

# Assessment of Practice and Factors Affecting Sunlight Exposure of Infants Among Mothers Attending Governmental Health Facilities in Debre Markos Town, East Gojjam, Ethiopia, 2015

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**Abstract:** Introduction: For centuries, sunlight has been used for therapeutic purposes. Parents still expose their infants to sunlight to treat neonatal jaundice, mostly to supply vitamin D for bone development as a consequence of health beliefs. Objective: The main objective of this study was to assess practice and factors affecting sunlight exposure of infants among mothers attending governmental health facilities in Debre Markos Town, East Gojjam, Ethiopia, 2015. Method: Cross sectional descriptive study was conducted among mothers attending in under five and immunization clinics of all government health facilities in Debre Markos Town by taking a total sample size of 345 from December 1 to 30, 2014. Probability sampling method was used for the selection of individual respondents. Data was entered using EPI data version 3.1 and analyzed by SPSS version 20. Binary and multiple logistic regressions were done to show the association of dependent and independent variables. Results: Out of 359 respondents identified for the study 96% (n=345) were responded for the interview. From the total respondents (55.4%) of them had poor practice about sunlight exposure. In multivariate analysis mothers' educational status had significant association with practice of sunlight exposure of infants. Conclusion and Recommendations: The findings in this study showed mothers had poor practice about sunlight exposure. Therefore, mothers need to be educated about the importance of sunlight exposure.

**Keywords:** Mothers' Practice, Rickets, Sunlight Exposure, Vitamin D, Vitamin D Deficiency

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## 1. Introduction

For centuries, sunlight has been used for therapeutic purposes (heliotherapy), which dates back to ancient Rome and Greece [1]. In the second half of the 19th century, it was realized that sunshine could have bactericidal effect as well as a therapeutic role in rickets [2-5].

In 1958, sunlight was first used for neonatal jaundice [2, 6, 7]. Placing a child in a room where sunlight enters through window panes (not in direct sunlight) for 10 minutes twice a day was often used to help treat mild neonatal jaundice [8].

In recent years, exposure to sunlight has been a subject of epidemiological interest both due to its beneficial as well as adverse effects on human health. It is an important etiological factor in the development of skin cancers and sun-related eye

problems when exposure is high [9, 10]. However, the exposure to solar ultraviolet radiation (UVR) is an essential step for the production of Vitamin D, and also the main source of vitamin D in human body [11-14]. Ultraviolet B (UVB) rays in the solar UVR spectrum produce vitamin D in the human body. UVB rays penetrate uncovered skin and converts cutaneous 7-dehydrocholesterol to pre-vitamin D<sub>3</sub>, which in turn becomes vitamin D<sub>3</sub> [15, 16].

Studies worldwide identify lack of sun exposure as the main cause of rickets [17, 18]. Rickets is a major public health problem in many countries of the world. In many rich industrialized countries, the prevalence of rickets in the general population diminished after the introduction of dietary supplementation. However, in such countries, vitamin-D deficiency rickets has re-emerged in recent years,

particularly among groups with limited exposure to UVB-containing sunshine. Infants at risk of rickets are those whose mothers had poor vitamin D status during pregnancy and those exclusively breast-fed for a prolonged period with little skin exposure to UVB [19]. Rickets is common in children in Sub-Saharan Africa. Vitamin D deficiency rickets has also common in Ethiopian children [20].

Decades have now elapsed since the pioneering studies on rickets in Ethiopia [21-24] showed that lack of exposure to sunshine was the single most important cause of rickets in Ethiopian children. Some pioneering studies as well as more recent work [25-27] suggested that daily exposure to sunshine remains the cheapest, safest and most effective method of preventing the disease [23]. Indeed, health education to change maternal behavior to expose infants to sunshine was adopted as the main strategy to combat rickets in the country in the early 1960s [25]. However, the implementation of the strategy has remained inconsistent and health messages lacked focus on factors that influence maternal practice excluding infants from getting adequate sunshine. This was largely because of lack of adequate information on the determinants of this particular risk behavior among Ethiopian mothers [28].

Contrary to general belief, rickets is widely prevalent in many tropical and subtropical regions despite abundant sunshine. WHO now estimates that globally one billion people have VDD [9]. The incidence of rickets is particularly high in children who live in crowded houses almost devoid of sunlight [29].

