



**St. Paul's Hospital
Millennium Medical College**
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**SAINT PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE, DEPARTMENT OF
DERMATOVENEROLOGY**

**Magnitude and associated factors of Atopic dermatitis at St. Paul's hospital millennium medical
college among children attending dermatology clinic, Addis Ababa, Ethiopia October 2021 – July
2022**

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ACRONYMS AND ABBREVIATIONS

AR	Allergic Rhinitis
AD	Atopic dermatitis
AAD	American academy of dermatology
SPHMMC	St. Paul's hospital millennium medical college
ISAAC	International Study of Asthma and Allergies in Childhood
AOR	Adjusted odds ratio
COR	Crude odds ratio
OPD	Out Patient Department

ABSTRACT

Background: Atopic dermatitis (AD) is a chronic non-contagious disease that affects the skin. It is characterized primarily by intense itching and the development of papules, scaly lesions, fissures, and crusting. Literature data suggest the incidence of atopic dermatitis in developing countries is gradually getting close to that of developed ones, in which atopic dermatitis affects 20% of the pediatric population. (1) There are only few studies done on the prevalence and associated risk factors of atopic dermatitis among children in Ethiopia.

Objective: To identify magnitude and associated factors of Atopic dermatitis at St. Paul's hospital millennium medical college among children attending dermatology clinic, Addis Ababa, Ethiopia from October 2021 – July 2022.

Methods: Institution based prospective cross-sectional study was conducted from October 2021 – July 2022 at St. Paul's hospital millennium medical college dermatology clinic, Addis Ababa, Ethiopia. Questionnaire was prepared and used to collect data. Systematic random sampling technique was used after identifying average number of children between 2 months to 15 years old who visited the dermatology clinic daily. After data collection was completed data was coded and entered into Statistical Package for Social Science (SPSS) version 20.0 software for analysis. Statistical Bivariate and multivariate logistic regression analyses were applied to estimate the crude and adjusted odds ratios with 95% CI to determine the presence and strength of association.

Result: Out of 417 children, 46 of them were diagnosed with Atopic dermatitis according to American Academy of Dermatology (AAD) criteria with a magnitude of 11%. Among these, 22 (47.8%) of them were male and the rest 24 (52.2%) were females. In this study the odds of AD were 6.2 times higher among children whose age is 2 months to 1 year old than those with age 10–15 years old. (AOR: 6.2, 95 % CI: 1.66-23.3). The odds of Atopic dermatitis were also higher among children who are not exclusively breast fed. (AOR: 4.069, 95% CI: 1.374- 12.053). The odds of Atopic dermatitis were 14 times higher among children who had personal history of asthma (AOR: 14.47, 95% CI: 1.46-143.2). Atopic dermatitis was

significantly associated with paternal history of asthma or allergic rhinitis (AR) (AOR: 9.1, 95% CI: 1.5-54.3) or (AOR: 8.9, 95% CI: 2.2-36.0) respectively and also significantly associated with maternal history of allergic rhinitis (AOR: 4.9, 95% CI: 1.2-20.98). And the odds of AD were also higher among children those who had Sibling history of AD (AOR: 10.850, 95% CI: 2.0-58.4).

Conclusion: On this study factors such as age of a child, maternal history of AR, paternal history of asthma or allergic rhinitis, personal asthma, sibling history of AD, and nonexclusive breast feeding were independent predictors of AD among children.

1. INTRODUCTION

1.1 BACKGROUND

Atopic dermatitis (AD) is a common inflammatory skin disease characterized by the development of highly pruritic eczematous lesions. AD often begins in infancy and follows a chronic, relapsing course. Diagnosis is based on patient and family history, as well as clinical characteristics of the disease, and is guided by several sets of diagnostic criteria, most of which derive from the 1980 Hanifin and Rajka criteria. A 2003 update of the Hanifin and Rajka criteria by the American Academy of Dermatology (AAD) established essential, important, and associated features of AD. Our understanding of the complex pathogenesis of AD has advanced considerably over the past few decades. The emerging picture is a complex disorder with genetics, barrier function, immunity, and environmental factors all playing key roles. Many of these pathological mechanisms interact and can be seen to work synergistically to maintain and progress AD.(2)

Atopic dermatitis usually starts in early childhood and may represent the initial step of the so-called ‘atopic march’, which represents the natural history of atopic manifestations in which the child may later develop asthma and/or allergic rhinitis (hay fever). Pruritus, the most common and burdensome symptom of atopic dermatitis, is usually associated with erythematous, scaly lesions of varying morphology. Repeated scratching triggers a self-perpetuating itch-scratch cycle, which can have a significant impact on the patient’s quality of life. Atopic dermatitis typically presents during the first year of life with erythematous papules, patches, or plaques on the face (especially the cheeks), scalp, trunk, and extremities. Older children and adults typically present with patches on the flexural surfaces.(3)

Atopic dermatitis poses a significant burden on health-care resources and patients’ quality of life (mainly because of sleep deprivation due to itchiness, employment loss, time to care and financial costs). As a consequence, there has been a heightened interest in the identification of environmental risks and protective factors.(4)

The aim of the study was to identify the magnitude and associated factor of atopic dermatitis at St. Paul’s hospital Addis Ababa Ethiopia.

1.2 STATEMENT OF THE PROBLEM

Atopic dermatitis (AD) is the most common inflammatory disease in childhood and poses a great number of problems related to health and quality of life of patients.(5) AD, affects a large proportion of children and is most common in infants, where it occurs in 20% of those under two years of age. Over the past 30 years, a twofold to threefold increase in pediatric atopic dermatitis has been reported.(6) AD has its onset during the first 6 months of life in 45% of children, the first year of life in 60% of affected individuals, and before 5 years of age in at least 85% of affected individuals.(7) AD patients usually outgrow the disease in late childhood as around 70% of the patients with a disease onset during childhood have a spontaneous remission before adolescence(before 15 years).(4)

The most comprehensive global epidemiological data can be sourced from the International Study of Asthma and Allergies in Childhood (ISAAC). Investigators from ISAAC phase 3, which surveyed more than 1 million schoolchildren throughout the world between 1999 and 2004, estimated the lifetime prevalence of AD in 6- to 7-year-old children to be relatively low in the eastern Mediterranean (7.2%) and high in Africa (23.3%). The global prevalence for 6- to 7-year-old children was 14.2%.(1) In Ethiopia there are few studies done on prevalence of AD, these includes a facility-based cross-sectional study done at Ayder referral hospital, Mekelle with magnitude of 9.6 % and a cross-sectional survey on children age 1 to 5 years in Jimma and surrounding rural areas in southwest Ethiopia with prevalence of 4.4%.(8)(9)

The pathogenesis of AD is multifactorial involving a complex interaction of genetic, neuroimmune factors and environmental factors. Concordance rates among monozygotic twins was found to be 77% compared to 15% for dizygotic supporting a strong genetic contribution to disease development. Environmental factors such as climate, urban versus rural dwelling, diet, Breast feeding, obesity, tobacco smoke, microbial Exposure, helminthes, antibiotics, higher socioeconomic status, higher level of family education, smaller family size and pollution also contribute to AD risk. (1)(5)(10)

Atopic dermatitis has a negative impact on physical, psychological and psycho-social aspects across all aspects of life. These effects include symptoms of itching and soreness, which cause sleeplessness in over 60%. Sleep deprivation leads to tiredness, mood changes and impaired psychosocial functioning of the child and family, particularly at school and work. Embarrassment, comments, teasing and bullying frequently cause social isolation and may lead to depression or school avoidance.(11)

There are limited studies conducted to address the issue of atopic dermatitis magnitude and its associated factors in Ethiopia.

