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# Maternal and Child Health in Northern Cyprus

Dilek SARP KAYA GÜDER<sup>1\*</sup>

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Sarpkaya Güder, D. (2021). Maternal and Child Health in Northern Cyprus. *Journal of Health Systems and Policies (JHESP)*, 3,75-84.

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## ABSTRACT

The data insufficiency in maternal and child health criteria may lead to deficiencies in the planning of primary healthcare services. The review aimed to provide information on the general health status of Northern Cyprus with scientific studies conducted in the country along with maternal and child health indicators presented at national level. This review research uses description and documentary analysis methods. In this study, the data was collected from publications using data collection techniques. Many health indicators have been defined by the world health organization (WHO) and Turkey to evaluate maternal and child health. The data in this study was presented accordingly. It has been stated that in Northern Cyprus, the infant mortality rate is 0.8 per thousand live births, the crude birth rate is 14.6 per thousand, and the fertility rate is 1.8. No stillbirth has been reported between 2013-2017. In the studies performed, it has been found that the cesarean delivery rate was high (47.6%-87.0%) and that the rate of exclusive breastfeeding in the first 6 months was very low (22.4-41.7%). There are no sufficient data on maternal and child health indicators in the country. No primary data such as maternal mortality

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rate, infant mortality rate, mortality and stunting rate under five years of age, immunization in children, adolescent pregnancy rate, and frequency and scope of prenatal and postnatal care was available.

**Keywords:** Mothers, Infant, Child, Northern Cyprus, Health

## INTRODUCTION

Maternal and child health is one of the most important criteria reflecting the general health status of a country and indicates the development level of society (Taşkın, 2020; Törüner and Büyükgönenç, 2012). Mothers and children have priority in healthcare services due to their different characteristics than the rest of society. These priorities are primarily given to ensure healthy mothers have healthy children and healthy children form a healthy society. The high risk of diseases and death due to biological and developmental processes and the fact that mothers and children constitute more than half of the total population, especially in developing countries, are among the other reasons for priorities (Taşkın, 2020). In the Turkish Republic of Northern Cyprus (TRNC), 47.4% of the population consists of women and 18.4% consists of children aged under 15 (KKTC Devlet Planlama Örgütü, 2017). One of the most important factors affecting the health of women and children is the educational level of women. The illiteracy rate of women in Northern Cyprus was found to be 2.7 times bigger than that of men (KKTC Devlet Planlama Örgütü, 2017).

There is no sufficient data on maternal and child health indicators in the country or it has not been specified at the national level. Some data has been reported by the Ministry of Health and the State Planning Organization and is limited only to state hospitals. However, it is known that most of the women in the country prefer private hospitals for maternal and child health services. The data insufficiency in maternal and child health criteria may lead to deficiencies in the planning of primary healthcare services. Identification of problems in this field is important for the development of preventive and therapeutic services. This is the first Northern Cyprus study reporting on the indicator of mother and child health. The aim of the study was to provide information on the general health status of Northern Cyprus with scientific studies conducted in the country as well as maternal and child health indicators presented at national level.

The study is a review. The research uses description and documentary analysis methods. In this review, the data was collected from publications using data collection techniques. Many health indicators have been defined by the World Health Organization (WHO) and Turkey to evaluate maternal and child health. The data in this study was presented accordingly.

Maternal and child health indicators vary worldwide. These indicators are affected by the socioeconomic factors of countries and change from one country to another (Young and Urquia, 2013). The last action of the WHO to immediately reach the health goals determined over the years, improve the world health, and end inequalities is the 'Millennium Declaration'. The goals in this declaration have been defined as the new millennium development goals. Improving maternal health and reducing child mortality are stated as the most important goals of all (Törüner and Büyükgöneç, 2012; WHO, 2012). The WHO has defined 11 health indicators to evaluate maternal and child health. These include maternal mortality ratio, newborn mortality rate, under-five child mortality, children under five who are stunted, unsatisfying demand for family planning, antenatal care coverage (at least four times during pregnancy), antiretroviral prophylaxis among pregnant women eligible for antiretroviral therapy and HIV-positive women to prevent HIV transmission, skilled birth attendants, postnatal care for mothers and babies within two days of birth, exclusive breastfeeding in the first 6 months, three doses of combined diphtheria-tetanus-pertussis immunization coverage, and antibiotic treatment for potential pneumonia (WHO, 2012). In scope of the millennium development goals in Turkey, the maternal and child health indicators have been defined as infant and under-five mortality rate, rate of under-one child vaccinated for measles, maternal mortality rate, rate of births by trained attendant, rate of contraceptive use, adolescent pregnancy rate, prenatal care coverage and unsatisfying demand for family planning (Türkiye Binyıl Kalkınma Hedefleri Raporu, 2010). Indicators such as fertility rate, crude birth rate, adolescent pregnancy rate, anemia rate in pregnant women and children, early breastfeeding rate, low weight child rate, measles and tuberculosis immunization rate, induced abortion rate, total abortion rate, and poverty level are defined as other maternal and child health indicators (Bozkurt and Erdim, 2019; Melo et al., 2013; Taşkın, 2020; Törüner and Büyükgöneç, 2012). Below are the data on the main mother and child health indicators in Northern Cyprus.

### *Mother and Infant Mortality Rate*

The maternal mortality rate is estimated to be 295 per 100,000 live births worldwide for 2017 and is more common in underdeveloped countries (WHO, 2017). According to the State Planning Organization (SPO) data, women's life expectancy at birth is 84.5 years. No data was available on the maternal mortality rate. One of the important indicators demonstrating health, development, and child health levels in countries is the infant mortality rate (Bozkurt and Erdim, 2019). According to the World Health Organization data, the infant mortality rate is 51 per 1000 live births in African regions whereas this ratio is 8 per 1000 in European regions (WHO, 2017). The infant mortality rate has been determined to be 0.8 per 1000 live births in Northern Cyprus (SPO, 2017). According to the current SPO data, no stillbirth was reported between 2013 and 2017 (SPO, 2017). The infant mortality rate in the country was found to be lower than that of underdeveloped and developing countries.

### *Total Fertility Rate*

The fertility rate is approximately 2.4 per woman worldwide. In underdeveloped countries, this number exceeds 5 on average (World Population Review, 2020). According to the SPO data, in 2011, the crude birth rate was 14.6 per thousand and the fertility rate was 1.8 in the country (KKTC Devlet Planlama Örgütü, 2017). The fertility rate was found to be lower compared to underdeveloped and developing countries (World Population Review, 2020).

### *Skilled Birth Attendant and Cesarean Rate*

It has been reported that a total of 25 midwives had been working in state hospitals for 2011 (KKTC Devlet Planlama Örgütü, 2017). According to the law of the Cyprus Turkish Nurses and Midwives Association, midwives who do not have a bachelor's degree are not allowed to perform their profession in the country. Therefore, according to this law, it is clear that midwives who do not have a bachelor's degree cannot participate in childbirths.

The cesarean rate is 16.0% worldwide and the World Health Organization recommends that the cesarean rates should not exceed 15% (WHO, 2014). Although there is no national data on cesarean rates in Northern Cyprus, according to Northern Cyprus Ministry of Health data, the cesarean rate of the



most comprehensive state hospital was 47.6% in 2017 (KKTC Sağlık Bakanlığı, 2017). In the study conducted by Sarpkaya Güder et al., it was found that the cesarean rate in a private hospital was 87% for the control group who did not receive a preparatory birth training (Sarpkaya Güder et al., 2018). In the study conducted by Duran, the cesarean rate in a private hospital was found to be 65% (Duran, 2018).