Rickets is common among Ethiopian children. It contributes to infant mortality and morbidity and carries long-term consequences. Factors influencing caregiver behavior of exposing infants to sunshine, a simple preventive strategy, are not fully understood [28].

A study done in Addis Ababa, 41% of children below three years of age visiting an out-patient department had rickets and the frequency was higher in infants [22]. On another study done in Jimma about 7% of under-five children were diagnosed to have rickets in paediatric admissions in Jimma Hospital [30] and there are indications that it is on the increase [24].

Another study done on children between 6 and 59 months of age for signs of rickets in Jimma Town, 25 (4%) of children were found to have rickets. The highest rate (11%) occurred in infants. It is also significantly associated with increased frequency of respiratory infections [31].

Since there is limited research conducted on the title particularly around the study area, the study is intended primarily to assess mothers' practice and factors affecting their practice about sunlight exposure of their infants.

## 2. Objectives

### 2.1. General Objective

- To assess practice and factors affecting sunlight exposure of infants among mothers attending

governmental health facilities in Debre Markos Town, East Gojjam, Ethiopia, 2015.

### 2.2. Specific Objectives

- To identify level of practice among mothers regarding exposure of their infants to sunlight.
- To identify factors affecting practice of exposing infants to sunshine among mothers.

## 3. Methods and Materials

### 3.1. Study Area and Period

The study was conducted in all governmental health facilities in Debre Markos Town, East Gojjam, Ethiopia.

### 3.2. Study Design

A cross-sectional institutional based study was conducted

### 3.3. Source Population

All mothers having children and attending in under five and immunization clinics of all governmental health facilities in Debre Markos Town.

### 3.4. Study Population

Mothers with infants attending in under five and immunization clinics of each governmental health facilities at the time of data collection and who fulfill the inclusion criteria.

### 3.5. Inclusion Criteria

- Mothers with infants who was attending in under five and immunization clinics of each governmental health facilities in Debre Markos town.
- Those mothers with infants who were volunteer to participate in the study

### 3.6. Exclusion Criteria

- Mothers with infants who were not mentally and physically capable of being responded.

### 3.7. Sample Size Determination

- A total of 345 mothers were participated in the study.

### 3.8. Sampling Procedure

All governmental health facilities were included in the study. Overall sample was taken proportionally from all governmental health facilities. Each study participants was selected using systematic sampling technique.

### 3.9. Data Collection Instrument

A structured interviewer administered questionnaire adapted from a study done in Jimma [31] and Turkey [33]. And it was modified according to Ethiopian context.

### 3.10. Data Collection Procedure

Before going to the data collection, pretest was done on 5% of similar mothers. Data were collected through face to face interview method. Five diploma nurses and two Degree nurses were participated as data collectors and supervisors respectively. All data collectors and supervisor were trained for two days on their responsibilities for describing the purpose of the study, how to collect the data and telling clients the importance of honest and genuine reply towards the questions. The principal investigator and supervisors strictly follow the overall activities of the data collection on daily base to ensure the completeness of questionnaire and to give further clarification.

### 3.11. Data Quality Assurance

Tool was given to expertise to check content validity and accuracy. Questionnaire prepared in English version and translated in to Amharic and back to English to check its consistency. After the pretest based on the response the questionnaire was modified. Data collection was carried out by trained nurses from other units of the health facilities. The collected data were checked by the supervisor daily for completeness and finally the principal investigator monitored the overall quality of data collection.

### 3.12. Independent Variables

- Socio-demographic factors (age, religion, ethnicity, marital status, educational status, occupation)
- Mothers belief (sickness, evil eye, cold, pneumonia)

### 3.13. Dependent Variables

- Practice of sunlight exposure

### 3.14. Data Analysis Procedure

Data were entered in to Epi Data version 3.1 and exported and analyzed using SPSS Software version 20. Mean, Standard deviation, frequencies, percents and odds ratio were calculated. Binary and multiple logistic regression analysis were determined to assess the association between independent and dependent variables. The strength of statistical association was measured by odds ratio and 95% confidence intervals and statistical significance was considered at  $P < 0.05$ .

### 3.15. Ethical Consideration

Ethical clearance was obtained from institutional review board of Department of Nursing and Midwifery, College of Health sciences, Addis Ababa University. Permission letter was obtained from woreda health office to all governmental health facilities for their cooperation to conduct the study in the health facilities. Each study participant was adequately informed about the purpose, method and anticipated benefit and risk of the study and the right to withdraw from the study any time by their data collectors. Oral Informed consent was obtained from each study participants.