1.3 SIGNIFICANCE OF THE STUDY

Atopic dermatitis is the most common chronic inflammatory skin disease, and its increasing prevalence presents a major public health problem worldwide as well as in Ethiopia. Beyond the cutaneous lesion AD results in Sleep deprivation which leads to tiredness, mood changes and impaired psychosocial functioning of the child and family, particularly at school and work. Embarrassment, comments, teasing and bullying frequently cause social isolation and may lead to depression or school avoidance. The child's lifestyle is often limited, particularly in respect to clothing, holidays, staying with friends, swimming or the ability to play or do sports. Restriction of normal family life, difficulties with complicated treatment regimens and increased work in caring for a child with eczema lead to parental exhaustion and feelings of hopelessness, guilt, anger and depression.(11)

Despite the extent of the problem, dermatology clinic service delivery in Ethiopia has remained poor. Some of the reasons are poverty, lack of trained staff and shortage of Dermatology specialists as in the whole Ethiopia.

There are very few studies done in our country on atopic dermatitis magnitude and its associated factors and these studies were done more than eight years ago and recent studies are lacking. This study will fill this gap.

This research project helps to improve the current Health care level of atopic dermatitis in children by assessing the burden of the disease and associated factors. The findings of this study will directly benefit patients as well as the public health by identifying associated factors and by showing responsible bodies the burden of the disease and help in resource allocation. And it can serve as baseline study for further high scale studies.

2. LITRATURE REVIEW

2.1 PREVALENCE AND SOCIO-DEMOGRAPHIC FACTOR OF ATOPIC DERMATITIS IN CHILDREN

Prevalence of atopic dermatitis (AD) in Korea was determined by using national statistics from 2003 - 2008. Data on AD patients who received medical service at least once a year from 2003 through 2008 were collected from health insurance research team of National Health Insurance Corporation. Data of estimated populations during the same period were obtained from the Statistics Korea. In 2008, the prevalence of AD was 26.5% in aged 12-23 months and decreased substantially to 7.6% at age 6 years, 3.4% at age 12 years and to 2.4% at age 18 yr. In males, the prevalence was higher than females until 2 years of age, while the opposite was shown in children aged 2 years or older.(12)

A study was done on prevalence and factors associated with atopic dermatitis among children aged 3 months to 12 years attending a regional dermatology training center skin clinic at Kilimanjaro Christian Medical University College Tanzania. The prevalence of AD in children was found to be 9.19%, occurred in the median age of participants was 4 years ranging from 3months-12 years. 48(51.6%) patient were males which outnumbered the females in the study.(13)

A study on magnitude and associated factors of Atopic dermatitis among children in Ayder referral hospital was done in Mekelle, Ethiopia on 2014. A facility-based cross-sectional study design was conducted among 477 children aged from 3 months to 14 years. Among the total respondents, 237 (50.4 %) were males and 233 (49.6 %) were females. The magnitude of the atopic dermatitis was found to be 9.6 %. (8)

2.2 FACTORS ASSOCIATED WITH ATOPIC DERMATITIS IN CHILDREN

Atopic dermatitis etiology is heterogeneous and complex, involving genetic, environmental, and neuroimmune factors that contribute to skin barrier dysfunction and inflammation. Family history of AD is the strongest risk factor for the condition. Known genetic risk factors include null mutations in the filaggrin (FLG) gene that encodes an epidermal structural protein.(14)

Dwelling in urban environments compared with rural environments has been linked to AD in both the Middle East and Africa. In Iran, prevalence of AD is higher in Tehran (17.6%) and Kerman (9.1%) than in Shahr-e-Kord (2.1%), a western city where a greater proportion of citizens have rural lifestyles. Effects of increased socioeconomic status and urbanization on prevalence of AD are thought to stem from factors that include increased air pollution, sedentary lifestyle and diet, and smaller family size.

Findings in Africa support the “hygiene hypothesis,” which argues that increased prevalence of AD stems, at least in part, from decreased exposure to infection and microorganisms in early childhood.(1)

In study done in Mekele Ethiopia AD was associated with first degree relatives with atopy. Those who had maternal asthma, maternal hay fever history or atopic dermatitis history, Paternal asthma, Paternal hay fever history or personal asthma or hay fever history, or weaning at 4 to 6 months age were a significant predictors of atopic dermatitis.(8)

In 2017 a cross-sectional study was done on allergy-related disorders (eczema, wheeze, asthma, and rhinitis) among Ethiopian primary school-aged children on Prevalence and associated risk factors and 541 children aged 5-14 years were studied in Sululta town, Ethiopia. Allergy-related disorders were significantly associated with a family history of allergic disorders. And also significant association was observed for ‘type of toilet’ category, with use of a modern flush toilet over a traditional pit or field latrine being a significant risk factor. Wearing sandals as opposed to closed-toe shoes and the use of insecticides were also significantly associated with a higher prevalence of ARDs.(15)

Antibiotic exposure in children within the first 2 years of life was associated with current asthma, current atopic dermatitis, and current allergic rhinitis at 5 years of age based on study done in Japan. Analysis of

the associations by type of antibiotics showed that cephem was associated with current asthma and current rhinitis, and macrolide was associated with current atopic dermatitis.(16)

Environmental tobacco smoke (ETS) is one of the most common indoor pollutants. In a study done on the effect of environmental tobacco smoke on atopic dermatitis among children in Korea, after adjustment for possible confounding variables, atopic dermatitis was found to be highly correlated with ETS, especially among children whose mothers had smoked during pregnancy and/or in the first year after birth. (17)

