status of the study population. The developed questionnaire was reviewed for content validity. Pilot-testing for an understanding of items by study population was conducted, using 10 pregnant women who did not form part of the sample used for the study.

**2.6 Data Collection Procedure**

Records of cards/folders of the randomly selected pregnant women attending ANC in the primary health facility were reviewed to provide information concerning screening for HIV to determine their status among others. The questionnaire was also administered on the pregnant women to obtain data on knowledge and awareness on risk factors of HIV/AIDS infection/disease.

**2.7 Ethical Consideration**

Participants were not subjected to harm in any way whatsoever. The protection of privacy and dignity of participants were ensured. An adequate level of confidentiality of research data was also ensured, noting that full consent of the participants was obtained prior to the study process of data collection. Approval for carrying out the study at study area quite earlier obtained from health authority and health facility management.

**2.8 Method of Data Analysis**

Data from responses and review of existing medical/health records of participants were collated and presented in a tabular form with nominal scale, showing values for the variable of study. The entries were double checked for possible error of recording. Qualitative descriptive analysis by way of frequencies and percentages were carried out. Descriptive method was used to represent the characteristics of the subjects and the differences in HIV infection among subjects.

**3. RESULTS**

**TABLE 1 Distribution of Socio-Demographic Characteristics of Study Population**

| Variables/Factors | Frequency | % |
|---|---|---|
| **Age in Years** | | |
| **18-22** | 22 | 27 |
| **23-27** | 29 | 36 |
| **28-32** | 23 | 29 |
| **33-37** | 4 | 5 |

| | | |
|---|---|---|
| **38-42** | 2 | 3 |
| **43 & Above** | 0 | 0 |
| **Total** | **80** | **100** |
| **Marital Status** | | |
| **Single** | 34 | 42 |
| **Married** | 20 | 25 |
| **Separated** | 6 | 8 |
| **Widow** | 20 | 25 |
| **Total** | **80** | **100** |

**TABLE 2 Distribution of Socio-Economic Characteristics of Study Population**

| Variables/Factors | Frequency | % |
|---|---|---|
| **Educational qualification** | | |
| **Primary** | 20 | 25 |
| **Secondary** | 39 | 49 |
| **Tertiary** | 7 | 9 |
| **Non formal education** | 14 | 17 |
| **Total** | **80** | **100** |
| **Occupational status** | | |
| **Civil servant** | 9 | 11 |
| **House wife** | 28 | 35 |
| **Self-employed** | 7 | 9 |
| **Unemployed** | 36 | 45 |
| **Total** | **80** | **100** |

Table 1 showed that, a total of eighty pregnant women were studied in this research work, in which the age distribution revealed that **majority, 29 (36.0%) were within 23-27 years' age bracket**, against 23 (29.0%) within 28-32years'age group and 22 (27%) within 18-22 years, whereas the age groups of 33-37 years and 38-42 years were 4(5%) and 2(3%) respectively; none of the participants fell under the age group of 43 and above. The marital status distribution showed that **majority, 34 (42%) were single**, against 20(25%) each who was married and widowed; while 6(8%) were separated.

In table 2, the educational qualification distribution showed that the **majority, 39(49%) had obtained secondary school education**, against 20(25%) who had primary school education; while 14(17%), had non-formal education; whereas 7(9%), had tertiary school education. The occupational distribution indicated that the **majority, 36(45%) were unemployed**, against 28(35%) who were house wife, while 9(11%) were civil servants, whereas 7(9%) were self-employed.

