

# Factors That Affect Access to Sunscreens: A Study of Persons with Albinism in Moshi Municipal, Tanzania

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## Abstract

People with albinism are particularly vulnerable to sunburn and skin cancer because of the reduction or absence of melanin in the body. The aim of the research was to analyze the factors that affect persons with albinism access to sunscreens. The study took a form of a cross-sectional design and it was conducted in Moshi municipality. Simple random sampling was used to select the population of 101 PWA who belong to Moshi Municipality but only 79 PWA manage to return questionnaires well enough to be used in the study. This study collected both primary and secondary data whereas household survey using self-administered questionnaire was used. Data were analyzed using descriptive analysis where frequencies and percentages were calculated and interpreted. Moreover, multiple regression analysis was applied to analyze the factors affecting PWA access to sunscreens. The study revealed that PWA are aware of sunscreen and they are knowledgeable about the methods used to protect skin from harmful sunrays. Furthermore, distance was revealed to be one of social factors that affect persons with albinism access to sunscreen but to those who live beyond Moshi Municipal. On the other hand income and price significantly affect persons with albinism on access to sunscreen. The study concluded that people with albinism are aware of the need to protect themselves from the effects of sunrays and are knowledgeable about the methods of protection, whereas travel distance, income and price of sunscreen were the main factors that affect persons with albinism access to sunscreen. The study recommended that government should provide sunscreen products for free or lower the price so that sunscreens would be accessible to persons with albinism. Moreover, it was recommended that distribution centers should be located near residential areas of persons with albinism.

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## Keywords

Albinism, People with Albinism, Sunscreen, Skin Cancer, Sunburn

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### 1. Introduction

People with albinism are particularly vulnerable to sunburn and skin cancer because of the reduction or absence of melanin in the body (Slevin, 2014). The prevalence of albinism across European countries is estimated to be 1:20,000 (Grossmann, 2014). People with albinism should wear sunscreen with a high sun protection factor to avoid sunburn and skin cancer (UTSS, 2012a). The United States of America recommends sunscreen use for prevention of sunburn and skin cancer but little is known about its access (Amber et al., 2014). Although it is known that people living in European countries, especially those participating in open-field activities, are at high risk of sunburn and that they do not protect themselves adequately with sunscreen, the reasons for their inadequate protection have not been determined (Slevin, 2014).

In Africa people with albinism make up about one in 4000 people in South Africa and perhaps one in 5000 in Nigeria (UTSS, 2012b). According to Pooe-Monyemore et al. (2012), there is inadequate use of sunscreen for people with albinism living in South Africa, access to sunscreen needs to be improved and the department of health should increase awareness. Sustained health promotion efforts are required to help people with albinism to best protect them, such as providing health education on sun protection and assisting with interpretation of commercial sunscreen products (Lund & Tayler, 2008). In northern South Africa, Lund and Tayler (2008) said that care programs have been designed and implemented to support people with albinism holistically by facilitating low-cost management of sunscreen, raising self-esteem and promoting community awareness, since people with albinism have both medical and sociological implications.

In tropical countries like Tanzania, Kenya and Uganda, sunscreens are a much-needed commodity for people with albinism, but poor access to sunscreens only worsens the health conditions of people with albinism since skin cancer is a leading cause of death (Okolo, 2014). In Tanzania, the prevalence of albinism is estimated to be 1 in 1400 and 1 in 19 carry the gene (Spritz et al., 1995). Due to harsh tropical sun, acute lack of education around sun protection and absence of affordable sunscreen lotions most PWA show signs of extensive sun damage and skin cancer at an early age (UTSS, 2012a).

In 2014 Tanzania government has exempted tax on all sun protective gears for persons with albinism including sunscreen (Kashililah, 2014). Moreover on December 2014, Tanzania government adopted a resolution proclaiming, with effect from 2015, 13 June as International Albinism Awareness Day. Although all those efforts have been done by Tanzania government, still the access to sun-

screen among persons with albinism still poses major therapeutic challenges which need to be addressed and more effort needs to be done to improve the access to sunscreen (Mabula et al., 2012). The access to sunscreen among persons with albinism in Tanzania has been poor because the majority of these patients present late to the hospital with advanced-stage skin cancer (Kiprono et al., 2012). Although access to sunscreen for the prevention of skin cancer and sunburn remains controversial, the study by Green et al. (2011) provides the strongest evidence to date that the regular use of sunscreen can prevent the development of skin cancer for up to 10 years. In general people with albinism are among people with disability more effort need to be done to support their health care especially access to sunscreen. According to Godeliver and Kagashe (2013), people with albinism who have attended the hospital in northern Tanzania had a reasonable understanding of the risks of skin cancer and of sun avoidance methods although they do not apply sunscreen. Since it is not clear what factors affect persons with albinism on access to sunscreen. This study aims to analyze the factors that affect people with albinism's access to sunscreen so as to prevent the early onset of skin cancer among persons with albinism in Tanzania.