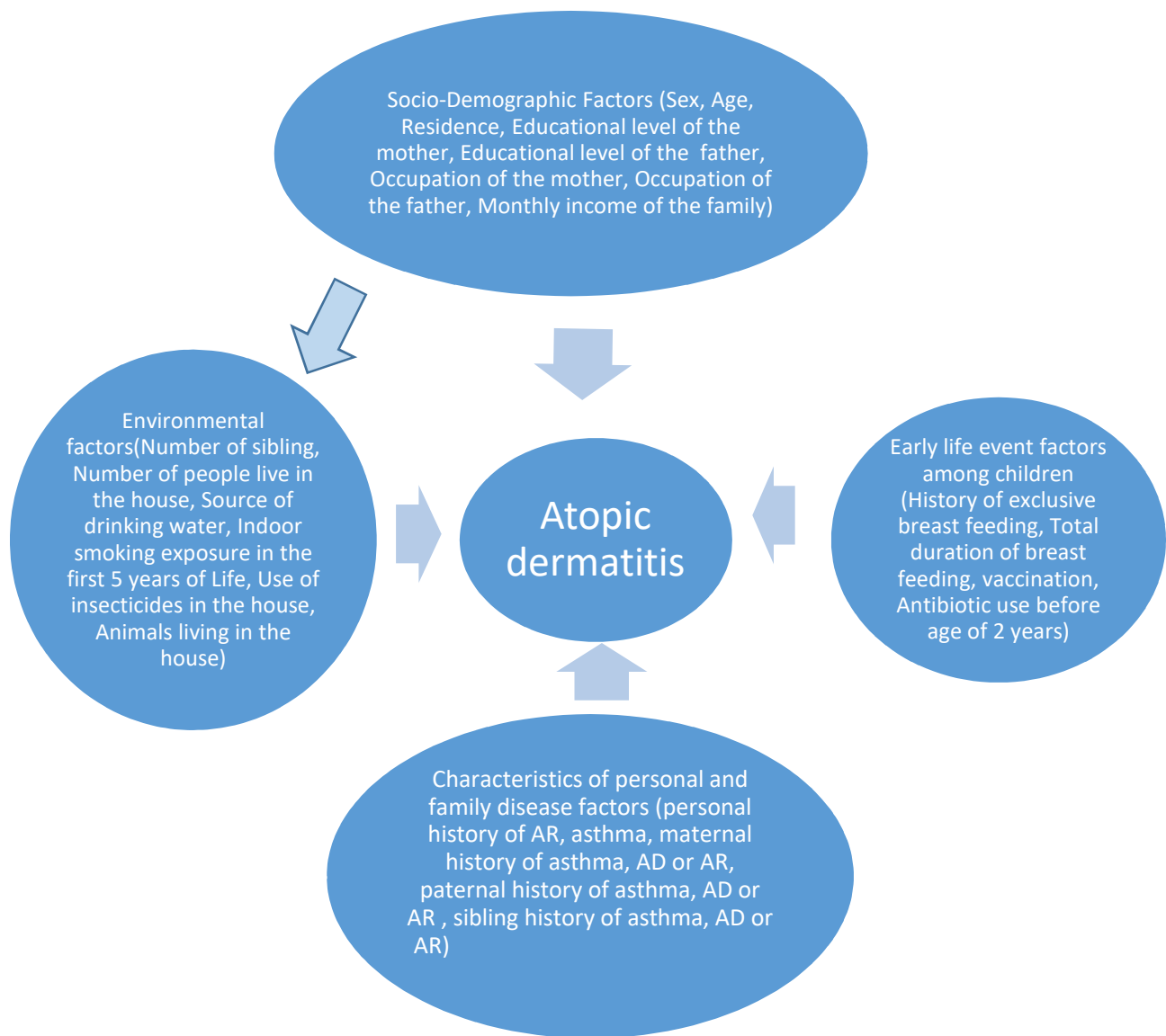


Figure 1 Conceptual frame work

3. OBJECTIVE

3.1 GENERAL OBJECTIVE

To identify magnitude and associated factors of Atopic dermatitis at St. Paul's hospital millennium medical college among children attending dermatology clinic, Addis Ababa, Ethiopia

3.2 SPECIFIC OBJECTIVES

To identify magnitude of Atopic dermatitis among children attending dermatology clinic at St. Paul's hospital millennium medical college

To identify associated factors of Atopic dermatitis among children attending dermatology clinic at St. Paul's hospital millennium medical college

4. METHODS AND MATERIALS

4.1 STUDY DESIGN

An Institutional-based cross sectional study was conducted. The study used quantitative methods of data collection to gather the required information.

4.2 STUDY AREA

This study was done at St. Paul's Hospital Millennium Medical College in Addis Ababa, Ethiopia. St Paul's Millennium Medical College, as it is known today, was established through a decree of the Council of Ministers in 2010, although the medical school opened in 2007 and the hospital was established in 1968 by the late Emperor Haile Selassie. It is governed by a board under the Federal Ministry of Health. The college has more than 2800 clinical, academic and administrative and support staffs that provide medical specialty services to patients who are referred from all over the country, teaching medicine and nursing students and doing basic and applied researches. While the inpatient capacity is more than 700 beds, The College sees an average of 1200 emergency and outpatient clients daily.

St. Paul's Hospital Millennium Medical College provides healthcare and training to its students through its different biomedical and clinical departments, including Anatomy, Physiology, Biochemistry, Pharmacology, Public health, Pathology, General Surgery, Internal Medicine, Obstetrics and Gynecology, Pediatrics and child health, Emergency Medicine, Urology, Neurology, Orthopedics, Psychiatry, Ophthalmology, Dermatovenereology, ENT, Dentistry and Maxillofacial Surgery, Radiology, Anesthesiology, Nursing, ICU (Intensive Care Unit), ART (HIV care), Endoscopy, Physiotherapy, Laboratory and Pharmacy.

Specifically the study place was at SPHMMC Dermatovenereology department. It has a total of five OPDs and one minor operation room. It has 5 dermatovenereology specialists, 1 dermatosurgeon and 1 dermatopathologist, 13 residents, and 6 nurses.

4.3 STUDY PERIOD

The study was conducted from October 2021 – July 2022.

4.4 SOURCE POPULATION

All children between 2 months to 15 years old who were seen at the dermatology OPD of St. Paulo's hospital were used as source population in this study.

4.5 STUDY POPULATION

All children between 2 months to 15 years old who visited the dermatology clinic in St. Paulo's hospital from October 2021 – July 2022 were used as study population with the help of their parents or legal guardian.

4.6 INCLUSION AND EXCLUSION CRITERIA

Inclusion criteria

All children between 2 months to 15 years old who visited the dermatology clinic in St. Paulo's hospital during study period.

Exclusion criteria

Children whose parents or legal guardian didn't gave consent

Children age less than 2 months or greater than 15 years

4.7 SAMPLE SIZE DETERMINATION

The sample size was determined by using single population proportion formula.

$$n = (Z)^2 p (1-p) / d^2$$

Where:-

- n = is calculated sample size
- Z = Confidence interval [95%]
- p = p value was taken 50% to increase sample size
- d2 = marginal error [5%]

Based on the above formula the sample size was 385. Taking 10% non-response rates, the sample size was increased to 423.

4.8 SAMPLING PROCEDURE

Systematic sampling technique was used to identify the study subjects. First the average number of children visiting dermatology clinics daily was determined from health management information system (HMIS) which is 25 then the number of working days were determined during study period 209. From this total number of children to be seen in the study period was determined 5225 dividing this with sample size it was 12. Then study subjects to be selected each day was determined selecting every 12th child by first randomly selecting from 1-12 as a starting point to reach sample size of 423 by the end of study period.