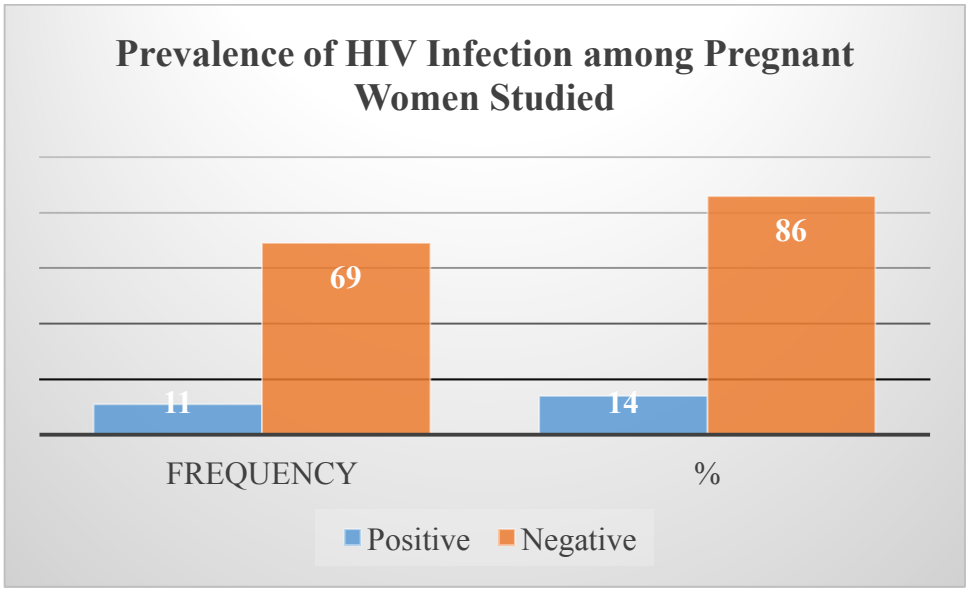


**Figure 2: Prevalence of HIV Infection among Pregnant Women**

In figure 2, showing the prevalence of HIV infection among N=80 pregnant women studied in this research work revealed that n=69(86%) were of negative HIV status, against n=11(14%) who were of positive HIV status.

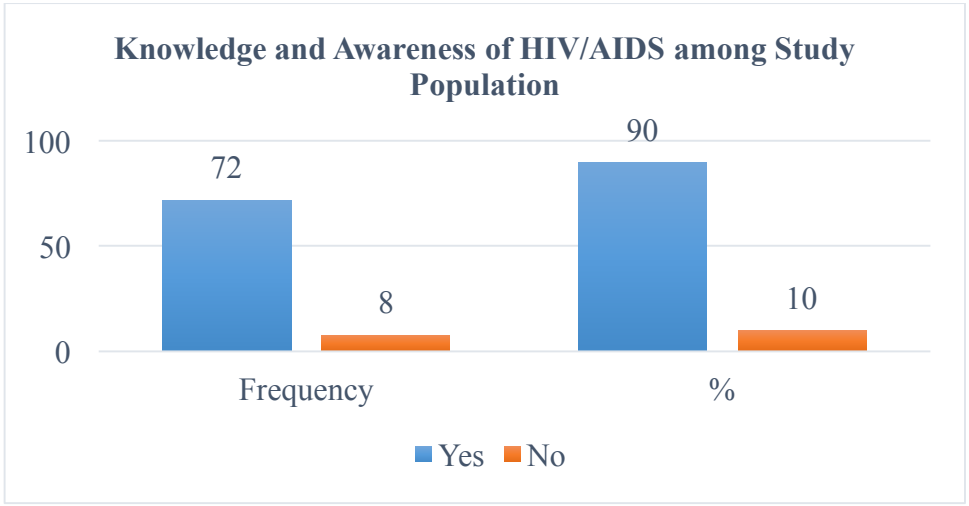


**Figure 3: Knowledge and Awareness of HIV/AIDS among Study Population**

Figure 3, which reflected knowledge and awareness of the study population, indicated that of N=80, n=72(90%) had knowledge and awareness of HIV/AIDS, while n=8(10%), claimed ignorant of HIV/AIDS.

**Table 3 Knowledge and Awareness on Risk factors associated with HIV/AIDS among Study Population**

| Risk Factor | Frequency(n) | % |
|---|---|---|
| **Sharing of sharp instrument/objects** | 14 | 17.0 |
| **Unprotected sex with sex partner/s** | 31 | 39.0 |
| **Transfusion of unscreened blood** | 9 | 11.0 |
| **The existence of other sexually transmitted infection/disease** | 26 | 33.0 |
| **Total** | **80** | **100** |

Table 3, showed knowledge and awareness on risk factors associated with HIV/AIDS as declared by the study population, N=80, in which majority, n=31(39%) identified unprotected sex with sex partner/s as the most common risk factor, followed closely by n=26(33%), who identified existence of other sexually transmitted infection/disease as the more common risk factor of HIV/AIDS. The other risk factors identified in their order were, sharing of sharp instrument/object, 14(17%) and transfusion of unscreened blood, 9(11%) respectively.

## 4. FINDINGS

The socio-demographic characteristic distribution of the study population showed that **majority, 29 (36.0%) were within 23-27 years' age bracket**, closely followed by 23 (29.0%) within 28-32years'age group and 22 (27%) within 18-22 years. In the marital status category, **the majority, 34 (42%) were single**, against 6(8%) who were separated. In the socio-economic characteristic distribution, more of the subjects**, 39(49%) had obtained secondary school education**, against 7(9%), who had tertiary school education. **The majority, 36(45%) were unemployed**, against 7(9%) who were self-employed. For the prevalence of HIV infection n=69(86%) were of negative HIV status, against n=11(14%) who were of positive HIV status. As regards, knowledge, and awareness of the study population, n=72(90%) had knowledge and awareness of HIV/AIDS, against n=8(10%), who claimed ignorant of HIV/AIDS. In the case of risk factors associated with HIV/AIDS, the majority, n=31(39%) identified unprotected sex with sex partner/s as the most common risk factor, against transfusion of blood infected with HIV, 9(11%) as the least factor identified.