## 2. Statement of the Problem

The aim of the research was to analyze the factors that affect persons with albinism access to sunscreens. Despite the fact that sunscreens are widely advocated for the prevention of skin cancer in persons with albinism, it is not known what factors affect persons with albinism on access to sunscreens (Godeliver & Kagashe, 2013). Still, there are inadequate sunscreens for persons with albinism in tropical countries, especially in Tanzania (Okolo, 2014). No other effort has been done since 2014 Tanzania government exempt tax to all sun protective gears for persons with albinism including sunscreen (Kashililah, 2014). The current state of sunscreen in Tanzania is very poor, according to Tanzania Bureau of Standard (2018) there are very few cosmetic product industries in Tanzania and none of them produce sunscreen most of the sunscreen is imported. There is a need to improve the access of sunscreen to persons with albinism living in Tanzania, so as to prevent early onset of skin cancer (UTSS, 2012a). Since the majority of people with albinism present late to the hospital with advanced-stage of skin cancer (TAS, 2012), this study was conducted to gain knowledge and obtain useful information about persons with albinism and their access to sunscreen in order to be used by government and private institutes that deal directly or indirectly to persons with albinism.

## 3. Objectives of the Study

General objective

To analyze the factors that affect persons with albinism access to sunscreens.

Specific objectives

1) To examine the awareness of persons with albinism on access to sunscreen

2) To assess the social factors that affect persons with albinism access to sunscreens.

3) To examine the economic factors that affect persons with albinism access to sunscreens.

#### **4. Significance of the Study**

The study's finding aims to provide information that reflects the existing gap between persons with albinism and access to sunscreen. Therefore the study finding aims to create community awareness and improve the access to sunscreen so that PWA can get and benefit from sunscreens more easily.

Furthermore, the study aims to direct the thoughts of different government and non-government organizations in Tanzania to promote the way of improving accessibility of sunscreen and testing new sunscreen products, develop and design a sunscreen product specifically for PWA by figuring out what is needed and ensure that the development and design of a product are highly targeted towards demand.

Moreover, the study aims to provide information that can be used by the government, especially by the ministry of health on what should be done to improve the access of sunscreens to persons with albinism. The study findings also aim to provide information that can be used by health departments, especially KCMC where the research was conducted. Health departments will be able to know what should be done to improve the accessibility to the PWA.

#### **5. Literature Review**

##### **5.1. Definition of Key Terms**

###### **5.1.1. Sunscreen**

Sunscreen is a lotion or oil that contains any combination of FDA approved sunscreen active ingredients. These ingredients either absorb or reflect ultraviolet radiation when applied to the skin (Russ & Zahner, 2013).

###### **5.1.2. Access to Sunscreens**

According to oxford dictionary (2018), the word access is defined as the means or opportunity to approach or enter a place. The access to sunscreen is the ability or opportunity to use or benefit from sunscreens (Mancebo & Wang, 2014). Access has been defined as "the use of services relative to the actual need for care, lack of access occurs when there is a need for services and those services are not utilized" (Bigdeli et al., 2013). Wyszewiansk (2002) gave a broad concept to access describing it as the fit between the characteristics and expectations of the service providers and the service user. According to this study access to sunscreen is ability of a person to be able to get and use sunscreen.

###### **5.1.3. Persons with Albinism**

People with albinism are little or no pigment in their hair, skin and eyes (Grossmann, 2014). Albinism is a rare, non-contagious, genetically inherited condition

characterized by a lack of pigmentation in the hair, skin and eyes. It occurs regardless of ethnicity or gender. Both parents must carry the gene for it to be passed on, even if neither have albinism themselves (Brilliant, 2015). Albinism is a genetically inherited disorder characterized by hypopigmentation of the skin, hair and eyes due to a reduced or lack of cutaneous melanin pigment production (Mabula et al., 2012).

## 5.2. Theoretical Review

### Theory of Access

A theory of access by Ribot and Peluso (2009), explained the term “access” as the ability to derive benefits from things. The strength of the theory is the access analysis, thus the process of identifying and mapping the mechanisms by which access is gained, maintained, and controlled (Ribot & Peluso, 2009), although this theory had a weakness, later Ribot and Peluso (2009) state that “access is the right to benefit from thing”. According to Tanzania Human Right Report (2016), the human right to health means that there is a guaranteed system of health protection for all and that health care must be provided as a public good for all. Sunscreen is a product that is given for free as donations or brought in the shops (Godeliver & Kagashe, 2013), so then access to sunscreens should not be referred to as right. Limitation of the theory, the theory did not explain the access for people with disability. According to persons with disability act (2010), people with albinism are among the people with disability.

## 5.3. Empirical Literature Review

### 5.3.1. People with Albinism and Awareness of Sunscreen

In the developed world, a study was done in Australia; Cockburn et al. (1997) on a clinical trial of sunscreens for reducing skin cancer in Victoria observe that, the trial required a considerable commitment from participants, in that they were asked to apply sunscreen every morning over a long period of time (seven months). It seemed feasible that participants could not guess which treatment they were receiving. Only around 30% of participants correctly guessed their treatment. It seems that participants were not aware of sunscreen. Cockburn et al. (1997) thought that if participants were aware of their treatment this would affect their access to sunscreen. For example, if a person believed that they were applying sunscreen they would feel protected against developing skin cancer and the access to sunscreen of the participant would be different from those who have never used sunscreen.