### 3.16. Operational Definitions

Good practice – Mothers responded to practice questions and scored above 6 median value.

Poor practice - Mothers responded to practice questions and scored 6 and below 6 median value.

## 4. Results

### Socio-demographic Characteristics of respondents

Out of 359 mothers identified for the study, 345(96%) responded to the interview. From those respondents 156(45.2%) were between age 21 and 26 years. The mean age of the mothers were 26.9( $\pm 5.3$ ) years and mean ages of the children were 4.7( $\pm 3.2$ ) months. About (96.5%) of the participants were Orthodox in religion and 339 (98.3%) were Amhara in ethnicity. Majority 329 (95.4%) of mothers were married and 86(24.9%) of mothers had diploma and above in their educational status. And 167(48.4%) of the respondents were housewives and 202(58.6%) of mothers had household family of 1-3 (Table 1).

**Table 1.** Distribution of socio-demographic characteristics of mothers' in Debre Markos Town, Ethiopia, 2015 (N=345).

Variable Name	Frequency	Percent (%)
Mother's age		
15-20	29	8.4
21-26	156	45.2
27-32	102	29.6
33+	58	16.8
Total	345	100
Infant's age		
0-6 months	245	71
7-12 months	100	29
Total	345	100
Religion		
Orthodox	333	96.5
Muslim	9	2.6
Protestant	3	0.9
Total	345	100
Ethnicity		
Amhara	339	98.3
Oromo	3	0.9
Tigre	3	0.9
Total	345	100
Marital status		
Single	7	2
Married	329	95.4
Divorced	6	1.7
Widowed	3	0.9
Total	345	100
Mother's educational status		
unable to read and write	38	11
able to read and write	55	15.9
grade 1-6	86	24.9
grade 7-10	67	19.5
grade 11-12	13	3.8
Degree and above	86	24.9
Total	345	100
Mother's occupation		
Student	12	3.5
House wife	167	48.4
Government employee	90	26.1
Private employee	23	6.7

Variable Name	Frequency	Percent (%)
Daily labourer	14	4.1
Merchant	31	9
Others	8	2.3
Total	345	100
Family size		
1-3	204	59.1
4-6	135	39.1
>6	6	1.7
Total	345	100
Husband's educational status		
unable to read and write	23	6.7
able to read and write	42	12.2
grade 1-6	9	2.6
grade 7-10	66	19.1
grade 11-12	63	18.3
Degree and above	126	36.5
Missing	16	4.6
Total	345	100

#### 4.1. Practice of Mothers About Sunlight Exposure of Infants

Table 2. Practice of mothers' on sunlight exposure of their infants in Debre Markos Town, Ethiopia, 2015 (N=345).

Variables	Categories	Frequencies	Percent
Do you expose your baby on sunlight	Yes	321	93
	No	24	7
	Total	345	100
Age infant start sunlight exposure	0-15 days	75	23.4
	16-30 days	102	31.8
	31-45 days	46	14.3
	45 days and above	98	30.5
	Total	321	100
How frequently expose	Daily	186	57.9
	Sometimes	135	42.1
	Total	321	100
Where do you expose	Outdoor	287	89.4
	Indoor	37	10.6
	Total	321	100
Time of sunlight exposure	Morning 8-10 AM	318	99.1
	Mid day 11AM-1PM	1	0.3
	Afternoon 2-4 PM	2	0.6
	Total	321	100
Condition of closing during exposure	Uncllothed	133	41.4
	With diapers and eye protection only	51	15.9
	Partly covered	121	37.7
	Completely covered	16	5
	Total	321	100
For how much minute do you expose	5-10 minute	80	24.9
	10-15 minute	122	38
	15-30 minute	82	25.5
	Above 30 minute	37	11.5
	Total	321	100

Out of 345 respondents, 321(93%) of mothers exposed their babies on sunlight. From these, 102 (31.8%) started sunlight exposure of their infants from 16-30 days, 98(30.5%) of mothers started after 45 days and 75(23.4%) from 0-15 days. Even though, 321(93%) of mothers stated exposed their infants on sunlight, only 186(57.9%) exposed daily. Regarding place of sunlight exposure, most 287 (89.4%) of mothers replied as they exposed infants on sunlight outdoor (outside the house). Majority 318(99.1%) of

mothers exposed their infants between the time range of 8-10AM. Regarding the condition of closing during exposure, 133(41.4%) of mothers exposed their infants on sunlight uncovered and 121(37.7%) of mothers exposed their infants by partly covered.