## 5. DISCUSSION AND INTERPRETATION OF RESULTS

The 14% prevalence of HIV among pregnant women attending ANC is much higher than the estimated National prevalence of 3.4% (FMH, 2012); higher than 5.4% in Bishoftu hospital in Ethiopia, East Africa; also, much higher than the 3.2% reported in an earlier study conducted among rural pregnant women in North Central Nigeria (Isichie, *et al*.2015), still higher, though closer to the 8.83% and 8.3% reported in the works of Okafor, Dinmoke and Udigwe, (2014) in Nnewi, Southeast, Nigeria and Charles, *et al*.(2016) in Jos, North Central Nigeria respectively; but lower than the prevalence of 19.1% reported in the study of Agida, *et al.* (2010) in Makurdi, North Central Nigeria also. The observed differences in the prevalence of HIV among pregnant women across the various regions may be explained in terms of differences in the peculiarity of socio-economic and cultural practices drivers for HIV transmission. However, considering the seemly commitment by government, development partners and health care professionals in the fight against HIV, more so among pregnant women and the implicated mother-to-child transmission of HIV, an increased difference of about 5% HIV prevalence among pregnant women in recent studies in Nigeria, does not depict a winning trend in the fight against HIV/AIDS. Therefore, it is a signal for more serious concern, noting that socio-demographic factors associated with HIV transmission as observed in this study were outstanding. More so, in this work, the sexually active age from 18-27years combined as studied constitute 63%; the majority (45%) unemployed; the majority (42%) single, are strong socio-demographic and socio-economic drivers for HIV infection. More importantly, pregnant women are among the priority subpopulations having a higher risk of acquiring HIV, and so increasing, decreasing, or stable prevalence is an indicator of winning the fight against HIV/AIDs or not. This is very important in the epidemiological and disease control point of view, since such may account for new infections including newborn via mother-to-child transmission (MTCT), noting that Nigeria accounted for 33% (n=58,000) of all new childhood infections among the sub-Saharan Africa priority countries (National HIV and AIDS Sentinel Sero-prevalence Survey, 2014).

Also, although a good number of pregnant women 72(90%) had knowledge and awareness of HIV infection, but it was observed to be slightly lower to the findings in Lagos (100%), Southwest Nigeria; Nnewi (99%) and Abakaliki (100%), Southeast Nigeria (Agbogborbia, 2002; Igwegbe and Ilika, 2005; Eze and Onwasigwe, 2017). However, Lagos, Abakaliki, and Nnewi are cities and urban settlements, therefore, the difference in knowledge and awareness of HIV infection may be attributed to high level of HIV/AIDS campaign carried out by the government in collaboration with various non-governmental organizations with more concentration in the cities and urban settlements than the rural settlements. From this indication, it is auspicious that we refocus our awareness creation strategies on HIV infection and control towards the rural settlements if we have to win the war against HIV/AIDS in Nigeria and indeed globally. Also, having noted that from table 3, the sex-related risk

factors (unprotected sex with sex partner/s and existence of other sexually transmitted infection/disease) constitute 72% of all risk factors studied, provide basis for aggressive awareness creation campaigns on protective/safe sexual practices intervention strategies directed more at the rural communities so as to reverse any further increasing trend in the prevalence of HIV in the population.

## 6. CONCLUSION

The seemly good knowledge on awareness and risk of HIV infection among pregnant women attending ANC at typical rural Primary Health Centre is a sound basis for epidemiology, outcome, and effectiveness in prevention and control of HIV/AIDS, considering implicated socio-demographic and socio-economic factors. This may provide the platform for the sustainable winning trend in the fight against HIV/AIDS.

## 7. RECOMMENDATIONS

1. Awareness creation on risk factors of HIV/AIDS, lifestyle changes as well as implicated cultural practices and adherence to medication (antiretroviral) requires sustainable attention with particular focus in the rural community settings in our vision to end the scourge.
2. Further population-based studies should be conducted, noting the limitation of health facility-based studies on prevalence, which may not be representative of all cases in the population being studied.
3. Facilities and capacities of health care professionals should be sustainably upgraded to ensure effective early infant diagnosis (EID), in rural Primary Health facilities in particular.