In Africa, The study done by Von et al. (1991) about sunscreen use and environmental awareness in Cape Town, South Africa reported that only 50% of respondents were using sunscreen and aware on the day of the interview, more women than men, and people over 25 years of age relative to younger persons, made frequent use of sunscreen lotions. Also, this viewed the same in the study done by Lund and Tayler (2008) found that rural areas of South Africa, especially children living away from home had inadequate sun protection and were un-

aware of sunscreen. According to [Dlova et al. \(2018\)](#) in their study about awareness and sunscreen use among outpatients of South African hospital though that most respondents are appropriately aware that regular use of sunscreen may prevent skin cancer and understand the concept of sun-protection factor but only 21% expressed an awareness of the need for regular use of sunscreen. With respect to peoples' knowledge and awareness of sunscreen, 90% of the population cited skin cancer as a potential consequence of over-exposure to sunlight, although, in general, knowledge of sunscreen was poor ([Caradee et al., 2016](#)). Later [Dlova et al. \(2018\)](#) concluded that South African population requires intensive education regarding the benefits of using sunscreen.

In Tanzania, According to [Godeliver & Kagashe \(2013\)](#) a study done in Dar es salaam reported that people with albinism are aware of the need to protect themselves from the effects of sunrays and they are knowledgeable on different means that can be applied to protect their skin including use of sunscreen products. 61.4% of the participants were at that particular time of the interview not applying the sunscreen products, the study did not explain the reasons, although other studies observed the same that only 25 of the 146 respondents study reported Itching after using sunscreens and 21 were uncomfortable with their appearance after using sunscreen, especially the white color while 5% reported developing wounds after using sunscreen and only a few mentioned to suffer from eye irritation ([Kiprono et al., 2012](#)). Those studies revealed that persons with albinism are aware of sunscreen but there are other factors associated with use of sunscreen which affect access to sunscreen. On the other hand, low prevalence of the side effects could be explained by the inconsistent application of sunscreens due to non-affordability of sunscreen products.

### **5.3.2. Social Factor Affecting Persons with Albinism Access to Sunscreens**

Global, a study done in the United State of America by [Amber et al. \(2014\)](#) reported that Sunscreen use is recommended for the prevention of sunburn and skin cancer but little is known regarding sunscreen availability. Their study analyzes sunscreen availability in three large metropolitan counties to determine the relationship between sunscreen availability and community demographics. The study found more than 50% of the sunscreen products were available in all pharmacies and supermarkets open as of July 2013. Furthermore, they recommended other studies of sunscreen usage patterns in different populations that must take into account sunscreen availability and price, as these significantly differ based on the community demographic.

In Africa, the studies done in South Africa by [Ravim and Handicap International \(2010\)](#) observed that socially there is still a lack of knowledge and acceptance of persons with albinism in the community. This is usually the case in the rural and urban areas where disability is still being viewed as an illness that is communicable, a shame, a result of witchcraft, a punishment from the ancestors for some wrongdoing of the parent or extended family or a sign of promiscuity by the mother of the child. For this case there is poor contribution of sunscreen

to people with albinism. The impact of this is often hidden from the community and neglected by their parent. Ravim and Handicap International (2010) later highlighted the most social factors faced by people with disability and their relatives in the community are distance. The distance to a health care center is taken into consideration before utilization of services. The distance affects the mode of transport utilized and the time taken to reach a health facility especially to the distribution centers of sunscreen for collection sunscreen. However, Coomer (2012) reported that in Namibia the distance from the health facility to the residence of the child with disability did not pose as a barrier, as most health centers in the Khomas region (central region) where on average 5km away. She also noted that the high cost of transportation, unreliability and its unavailability as the main obstacles to accessing healthcare especially the access to sunscreen for people with albinism. Barrat and Claire (2009), in their evaluation common complaints among the caregivers included travelling long distances from sites barely accessible by motor vehicles, combined with expensive, unreliable transport, making regular follow-up visits difficult to achieve.

In Tanzania the distance to a health care center is taken into consideration before PWA access to sunscreen. Distance affects the mode of transport utilized and the time taken to reach a health facility (Kiprono et al., 2012; Godeliver & Kagashe, 2013). Furthermore, Kiprono et al. (2012) observed that people with albinism cannot access sunscreen if it does not exist in their geographic area, or if providers are not available. Godeliver and Kagashe (2013) on the availability of knowledge and use of sunscreen products by people with albinism in Dar es Salaam region, Tanzania observed that Albinism is a condition that cannot be cured, but efforts can be made to improve the quality of life of people with albinism. The use of sunscreen products to protect the skin is recommended so as to prevent premature skin aging or skin cancer when exposed to sunlight. Also, use of hats and sunglasses can also help people with albinism to tolerate sunlight. Their study on exploring the availability of sunscreen on the market, it was found that six brands/ types of sunscreen products were available on the Tanzanian market. Of the representative samples 88% qualified for sun protective factor for people with albinism with SPF of 20 and above as recommended by WHO and NOAH. The reason given for why most of the participants were currently not using sunscreen products was not clear. People with albinism are among the disadvantaged group having low levels of education to have employment with good salaries. High humidity and temperatures prevailing in most months year in Dar set Salaam region, leave sunscreen products as the most convenient method of protecting the body compared to covering the exposed body parts with clothes such as kanga. Although kanga is cheaper and could have been an obvious method, especially amongst women, sweating brings a lot of discomforts hence less used.