#### *Use of Family Planning Method*

Worldwide, 12% of married women aged 15-49 do not use an effective contraceptive method even when they want to prevent pregnancy (WHO, 2019). The frequency of using modern methods in the world has been determined to be 57.4% (WHO, 2019). There are no national data on the use of family planning methods in Northern Cyprus. In a study conducted in Iskele Region of the country (among 334 women), it was determined that the first four methods still used by women aged 15-49 years were interruptus, tubal ligation, intrauterine device, and condom respectively (Sarpkaya and Eroğlu, 2011). In the same study, it was found that 83.5% of the women used one method and 44.0% used a modern method (Sarpkaya and Eroğlu, 2011). There are no family planning clinics in private and public hospitals and health centers and family planning services are not provided sufficiently (Sarpkaya and Eroğlu, 2011).

#### *Total Abortion and Induced Abortion Rate*

Between 2010 and 2014, 27 out of 1000 women in developed countries and 36 out of 1000 women in developing countries had undergone curettage (Singh et al., 2018). There is no national data on spontaneous or induced abortion rates in the country. According to a study conducted in Iskele Region (among 334 women), 25.4% of the women had a spontaneous abortion and 27.5% had a curettage before (Sarpkaya and Eroğlu, 2011).

Termination of pregnancy is regulated by article 169 of the Penal Code. With this law, the termination of pregnancy is allowed only in the first ten weeks of pregnancy. The procedure should be performed by a registered obstetrician and gynecologist without situations specified in the law (Paşa, 2012). Although curettage is included in the law, illegal curettage cases are encountered in Northern Cyprus as a result of uncontrolled curettage cases (Asit, 2019; Say-

gun, 2017). In the study conducted by Asit (2019), it was found that there were 115 reports in which there were many ethical violations until the trial on the “illegal curettage” case submitted to the judiciary in Northern Cyprus Media was concluded (Asit, 2019).

#### *Rate of Exclusive Breastfeeding for Six Months*

There is no national data available in the country on exclusive breastfeeding for 6 months. When the relevant studies were examined, in a study conducted in the most comprehensive training and research hospital in Northern Cyprus, it was found that the rate of exclusive breastfeeding for 6 months was 41.7% (Duran, 2018). In a different study conducted in the most comprehensive public hospital, it was found that the rate of exclusive breastfeeding for 6 months was 22.4% among working mothers (Özülüses, 2014). In a study conducted with 187 mothers in a private hospital in the Famagusta region, it was found that the mean duration of exclusive breastfeeding was  $3.29 \pm 0.17$  months and that the mean duration of breastfeeding was  $8.10 \pm 0.57$  months (Şafak and Ata Tutkun, 2015). The World Health Organization recommends exclusive breastfeeding for the first 6 months even without giving water to the infant. According to the results of the research conducted in Northern Cyprus, it is seen that the rate of exclusive breastfeeding for 6 months is very low.

#### *Prenatal Follow-up, Postpartum Care, Maternal and Child Health Service*

The World Health Organization recommends at least 4 follow-ups for the prenatal period, including training and counseling services during pregnancy. It is also emphasized that postpartum care should be given within two days after birth (WHO, 2012). In Northern Cyprus, prenatal follow-ups are conducted every day between 9 a.m. and 12 a.m. in public hospitals and health centers and mostly, private hospitals and clinics are preferred for follow-ups. There is no data available on the frequency and scope of prenatal and postnatal follow-ups.

In health centers, basic practices such as pregnant and infant follow-ups and vaccination are provided only if the citizen applies to the relevant health institution and no regular recording is made. In addition, there are no special units regarding maternal and child health neither in health centers nor in the organization of the ministry. Furthermore, there is no family medicine practice

system. Currently, the insufficient number of practitioners working in Northern Cyprus is another problem regarding human resources in the system and this can make it difficult to provide better primary care services by improving health centers. The absence of midwives in Northern Cyprus health centers is also considered to be an important inadequacy in terms of maternal and child health services (KKTC-FOKUS, 2020).

A national vaccination program, which was conducted by the Ministry of Health and the Cyprus Turkish Pediatric Association, is implemented in health centers. Vaccines administered free of charge in this program include hepatitis B, DaBT-IPV-HIB, DaBT-IPV, dt (dbt), OPV, Pneumococcus, chickenpox, MMR, and hepatitis A. There are no studies in the country on immunization. According to the Northern Cyprus Ministry of Health Statistics Reports, the most reported diseases between 2014 and 2018, which are obliged to be reported, were HIV (+) (66 cases), lung tuberculosis (53 cases), hepatitis B (50 cases), measles (44 cases) and chickenpox (40 cases) (Sağlık Bakanlığı, 2017). Considering the common diseases in the country, the information gap on the immunization status of children at the national level is thought to be important.

## CONCLUSION

The health of a society can be ensured by protecting children from all kinds of damages starting from the prenatal period until adulthood, and providing a qualified childbirth service and postnatal protective and supportive services to the mothers (Bozkurt and Erdim, 2019). It is concluded that many criteria regarding maternal and child health in Northern Cyprus are not presented at the national level and that there are no sufficient scientific studies on the subject. Primary data such as maternal mortality rate, newborn mortality rate, under-five mortality rate, immunization status in children, adolescent pregnancy rate, frequency and coverage of prenatal and postnatal care was not available. Relevant scientific studies are recommended since data such as unsatisfied demand for family planning, breastfeeding rate, infant immunization status, cesarean delivery rate, total abortion rate, and induced abortion rate has not been presented at the national level.

In terms of monitoring and evaluating health programs and determining future policies, it is of great importance to estimate the levels, trends, and dif-

ferences in maternal mortality rate and in neonatal, postnatal and child mortality. According to current data, the rate of exclusive breastfeeding for the first 6 months is low; the cesarean rate is high; there is a lack of services regarding maternal and child health. It can be said that the risk of HIV transmission is high in terms of maternal and infant health due to the high number of HIV (+) cases in the country. The infant mortality rate and fertility rate were found to be low compared to underdeveloped and developing countries.

**Ethical Approval:** Ethics committee approval has not been obtained since this study was not conducted on either humans or animals. The review research used documentary analysis method.

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# Health Problems Accompanying the Call for 'Stay-at-Home' During the Pandemic

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## ABSTRACT

The 'stay-at-home' order is a kind of mass quarantine strategy and has been enforced globally in response to the COVID-19 pandemic. However, various problems have been reported as well. An electronic research was performed in PubMed and Web of Science databases to determine these problems. This study indicates in a holistic approach to determine some of the potential problems during staying at home mandates. Nutritional disorders, sedentary life, disrupted checkups, eye diseases, increase in alcohol and cigarette consumption, psychological negative influences, sleep disorders, and conflict of generations are among them.

**Keywords:** Pandemic, Stay-at-Home, Quarantine, Strategy, Holistic Approach

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## INTRODUCTION

Since the World Health Organization declared a global pandemic in March 2020, healthcare systems worldwide have been under pressure to implement strategies and various containment measures against COVID-19 have been observed in societies across the globe.