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# Sonographic Comparison of Mean Velocity of Portal Vein in Liver Cirrhosis and Normal Individuals

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**Abstract**

Background: Liver cirrhosis is a life threatening condition, its consequences ranging from gross financial loss to death. Grayscale ultrasound has been used since long for the diagnosis of liver cirrhosis. Gray scale sonography along with color Doppler is the first-line modality used for evaluating the mean velocity of portal vein in Liver Cirrhosis. Chronic liver parenchymal diseases (CLPD) and liver cirrhosis cause decrease in the flow velocity of portal vein. Doppler ultrasound (US) can determine portal vein (PV) velocity in liver cirrhosis. The mean velocity of portal vein provides a distinguishable value between cirrhotic and normal individuals. Mean portal vein velocity is a reliable parameter in the diagnosis of liver cirrhosis and (CLPD). Objective: To compare mean velocities of portal vein of cirrhotic patients, and normal individuals by Doppler Ultrasound. Methods: A total of 188 individuals were cross-sectionally included in this study. The study was conducted in Gilani Ultrasound Centre, Ferozpur Road, Lahore, while using Toshiba Xario with 3-6 MHz transducer. Results: Mean portal vein velocity in cirrhotic patient was 10.72 ± 1.91 cm/s and in normal individuals was 23.36 ± 6.06 cm/s. Conclusions: Liver cirrhosis causes prominent changes in the texture of liver as compared to the texture in normal individuals. This study showed that mean velocity of portal vein was decreased in patients with liver cirrhosis as compared to normal individuals.

**Keywords:** Liver cirrhosis, Portal Vein, Chronic Liver Parenchymal Diseases, Doppler Ultrasound, Mean Portal Vein Velocity

## Introduction

Chronic liver diseases (CLD) and liver cirrhosis is a serious health problem due to its high mortality rate worldwide. The mortality rate of liver cirrhosis is approximately 2 % of all deaths(Hanafiah et al., 2013). The exact prevalence of cirrhosis worldwide is unknown, but reasonably to be estimated around 1%(Shah et al., 2015). The prevalence of liver cirrhosis in the United States was 0.27%(Scaglione et al., 2015), CLD causes an estimated 36,000 deaths in the United States each year (Wong et al., 2000). Cirrhosis is the leading cause of mortality in Pakistani population, due to widespread diseases of viral hepatitis(Ahmad et al., 2010). According to WHO, Pakistan has 2nd highest estimated prevalence of hepatitis C after Egypt(Organization, 2008). Individuals infected with HBV and HCV are 370 and 130 million respectively and it is anticipated that 15%-40% of chronic hepatitis B virus infected patients will develop cirrhosis(Sami et al., 2009, Shepard et al., 2005).

Cirrhosis is a complication of liver disease that involves gradual damage of normal architecture of liver cell and irreversible scarring of the liver(Friedman, 2003). Scar tissues replaces healthy tissues and partially blocks the flow of blood through the liver(Zhou et al., 2014). It results from multiple pathologic processes including inflammation, fibrosis and regeneration of nodules(Wynn and Ramalingam, 2012). Ultrasound has very high overall reliability in the assessment of liver pathologies(Hernaez et al., 2011). It is an effective modality to see the texture of the liver and measure the velocity of the portal vein(Gerstenmaier and Gibson, 2014). The sensitivity of U/S for severe fibrosis and cirrhosis was 91.1%, the specificity of 93.5% and the accuracy of 92.3%. Positive predictive value of 91.8% and negative predictive value of 91.5%(Simonovský, 1999).

The gold standard for assessing cirrhosis is liver biopsy, however this procedure is invasive, expensive and carries high risk of complications including bleeding, pneumothorax and perforation of colon or gallbladder(Bedossa and Carrat, 2009, Herrine and Friedman, 2005). Grayscale sonography along with color Doppler is modality of choice for assessing cirrhosis and has advantage over other modalities. According to Ashis Saha et al, ultrasonography is inexpensive, readily available, and free of bio-effects, non-invasive procedure that is performed in patients with liver cirrhosis(Mukhopadyay and Saha, 2015, Jeong et al., 2014). This research is an effort to diagnose liver cirrhosis (Chronic liver parenchymal diseases), with the help of (US). With the application of US in the patients of liver cirrhosis make it possible to diagnose it timely, managed properly and treat accordingly(Pavlov et al., 2016). Doppler US velocimetry is also used to quantify the blood flow velocity in the PV. Hence PV mean velocity could be predictor of liver cirrhosis(Martínez-Noguera et al., 2002).