Regarding to duration of exposure of their infants on sunlight, 122(38%) exposed from 10-15minutes and 82(25.5%) of mothers exposed their infants from 15-30minutes (Table 2).

#### 4.2. Application of Lubricants on the Infants Body

Regarding to practice of application of lubricants, almost all mothers 316(98.4%) of mothers apply lubricants on the infants body during the time of sunlight exposure. Majority 223(70.6%) of mothers apply these lubricants during sunlight exposure and 51(16.1%) of mothers apply after sunlight exposure. From 316(98.4%) of mothers, 138(43.7%) of mothers, apply butter and 107(33.9%) of mothers apply baby Vaseline on the infants body (Figure 1).

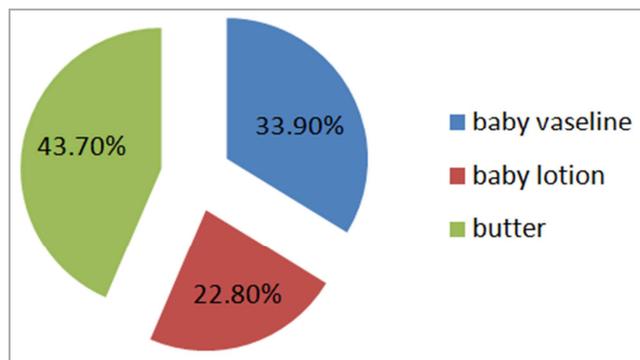


Figure 1. Application of lubricants on the infants' body at governmental health facilities in Debre Markos town, Ethiopia, 2015.

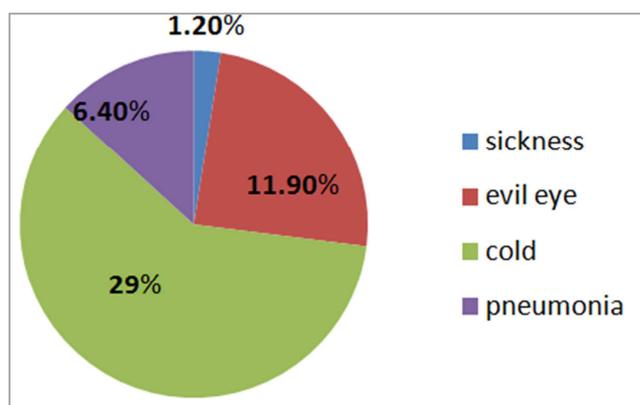


Figure 2. Factors affecting practice of mothers about sunlight exposure of infants at governmental health facilities in Debre Markos town, Ethiopia, 2015.

#### 4.3. Mothers Practice Status About Sunlight Exposure of Infants

Based on the practice questions, median value was calculated and it was 6. Out of 345 respondents, 191(55.4%) scored less than or equal to 6. Therefore based on the

operational definition, 55.4% of mothers had poor practice about sunlight exposure of infants.

Out of the total of 345 respondents, 132(38.3%) of mothers had fear to expose their infants on sunlight. The highest fear of mothers' in this study was 100(29%) fear of cold and 41(11.9%) fear of evil eye (Figure 2).

Regarding to sunlight exposure practice, there was a statistically significant association between maternal age and practice. In bivariate analysis mothers' age between 27-32 years were 7.03 times more likely practice sunlight exposure than mothers between the age group of 15-20 years (COR=7.03(95%CI=2.62, 18.84)). Mothers with educational status of diploma and above were 8.79 times more likely practice sunlight exposure than mothers who were unable to read and write (COR=8.79(95%CI=3.70, 20.90)).

Regarding mothers occupation, daily laborer mothers 0.08 times less likely practice sunlight exposure than student mothers (COR=0.08(95%CI=0.01, 0.57)). Family size of 4-6 were 2.30 times more likely practice sunlight exposure than

family size of 1-3(COR=2.30(95%CI=1.47, 3.58)).

Regarding mothers belief, in the bivariate analysis mothers who had no fear of evil eye were 4.55 times more likely practice sunlight exposure than mothers who had fear of evil eye (COR=4.55(95%CI=1.96, 10.58)). Mothers who had no fear of cold were 6.19 times more likely practice sunlight exposure than mothers who had fear of cold (COR=6.19(95%CI=3.46-11.06)).