Physical distancing measures aim at reducing the frequency of social contact and subsequent transmission of the virus between individuals (Medline et al., 2020). Many studies have showed the protective impact of such measures on controlling the spread of COVID-19 (Lin et al., 2021) and effective prevention of the overloading of health systems during the pandemic (Gostin and Wiley, 2020); consequently, these social distancing measures have been adopted by the governments in a global scale (Eubank et al., 2020). However, compliance with stay-at-home orders has varied among countries (Hong et al., 2021). As calls to “stay-at-home” by ministries of health and other governmental bodies eventually progress to lockdowns nested within the framework of the fight against COVID-19, a new concept of the “normal” came into our lives. Together with such changes, the stay-at-home mandates brought with it difficulty in implementing physical activity.

The World Health Organization (WHO) defines ‘health’ as a state of complete physical, mental, and social well-being, not merely the absence of disease or infirmity (International Health Conference, 2002) which requires consideration of the holistic approach in a biopsychosocial model. Stay-at-home mandates is an effective way to prevent the transmission of the COVID-19 (Fowler et al., 2020). However, studies have indicated that prolonged intensive stay-at-home isolation may be associated with physical and psychological problems (Toprak Celenay et al., 2020).

The current compilation highlights some of the potential problems associated with staying in an indoor environment for human health over a prolonged period of time and explores solutions and interventions that could be explored and potentially implemented at various levels.



## **METHOD**

We have conducted a rapid review of studies that gathered data from general populations during the on-going stay-at-home phase in 2020-2021 (Munn et al., 2018). PubMed and Web of Science were chosen as the search databases. The following terms were searched: “stay-at-home” OR “lockdown”, and “health problems” OR “negative effects” OR “adverse effects” OR “negative impacts” OR “adverse impacts”. Included language was English. There was no funding source for this study.

## **RESULTS**

A total of 187 articles related to searched terms were found in the PubMed and Web of Science databases. Various problems like nutritional disorders, sedentary life, disrupted checkups, eye diseases, increase in alcohol and cigarette consumption, psychological negative influences, sleep disorders, conflict of generations, etc. have been reported.

### **Nutritional Disorders**

During this period, food buying patterns for both individuals and families have changed significantly due to a wide variety of factors including access and availability, safety concerns, and financial considerations. In many cases, procurement and consumption of less nutritious foods has increased with foods that may be cheaper to purchase or with longer shelf lives being prioritized over nutritional value. Many individuals have increased intake of refined foods which may be associated with increased serotonin secretion and thus correlate with improved mood (Eskici, 2020). Additionally, we have seen an increase in hoarding behaviors (Ongan et al., 2020). In this period, we advise home-cooked natural dishes should be consumed and dietary supplement suggestions should be taken from health care professionals.

As time spent indoor increases for both children and adult, a lack of sun exposure can also contribute to deficiency in Vitamin D synthesis; thus, supplementation of Vitamin D may also be considered. Further, Zinc and Vitamin C, D, and E supplements may positively contribute to immunomodulation. The use of prebiotics and probiotics may regulate phagocyte function of the immune system (Eskici, 2020; Grant et al., 2020).

There are also hypotheses that the active ingredients in some foods reduce pulmonary involvement in COVID-19 patients; for example, it was indicated that protein deficiency is significant in the course of respiratory insufficiency (Kartal et al., 2020).

As schools were also shut down during the COVID-19 pandemic, students are also at an increased risk for weight gain and even obesity secondary to decreased physical activity. The available data shows that children put on weight particularly during out-of-school times, partially because they consume increased amounts of unhealthy foods during these periods. This is observed more specifically in the already overweight children (Rundle et al., 2020), which may further risk amongst this population.

In considering diet changes, it is notable that a change of diet in prison inmates was previously shown to show improvement in management of chronic diseases at a population level; in particular, adding olive oil dishes to diets has been shown to be a positive intervention (Gil Delgado et al., 2011).

### **Sedentary Life**

In this period, typical daily activities such as “going to work” or “going to school” are suspended; sports competitions and sports activities are cancelled; and broader circumstances do not allow routine socialization. The changes contribute to an increasingly sedentary lifestyle associated with a decrease in physical activity for many during the pandemic. Tracking data shows that tens of thousands of steps in pedometers were reduced to around 1500 (Ozturk and Bayraktar, 2020). Individuals will likely benefit from increased access to affordable activities that can be performed while observing “stay-at-home” in order to increase overall physical activity (Ozkan and Dilicikik, 2020). As schools begin to re-open, physical education and gymnastics classes should be prioritized alongside traditional academic curriculum such as science and mathematics, while of course social distancing and other safety measures are safely observed (Rundle et al., 2020).

### **Musculoskeletal Pain**

Musculoskeletal disorders have been assessed in a few COVID-19 studies, and it was shown that musculoskeletal disorders, may increase during inten-

sive and prolonged COVID-19 lockdowns (Fallon et al., 2020; Lippi et al., 2020). Sitting down for a long time increases the probability of suffering from musculoskeletal complaints (Condrowati et al., 2020).

### **Disrupted Checkups**

Emergency service visits for conditions such as appendicitis, heart attack, and stroke were reduced to a great extent during the COVID-19 pandemic. Various accounts have highlighted that patients might have avoided seeking medical attention for both longitudinal and emergency care due to fear of exposure to COVID-19 in medical settings; this, an unintended result of the orders for staying at home included a disruption in typical medical care not directly related to COVID-19 (Masroor, 2020). As many chronic diseases require routine and periodic examination, this has been of critical concern for many primary care providers. Particularly in cases that require regular follow-up such as the use of insulin, warfarin, lithium, and immunosuppressive drugs, patients may benefit from being examined in presumably safer environments including their homes; for this, home health care units and/or telemedicine cooperation are critical. The increased risks arising from COVID-19 may lead to updating instruments, roles, and available mediums in the delivery system of health care (Flint and Tahrani, 2020).

### **Eye Diseases**

The people that stay-at-home all day are increasingly spending their time in virtual media. Continuous exposure to screens may increase the risk of xerophthalmia (Akca Bayar and Akova, 2012). Synthetic teardrops, taking breaks in looking at screens, wearing eye relaxing glasses, and consuming foods containing flavonoids, lutein-component and Omega-3 fatty acids may be considered amongst potential interventions (Cakmakci and Tahmas Kahyaoglu, 2012; Coskun, 2005; Huang et al., 2002).

### **Increase in Alcohol and Cigarette Consumption**

The increase in the period of staying at home can also be associated with increases in alcohol and cigarette consumption. Given concurrent increased financial difficulties and unemployment, one must also consider the role these

substances can play as maladaptive coping mechanisms during periods of increased stress. Notably, increases in alcohol consumption has been suggested to weaken the long-term acquired immunity (Rehm et al., 2020); in 2003, a study on the SARS pandemic, which was caused by another virus from the coronavirus family, reported that 12.9% of smokers increased cigarette consumption after the pandemic compared to the period before the pandemic (Lau et al., 2005). Remarkably, cigarette consumption was proven to increase

COVID-19 morbidity and mortality rates (Zhang et al., 2020; Zhao et al., 2020). Further education, regulation, and the addressing of underlying stressors will likely be most impactful at a population level in decreasing overall consumption of these potentially harmful agents.

### **Psychological Negative Influences**

Emotional disorders, panic disorders, and suicidal ideation have been shown to be correlated with increases in feelings of social isolation (Klomek, 2020; Marroquín et al., 2020). The utilization of messaging and video chatting programs to contact their loved ones more frequently, exploring new hobbies, and engaging in organized, planned activities – e.g., doing housework that one had postponed previously due to lack of time – can be critical in keeping psychologically healthy (Everett et al., 2020).