**Methods**

This cross-sectional comparative study was conducted at Gilani Ultrasound Center, Ferozpur Road, Lahore, while recruiting 188 individuals. This research was commenced after approval of Institution Review Board (IRB). The study duration was 8 months (March - October, 2018). Ninety four patients of liver cirrhosis and similar number of normal individuals from the same population with same ages were included. The procedure and aim of research was briefly explained to the patients and consent form was signed. All the patients were examined according to American Institute of ultrasound in Medicine (AIUM) guidelines. Patients were scanned by Toshiba Xario using transabdominal transducer of 3-6 MHz. Portal vein velocity was measured while locating it in long axis view. Angle was kept below 60 degree and parallel to the vessel wall. (Figure 1 and 2). Maximum, median and minimum velocity were measured and mean velocity was calculated by the machine automatically(Medicine, 2003). Data was tabulated and analyzed by SPSS version 24.0.

**Results**

Total 188 individuals were included in this study, half (94) were cirrhotic and half (94) were normal. The mean age of patients was 46.15 ± 15.88 years (9-83years). The mean velocity of portal vein in cirrhotic patients was 10.72 ± 1.91 cm/s and in 23.36 ± 6.06 cm/s in normal individuals. The standard deviation in normal individuals was 6.06 cm/s, which show a large variation, while the standard deviation in cirrhotic patients was 1.91 cm/s, focus on a narrow range of variation (Figure-3**).** Relation of the portal vein velocity in liver cirrhosis with 95% confidence interval was significant (p-value was 0.000). (Table-1). Cross tabulation of the liver sonographic texture in normal and cirrhotic patients shows that, coarse liver texture was present in 33 (18%) in cirrhotic

while 0 (0%) in normal individuals. Heterogeneous texture was present in 61 (32%) cirrhotic while 26 (14%) in normal individuals. However homogeneous texture was present in 68 (36%) in normal individuals and 0 (0%) in cirrhotic patients. Gender cross tabulation of the liver texture shows that, that the total number of females in this study were 77 (41%), in which 33 (18%) were cirrhotic and 44 (23%) were normal. Detail is given in (Table-2, Figure-4).