### **5.3.3. Economic Factor Affecting Access to Sunscreen for Person with Albinism**

In the United State of America Access to healthcare is tied to the affordability

and income of beneficiaries (NCHS, 2016). Healthcare is the organized provision of treatment or medical care of the physically and the mentally ill such as provision of sunscreens to persons with albinism (Levesque et al., 2013). Later, Levesque et al. (2013) noted that economic challenges faced by people with disability also affect access to healthcare and most of organization saw it as the opportunity to identify health-care needs such as reaching sunscreen providers, obtaining sunscreen, or using sunscreen. The Kaiser Commission on Medicaid and the Uninsured (KFF, 2016), notes that people who lower income have worse access to health care. Moreover, people who are 18 - 64 years old are more likely afford medical care such as sunscreen, medicines and medical therapy. People in families whose income is less than 20% of the federal poverty level are more likely to have poor access to healthcare. Economic resources (such as income and wealth) enable access to material goods and services, including health-care services (Schoen et al., 2013).

In Africa, The study done in Kenya revealed that economic factors can support or constrain access to sunscreen. For example, PWA with economic disadvantage may not be able to easily eat or provide food to their families. This affect the ability to seek medical care such use sunscreen despite of its adequate (Okolo, 2014). Economic disadvantage also affects the ability to access sunscreen, as well as the quality of care received. Work hours, work sick-leave policies, clinic hours, and transportation and childcare issues can make seeing a health care professional very difficult. Further, there is ample evidence to show that those with lower educational attainment, those with lower incomes, and people with albinism all receive lower quality health care.

In Tanzania, According to Godeliver and Kagashe (2013) reported that there was financial inability for persons with albinism as sunscreen products are very expensive. For them to use sunscreen products solely depend on free donation from Tanzania Albino Society. The price of one tube of sunscreen product ranged from 10\$ to as high as 35\$. 75.4% of persons with albinism respondent said the sunscreen products were very expensive and none of them could afford to buy the products. People with albinism are among the disadvantaged group having low level of education to have employment with good salaries. Most of them are not employed as civil workers nor working in private sectors/non-governmental organizations but petty traders with unreliable low income sometimes less than 1\$ per day. Also, the same results were reported by Kiprono et al. (2012) that the sunscreen products are available on the Tanzanian market but they are expensive and unaffordable by most PWA.

## 6. Methodology

### 6.1. Research Design

Cross-sectional design was used as research findings required in a short period of time and study population based on the inclusion and exclusion criteria. This design was used because it is the only design that selected the participants must



base on the inclusion and exclusion criteria set for the study and once the participants have been selected for the study, the investigator follows the study to assess the exposure and the outcomes at the same time (Setia, 2016). This helped the study to spend relatively little time and cost on conducting the study and hence reduce the work in consideration of limited time and resources available for carrying out the study.

## **6.2. Description of Study Area**

### **6.2.1. Location**

The study was conducted in Moshi municipal, Kilimanjaro in Tanzania. Kilimanjaro region was selected because of Regional Dermatology Training Centre (RDTC) at KCMC which has long history of providing skin health care on persons with albinism in Tanzania. RDTC at KCMC was founded in Moshi with the material, financial and human resource support of the government of Tanzania, the Good Samaritan Foundation and the International Foundation for Dermatology in 1992 (RDTC, 2018a). The study was conducted in Moshi Municipal because it is the only place with more than 55% of PWA in Kilimanjaro according to Tanzania Albinism Society (2012). Moshi municipal has an area of 58 km<sup>2</sup> which compose of 21 wards (Moshi Municipal council, 2018).

### **6.2.2. Demographics**

There are 572 persons with albinism of which males 214 and females 358 in Kilimanjaro region. KCMC has successfully registered only 135 PWA of which males are 64 and females 71 in Moshi municipal.

## **6.3. Sampling**

### **6.3.1. Sample Frame**

The sample population of this study was 135 persons with albinism who belong to Moshi Municipal. The sample population was obtained from RDTC at KCMC using client registry. RDTC at KCMC was selected to obtain the sample population because of its long history of providing skin health care on persons with albinism in Kilimanjaro region (RDTC, 2018a).

### **6.3.2. Sample Size**

According to data obtained from RDTC (2018b) the study consisted sample of 101 persons with albinism which was calculated using the Raosoft Sample Size Calculator using confidence interval at 95%, margin of error of 5% and skewness level (response distribution) 50%. Raosoft sample size calculator was used because it is the best and modern way to illustrate the interconnectedness of the margin of error, sample size and confidence level (Hightower & Scott, 2012).