Previous studies have shown that patients that stay in intensive care units have benefited from addressing psychological distress by engaging in practices such as utilizing diaries as a means of recording and reflecting on difficult experiences (Aitken et al., 2013). Thus, keeping diaries can also be recommended for the people staying at home during this global pandemic. Online concerts can be watched in order to make up for the closure of social areas and cancellation of concerts (Kaya Deniz, 2020). Other options for spending time include playing domestic recreative games, online games, and surfing on the internet, but they should be kept within healthy bounds (Gumusgul and Aydogan, 2020; King et al., 2020; Király et al., 2020).

### **Sleep Disorders**

Studies report that sleep quality of people is deteriorating day by day in the pandemic period; it is reported not only for the socially isolated people but also

the personnel who fight the pandemic (Xue et al., 2020). Sleep problems are caused by increased body mass index, tea and coffee consumption, and such-like circumstances as well as one's mental health (Aktas et al., 2015). A reason-oriented approach can be adopted to solve such problems.

### **Conflict of Generations**

Some people in risk groups and particularly the elderly people were isolated from the society for a length of time. It led to the social issues causing generation gap and conflict of generations (Soysal, 2020). Differences of opinion are on the rise even within the same generation; therefore, additional problems may arise from a teenager and an elderly person spending a long time in the same home. Although these situations can be challenging due to various relational and interpersonal factors, establishing communication through common hobbies and needs might be good option.

### **CONCLUSION**

A stay-at-home order restricts movements of a population as a mass quarantine strategy. Public trust is required for the orders to be effective while it should not be confused with a shelter-in-place situation. Although stay-at-home strategy is an effective way against COVID-19 exposure, it may be accompanied by negative consequences. Therefore, during strict social distancing measures, necessary precautions should be taken in accordance with the holistic health approach against the potential negative consequences. It is suggested to take into account by health system to implement measures for the promotion of good health and quality-of-life with a holistic approach. This research has the limitations of a rapid review with shortcuts; therefore, it is not as comprehensive. It can impact policy, but systematic reviews are still needed.

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# Risk Factors of Childhood Diarrhoeal Diseases in Bangladesh: Evidence from a Nationwide Cross-sectional Survey

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## ABSTRACT

Globally, different episodes of diarrhoeal diseases are one of the leading causes of childhood morbidity and mortality, especially in developing countries. Diarrhoeal diseases among children under five years of age have been considered as the major causes of morbidity and mortality in Bangladesh although it has declined recently. In this study, the most recently published Multiple Indicator Cluster Survey 2019 (MICS 2019) data were used to observe the prevalence of childhood diarrhoea and to identify the socio-economic and demographic risk factors of childhood diarrhoea in Bangladesh. The chi-square test was used in this study to identify the risk factors of childhood diarrhoeal diseases in Bangladesh. The overall prevalence of diarrhoea among children under five years of age in Bangladesh was found 6.9% in the last two weeks preceding the survey. The findings of the study identified that child age less than two years, an un-

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improved facility of toilet or source of drinking water, floor material made of earth/sand, no handwashing place observed in dwelling/ yard/plot, lower or no education of mothers and household heads, lower economic status, three or more under-five children living in the family are the most potential risk factors of childhood diarrhea in Bangladesh. Improved source of drinking water supply, better sanitation, hygiene practice, mother's knowledge and consciousness about diarrhoea and, timely treatment and can reduce the burden of childhood diarrhoea in Bangladesh. The quality of existing child healthcare services like oral rehydration therapy (ORT) during diarrhoea, rotavirus vaccination programs should be improved at all stages without any discrimination which will contribute to a reduction in childhood morbidity and mortality due to diarrhoea in Bangladesh.

**Keywords:** Childhood Diarrhoea, Risk Factors, Multiple Indicator Cluster Survey (MICS), Bangladesh

## INTRODUCTION

Globally, different episodes of diarrhoeal diseases are one of the leading causes of childhood morbidity and mortality, especially in developing countries (Moharana et al., 2019; Peter and Umar, 2018; Sanyaolu et al., 2020), killing nearly 1.5 million children annually (Sarker, 2016). Diarrhoea is the condition showing the frequent and excessive discharge of or loose stools from the bowel. Although deaths due to diarrhoea has been declined globally (Ahmed et al., 2018), it still remains the second major causes of deaths among under-five children (Workie et al., 2018), and according to the World Health Organization, there are nearly 1.7 billion cases of diarrhoea occurred every year worldwide among children under five (Sarker, 2016; Peter and Umar, 2018; WHO, 2017). A recent report by the International Vaccine Access Center (IVAC), Johns Hopkins Bloomberg School of Public Health reveals that about 1200 young children die due to diarrhoea every day which means that it claimed the lives of approximately 4,37,000 children per year (Pneumonia and Diarrhea Progress Report 2020). Besides mortality, the longer duration of diarrhoea among children is a major threat to child health (Li et al., 2020) that have a greater adverse effect on nutritional status of children and child loses the nutrition during each episode of diarrhoea which is essential for the growth of the children (Alemayehu et al.,

2020). Diarrhoea lasts up to several days is responsible for removing essential body fluids and vital nutrients necessary for normal body functions causing severe dehydration which is the main cause of death among children suffering from diarrhoea (Sanyaolu et al., 2020). Diarrhoea among newborns and infants is more dangerous, leading to dehydration in just one or two days. A child suffering from dehydration can die within a very few days. Diarrhoea is associated with a high rate of malnutrition through nutrient loss, reduced food appetite, and mal-absorption and energy intake which in turn causes immune deficiency and increased susceptibility to infections like contracting diarrhoea again (Wasihun et al., 2018). The etiological factors responsible for causing diarrhoea or pathogens of diarrhoea transmitted from infected to susceptible people through one or more of the environmental reservoirs such as food, water, fields, fingers, flies, etc. by human-environment interaction or by natural processes (Julian, 2016). Many germs such as bacteria, parasites, fungi, or viruses can cause infections that lead to diarrhoea. Rotavirus has been reported to be the most common cause of severe childhood diarrhoea both in developed and developing countries (Nirwati et al., 2016).

Diarrhoea is a major public health problem in Bangladesh and the most challenging issue for health which remains one of the major causes of morbidity and mortality, especially in children under five years of age. Diarrhoeal diseases among children less than five years in Bangladesh have been considered as the major causes of mortality (Islam, 2020), but have declined recently (Billah et al., 2019). Two or three decades ago, one-third of the total child death burden in Bangladesh was due to diarrhoea (Victora et al., 1993) which was responsible for 15%-30% of deaths among the under-five children of Bangladesh (Piechulek et al., 2003). But the recent Bangladesh Demographic and Health Survey (BDHS) 2017-18 reported that only 3.2% of under-five children deaths occurred due to diarrhoea and the death rate was highest among the postneonatal age group that is between 1-11 months (14.1%) (NIPORT and ICF, 2020). Many types of research have been conducted about the prevalence and risk factors of childhood diarrhoea using nationally representative survey, but in this study, we have used the most recent published Multiple Indicator Cluster Survey 2019 (MICS 2019) data to identify the prevalence of childhood diarrhoea and examine the risk factors of diarrhoea with different demographic and socio-economic factors in Bangladesh.