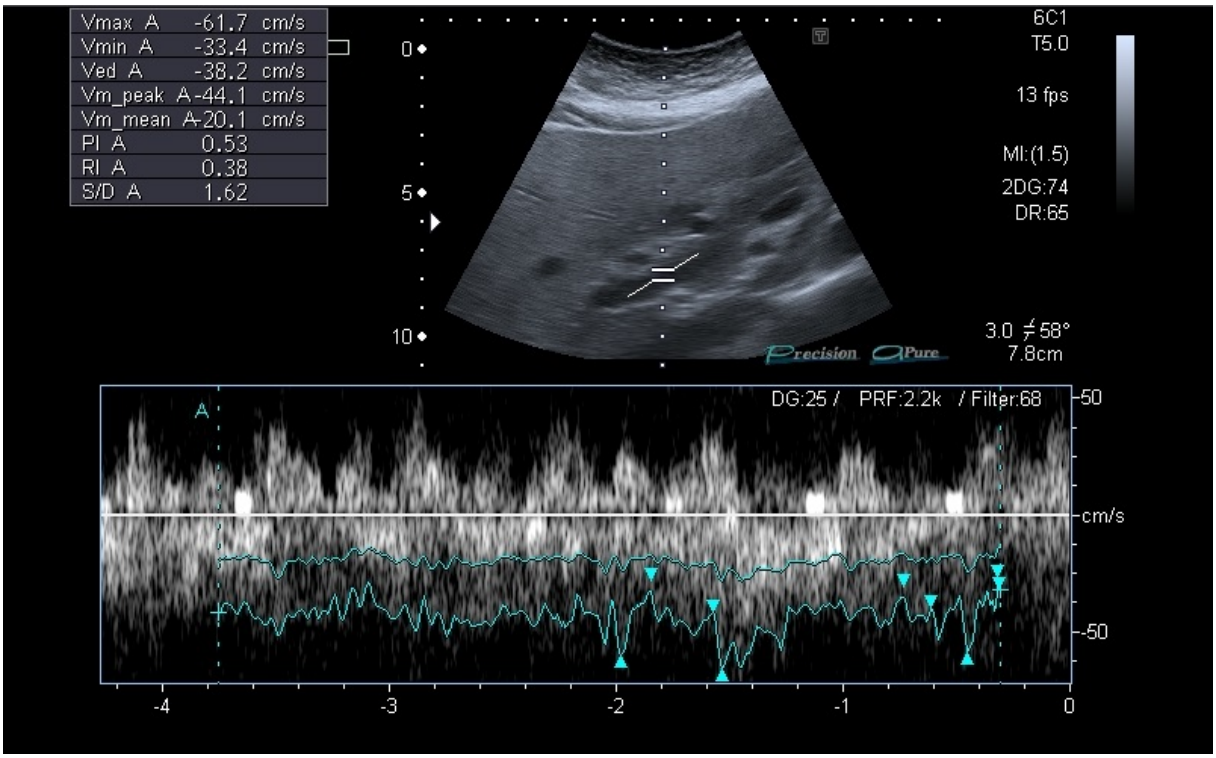


**Fig 1:** Homogeneous echotexture of liver in normal individual, mean PV velocity is 20.1 cm/s.

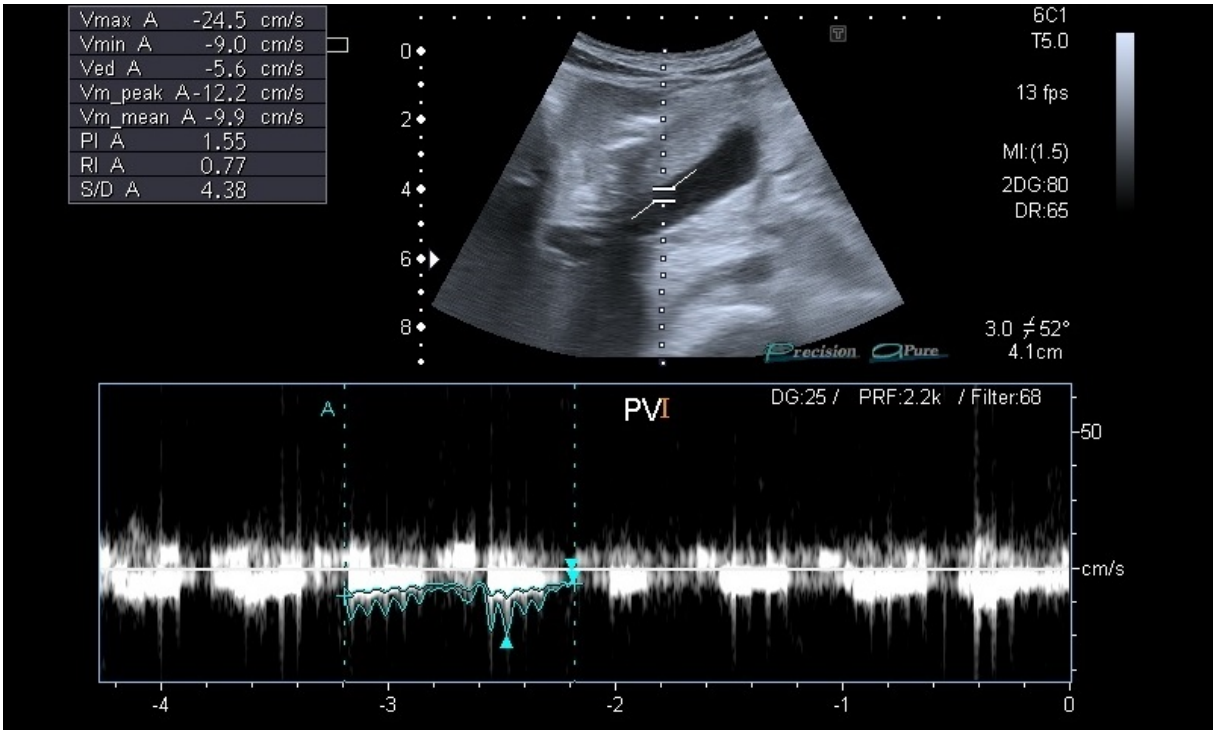


**Fig 2:** heterogeneous echotexture of liver in cirrhotic patient, mean velocity of PV is 9.9 cm/s.

**Discussion**

Portal vein velocity decreases with liver congestion and resultant portal hypertension. Previously some data is published regarding chronic liver diseases and portal vein velocities. According to study in 2005, conducted by Irandati Mukhopadhyay and Ashis Saha; in West Bengal, the study shows that Duplex ultrasound is excellent investigation of choice in assessing pathophysiological hemodynamics, judging the severity of disease in patients with liver diseases. The mean velocity of portal vein in normal individual in was 15.5 ± 4.0 cm/sec in 100 individuals. The mean velocity of portal vein in Liver Cirrhosis was 9.8 ± 2.8 cm/sec in 80 patients(Mukhopadyay and Saha, 2015). Another study conducted in 2005, on cirrhotic patients with portal hemodynamics, by Arvind Chouhan et al, they studied 100 patients. Portal vein mean velocity is estimated by using correction factor to a true average mean velocity. Portal vein velocity was in the range of 12.9 cm/s in cirrhotic and 15-18cm/s in control group(Chouhan et al., 2015). A study was conducted in 2008, on portal vein hemodynamics in patients with non-alcoholic fatty liver diseases (NAFLD), in Turkey by Besir Erdogmus et al. The Mean flow velocity was 14.6 cm/s in grade 1 patients, 12.6 cm/s in grade 2 patients and 10.3 cm/s in grade 3 patients. The mean flow velocity in