### **6.3.3. Sampling Techniques**

The study used simple randomly sampling to select sample of 101 respondents. First, all names of persons with albinism in Moshi municipal were written on a

piece of paper and then folded before selecting the required number of sample size using lottery technique. This sampling technique was used because simple randomly sampling is very convenient working with small populations that have already been identified and listed. Also, every PWA living in Moshi Municipal had equal chance of being selected. Although only 79 PWA manage to return questionnaires well enough to be used in the study.

## **6.4. Data Collection**

### **6.4.1. Types of Data**

This study collected both primary data and secondary data. Primary data had both qualitative and quantitative data but secondary data was only quantitative data. Qualitative data included education level of respondent, marital status of respondent, sex of respondent, and experience of respondent. Quantitative data included household size, price of sunscreen, income of respondent, cost to reach the supplier and number of supplier and distributors.

### **6.4.2. Sources of Data**

Source of primary data was persons with albinism. The study used primary data mostly because PWA statistics are not shortly updated. The source of secondary data was sunscreen books, people with albinism research and client registry from KCMC.

### **6.4.3. Data Collection Methods**

Household survey using self-administered questionnaire was used. Self-administered questionnaire had both open ended or close ended questions so that comparisons can be easily made and strengthen the explanation when there were too much similarities and unexpected differences.

## **6.5. Reliability and Validity of Data**

### **6.5.1. Reliability of Data**

Reliability was carefully considered to facilitate the data obtained to provide firm support for the conclusion drawn from research findings. **Cameron and Price (1997)** consider the importance of telling good data from bad. The research instrument was pretested to 10 persons with albinism who did not participate in the main study to test its reliability of the instrument using Cronbach's alpha. Cronbach's alpha as a measure of internal consistency was used, basing on the scales of excellent  $\geq 0.9$ , good  $0.8 \leq \alpha < 0.9$ , acceptable  $0.7 \leq \alpha < 0.8$ , Questionable  $0.6 \leq \alpha < 0.7$ , poor  $0.5 \leq \alpha < 0.6$ , unacceptable  $\alpha < 0.5$ . The study was show to be reliable because Cronbach's alpha coefficient of 0.7 was obtained.

### **6.5.2. Validity of Data**

Validity of data was ensured by pre-testing methods of data collection. Clarification was given to respondents as they answered questions to ensure that the questions answered were in line with the expectations of the study. The other method of ensuring validity was triangulation which is a process of collecting

data by using multiple sources where by the information or facts obtained from each source are compared with each other.

### **6.6. Data Analysis**

Principally the data were analyzed by Statistical package for social scientists (SPSS) version 20. In order to analyze all answers obtained from the questionnaires. The study expects that by combining two methods, it was possible to get detailed analysis that helps the study to answer each study's objective and relevant research questions. Specifically to study objectives, the study intends to use the following techniques of data analysis. For specific objective, one descriptive analysis was used where frequencies and percentages were calculated and interpreted. The descriptive statistic is employed for the basic features of data in this study. It offers simple conclusions about the sample and the measures (Trochim, 2008). Content analysis was also applied mostly in the data for specific objective one since the study intends to find out awareness of sunscreen in persons with albinism.

The study findings also use multiple regression analysis to specific objective two and three since the study intends to find social factors and economic factors that have any influence on access to sunscreen. In order to ensure an accurate understanding and analysis of the regression model, it is critical to test for normality, homoscedasticity of residuals, independence of residuals, multi-collinearity and linearity. All the tests were assessed and passed to proceed with regression analysis.

### **6.7. Competing Interests**

The authors declare no competing financial or non-financial interests.

### **6.8. Ethical Review**

RDTC at KCMC has been in the field of research for more than 20 years and anticipates the highest ethical standards of its researchers; all the ethical issues have been reviewed by the institute and adhered to. The researcher already has addressed the academic justification for the research in the proposal. An ethics checklist was also given to the researcher during every step of the research that included design of the questionnaire. The checklist is only an example to practice ethical standards for research involving human participants.

## **7. Data Availability**

The data that support the findings of this study are available on request from the corresponding author, Ebenezer Fabian. The data are not publicly available due to Regional Dermatology Training Centre (RDTC) and Kilimanjaro Christian Medical Centre (KCMC) clients and patients policy some of the data contains information that could compromise the privacy of research participants and the health centre.

## 8. Findings and Results

This chapter presents the findings of the study concerning the factors that affect persons with albinism access to sunscreens. It consists of four main sections which include: Profile of respondents, awareness of persons with albinism on access to sunscreen, the social factors affecting persons with albinism access to sunscreen and the economic factors affecting persons with albinism access to sunscreen.

### 8.1. Awareness of Persons with Albinism on Access to Sunscreen

Understanding the awareness of persons with albinism on access to sunscreen was an entry point in this study so as to establish the factors that affect persons with albinism on access to sunscreen. As a theory of access by Ribot and Peluso (2009) explained that access to sunscreen is the ability to benefit sunscreens. Godeliver and Kagashe (2013) argue that PWA was knowledgeable and aware of sunscreen, though they have no access to sunscreen. This section will gather information about persons with albinism whether are aware of sunscreen or not aware.

#### 8.1.1. Awareness of Persons with Albinism on Sunscreen

In order to know persons with albinism are aware or not, every respondent was asked to provide the meaning of sunscreen. In some ways, an explanation given by people about something is the best way to measure awareness or knowledge of those people (Aminrad et al., 2011).