## METHODOLOGY

In this study, data were extracted from the population-based cross-sectional survey (UNICEF, 2019) from the Multiple Indicator Cluster Survey (MICS) Bangladesh 2019, which was done by the Bangladesh Bureau of Statistics (BBS) in collaboration with the United Nations Children's Fund (UNICEF) Bangladesh, as part of the Global MICS Program. It is the sixth round of this kind of survey (MICS6) in Bangladesh. The UNICEF provides the technical support for this survey and the United Nations Population Fund (UNFPA) Bangladesh also provided the financial resource to undertake quality assurance visits during data collection. The MICS6 used a standard set of questionnaires designed to collect nationally representative data on statistically reliable estimates of demographic, health, and nutrition indicators of children and women for rural, urban, and national levels. Using a two-stage stratified cluster sampling, the primary sampling units (PSUs) selected at the first stage and a sample of households were selected at the second stage. The number PSU and number of sampled households in this survey were selected 3,220 and 64,400 respectively. In MICS6, mothers or caretakers were asked whether their child under age five years had an episode of diarrhoea in the two weeks before the survey which is considered as the dependent variable for this study. A sub-sample of 23,069 children for whom mothers reported that the child had diarrhoea (excluding missing values concerning dependent and explanatory variables) aged between 0-59 months were selected for this study.

The ethical consideration and protocol of this survey were approved by the technical committee of the Government of Bangladesh lead by the Bangladesh Bureau of Statistics (BBS). Consent about the interview and questionnaire was obtained for each respondent who participated in the survey. Details about the sampling design, standard questionnaire, and data collection procedure are available in the final report of 2019 MICS (Bangladesh Bureau of Statistics and UNICEF Bangladesh, 2019).

In this study, some socio-economic and demographic risk factors are assessed as independent or explanatory variables which are child's age, sex of child, type of toilet facility, source of drinking water, place where household members most often wash their hands, type of floor material, educational qualification of the mother, educational status of household head, number of

under-five children in the family, wealth index, area of residence and place of administrative division.

Data and statistical analyses in this study were performed using the IBM SPSS for Windows ver. 23.0 (IBM Corp., Armonk, NY, USA). Descriptive statistical analysis was performed to characterize the study population concerning explanatory variables. The chi-square ( $\chi^2$ ) test is an important non-parametric test that is simply a technique to test either as a test of goodness of fit or as a test to judge the significance of the association between attributes. In this study, chi-square ( $\chi^2$ ) test is performed to identify the socio-economic and demographic risk factors associated with diarrhoea among under-five children in Bangladesh.

## RESULTS

The overall prevalence of diarrhoea among children under five years of age in Bangladesh was found 6.9% in the last two weeks preceding the survey (Table 1). The highest percentage of reported diarrhoea was found among the child age group 12-23 months (10.2%) and after that, the prevalence decreases with the increase of age and found lowest among the child age group 48-59 months (3.4%). In this study, boys (7.1%) were found more affected by childhood diarrhoea than those of girls children (6.6%). We observed in this study that improved sanitation, improved source of drinking water, and available handwashing facility decreases the chance of having diarrhoeal diseases among children. The percentage of children having diarrhoea among the household with improved toilet facilities, improved sources of drinking water, and observed facility of handwashing facility were 6.4, 6.8, and 6.3 respectively. On the other hand, this percentage among the household with unimproved toilet facility, unimproved source of drinking water and with not observed availability of handwashing facility were 9.2, 10.3, and 9.6 respectively. The diarrhoeal diseases among under-five children were more prevalent among the house living with floor material earth/sand (7.4%) compared to floor material cement/carpet/tiles (5.9%) and others (6.2%). The secondary educated mothers (6.7%) and higher secondary/higher educated mothers (5.7%) experienced a lower prevalence of childhood diarrhoea than mothers with pre-primary/no education (7.7%) and primary education (7.6%) respectively. A similar pattern was found about the educational status of the household head with a higher prevalence of childhood diarrhoea

found among lower educated household head compared to educated counterpart. The family with 2 or fewer under-five children (6.6%) experienced a lower prevalence of childhood diarrhoea than a family having 3 or more under-five children (8.2%). The percentage of under-five children affected by episodes of diarrhoea prior to the last week of the survey was found 8.5%, 7.9%, 5.9%, 6.2%, and 5.1 % respectively among the household with wealth index poorest, poor, middle, fourth, and richest respectively. Our studies found no variation in the prevalence of diarrhoea among under-five children of Bangladesh living in rural and urban areas, but diarrhoeal disease was found greatly varied by the geographic division of the country with the highest prevalence in Barishal (12.4%) and lowest prevalence was reported in Rangpur (4.2%).

The result of the chi-square ( $\chi^2$ ) test of Table 1 also shows that there is a statistically significant association exist between the prevalence of childhood diarrhoea and different socio-economic and demographic factors such as child’s age, type of toilet facility, source of drinking water, place where household members most often wash their hands, type of floor material, educational qualification of the mother, educational status of household head, number of under-five children in the family, wealth index, place of administrative division. Out of all the explanatory variables, the sex of children and area of residence of the children shows a statistically insignificant association with the prevalence of childhood diarrhoea.

**Table 1:** Prevalence of diarrhoea and its associated risk factors among under-five children in Bangladesh

Socio-economic and demographic factors	Total Children	Number of children who had an episode of diarrhoea in the last two weeks of the survey (Percentage)	Chi- square value	P-value
<b>Child age</b>			228.977	< 0.001***
0-11	4540	408(9.0)		
12-23	4512	459(10.2)		
24-35	4590	328(7.1)		
36-47	4785	231(4.8)		
48-59	4642	157(3.4)		



<b>Sex of child</b>				
Male	11937	847(7.1)	2.111	0.146
Female	11132	136(6.6)		
<b>Type of toilet facility</b>				
Improved <sup>1</sup>	18948	1204(6.4)	42.794	< 0.001***
Not Improved <sup>2</sup>	4121	379(9.2)		
<b>Source of drinking water</b>				
Improved <sup>3</sup>	22513	1526(6.8)	10.243	0.001***
Not Improved <sup>4</sup>	556	57(10.3)		
<b>Fixed hand washing facility like tube well/ tap/sink in the dwelling/yard/plot</b>				
Observed <sup>5</sup>	19378	1230(6.3)	50.186	< 0.001***
Not Observed <sup>6</sup>	3691	353(9.6)		
<b>Type of floor material</b>				
Earth or Sand	14784	1091(7.4)	17.425	< 0.001***
Cement/Tiles/ Carpets	6880	405(5.9)		
Others <sup>7</sup>	1405	87(6.2)		
<b>Educational status of mother</b>				
Pre-primary or no education	2590	199(7.7)	15.922	0.001***
Primary	5552	423(7.6)		
Secondary	11348	757(6.7)		
Higher secondary or higher	3579	204(5.7)		
<b>Educational status of household head</b>				
Pre-primary or no education	6918	494(7.1)	18.094	< 0.001***
Primary	6957	524(7.5)		
Secondary	6431	420(6.5)		
Higher secondary or higher	2763	145(5.2)		