4.9 OPERATIONAL DEFINITION

Atopic dermatitis = is diagnosed clinically when it fulfills the Hanifin and Rajka's criteria which requires 3 major out of 4 and 3 minor out of 23 criteria and the American Academy of Dermatology(AAD) criteria which requires all essential features(18)(19)

= In this study the American academy of dermatology criteria was used. And children who have all of the three essential factors were diagnosed as atopic dermatitis.

Allergic Rhinitis = The diagnosis of allergic rhinitis was made on clinical grounds based upon the presence of characteristic symptoms (ie, paroxysms of sneezing, rhinorrhea, nasal obstruction, nasal itching, postnasal drip, cough).(20)

Asthma =diagnosis was made when classic presentation with intermittent cough, wheeze, and shortness of breath brought on by characteristic triggers and relieved by bronchodilating medications or patients who were on follow up at the hospital (and for children age >5 years was additional criteria).

4.10. STUDY VARIABLES

4.10.1. DEPENDENT VARIABLES

- atopic dermatitis

4.10.2. INDEPENDENT VARIABLES

- Socio-Demographic Factors (Sex, Age, Residence, Educational level of the mother, Educational level of the father, Occupation of the mother, Occupation of the father, Monthly income of the family)
- Environmental factors (Number of sibling, Number of people live in the house, Source of drinking water, Indoor smoking exposure in the first 5 years of Life, Use of insecticides in the house, Animals living in the house)
- Early life event factors among children (History of exclusive breast feeding, Total duration of breast feeding, vaccination, Antibiotic use before age of 2 years)
- Characteristics of personal and family disease factors (personal history of AR and asthma, maternal history of asthma, AD and AR, paternal history of asthma, AD and AR, sibling history of asthma, AD and AR)

4.11. DATA COLLECTION PROCEDURES

A questionnaire format was prepared and data was collected by interviewing parents or care givers based on a review of the different kind of literature. The questionnaire was pretested and was prepared in English

first and then translated into Amharic. Two nurses and one dermatology resident working in the OPD of the dermatology clinic in St. Paul's hospital were recruited to collect data.

4.12. DATA QUALITY MANAGEMENT

The data abstraction format was pretested to ensure any relevant information was not missing out and to make sure there was no difficulty of understanding. After pre-testing, all the necessary modification was incorporated. Data collectors were given appropriate training prior to data collection. Supervision was made by the principal investigator during the data collection process and inconsistencies were corrected on time.

4.13. DATA ANALYSIS

After data collection was completed data was coded and entered into Statistical Package for Social Science (SPSS) version 20.0 software for analysis. A descriptive analysis was presented using descriptive statistics such as frequency tables, bars, and percentages. Crude odds ratios (COR) and adjusted odds ratios (AOR) were analyzed with a 95% confidence level. Binary logistic regression was used first to see association between dependent and independent variables. Variables with bivariate logistic regression $P < 0.25$ were selected and transferred into multivariate logistic regression. Model of goodness was assessed using hosmer – lemeshow model. The variables with p-value of < 0.05 on multivariable logistic regression were reported to have significant association.

4.14. ETHICAL CONSIDERATION

Ethical approval was obtained from St. Paul's Hospital Medical College department of public health, Research Ethics Committee (REC). And the study was conducted in St. Paul's Hospital after obtaining the permission from St. Paul's hospital Ethics Review Committee. To keep the confidentiality no personal identifiers was used on the data collection format.

4.15. DISSEMINATION PLAN

The results of the study will be submitted to St. Paul's Hospital medical college department of public health, St. Paul's Hospital dermatology department and other concerned bodies.

5. RESULTS

Socio-demographic characteristics

In this study a total of 423 children patients, who were enrolled based on the inclusion criteria, are studied. Only 6 children patient's parents refused to participate, that makes the response rate 98.5%. Of these participants, 214(51.3%) were males and 203 (46.7 %) females, and 369(88.5%) were from the urban. About 178(42.7%) of the family earn a monthly income of less than 5000 birr (Table 1).

Table 1 Socio-Demographic characteristics of children in St. Paul's Hospital millennium medical college, Addis Ababa, Ethiopia, October 2021 – July 2022

Variables	Variables Category	Number / frequency	Percents
Sex	Male	214	51.3
	Female	203	48.7
Age category	2months – 11months	66	15.8
	1 year - 5 years	112	26.9
	6years - 10 years	106	25.4
	11 years - 15 years	133	31.9
Residence	urban	369	88.5
	rural	48	11.5
Educational level of the mother	Not educated	57	13.7
	primary school	147	35.3
	high school	148	35.5
	tertiary school	65	15.6
Educational level of the father	Not educated	33	7.9
	primary school	114	27.3
	high school	177	42.4
	tertiary school	93	22.3

Occupation of the mother	farmer	36	8.6
	employed	263	63.1
	unemployed	111	26.6
	other	7	1.7
Occupation of the father	farmer	35	8.4
	employed	355	85.1
	unemployed	8	1.9
	other	19	4.6
Monthly income of the family	Less than 5000 birr	178	42.7
	Greater than or equal to 5000 birr	239	57.3

Environmental factors

Among the respondents, 186(44.6%) of them had 0-1 siblings and 147 (35.3 %) of the respondents had less than 4 people living in the house. A total of 16 (3.8 %) of the respondents uses insecticide at their home. (Table 2).

Table 2. The characteristics of home environmental factors among children in St. Paul's Hospital millennium medical college, Addis Ababa, Ethiopia, October 2021 – July 2022

Variables	Variables Category	Number / frequency	Percents
Number of sibling	0-1	186	44.6
	greater than or equals to 2	231	55.4
Number of people live in the house	<4	147	35.3
	>=4	270	64.7
Source of drinking water	Piped water or hard water	326	78.2
	Purified or bottled water	72	17.3
	Breast feeding	19	4.6
Indoor smoking exposure in the first 5 years of Life	yes	7	1.7
	no	410	98.3
Use of insecticides in the house	yes	16	3.8
	no	401	96.2
Animals living in the house	yes	97	23.3
	no	320	76.7

Early life event factors among children

Majority of the children 377(90.4%) had history of exclusive breast feeding. (Table 3).

Table 3. The characteristics of early life event factors among children in St. Paul's Hospital millennium medical college, Addis Ababa, Ethiopia, October 2021 – July 2022

Variables	Variables Category	Number / frequency	Percents
History of exclusive breast feeding	No	40	9.6
	Yes	377	90.4
Total duration of breast feeding	Less than 6 months	29	7.0
	Greater than 6 months	368	88.2
	On breast feeding	20	4.8
vaccination	Incompletely vaccinated	9	2.2
	Fully vaccinated or vaccinated for his/her age	408	97.8
Antibiotic use before age of 2 years	no	316	75.8
	yes	101	24.2

Characteristics of personal and family disease factors

History of asthma was interviewed among the family members and 11(2.6%) mothers of the child, 10 (2.4% %) fathers of the child, 6 (1.4%) siblings, 10 (2.4 %) children themselves had asthma respectively (Table 4).