Figure 1 shows that the majority of respondents (93.6%) were found to be aware of sunscreen as they define well the sunscreen while minority of respondents were found to be poorly aware as they defined wrongly sunscreen (6.4%).

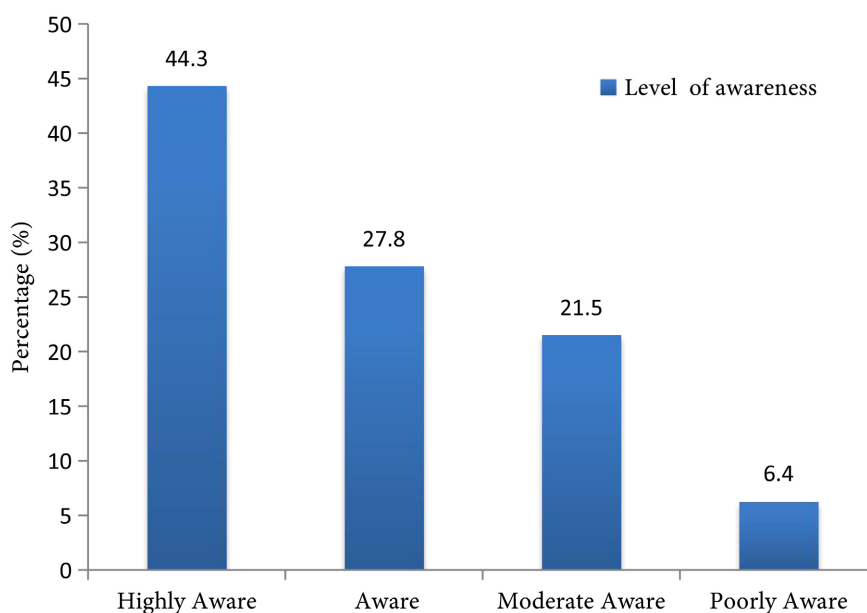


Figure 1. People with albinism level of awareness on definition of sunscreen.

This means that most persons with albinism know the meaning of sunscreen and were knowledgeable about sunscreen. This agreed with [Godeliver and Kagashe \(2013\)](#) that PWA who attended hospital from northern Tanzania are knowledgeable on different means that can be applied to protect their skin including use of sunscreen products.

After the study found that persons with albinism are aware of sunscreen, the study went furthermore to see whether social demographic factors have any association on awareness of persons with albinism on access to sunscreen. The study sought to find the association of social demographic factors and awareness as sub-analysis to support the study findings of the awareness of persons with albinism on access to sunscreen. Several variables associated with the level of persons with albinism awareness were tested, all the variables, except employment status.

### 8.1.2. Age of Respondents and Awareness on Sunscreen

To confirm that awareness affected access on sunscreen Chi-square was undertaken between age of respondents and awareness on sunscreen.

**Table 1** shows that respondents in age group 16 - 25 years had an awareness (28.6%), respondents in age group of 26 - 35 years had an awareness of sunscreen (44.2%), respondents in age group of 36 - 45 years had an awareness on (15.6%) and 55+ years of the subjects had an awareness on (2.6%). Chi-square tests of independent show that these results were statistically significant ( $p = 0.013$ ). This means that PWA awareness on sunscreen was significant associated with age group. This also implies that PWA at the age group of 26-35 are more aware because KCMC started to care and raise awareness on PWA in Kilimanjaro since 1992, most of PWA who were children at time are likely to be on this age group nowadays. This agrees with [Masanja et al. \(2014\)](#), who found that there was a significant association between categories of awareness and various age categories, later he concluded that respondents below 16 years had moderate knowledge on albinism while those with age above 60 years were highly aware.

### 8.1.3. Education Level of Respondents and Awareness on Sunscreen

As can be observed from **Table 2**, respondents who had primary education

**Table 1.** Age of respondents and awareness on sunscreen.

	Aware (n = 77) (%)	Not aware (n = 2) (%)	Chi-square	p-value
Age group				
16 - 25	28.6	0.0	12.615	0.013*
26 - 35	44.2	50.0		
36 - 45	15.6	0.0		
45 - 55	9.1	0.0		
55+	2.6	50.0		

\*Pearson Chi-square.

**Table 2.** Education level of respondents and awareness on sunscreen.

	Aware (n = 77) (%)	Not aware (n = 2) (%)	Chi-square	p-value
Education level			2.329	0.507*
Primary	45.5	0.9		
Secondary	29.9	0.0		
College/certificate	22.1	0.0		
University	2.6	0.0		

\*Pearson Chi-square.

level had an awareness on sunscreen by 45.5%, while college/certificate level had an awareness on sunscreen (22.1%) and university had an awareness of (2.6%). Chi-square tests of significance show that these results were not statistically significant ( $p = 0.507$ ). This means that there is no association between education level of PWA and awareness on sunscreen. These finding contradict with [Masanja et al. \(2014\)](#) who noted that, PWA awareness was highest among those with secondary school education and their results show there is significant association between awareness of PWA and education level.