<b>Number of under-five children in the family</b>				
2 or less	19637	1303(6.6)	10.604	0.001***
3 or more	3432	280(8.2)		
<b>Wealth index</b>				
Poorest	5746	487(8.5)		
Second	4828	378(7.8)	59.003	< 0.001***
Middle	4350	256(5.9)		
Fourth	4306	267(6.2)		
Richest	3839	195(5.1)		
<b>Area of residence</b>				
Urban	4296	295(6.9)	0.000	0.989
Rural	18773	1288(6.9)		
<b>Place of administrative division</b>				
Barishal	2052	254(12.4)		
Chattogram	4801	385(8.0)		
Dhaka	4508	249(5.5)	161.059	< 0.001***
Khulna	3173	203(6.4)		
Mymensingh	1387	112(8.1)		
Rajshahi	2404	152(6.3)		
Rangpur	2768	116(4.2)		
Sylhet	1976	112(5.7)		
<b>Total</b>	<b>23069</b>	<b>1583(6.9)</b>		

Note:

\*\*\* Significant at  $p < 0.01$ ,

<sup>1</sup> Improved toilet includes: flush/Pour flush to-piped sewer system, septic tank, pit latrine, Ventilated pit latrine, Pit latrine with slab, Composting toilet,

<sup>2</sup> Unimproved latrine includes: Open drain, Pit latrine without slab/ open pit, Hanging toilet/latrine, Other defecation (no facility or bush, field)

<sup>3</sup> Improved source of drinking water includes: Piped water- into dwelling, into yard/plot, to neighbour, public tap/standpipe, Tubewell/borne hole, Protected well, Protected spring, Rainwater collection, Cart with a small tank, Water kiosk, Bottled water, Sachet water.

<sup>4</sup> Unimproved source of drinking water includes: Unprotected well, Unprotected spring, Surface water, other

<sup>5</sup> Observed Place where household members most often wash their hands includes fixed facility observed in (sink/tap/tubewell) in dwelling, (sink/tap/tubewell) in yard/plot, mobile object includes bucket, jug kettle.

<sup>6</sup> Not Observed Place where household members most often wash their hands includes: No handwashing place in dwelling/yard/plot, no permission to see, other reason.

<sup>7</sup> Others include dung, wood planks, palm/ bamboo/ betel nut, parquet or polished wood, vinyl, or asphalt strips.

## DISCUSSIONS AND CONCLUSIONS

Bangladesh has achieved much improvement in child health status and reducing the burden of childhood diseases which reflects in this study that the prevalence of childhood diarrhoea is only 6.9% which was much more in two or three decades ago. Some socio- economic and demographic factors have been identified as potential risk factors of childhood diarrhoea in this study. The association between a child's age and the prevalence of diarrhoea was found highly significant in the present study. As the age of the child increases, the prevalence of diarrheal diseases falls. After one year of age, a child begins to walk alone successfully and for this reason, their risk of exposure to contaminated agents and various types of infections from the environment increases at the age of 12-23 months but again with the increase of age the risk of having diarrhoea decreased. Similar results have been found by Sarker et al., 2016 in Bangladesh. It is widely recognized that the source of drinking water and type of toilet facility are the most important sanitation variables that are closely associated with diarrhoeal morbidity and mortality. The disease agents can easily be transmitted to a new host if the toilet used by the house is not safe enough. The human excreta contain various fecal- borne disease agents which can be transmitted to a new host through various channels such as water, fingers, flies, soil, and foods. Diarrhoea can also be transmitted by both water-borne and water-washed mechanisms. Inadequate, improper, and unsafe water supplies are closely associated with the high prevalence of childhood diarrhoea in Bangladesh. In this study, the diarrhoeal prevalence among children was found among the children living in the household who have unimproved toilet facility and unimproved source of drinking water which are significantly associated with childhood diarrhoea in Bangladesh and considered as the potential risk

factors. This finding is consistent with those of other many studies in Bangladesh and also other countries for example a study in Ghana by Boadi and Kuitunen (2005). A study by Hashi, 2017 reveals that handwashing with soap practice reduces an overall diarrhoeal diseases reduction by 35%. Our study findings show that the household where there was no permanent facility for handwashing was observed at the time of the survey were experienced a higher prevalence of childhood diarrhoea compared to their counterparts. Since the floor made of dirt materials cannot be washed they are more likely to provide a breeding ground for various agents that are responsible for causing diarrhoea and among children. The diarrhoeal prevalence is observed significantly related with floor material of house and it is more prevalent among the children from the house whose floor materials are made from earth or sand and the result is an agreement with the study result by Sarker et al., 2016 and Workie et al., 2019.

Parental knowledge and understanding are very much essential for reducing the burden of childhood diarrhoea. Educated mother and father can have better knowledge about domestic hygiene which contributes to the lower prevalence of diarrhoea. The low educational status of the mother and household head are identified as important risk factors of childhood diarrhoea in this study. In this study, education of mother and education of household head is found a highly significant association with suffering different episodes of diarrhoea two weeks preceding the survey, and these findings also consistent with many national and international studies such as a study done by Miharshahi et al., 2007. The family where three or more under- five children lives experienced a high prevalence of diarrhoeal disease than a family with two or fewer under-five children. Dessalegn et al., 2011 and Siziya, 2009 found in their study that the prevalence of diarrhoea among children was low among rich families compared to the poor family, our study findings also consistent with these findings. The economic status of a household is an indicator of access to adequate food supplies, use of health services, availability of improved water sources and sanitation facilities, which decreases the chance of having childhood diarrhoea. The current study finds no variation in the diarrhoeal prevalence of children in rural areas but observed a great variation in occurring childhood diarrhoea in the different divisions of the country.

Although among the children under five years of age in Bangladesh is a major public health problem but these problems can be reduced with access to simple,

affordable interventions like oral rehydration therapy (ORT) during diarrhoea. Improved source of drinking water supply, better sanitation, hygiene practice, timely treatment can reduce the burden of childhood diarrhoea in Bangladesh. People should be encouraged to make hygienic toilets at their homes and use safe water for drinking purposes. An educated parent would make better use of medical facilities for their children that will contribute to a reduction in childhood morbidity and mortality due to diarrhoea. So community-based educational programs should be strengthened. The findings of the study suggest that the use of oral rehydration therapy should be increased when a child suffered from diarrhoea and parents should take medical treatment immediately for their children suffered from diarrhoea, parents should also be conscious about the rotavirus vaccination program in the country. Efforts should be made to improve the quality of existing child healthcare services and ensure adequate access to child healthcare facilities at all stages without any discrimination.

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# Prevalence of Cutaneous Leishmaniasis in Alert Center, Retrospective Analysis, Addis Ababa

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## ABSTRACT

Cutaneous leishmaniasis is gradually becoming an increasing public health concern. Therefore, it is essential to generate knowledge on the epidemiological determinants of the infection to develop effective control strategies on the transmission of the disease. Environmental changes, the immune status of the host, and treatment failure are the three most important risk factors associated with cutaneous leishmaniasis. The aim of this study was the prevalence of cutaneous leishmaniasis at the ALERT center, over a five-year (2014-2018). A total of 2329 study participants comprising 1174 (50.4%) males and 1155 (49.6%), females participated. The data was collected retrospectively from ALERT center clinical laboratory records within the study period (2014-2018).

The overall prevalence of cutaneous leishmaniasis among the study participants was 33%. Of this, the prevalence of cutaneous leishmaniasis among male

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and female study participants was 34.9% and 31.1%, respectively. The prevalence in the age group less than 18, 19-28, 29-38, and greater than 39 years was 37.0%, 26.6%, 13.3%, and 23.1%, respectively.