Table 4 Personal and family disease related factors with AD diagnosed according to AAD diagnostic criteria, in St. Paul's Hospital millennium medical college, Addis Ababa, Ethiopia, October 2021 – July 2022

Variables	Variables Category	Number / frequency	Percents
Known diagnosis of asthma of the child	yes	10	2.4
	no	407	97.6
personal history of allergic rhinitis	no	406	97.4
	yes	11	2.6
maternal history of asthma	no	406	97.4
	yes	11	2.6
maternal history of atopic dermatitis	no	414	99.3
	yes	3	0.7
maternal history of allergic rhinitis	no	400	95.9
	yes	17	4.1
paternal history of asthma	no	407	97.6
	yes	10	2.4
paternal history of atopic dermatitis	no	414	99.3
	yes	3	0.7
paternal history of allergic rhinitis	no	401	96.2
	yes	16	3.8

sibling history of asthma	no yes	411 6	98.6 1.4
sibling history of atopic dermatitis	no yes	402 15	96.4 3.6
sibling history of allergic rhinitis	no yes	405 12	97.1 2.9

Magnitude of Atopic Dermatitis

Out of 417 children, 46 of them were diagnosed with AD according to Atopic dermatitis diagnostic (AAD) criteria with a magnitude of 11%. (Fig 2)

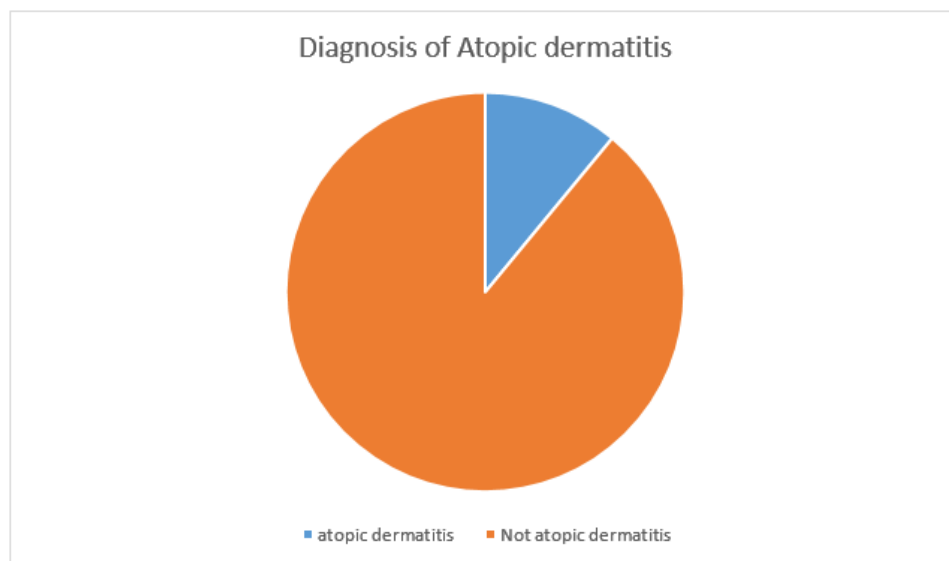


Figure 2 Diagnosis of Atopic dermatitis among children in St. Paul's Hospital millennium medical college, Addis Ababa, Ethiopia, October 2021 – July 2022

Factors associated with atopic dermatitis among children

In this study variables which have p-value less than 0.25 in bivariate analysis were considered as candidate for multivariate analysis.

The variables that showed significant association in binary logistic regression model were age, residence, mother education level, occupation of the mother, occupation of the father, family monthly income, number of siblings, exclusive breast feeding, total duration of breast feeding, maternal asthma, maternal AR, paternal asthma, paternal AR, sibling asthma, sibling AD, siblings AR, personal history of asthma, personal history of AR, Antibiotic use before age of 2 years, Indoor smoking exposure in the first 5 years of Life.

According to the multiple logistic regression, the odds of AD were 6.9 times higher among children whose age is 2 months to 1 year old than those with age 10–15 years old (AOR: 6.9, 95 % CI: 1.57 - 30.265).

The odds of AD were also higher among children those who had no history of exclusive breast feeding (AOR: 20.8, 95% CI: 1.658- 261.298). The odds of AD were 19 times higher among children who had personal history of asthma (AOR: 19.8, 95% CI: 1.23 - 319.25). AD was significantly associated with maternal history of asthma (AOR: 16.59, 95% CI: 1.54 - 178.95), and also significantly associated with paternal history of AR (AOR: 15.25, 95% CI: 2.675 - 86.93). And the odds of AD were also higher among children those who had Sibling history of AD (AOR: 10.43, 95% CI: 1.53 - 70.94), Sibling history of AR AOR: 12.581, 95% CI: 1.809 - 87.524).

Table 1 Table 5 Factors associated with atopic dermatitis among children in St. Paul's Hospital millennium medical college, Addis Ababa, Ethiopia, October 2021 – July 2022

Variable		Atopic dermatitis		COR (95% CI)	AOR (95% CI)	P value
		Yes	No			
Age	2months – 11months	17	49	6.245(2.439 - 15.987)	6.885(1.566- 30.265)	0.011
	1 year - 5 years	13	99	2.364(0.909- 6.147)	2.056 (0.468- 9.024)	0.340
	6years - 10 years	9	97	1.670(0.601 - 4.644)	2.577 (0.509 - 13.040)	0.252
	11 years - 15 years	7	126	1	1	
Exclusive breast feeding	No	16	24	6.326(2.982 - 13.418)	20.812(1.658- 261.298)	0.019
	Yes	30	347	1	1	
Personal history of asthma	No	39	369	1	1	
	Yes	7	3	22.017(5.472- 88.589)	19.792(1.227 - 319.247)	0.035
Maternal Asthma	No	38	368	1	1	
	Yes	8	3	25.825(6.573- 101.454)	16.591(1.538 - 178.946)	0.021
Paternal AR	No	37	364	1	1	
	Yes	9	7	12.649(4.453- 35.930)	15.250 (2.675 - 86.927)	0.002
Sibling AR	No	40	365	1	1	
	Yes	6	6	9.125(2.810- 29.629)	12.581 (1.809 - 87.524)	0.011
Sibling AD	No	35	367	1	1	
	Yes	11	4	28.836(8.722- 95.332)	10.430(1.534 - 70.937)	0.017

6. Discussion

Atopic dermatitis is one of the most common inflammatory skin disease and affects up to 20% of children and up to 3% of adults; recent data show that its prevalence is still increasing, especially in low-income countries. (21) However, there are limited number of studies on the prevalence and associated risk factor of AD among children in our country except a few studies conducted. Determining the magnitude and identifying factors related to AD in our country is crucial to decrease the occurrence, recurrence and complication of AD by strengthening the national skin diseases prevention and control program. This study investigated magnitude of AD and its associated risk factors.