control group was 16.5 cm/s and 12.3 cm/s in NAFLD patients(Erdogmus et al., 2008). A study was conducted in 2016, on Doppler assessment of children with liver cirrhosis and portal hypertension in comparison with a healthy control group, in Iran, by Maryam Riahinezhad et al. Portal vein mean velocity were 15.03 ± 7.3 cm/s in a group of 33 children with cirrhosis, 16.47 ± 6.4 cm/s in 19 controls (*P* = 0.51), 11.6 ± 4.7 cm/s in cirrhotic patients with varices. Alteration in Doppler parameter of portal vein velocity may be helpful indicators in liver cirrhosis(Riahinezhad et al., 2018). The results of this study were correlated with the previous studies, that shows decrease in portal vein velocity provide useful information in the diagnosis of liver cirrhosis.

**Conclusion**

Liver cirrhosis causes prominent changes in the texture of liver as compared to the texture in normal individuals. This study showed that mean velocity of portal vein was decreased in patients with liver cirrhosis as compared to normal individuals.

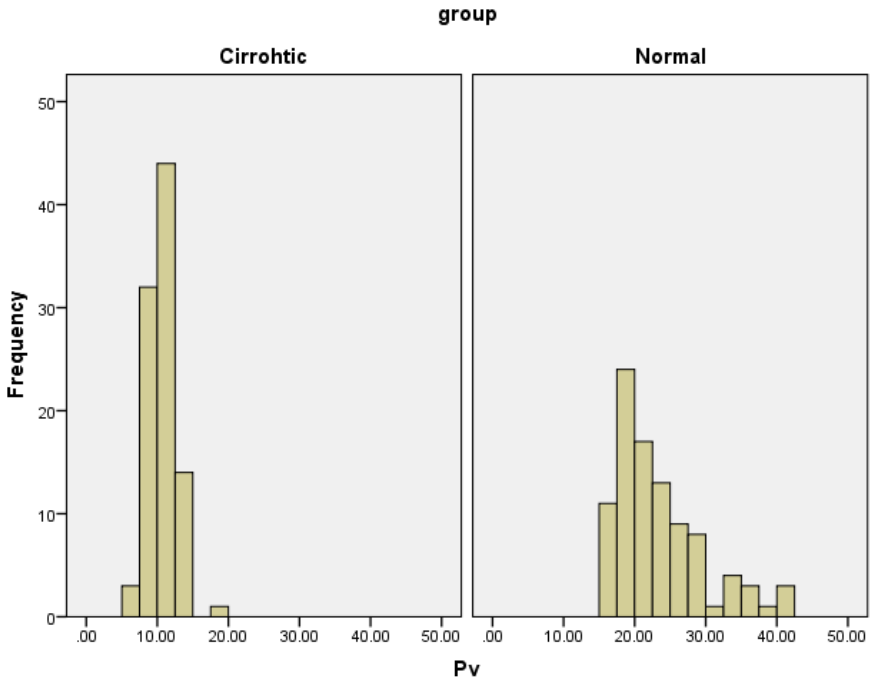


**Figure 3:** Frequency of portal vein mean velocity in cirrhotic and normal individuals

**Table-1:** Relation of the portal vein velocity in liver cirrhosis with 95% confidence interval was significant (p-value was 0.000).

**Independent Samples Test**

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | | Lower | Upper |
| PV | Equal variances assumed | 61.282 | 0.000 | -19.268 | 186 | 0.000 | -12.64255 | 0.65615 | -13.93701 | -11.34809 |
| | Equal variances not assumed | | | -19.268 | 111.366 | 0.000 | -12.64255 | 0.65615 | -13.94272 | -11.34239 |