Generally, this study showed that cutaneous leishmaniasis, prevalent in the study area, is still a public health problem associated with many risk factors. Hence, there is a need to implement a sound control program, strengthened behavioral change, communication, and social mobilization-related activities.

**Keywords:** Leishmaniasis, Cutaneous Leishmaniasis, Trend

## INTRODUCTION

Leishmaniasis is a collective name of diseases caused by different species of the intracellular protozoa of the genus *Leishmania* (Claborn, 2010) and transmitted by the bite of female phlebotomine sandflies of the genera *Phlebotomus* or *Lutzomyia* (Goto and Lindoso, 2010). The different clinical forms of leishmaniasis constitute severe public health problems: Visceral leishmaniasis (VL) is usually fatal when untreated, Mucocutaneous leishmaniasis (MCL) is mutilating disease, diffuse cutaneous leishmaniasis (DCL) and Cutaneous leishmaniasis (CL) is disabling when lesions are multiple (Bari et al., 2012).

It is endemic in many parts of the world; it has re-emerged in a number of endemic countries. The increase in leishmaniasis incidence worldwide is mainly attributed to the increase of several risk factors, including massive migration, deforestation, urbanization, immune suppression, malnutrition, and treatment failures (Goto and Lindoso, 2010). It is prevalent in tropical and subtropical areas. Still, due to the increase in international travel, it also appears to be an important disease in people living in no endemic areas (Negera et al., 2008). In terms of the global burden of the disease, leishmaniasis represents the third most important vector-borne disease (Bsrat et al., 2015). World Health Organization estimates an incidence of 1 million cases of CL in the past 5 (2008-2013) years. However, this number is probably underestimated because of misdiagnosis and inconsistent reporting guidelines (Sunyoto et al., 2018).

In Ethiopia, it is not unique in this perspective as the case is testified by its poor health outcomes even by sub-Saharan Africa's standards. The serious environmental problems of the country such as deforestation, overgrazing, soil erosion, desertification, and high vulnerability to a changing climate. Such

changes are undoubtedly influencing the profile of vector-borne diseases (Bsrat et al., 2015). Another study indicated on a systematic review and meta-analysis shows in Ethiopia shows that: prevalence of leishmaniasis in animals and humans, CL has been well known since 1913 and is endemic in most regions; however, it is one of the neglected diseases in the country (Valero and Uriarte, 2020). A study of the epidemiology of CL in three areas of Ethiopia was initiated in 1969 by a group of investigators. Those areas were Kutaber (North West of Dessie) in 1969, Aleku (in the Wollega province) in 1970, and Ochollo (southwest Ethiopia) in 1971. Studies in Ochollo in 1971 and 1981 reported a prevalence of active cutaneous leishmaniasis of 10.7% and 3.8%, and of healed lesions of 30.4% and 32.8%, respectively (Bugssa, 2014).

Therefore, this study was to assess the prevalence of CL cases diagnosed in one of the known dermatology specialized hospitals in Addis Ababa, ALERT Center, between January 2014 and December 2018.

## **METHODOLOGY**

### **Study Area Description**

The study was conducted by extracting information from laboratory and individual clinical history reports for patients visiting the ALERT Center. Addis Ababa is the capital city of Ethiopia, with a population of 3,435,028 according to the 2017 population census conducted by the Central Statistical Agency (CSA) with an annual growth rate of 4.36%. ALERT center was established in 1934 by Sudan Interior Mission as a Leprosarium and named after the daughter of His Majesty Emperor Haile Selassie I as Prince Zenebework Memorial Hospital (PZWMH). It is one of the specialized tertiary referral hospitals in the country, located in Addis Ababa at 7 km southwest on the way to Jimma.

### **Study Population and Design**

A retrospective hospital-based study was utilized of patient medical records to assess the prevalence of cutaneous leishmaniasis in the period 2014-2018 in patients presenting to ALERT center.

### **Eligibility Criteria and Inclusion Criteria**

All individuals' records were those had Leishmania parasite and prescribed by the physicians for laboratory diagnosis were included.

### **Exclusion Criteria**

Any individual's record who was previously treated for Leishmaniasis was excluded (anyone on follow-up for treatment outcome according to request paper indicated).

### **Data Collection**

The data was collected retrospectively from ALERT center clinical laboratory records (laboratory information system) within the study period (2014-2018). Age, Sex, and geographical location of the patient were used for variables of interest.

### **Data Collection Tools and Approaches**

Data were collected by trained personnel or by group members. The group leader is the principal investigator and collected data during the study period from 1st January 2014-Dec 30, 2018 from a computer-based information system and patients' medical records.

### **Data Quality Assurance**

The data was collected carefully and entered manually into SPSS software version 20.0. It was checked to ensure the completeness of all the required variables before analysis by frequencies and percentages.

### **Statistical Analysis**

The collected data was checked by the principal investigator and group leader on a daily basis for any incompleteness and/or inconsistency. Any incompleteness and/or inconsistency appeared; corrections were made by re-checking data back against the records. Data entry and statistical analysis were done by using SPSS software version 20.0. A frequency was used to calculate the prevalence rate, and a Chi-squared test for linear trend was used to verify the statistical significance of the trend. Best fits the nature of the trend was fixed, and future predictions were made accordingly.

## RESULTS

### Socio-Demographic Characteristics of Study Participants

A total of 2329 study participants were enrolled in this study. 1174 (50.4%) of the study participants were males. The mean and median age of the participants was 28 and 24 years, respectively. The majority of the study participants were within the age group of less than or equal to 18 (34.9 %) as shown (Table 1).

**Table 1:** Socio-demographic characteristics of study participants at ALERT center

Variable	Frequency (N=2329)	Percentage
Sex		
Male	1174	50.4%
Female	1155	49.6%
Age group		
≤18	813	34.9%
19-28	648	27.8%
29-38	270	11.6%
≥39	598	25.7%

### Prevalence of Cutaneous Leishmaniasis and its Association with Socio-Demographic Characteristics

Prevalence of Cutaneous Leishmaniasis and its Association with Socio-Demographic Characteristics

The total prevalence of cutaneous leishmaniasis in this study was 33% (768/2329). The prevalence of cutaneous leishmaniasis in males and females is 34.9% 410 (34.9) and 31.1% 359 (31.1) respectively. It indicates that there is a slight difference in the prevalence of cutaneous leishmaniasis between the two sexes, but there is no statistically significant association ( $p > 0.05$ ). This study shows the prevalence of cutaneous leishmaniasis predominance at the age group 29-38. However, there is no statistically significant association between the stated age groups ( $p > 0.05$ ) (Table 2).

**Table 2:** Disease Status of Cutaneous Leishmania with socio-demographic characteristics using chi square(X<sup>2</sup>).

Variable	Total	Prevalence of Cutaneous leishmaniasis		p-value
		No. of Positive (%)	No. of Negative (%)	
<b>Sex</b>				
Male	1174	410(34.9)	764(65.1)	0.421
Female	1155	359(31.1)	796(68.9)	
<b>Age group</b>				
≤18	813	284(35.0)	529(65.0)	0.134
19-28	648	204(31.5)	444(68.5)	
29-38	270	102(37.6)	168(62.4)	
≥39	598	178(29.8)	420(70.2)	

**Prevalence of Cutaneous Leishmaniasis Associated with Geographical Location**

In this study, about 2329 cutaneous leishmaniasis suspected patients attended ALERT center and were enrolled. Out of 2329 subjects, cutaneous leishmaniasis was diagnosed and confirmed in 768(33%) subjects. According to this study majority of confirmed cutaneous leishmaniasis cases were in the Oromia region 323(42%); followed by Amhara 200 (26%) (Table 3).