## 8.2. Social Factors That Affects Persons with Albinism on Access to Sunscreen

Examining the social factors affecting PWA access to sunscreen was the second objective of this study. According to [Withers \(2014\)](#) on disability politics and theory, provide compact and well-researched theories for people with disabilities. In treating each as a specific “model” of disability, later Withers provides some issues that need to be discussed when dealing with people with disability. On social challenges, he mentions travel distance, time taken to archive the service, availability of service providers, society contribution and availability of the service or product.

### 8.2.1. Testing for Internal Consistency and Multicollinearity on Social Factors

Internal consistency using Cronbach’s alpha ( $\alpha$ ) exhibited high reliability of the study variables with  $\alpha$  ranging between 0.83 - 0.93 ( $\alpha > 0.80$ ) as shown in [Table 6](#), this is considered to be high reliability. Similar results were reported by [Heckman and Coups \(2011\)](#) in their study  $\alpha$  ranged between 0.72 and 0.89 for the study variables.

Also correlation analysis was carried out in order to test for multicollinearity assumption between the dependent and the independent variables and later multiple regression analysis.

The results in [Table 3](#) showed no presence of multicollinearity between the independent variables as none of the correlations is high enough to cause problems to the regression analysis and therefore multiple regression analyses were employed.

**Table 3.** Social factors correlation matrix (n = 79).

	Distance	Time	Distributor availability	Society contribution	Sunscreen availability
Distance	1.0	-	-	-	-
Time	0.016	1.0	-	-	-
Distributor availability	0.195	-0.692	1.0	-	-
Society contribution	0.138	0.145	-0.126	1.0	-
Sunscreen availability	-0.224	0.134	-0.344	-0.0377	1.0

### 8.2.2. Social Factors of Persons with Albinism and Access to Sunscreen

Since none of the correlation is high enough to allow the regression analysis to proceed, then multiple regression analysis were employed. In multiple linear regressions, several independent variables are used to predict with a least square approach one direct variable.

**Table 4** shows that distance had a negative and significant effect on access to sunscreen ( $p = 0.000$ ). This means PWA living in Moshi Municipal does not face problems travelling a long distance but distance has an influence to those who live beyond Moshi Municipal. This agreed with [Godeliver and Kagashe \(2013\)](#) that distance affects the mode of transport utilized to access sunscreen. Sunscreen availability and distributor availability had a positive and insignificant effect on access to sunscreen ( $p = 0.298$ ) and ( $p = 0.095$ ) respectively. This means that sunscreen is available at the markets but is sold at high price, also the presence of foreigners in Moshi Municipality could be the reason for availability of sunscreen in most of cosmetic shops. This disagreed with [Okolo \(2014\)](#), on her study concluded that there is inadequate of sunscreens to persons with albinism in tropical countries especially in Tanzania. Time had a negative and insignificant effect on access to sunscreen ( $p = 0.290$ ). This means that time taken to arrive at the distribution for collection of sunscreen has no effect on access to sunscreen because Moshi Municipality is small town; persons with albinism do not travel for a long time to access sunscreen. This disagrees with [Godeliver and Kagashe \(2013\)](#) that time affects the mode of transport utilized for PWA to reach a health facility and sunscreen distribution centers. Society contribution had a positive and insignificant effect on access to sunscreen ( $p = 0.395$ ). This implies society does contribute to raising awareness of people with albinism, especially on the use of sunscreens but had no effect on people with albinism and access to sunscreen. This agrees with [RDTC \(2018a\)](#) that hospitals in northern Tanzania contribute to providing health education including the use of sunscreen and raise awareness in society since 1992.

### 8.3. Economic Factors That Affect Persons with Albinism on Access to Sunscreen

Economic factors play a crucial role for persons with albinism on access to sunscreen. [Withers \(2014\)](#) on disability politics and theory, provide a compact and

**Table 4.** Social factors of persons with albinism and access to sunscreen.

Variables	Statistic	p-value	95% CI
Constant	11.738	0.000	1.570,2.213
Distance	-8.580	0.000	-0.663, -0.413*
Time	-1.066	0.290	-0.176, 0.053
Distributor availability	1.689	0.095	-0.020, 0.238
Society contribution	0.855	0.395	-0.049, 0.124
Sunscreen availability	1.048	0.298	-0.043, 0.138
R	0.755		
R-Square	0.570		

\*Statistical significance.

well-researched theories for people with disabilities. In treating each as a specific “model” of disability, later Withers provides some clues that need to be discussed when dealing with people with disability. On economic challenges, he mentions income, cost of the product or service and occupation of the person with disability.

### 8.3.1. Testing for Internal Consistency and Multicollinearity on Economic Factors

Internal consistency using Cronbach’s alpha ( $\alpha$ ) exhibited high reliability of the study variables with  $\alpha$  ranging between 0.72 - 0.85 ( $\alpha > 0.80$ ). This data is considered to be acceptable, as the importance of telling good data from bad very important in research study (Cameron & Price, 1997).