On this study the magnitude of AD was 11% based on the AAD diagnostic criteria. The finding is slightly higher than studies conducted in this country at Ayder hospital in Mekelle 9.6% (8), and at Jimma 4.4 % (9) and in some African nations like Tanzania 9.19% (13) and Madagascar 5.6%.(22) However, it is less compared to studies from Korea 26.5% (16), Spain 18.7 % and Italy 19.5 % (10). This differences in the proportion of AD might be due to the use of different diagnostic criteria, the geographical difference, the age group considered and study period. The possible reason for the higher magnitude compared to studies conducted in other parts of Ethiopia could be due to the time interval between the previous studies and this study which is more than 8 years with in this period there is increment in urbanization and the other explanation is since the study was done at St. Paul hospital dermatology OPD where skin disorders are primarily seen this might increase the magnitude.

The study identified higher chance of AD among children who were not exclusively breast fed compared to those children who were exclusively breast fed. Children whose age between 2 months and 11 months were more likely exposed to AD compared to older children. Children who had personal history of asthma were more likely to develop AD compared to those with no asthma history. Maternal history of asthma, paternal history of AR, Sibling history of AD, Sibling history of AR were also the most predicting risk factor for AD.

Infants between 2 months to 11months old were more likely to develop AD compared to 10 to 15 years and this is consistent with other studies.(12)(9)(8) The Korean National Health Insurance Corporation reported that 26.5% of infants under 2 years old were diagnosed with AD and the rate was reduced dramatically through age from 11.6% in 3 years old to 4.6% in 19 years old according to the report in

2008.(12) Similarly studies in our country Jimma and Mekele showed higher incidence younger children compared to older ones.(8,9) This higher incidence of AD in infants may be due to immature epidermal barrier. And AD is due to the interaction of a dysfunctional epidermal barrier in genetically predisposed individuals with harmful effects of environmental agents which leads to the development of the disease. (23)

Maternal, Paternal, sibling and personal atopic diseases history is the significantly associated factor with AD in this study and it is consistent with different published studies at different times.(24) On a study done in Ireland the odds of AD at 24 months were higher among infants whose mothers had rhinitis AOR, fathers had AD or had asthma.(25) This is also consistent with studies done in Ethiopia in Ayder hospital.(8) This study further support what has been stated about the association of AD with atopic family or siblings' history. This may be due to effect of genetics on development of AD.

Nonexclusive breast feeding was significantly associated factor compared to those who were exclusively breast fed in this study. This is consistent with a study done in Taiwan and other areas.(26)(27) A birth cohort study in Taiwan with 186 subjects reported that exclusive breast feeding for at least 6 months appears to be associated with a reduced risk of developing AD in early childhood. However, studies done in our country at Jimma and Mekele(8)(9) and some studies from other countries did not show association of exclusive breast feeding with AD.(28) The possible explanation could be due to protection from early sensitization from allergens that could have been introduced from solid diet, however there are conflicting results some even showing increased risk with prolonged breast feeding.(29)

This study found no effect of several risk factors that have long been linked to AD including sex, residence, education status and occupation of parents, family monthly income, home, family size, number of siblings, source of water, use of insecticides at home, exposure to indoor smoking, living animals at home, breast-feeding duration, exclusive breast-feeding, vaccination status, antibiotic use, siblings asthma, Mothers AR or AD, Fathers AD or asthma, personal AR history.

Limitations – since it was a cross sectional study no causal relationships were explored and didn't include children on treatment.

Strength – To obtain data which is reliable and to increase the response rate the study used long time experienced data collectors and supervisors who work in the field of dermatology.

7. Conclusion

This study found the prevalence of AD was high in St. Paul's Hospital millennium medical college. Factors such as age of a child, maternal history of asthma, paternal history AR, personal asthma, sibling history of AD, sibling history of AR, nonexclusive breast feeding were independent predictors of AD among children.

8. Recommendations

Organizations (hospitals)

- Hospitals and related organizations should understand the burden and arrange platforms for awareness creation on AD especially for those with self or family history of atopy to improve the quality of life of children

Healthcare providers

- Healthcare providers should screen and follow family members of atopy patients for other atopy conditions

Researchers

- Researchers can use this study as a base line to conduct further researches.

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10. Annex

Annex 1. Information sheet and consent form English version for the quantitative part of the study for assessing magnitude and associated factors of Atopic dermatitis at SPHMMC among children attending dermatology clinic

Greeting:

Hello, how are you?

My name is -----

I am a data collector on behalf of Yared Eshetu (MD) who is a dermatovenerology resident in SPHMMC who want to conduct this survey.

The objective of the study - To assess magnitude and associated factors of Atopic dermatitis at St. Paul's hospital millennium medical college among children attending dermatology clinic. I am interviewing parents or legal guardians of children with atopic dermatitis at SPHMMC dermatology OPD, to assess prevalence, risk factors and disease modifying factors of atopic dermatitis. I am going to ask you some questions that are very important for the health care decision makers, patient's, clinicians and policy makers among others make well informed decision and thereby improve the quality towards health care services of atopic dermatitis. This study also intends to invite the interested intellectuals to perform a detailed careful and long period of study in magnitude and associated factors of Atopic dermatitis. Your cooperation and willingness for the interview is very helpful in identifying the problems related to the issue. Your name will not be written in the form and I assure you that all information that you give will be kept strictly confidential. Your participation is voluntary, and you are not obliged to answer any question you do not wish to answer. If you are not still comfortable with interview, please be free to stop me any time you like there is no harm if you not answer the questions and no special benefit you get if you answer the question the interview will take 20- 25 minutes. We would be thankful if you spend some time with us answering questions related to the issues described above.

1. If yes,

Participant Signature_____

Name of interviewer_____ Signature _____

2.If not, skip to the other participant

For more information and question, here is the contact address of investigator.

Yared Eshetu (MD)

Tel: 0912487816

Email: yaredauye@gmail.com

Consent form

I am informed on study to be conducted by Yared Eshetu (MD) dermatovenerology resident at SPHMMC on magnitude and associated factors of Atopic dermatitis at St. Paul's hospital millennium medical college among children attending dermatovenerology clinic. The objective of the study and participation to this study is voluntary no obligation to answer any questioner, there is no harm by not answering the questions and no special benefit by answering the question and also the interview will take 20-25 minutes .I heard all the information mentioned above and willing to participate in the interview.

Name of Interviewer _____Signature_____

(Signature of interviewer certifying that respondent has given informed consent verbally)

Assent form for children (12-15 years)

The objective of the study is to assess magnitude and associated factors of Atopic dermatitis at St. Paul's hospital millennium medical college among children attending dermatology clinic.

I am requested to participate in this study. It is very well explained to me and I have understood that I will be asked some questions about atopic dermatitis that are important for the health care decision makers, patient's, clinicians and policy makers among others make well informed decision and thereby improve the quality towards health care services of atopic dermatitis.