**Table 2:** Cross tabulation of gender wise texture of liver in cirrhotic and normal individuals.

| Gender | | | Group | | Total | |
|---|---|---|---|---|---|---|
| | | | Cirrhotic | Normal | | |
| Female | texture | Coarse | 12 (6.3%) | 0 (0%) | 12 (6.3%) | |
| | | heterogeneous | 21 (11.1%) | 8 (4.2%) | 29 (15%) | |
| | | homogenous | 0 (0%) | 36 (19%) | 36 (19%) | |
| | Total | | 33 (18%) | 44 (23%) | 77 (41%) | |
| Male | texture | Coarse | 21 (11%) | 0 (0%) | 21 (11%) | |
| | | heterogeneous | 40 (21%) | 18 (10%) | 58 (30%) | |
| | | homogenous | 0 (0%) | 32 (17%) | 32 (17%) | |
| | Total | | 61 (32%) | 50 (27%) | 111 (59%) | |
| Total | texture | Coarse | 33 (18%) | 0 (0%) | 33 (18%) | |
| | | heterogeneous | 61 (32%) | 26 (14%) | 87 (46%) | |
| | | homogenous | 0 (0%) | 68 (36%) | 68 (36%) | |
| | Total | | 94 (50%) | 94 (50%) | 188 (100%) | |

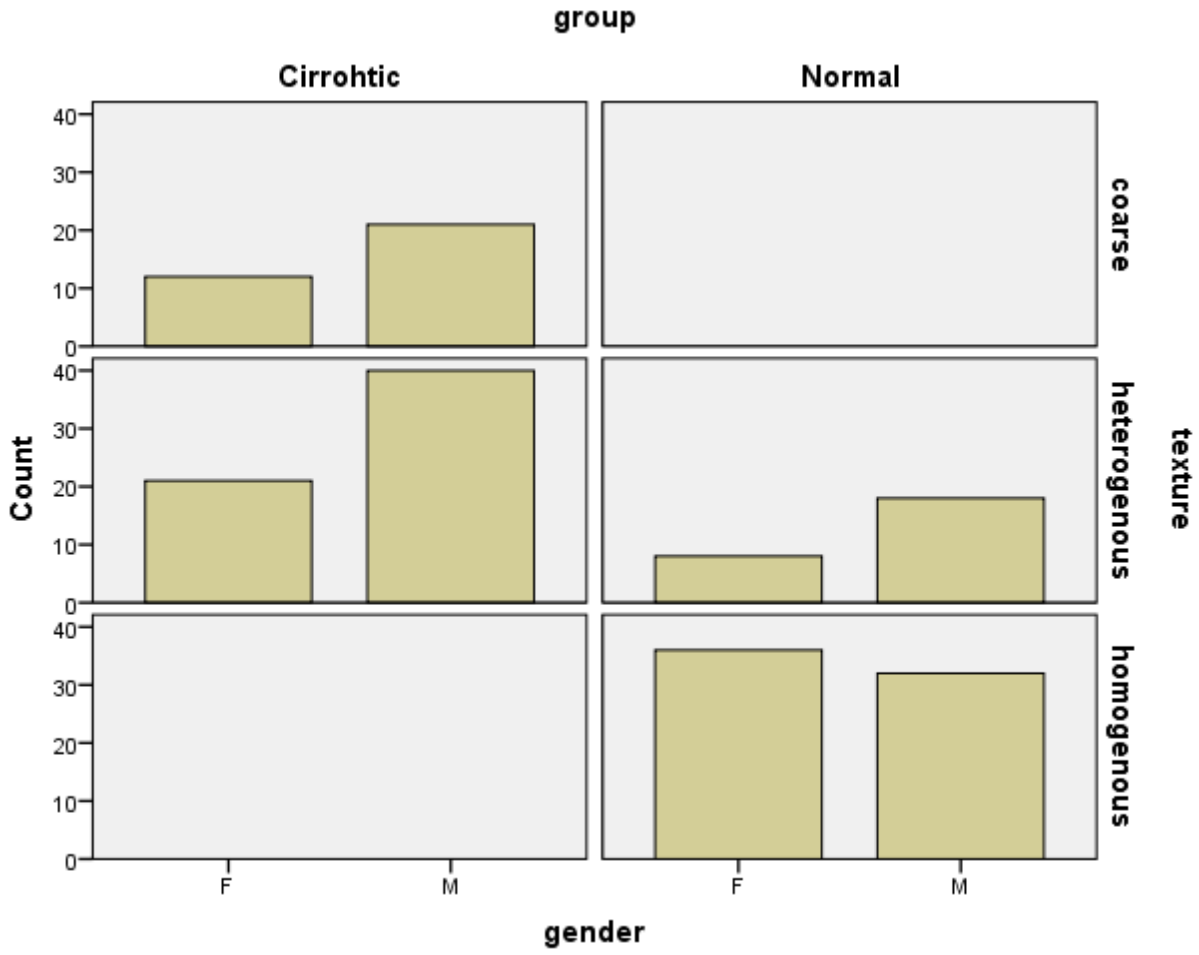


**Figure 4: Texture of liver in cirrhotic and normal individual's gender wise.**

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