Mothers who had no fear of pneumonia were 2.9 times more likely practice sunlight exposure than mothers who had fear of pneumonia (COR=2.91(95%CI=1.05, 8.08)).

Variables that had p-value less than 0.2 in the bivariate analysis were taken into multivariate analysis and the significant association between maternal education, family size, fear of cold and practice about sunlight exposure was retained in the multivariate analysis. But the significant association between maternal age, husband educational status, evil eye, pneumonia and practice on sunlight exposure was not retained in the multivariate analysis (Table 3).

**Table 3.** Factors associated with practice of mothers on sunlight exposure of infants in Debre Markose Town, Ethiopia, 2015 (N=345).

Variables	Practice of sunlight exposure		p-value	COR	p-value	AOR
	Poor	Good				
Mothers' age						
15-20	23(6.7%)	6(1.7%)	0.00	1	0.00	1
21-26	90(26.1%)	66(19.1%)	0.03	2.81(1.08,7.29)	0.07	3.50(0.88,13.96)
27-32	36(10.4%)	66(19.1%)	0.00	7.03(2.62,18.84)	0.26	2.30(0.54,9.82)
33+	42(12.2%)	16(4.6%)	0.49	1.46(0.50,4.24)	0.18	0.34(0.07,1.65)
Marital status						
Single	4(1.2%)	3(0.9%)	0.63	1		
Married	179(51.9%)	150(43.5%)	0.89	1.11(0.25,5.07)		
Divorced	5(1.4%)	1(0.3%)	0.32	0.27(0.02,3.65)		
Widowed	3(0.9%)	0(0.0%)	0.99	0.00		
Mothers educational status						
unable to read and write	26(7.5%)	12(3.5%)	0.00	1	0.00	1
able to read and write	33(9.6%)	22(6.4%)	0.40	1.44(0.60,3.45)	0.04	4.33(1.09,17.22)
grade 1-6	72(20.9%)	14(4.1%)	0.06	0.42(0.17,1.03)	0.48	0.63(0.17,2.28)
grade 7-10	36(10.4%)	31(9%)	0.14	1.87(0.81,4.30)	0.07	3.23(0.90,11.54)
grade 11-12	7(2%)	6(1.7%)	0.35	1.86(0.51,6.73)	0.13	4.07(0.67,24.52)
Degree and above	17(4.9%)	69(20%)	0.00	8.79(3.70,20.90)	0.14	2.91(0.70,12.00)
Mothers' occupation						
Student	4(1.2%)	8(2.3%)	0.00	1	0.02	1
House wife	119(34.5%)	48(13.9%)	0.01	0.20(0.06,0.70)	0.03	0.14(0.02,0.80)
Government employee	15(4.3%)	75(21.7%)	0.17	2.50(0.67,9.38)	0.60	0.59(0.08,4.15)
Private employee	17(4.9%)	6(1.7%)	0.02	0.18(0.04,0.81)	0.11	0.18(0.02,1.51)
Daily labourer	12(3.5%)	2(0.6%)	0.01	0.08(0.01,0.57)	0.01	0.02(0.00,0.44)
Merchant	18(5.2%)	13(3.8%)	0.15	0.36(0.09,1.46)	0.02	0.10(0.01,0.71)
Others	6(1.7%)	2(0.6%)	0.08	0.17(0.02,1.23)	0.11	0.12(0.00,1.67)
Family size						
1-3	128(37.1%)	74(21.4%)	0.00	1	0.00	1
4-6	58(16.8%)	77(22.3%)	0.00	2.30(1.47,3.58)	0.00	3.90(1.75,8.69)
>6	5(1.4%)	3(0.9%)	0.51	1.73(0.34,8.79)	0.06	7.66(0.94,62.30)
Husband's educational status						
unable to read and write	15(4.6%)	8(2.4%)	0.00	1	0.01	1
able to read and write	27(8.2%)	15(4.6%)	0.94	1.04(0.36,3.02)	0.21	0.39(0.09,1.71)
grade 1-6	8(2.4%)	1(0.3%)	0.21	0.23(0.03,2.22)	0.19	0.11(0.00,2.90)
grade 7-10	54(16.4%)	12(3.6%)	0.11	0.42(0.14,1.20)	0.12	0.32(0.08,1.33)
grade 11-12	45(13.7%)	18(5.5%)	0.58	0.75(0.27,2.07)	0.08	0.31(0.08,1.15)
Degree and above	30(9.1%)	96(29.2%)	0.00	6.00(2.31,15.53)	0.84	1.14(0.31,4.25)
Fear of mother						
Sickness						
Yes	3(0.9%)	1(0.3%)	0.34	1		
No	188(54.5%)	153(44.3%)	0.44	2.44(0.25,23.70)		
Evil eye						