I have got the right to or not to participate in this study as well as discontinue from the study if I am not interested in the participation at any time and this doesn't have any impact on the medical follow up I should obtain. I am also told that no personal identifier will be disclosed and it will be kept confidential. With this, I therefore have voluntarily agreed to participate on this study.

Participant's Signature-----Date-----

Data collector's Name _____ Signature_____ Date-----

Annex 2 Information sheet and consent form Amharic version

በቅዱስ ጳውሎስ ሆስፒታል በብዛት በህፃናት ላይ የሚከሰተውን የቆዳ አስም መጠን እና ተያያዥ ጉዳዮችን ለማወቅ የተሰራ ጥናት

ጤና ይስጥልኝ

እኔ.....

የቆዳ ህክምና ተማሪ ለሆነው ዶ/ር ያፌድ እሸቱ በቅዱስ ጳውሎስ ሆስፒታል በብዛት በህፃናት ላይ የሚከሰተውን የቆዳ አስም መጠን እና ተያያዥ ጉዳዮችን ለማወቅ የተሰራ ጥናት ::በዚህ ጥናት የሚገኘው ውጤት ለባለሙያዎች በማስረጃ የተደገፈ እቅድ ለማቀድና በዚህ ተመሳሳይ ጥናት ለሚያደርጉ ምሁራን ጥልቅ ጥናት ለማድረግ የሚያስችል መረጃ መሆን እንዲችል እንዲሁም አገልግሎቱን ለሚሰጡ የጤና ባለሙያዎች ጥራት ላለው ተጨማሪ አገልግሎት የመረጃ ግብዓት ሆኖ ያገለግላል ተብሎ ይታሰባል ::ይህንን በፍቃደኝነት ላይ የተመሠረተን መጠይቅ ለመሙላት ከ20-25 ደቂቃ የሚፈጅብዎት ሲሆን ለመሳተፍ ካልፈልጉ አይገደዱም:: እንዲሁም በመጠይቁ መሳተፍ ከጀመሩ በኋላ በማንኛውም ሰዓት ማቋረጥ ይችላሉ :: ለጥያቄዎቹ የሚሰጥዎቸው መረጃዎች በሙሉ ሚስጥራዊነታቸው የተጠበቀ ስለሆነስ ለማንንነትዎ እና ስለሚመልሷቸው መልሶች ምስጢር መጠበቅ ምንም ስጋት አይግባዎት በተጨማሪም በሚሰጡት መረጃ አማካኝነት ምንም የተለየ ጥቅም አያገኙም ወይም መረጃ ባለመስጠትዎ አገልግሎቱ አይቋረጥብዎትም ወይም ሌላ ጉዳት አስከታይ ችግር አይገጥምዎትም ስለዚህ መረጃውን ለመስጠት እና በዚህ ጥናት ተሳታፊ እንዲሆኑልኝ በአክብሮት እጠይቀዎታለሁኝ ::

ለተጨማሪ መረጃ በስልክ ቁጥር 0912 48 78 16 ወይም ኢ-ሜይል yaredauye@gmail.com ሊያገኙን ይችላሉ::

በጥናቱ ለመሳተፍ ፈቃደኝነዎት ?

እሳተፋለሁ.....

አልሳተፍም.....

ለመሳተፍ ፈቃደኛ ካልሆኑ እናመሰግናለን ጥያቄዎቹን በዚሁ ያቋርጡ::

የስምምነት ማረጋገጫ ቅጽ

እኔ በፍቃደኝነት ላይ በተመሠረተ የመረጃ ስምምነት ያለ ምንም ተፅእኖ በቅዱስ ጳውሎስ ሆስፒታል በብዛት በህፃናት ላይ የሚከሰተውን የቆዳ አስም መጠን እና ተያያዥ ጉዳዮችን ለማወቅ በተዘጋጀ መጠይቅ ላይ ለመሳተፍ የጥናት ዓላማውን በመረዳት ከ20-25 ደቂቃ ለሚፈጅ ጊዜ ተሳታፊ መሆኔን አረጋግጣለሁ ::

ለመሳተፍ ፈቃደኛ ከሆኑ ወደ ቀጣይ ጥያቄዎች ይለፉ

የመረጃው ሰብሳቢው ስም

ፊርማ

Annex 3 Diagnostic criteria

A. Hanifin and Rajka criteria

Major criteria (need 3 or more) are as follows:	Minor criteria (need 3 or more) are as follows:
• Pruritus • Typical morphology and distribution ○ Flexural lichenification in adults ○ Facial and extensor involvement in infants and children • Dermatitis - Chronically or chronically relapsing • Personal or family history of atopy (asthma, allergic rhinitis, atopic dermatitis)	• Cataracts • Cheilitis • Conjunctivitis - Recurrent • Eczema - Perifollicular accentuation • Facial pallor or erythema • Food intolerance • Hand dermatitis - Nonallergic • Ichthyosis • IgE - Elevated • Immediate (type I) skin test reactivity • Infections (cutaneous) • Dennie-Morgan infraorbital fold • Itching when sweating • Keratoconus • Keratosis pilaris • Nipple dermatitis • Orbital darkening • Palmar hyperlinearity • Pityriasis alba • White dermographism • Wool intolerance • Xerosis

B. The American Academy of Dermatology criteria

Essential features: all of them must be present and are sufficient for diagnosis

- Pruritus
 - Rubbing or scratching can initiate or exacerbate flares (“the itch that rashes”)
 - Often worse in the evening and triggered by exogenous factors (e.g. sweating, rough clothing)
- Typical eczematous morphology and age-specific distribution patterns
 - Face, neck, and extensor extremities in infants and young children
 - Flexural lesions at any age
 - Sparing of groin and axillae
- Chronic or relapsing course

Important features: seen in most cases, supportive of diagnosis

- Onset during infancy or early childhood
- Personal and/or family history of atopy (IgE reactivity)
- Xerosis
 - Dry skin with fine scale in areas without clinically apparent inflammation; often leads to pruritus

Associated features: suggestive of the diagnosis, but less specific

- Other filaggrin deficiency-associated conditions: keratosis pilaris, hyperlinear palms, ichthyosis vulgaris
- Follicular prominence, lichenification, prurigo lesions
- Ocular findings: recurrent conjunctivitis, anterior subcapsular cataract; periorbital changes: pleats, darkening
- Other regional findings, e.g. perioral or periauricular dermatitis, pityriasis alba
- Atypical vascular responses, e.g. midfacial pallor, white dermographism, delayed blanch

To diagnose AD all of essential features must present Pruritus, Chronic or relapsing course and typical eczematous morphology and age-specific distribution patterns.