**Table 3:** Frequency of cutaneous leishmaniasis associated with geographical location (region)

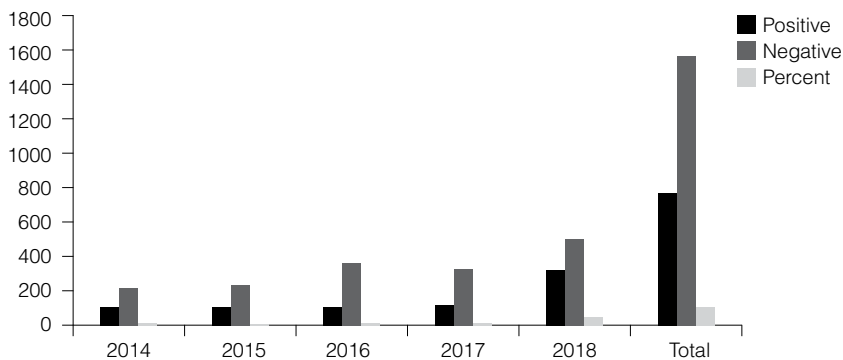
<b>Geographical location (region)</b>	<b>Prevalence</b>	<b>Percent (%)</b>
Oromia	323	42
Amhara	200	26
Southern Nation Nationality Peoples (SNNP)	92	12
Addis Ababa	129	16.8
Tigray	17	2.2
Afar	3	0.4
Benshangul Gumze	4	0.6
Total	768	100%

### **Trends of Cutaneous Leishmaniasis over the Past Four Years (2014-2018) in the Study Area**

Health records of CL kept between December 2014 – December 2018 obtained from the ALERT center was analyzed. Based on these records, we determine the trend of cutaneous leishmaniasis over the past four years (2014-2018). The trend of cutaneous leishmaniasis cases decreased consecutively from 2014-2018, but in 2018 the case increased randomly (Table 4 and Figure 1). The following figure also showed us the trend of cutaneous leishmaniasis cases decreased consecutively from 2014-2018, but in 2018 the cases increased randomly.

**Table 4:** Trend of cutaneous leishmaniasis from 2014-2018.

Year	Frequency	Prevalence of CL		Percent (%)
		No positive (%)	No Negative (%)	
2014	330	109(33%)	221(67%)	15.9
2015	350	106(30.2)	244(69.8)	4.2
2016	371	106(28.6)	265(71.4)	15.5
2017	454	122(26.9)	332(73.1)	17.8
2018	824	319(38.7)	505(61.3)	46.6
Total	2329	768	1561	100.00



**Figure 1.** Trend of cutaneous leishmaniasis cases.

**DISCUSSION AND CONCLUSIONS**

Direct skin smear microscopic approach was employed to determine the prevalence of cutaneous leishmaniasis at the ALERT center from 2014 to 2018. A total of 2329 study participants were enrolled. The total prevalence of cutaneous leishmaniasis in this study was 33%. It had a greater prevalence than those areas were in 1970 (30.4%) and Ochollo (32.8%) in 1971 (Bugssa, 2014). The prevalence of cutaneous leishmaniasis in males and females is 34.9% and 31.1% respectively and compared with the study conducted in Isfahan, Iran indicated similar prevalent of cutaneous leishmaniasis in both men and women, it had a higher incidence in men (61.8%) (Karami et al., 2013). Similar to study

our study conducted in Addis Ababa, Ethiopia, and Ramshir, Iran showed that the prevalence of cutaneous leishmaniasis in males was 53.7% (Valero and Uriarte, 2020; Bekele et al., 2016). But the study findings reported at Ochollo in Silte woreda (South Ethiopia) show females seemed to be at a higher risk of acquiring cutaneous leishmaniasis than males (Bsirat et al., 2015). The reason why females showed a higher infection rate than males is unclear. Still, it could be due to various environmental and behavioral factors or other genetic or immunological characteristics (Tilahun, 2014). According to global Findings in 2013, Nine countries had significantly greater DALYs from cutaneous leishmaniasis than the mean: Afghanistan (87.0), Sudan (20.2), Syria (9.2), Yemen (6.2), Iraq (6.0), Burkina Faso (4.8), Bolivia (4.6), Haiti (4.1), and Peru (4.0). Similar proportions of males and females had cutaneous leishmaniasis in most countries with a high incidence (Karimkhani et al., 2017). It indicated that the prevalence of cutaneous leishmaniasis was higher in males than females; however, the incidence rate is significantly higher as compared to this finding.

According to this finding, cutaneous leishmaniasis infection was observed in all age groups; however, the highest prevalence was recorded in the age group of 29-38 years followed by the age group less than or equal to 18 years (35%), putting the former age group at higher risk of contracting the disease. However, the difference was not statistically significant ( $p > 0.05$ ). While some studies also reported a high prevalence of cutaneous leishmaniasis in the age group of 20-34 (Goto and Lindoso, 2010; Bekele et al., 2016).

Hence it can be concluded that rates of infection in different age groups depend upon the study location. According to our study majority of confirmed cutaneous leishmaniasis cases were in the Oromia region 323 (42%); this may be the location of the study area is more nearby to the Oromia region, and most patients are referred to the center. While the remaining 26%, 16.8%, 12%, 2.2%, 0.4%, and 0.6% were in Amhara, Addis Ababa, SNNPR, Tigray, Afar, and Benshangul Gumz region respectively, this is in line with previous reports by (Bekele et al., 2016). The increase in the number of tests from 2014 to 2018 may be due to the treatment and testing capacity of the Hospital. The trend of cutaneous leishmaniasis cases was decreased consecutively from 2014-2017. It may be due to the presence of good leishmaniasis intervention in the past few years, however in 2018, the cases increased randomly, this may be due to increasing the detection rate and diagnosis.



The finding in this study in relation to the presence of cutaneous leishmaniasis revealed that the prevalence of cutaneous leishmaniasis in the study area was 33% which was too high relative to the study conducted yet. Most males and farmers are groups to have relatively higher exposure for cutaneous leishmaniasis with respect to the female, and the majority of the study participants were within the age group of less than or equal to 18 years. Based on the findings of this study, the prevalence of cutaneous leishmaniasis in an ALERT center increase from 2014 to 2018. It is advisable that strengthening the capacity of hospitals and health facilities to ensure the availability of early, accurate diagnostic testing followed by appropriate anti-leishmaniasis treatment. Taking the burden of cutaneous leishmaniasis and the distribution of the disease into consideration, immediate interventions are needed. It is also advisable if it is integrated with other control programs aimed against vector-borne diseases. The prevention and control of leishmaniasis expanded the country as a whole in order to contribute to policymakers on leishmaniasis control.

**Ethical Approval:** Only patient identifiable codes were used to maintain the confidentiality of individuals' identities, and ethical approval was obtained from the AHRI/ALERT Ethics Review Committee before the conduct of the study.

**Authors' Contributions:** Sebsib Neway and Gizealew Ayalew designed the study, drafted the manuscript, and were involved in the subject recruitments. Biniam Mebrat and Birik Yeshitila performed data analysis. All authors read, approved, and contributed to this final draft.

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