The study went further to assess whether economic factors affect persons with albinism access to sunscreen. A correlation analysis was carried out in order to test for multicollinearity assumption between the dependent variables and the independent variables. The results showed no presence of multicollinearity between the independent variables as shown in Table 5, none of the correlation is high enough to cause problems with the regression analysis and therefore multiple regression analyses were employed.

### 8.3.2. Economic Factors of Persons with Albinism and Access to Sunscreen

Since none of the correlations is high enough to cause problems for the regression analysis and the multiple regression analysis was employed. In multiple linear regressions, several independent variables are used to predict with a least square approach one direct variable.

Table 6 shows that income had a positive and significant effect on access to sunscreen, ( $p = 0.011$ ), this means that PWA had a poor income per day and they do not involve themselves in many economic activities. This is in line up with Stokes and Lucas (2011) who observed that people with low income have less access to information and health service which also affect mode of travelling.



**Table 5.** Economic factors correlation matrix (n = 79).

	Income	Employment status	Transport cost	Price
Income	1.0	-	-	-
Employment status	0.691	1.0	-	-
Transport cost	0.121	0.277	1.0	-
Price	-0.234	0.108	0.134	1.0

**Table 6.** Economic factors and access to sunscreen of persons with albinism.

Variables	Statistic	p-value	95% CI
Constant	1.144	0.260	-0.336,1.205
Income	2.665	0.011	0.054,0.401
Employment status	0.489	0.628	-0.151,0.247
Transport cost	1.730	0.092	-0.027,0.339
Price	1.860	0.047	-0.06,0.220
R	0.317		
R-Square	0.101		

Price had a positive and significant effect on access to sunscreen, ( $p = 0.547$ ), this implies that price is still major challenge affecting PWA on access to sunscreen because most sunscreen is sold at a high price compared to other cosmetic products. This agrees with [Kiprono et al. \(2012\)](#) and [Godeliver and Kagashe \(2013\)](#) that sunscreen is sold at high price none of the PWA are willing to afford. Employment status and transportation cost had positive and insignificant effect on access to sunscreen. This means that unemployment and high transportation cost are among the challenges PWA face but does not affect persons with albinism on access to sunscreen. This agrees with [Masanja et al. \(2014\)](#), from his study on awareness, attitude and behavior of persons with albinism, that there are more employed and self-employed persons with albinism than unemployed but employment status has no influence on access of health that includes access to sunscreen.

## 9. Discussion

This section presents a discussion of the key findings on factors that affect persons with albinism on access to sunscreen in Moshi Municipal. The first summary of key findings on awareness of sunscreen shows that persons with albinism living in Moshi Municipal are aware of sunscreen and this cannot be one of the factors that affect persons with albinism on access to sunscreen. The second summary of the key findings was social factors that affect persons with albinism on access to sunscreen, the study found that among five social factors distance to the distributor, time taken to get sunscreen, availability of sunscreen, distributors of sunscreen availability and social contribution. Only distance was found to

have effect to persons with albinism on access to sunscreen but not in Moshi municipal, to those who live beyond the study area, while availability of sunscreen showed less effect compared to other studies' findings. The third summary of the key findings shows that economic factors such as price, income, transport cost and employment status, only price and income found to affect persons with albinism on access to sunscreen because sunscreen is sold at high price and income of persons with albinism are very poor.

## 10. Conclusion

In regard to the general objective of the study analysis of the factors affecting PWA on access to sunscreen in the study area, the study concluded there are some factors that affect persons with albinism on access to sunscreen although the study found sunscreen to be available to people with albinism living in Moshi Municipal while most of the study sought its differences. The simplest example or proof of this is that some persons with albinism reported that in past years they used to receive sunscreen in some hospitals free of charge.

To assess awareness of persons with albinism on sunscreen in the study area, the study concluded that persons with albinism are aware of sunscreen; they also know other methods and sun protective gear to protect themselves from harmful sun rays. The study also concludes that a major social factor that affects persons with albinism on access to sunscreen was found to be distance, although the distance was only found to affect those who live beyond Moshi Municipal.

In examining economic factors that affect persons with albinism on access to sunscreen, the study concludes that economic factors play a major role in access to sunscreens as the study revealed that there is poor income earned per day by person with albinism and sunscreen is sold at a very high price most of the persons with albinism cannot afford.

## Recommendations

The study recommends that distribution centers should be initiated in many places in Kilimanjaro to minimize travel distance and transportation cost, also in order to improve spreading of information to persons with albinism about sunscreen. Moreover distributors should work closely with those organizations that deal with persons with albinism to observe the need.

Government should prioritize education for persons with albinism so as to reduce the challenge of unemployment. Since albinism is one among other disabilities, entrepreneurship training and workshop should be given to them to improve their economic activities so that they can afford to buy sunscreen in the markets. Our government also should provide sunscreen products for free as other free healthcare services or lower the price so that sunscreens could be available at affordable price.

Regarding social influence like education, it has been observed that major attention should be given to persons with albinism on improving their access to

sunscreens. Also, health departments need to be incorporated into governmental plans and policies to balance development by implementing some initiatives that will help persons with albinism to formalize their access to sunscreens like creating peer pressure which will facilitate the formalization of health services to persons with albinism or creating health insurance system for people with disability.

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### Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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