Annex 4. QUESTIONNAIRE ENGLISH VERSION

Read the question and mark “√” on your answers

Part 1. Sociodemographic factors

1	Sex		
2	Age		
3	Residence	Urban	
		Rural	
4	What is the educational level of the mother?	Uneducated	
		Read & write	
		Primary school	
		High school	
		Tertiary school	
5	What is the educational level of the Father?	Uneducated	
		Read & write	
		Primary school	
		High school	
		Tertiary school	
6	What is the Occupation of Father?	Farmer	
		Merchant	
		Civil servant	
		Other	
7	What is the Occupation of mother?	Farmer	
		Merchant	

		Civil servant	
		Other-----	
8	How many People are living in the House?	<4	
		≥4	
9	How many siblings dose the child has?	0–1	
		2–3	
		4 or more	
10	How many rooms does your house have?	-----	
11	How much is the Monthly income of the family?	≤2000	
		2000 – 4000	
		4000 – 6000	
		≥6000	

Part 2. Environmental factors

1	Dose the child ever had Indoor smoking Exposure before age of 5 years?	Yes	
		No	
2	Have you ever use insecticide?	Yes	
		No	
3	For how long does the child had exclusive breast feed?	Not exclusively breast fed	
		< 6 months	
		≥ 6 months	
		On breast feeding	
4	For how long was the child totally breast fed?	<4 months	
		4–6 months	

		7–12 months	
		≥12 months	
5	What is your main source of drinking water?	Piped into compound	
		Open well or spring or river	
		Purified bottled water	
		On exclusive breast feeding	
6	Are there animals living in the house?	Yes	
		No	
7	Has your child taken any antibiotics for any illnesses while age < 2years?	yes	
		no	
8	What type of antibiotics do the child use? (If documented on the patient card, have the cover or prescription)	-----	
9	Vaccination status of the child?	Incomplete	
		Fully vaccinated	

Part 3. Disease related factor

1	Does the child has any the following manifestations? (Diagnosis)	Itching	
		Rash over cheek, outer surface of forearm and legs(infant) or inner surface of forearm and legs(older Children)	

		These lesions are long standing or recurrent			
2	Does your child has Asthma confirmed by doctor?	Yes			
		No			
3	Does your child has allergic rhinitis?	Yes			
		No			
4	Do any of the child's First degree relatives has Asthma, Atopic dermatitis or allergic rhinitis?	Disease	Asthma	Allergic rhinitis	Atopic dermatitis
		Father			
		Mother			
		Siblings			

Allergic Rhinitis = The diagnosis of allergic rhinitis can be made on clinical grounds based upon the presence of characteristic symptoms (ie, paroxysms of sneezing, rhinorrhea, nasal obstruction, nasal itching, postnasal drip, cough, irritability, and fatigue)

Asthma = diagnosis was made when classic presentation with intermittent cough, wheeze, and shortness of breath brought on by characteristic triggers and relieved by bronchodilating medications or patients who were on follow up at the hospital (and for children age >5 years was additional criteria).

Atopic dermatitis = according to American academy of dermatology

Annex 5 የአማርኛ መጠይቅ

ጥያቄውን ያንብቡ እና መልሶችዎ ላይ “✓” ምልክት ያድርጉበት

ክፍል 1

1	ፆታ		
2	እድሜ		
3	የመኖሪያ አካባቢ	ከተማ	
		ገጠር	
4	የእናት የትምህርት ደረጃ?	ያልተማረ	
		የመጀመሪያ ደረጃ ትምህርት የተማረች	
		ሁለተኛ ደረጃ ትምህርት የተማረች	
		ከፍተኛ ትምህርት(ኮሌጅ ወይም ዩኒቨርሲቲ) የተማረች	
5	የአባት የትምህርት ደረጃ?	ያልተማረ	
		የመጀመሪያ ደረጃ ትምህርት የተማረ	
		ሁለተኛ ትምህርት የተማረ	
		ከፍተኛ ደረጃ ትምህርት (ኮሌጅ ወይም ዩኒቨርሲቲ) የተማረ	
6	የአባት ሥራ	ገበሬ	
		ነጋዴ	
		የመንግስት ሰራተኛ	
		ሌላ	
7	የእናት ሥራ	ገበሬ	
		ነጋዴ	
		የመንግስት ሰራተኛ	

		ሌላ	
8	በቤት ውስጥ ስንት ሰዎች ይኖራሉ?	<4	
		≥4	
9	ልጁ ስንት ወንድሞች እና እህቶች አሉት?	0-1	
		2-3	
		4 ወይም ከዚያ በላይ	
10	ቤትዎ ስንት ክፍሎች አሉት?	-----	
11	የቤተሰቡ ወርሃዊ ገቢ ስንት ነው?	≤2000	
		2000 – 4000	
		4000 – 6000	
		≥6000	

ክፍል 2

1	ልጁ ከ5 አመት እድሜው በፊት የሲጋራ ጭስ ተጋላጭነት ነበረው?	አዎ	
		አይ	
2	በቤት ውስጥ ፀረ ተባይ መድኃኒቶችን ተጠቅመው ያውቃሉ?	አዎ	
		አይ	
3	ልጁ ለምን ያህል ጊዜ ጡት ብቻ ጠባ(ተጨማሪ ምግብ ከመጀመሩ በፊት)?	ይህ ተግባራዊ አልተደረገም	
		<6 ወራት	
		≥ 6 ወራት	
		ጡት ብቻ በመጥባት ላይ ነው	

4	በአጠቃላይ ልጁ ጡት ለምን ያህል ጊዜ ጠባ?	<4 ወራት	
		ከ4-6 ወራት	
		7-12 ወራት	
		≥12 ወራት	
5	የቤተሰቡ ዋነኛ የመጠጥ ውሃ ምንጭ	ቧንቧ	
		ጉድጓድ ወይም ምንጭ ወይም ወንዝ	
		የተጣራ የታሸገ ውሃ	
		ጡት በመጥባት ላይ	
6	በቤቱ ውስጥ የሚኖሩ እንስሳት አሉ?	አዎ	
		አይ	
7	ልጅዎ ከሁለት አመት እድሜው በፊት መድኃኒት ወስዶ ያውቃል?	አዎ	
		አይ	
9	የልጁ የክትባት ሁኔታ?	ያቋረጠ	
		የጨረሰ	

ክፍል 3

1	ልጁ የሚከተሉት የቆዳ ላይ ምልክቶች አሉት?	ማሳከክ	
		በጉንጭ ላይ ሽፍታ፣ የክንድ እና የእግሮች (ለሕፃን) ውጫዊ ገጽ ወይም የፊት እና የእግር ውስጠኛ ገጽ (ለትላልቅ ልጆች)	
		እነዚህ ምልክቶች ለረዥም ጊዜ ወይም በተደጋጋሚ የሚወጡ ናቸው	

2	ልጅዎ አስም በሽታ አለበት	አዎ			
		አይ			
3	ልጅዎ የአፍንጫ አለርጂ አለበት?	አዎ			
		አይ			
4	የልጁ ቤተሰብ መካከል አስም ፣ የአፍንጫ አለርጂ ወይም የቆዳ አስም በሽታ ያለበት አለ?		አስም	የአፍንጫ አለርጂ	የቆዳ አስም
		አባት			
		እናት			
		እህት ወይም ወንድም			