Variables	Practice of sunlight exposure		p-value	COR	p-value	AOR
	Poor	Good				
Yes	34(9.9%)	7(2%)	0.00	1		1
No	15745.5%	147(42.6%)	0.00	4.55(1.96,10.58)	0.25	2.04(0.61,6.88)
Cold						
Yes	83(24.1%)	17(4.9%)	0.00	1		1
No	108(31.3%)	137(39.7%)	0.00	6.19(3.46,11.06)	0.00	4.67(2.06,10.57)
Pneumonia						
Yes	17(4.9%)	5(1.4%)	0.02	1		1
No	174(50.4%)	149(43.2%)	0.04	2.91(1.05,8.08)	0.27	2.30(0.53,10.00)

\* Statistically significant at  $p < 0.05$

## 5. Discussion

Regarding practice of sunlight exposure, majority 93% of mothers exposed their infants on sunlight. It is in line with the same study done in Sakarya which was 87.5% of mothers exposed their infants on sunlight [32] and it was lower than the same study done in Jimma town which was 100% [31]. The reason behind for this difference may be socio demographic and cultural differences. It was also higher than the same study done in Townsville, Australia which was 20% [1]. It may be due to because Australia is found in tropical region where there is high prevalence of skin cancer, mothers may fear of skin cancer and may not exposed their infants to sunlight [1].

In this study, 23.4% of mothers started sunlight exposure of their babies between 0-15 days which was lower than the same study done in Jimma town which was 42.04% [31]. Similarly in this study, (57.9%) of mothers exposed their infants on sunlight daily and the remaining mothers exposed their infants sometimes. This finding was lower than the same study done in Jimma town which was (92.16%) of mothers exposed daily [31]. The reason behind for this difference may be socio demographic and cultural differences.

Majority (89.4%) of respondents exposed their infants outside the house (outdoor). This finding was similar to the study done in Sakarya which was (87.5%) [32]. While the correct recommended time for exposure of sun light is 15-30 minutes, only about (38%) of respondents exposed their infants with time duration of 10-15 minutes. This was lower than the study done in Sakarya which was for 30 minutes [32]. Most (98.4%) of respondents apply lubricants on the baby's body at the time of sunlight exposure and majority (70.6%) of mothers apply during sunlight exposure. This indicates that (43.7%) of respondents apply traditional malpractice.

Out of 345 respondents, 38.3% of mothers had fear to expose their infants on sunlight. Among these, (11.9%) of mothers didn't exposed their infants on sunlight due to fear of evil eye. The result was higher than the same study done in Jimma town which was (1.46%) [31]. The possible explanation for this difference may be due to cultural difference between the two populations.

Regarding mothers' sunlight exposure practice in the bivariate analysis mothers' age, mothers educational status, mothers' occupation, family size, fathers' educational status, evil eye, cold and pneumonia had statistically significant association with sunlight exposure practice, with odds ratio

of; (COR= 7.03, 95%CI=2.62,18.84), (COR=8.79, 95%CI=3.70, 20.90), (COR=0.08(0.01, 0.57) (COR=2.30 (1.47, 3.58), (COR=6.00 (2.31, 15.53), (COR=4.55(1, 96, 10.58), (COR=6.19 (3.46, 11.06) (COR=2.91 (1.05, 8.08) respectively. But among these variables maternal educational status, occupation, family size and fear of cold had significant association with mothers practice of sunlight exposure of infants in multivariate analysis. Similarly maternal age and maternal education had significant association in the study done in Townsville, Australia [1].

## 6. Conclusion and Recommendation

In this study, about (55.4%) of mothers had poor sunlight exposure practice. Common fear of mothers that affect sunlight exposure practice in this study area were fear of cold, fear of evil eye and fear of pneumonia. Mother's educational status, occupation, family size and fear of cold had significant association with mothers practice about sunlight exposure of infants.

Health care professionals should create awareness by giving continuous health education program about benefit of sunlight exposure of infants among mothers. Finally, researchers should do further study to identify knowledge, attitude and practice of mothers with qualitative data about sunlight exposure of infants at large scale.

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