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Association between Education level and personal hygiene among displaced individuals during the Sudan war 2023-2026

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ABSTRACT

Background: The complex interplay of physical, social, and psychological factors in refugee camps can significantly impair individuals' personal hygiene. Therefore, the present study aimed to assess the association between education level and personal hygiene among displaced individuals during the Sudanese war (2023–2026). **Methodology:** This inquiry was a cross-sectional survey conducted in El-Obeid City, the capital of North Kordofan State, Sudan. Approximately 550 participants were randomly chosen for this study, irrespective of demographic criteria. The chosen contributions were selected from approximately 4000 displaced families. **Results:** Out of 550 participants, 40.2% were illiterate, 53.2% had basic education, 3.8% had university, and 2.7% had other education. Participants were asked, "Do you wash your hands with soap?" 7.6% said "No." 8.6% of 42 participants were illiterate, 6.8% had basic education, 4.8% had university degrees, and 2/15 (13.3%) were others. 36.2% said “No” to “Are handwashing tools available?” Out of 199 participants, 35.7% were illiterate, 36.9% basic, 33.3% university, and 33.3% others. Only 4% said “No” to “Do you maintain self-hygiene when sick?", with 3.6% illiterate and 4.8% basic. 31.2% said "No" to "Do you have hygiene tools available during illness?" comprising 28% illiterates, 33.4% basic, 33.3% university, and 33.3% others. **Conclusion:** Academic education affects personal hygiene habits in refugee camps, but factors like community conditions, available resources, and how well educational programs work can make this relationship more complicated, as shown by the different answers about hygiene tool availability from people with various education levels.

Keywords: Personal hygiene, displaced people, refugee, war, Sudan

Introduction

Personal hygiene is considered important due to the aging of the world population and the immunocompromised nature of most elderly people [1, 2]. Most personal hygiene influencing factors are those linked to skin and oral care measures. Although these factors are important, their sustainable implementation is challenging in most settings [1].

Daily skin care habits are essential components of proper personal hygiene

practices. The provision of skin care, encompassing cleaning and the application of leave-on products, significantly influences the prevention and treatment of many skin disorders. Numerous unique studies exist about skin dangers, classifications, problems, prevention, and therapy [3].

By the end of 2024, an estimated 123.2 million individuals had been forced to leave their homes because of war and persecution. Eighty percent of them lived in low- and middle-income nations [4]. Refugees often have decreased personal hygiene due to restricted access to sufficient water, sanitation, and hygiene (WASH) facilities, resulting in heightened risks of waterborne diseases such as cholera and diarrhea. Although a majority of refugees engage in daily bathing (64.2%) and nail care, considerable obstacles remain, including infrequent handwashing with soap (typically below 50–60% compliance) and insufficient access to clean water [4].

As of April 15, 2023, the ongoing armed conflict in Sudan has profoundly impacted millions, leading to widespread displacement, severe food insecurity, and significant educational challenges that necessitate urgent humanitarian assistance [5].

Internally displaced people live in very poor, crowded conditions with few facilities. These conditions make it harder to get the main tools for personal hygiene, such as soap, clean water, and sanitary products, which are essential for maintaining health and preventing disease. Hygiene problems for displaced people in Sudan are big because of many things, including war. Many displaced people don't have access to clean, safe drinking water. In refugee camps, there aren't enough sanitation facilities, like toilets and waste disposal systems. There is often limited access to soap, sanitary products, and other hygiene supplies. Improving hygiene among displaced populations is important for their overall health and well-being. To solve these problems, research is needed to provide information for coordinated efforts from governments, NGOs, and humanitarian organizations, particularly focusing on the specific needs and challenges faced by displaced populations in maintaining hygiene standards. Therefore, the present study aimed to assess the association between education level and personal hygiene among displaced individuals during the Sudan war in 2023–2026.

Materials Methods

This was a cross-sectional survey conducted in El-Obeid City, the capital of North Kordofan State, Sudan. About 550 participants were randomly selected for this study regardless of any demographic characteristics. The selected contributors were enrolled in about 4000 displaced families. All families were sequentially registered, and the participating families were selected by starting with the number 1 and adding 7 repeatedly until reaching 4000, which ultimately resulted in selecting 550 families.

A purposeful Arabic questionnaire was designed and used to collect information regarding personal hygiene practices during the interview. The most common variables were included.

The most common variables included hand hygiene, oral hygiene, bathing, nail care, hair care, clothing, foot care, menstrual hygiene, and hygiene during illness, hygiene, and hygiene during illness. One of the authors conducted the interview with the responding participants.

Data Analysis

All questionnaires were initially filled in on a data sheet, then entered into a computer software statistical package for the social sciences (SPSS). IBM version 27) for analysis. Frequencies, percentages, and cross-tabulations were calculated.

Results

This study assessed the personal hygiene among 550 Sudanese women aged 7 to 100 years, with a mean age of 31. Of the 550 participants, 221 (40.2%) were illiterate, 293 (53.2%) had a basic education level, 21 (3.8%) had a university level, and 15 (2.7%) had other educational means. When asking the participants, "Do you use soap when washing hands?" 42/550 (7.6%) replied "No." Of 42 participants, 19/221 (8.6%) were illiterate, 20/293 (6.8%) had basic education, 1/21 (4.8%) had university education, and 2/15 (13.3%) were in other categories. Regarding the question, "Are hand-washing tools available?" 199/550 (36.2%) claimed "no." Of the 199 participants, 79/221 (35.7%) were illiterate, 108/293 (36.9%) were basic, 7/21 (33.3%) were university, and 5/15 (33.3%) were others. Regarding the question "Do you maintain self-hygiene when sick?" only 22/550 (4%) responded as "No," of whom 8/221 (3.6%) were illiterate and 14/293 (4.8%) basic. The question asked was, "Do you have hygiene tools available during illness?" 172/550 (31.2%) stated "No," including 62/221 (28%) illiterates, 98/293 (33.4%) basic, 7/21 (33.3%) university, and 5/15 (33.3%) others, as indicated in Table 1 and Fig. 1.

Table 1. Distribution of the study participants by education level and personal hygiene regarding handwashing habits

Variable	Illiterate n=221	Basic n=293	University n=21	Other n=15	Total n=550
Do you use soap when washing hands					
Yes	157	217	16	8	398
No	19	20	1	2	42
Sometimes	45	56	4	5	110
Are hands washing tools available?					
Yes	83	100	10	2	195
No	79	108	7	5	199
Sometimes	59	85	4	8	156
Do you maintain self-hygiene when sick					
Yes	202	260	19	13	494
No	8	14	0	0	22
Sometimes	11	19	2	2	34
Do you have hygiene tools available during illness					
Yes	113	122	11	6	252
No	62	98	7	5	172
Sometimes	46	75	3	4	126

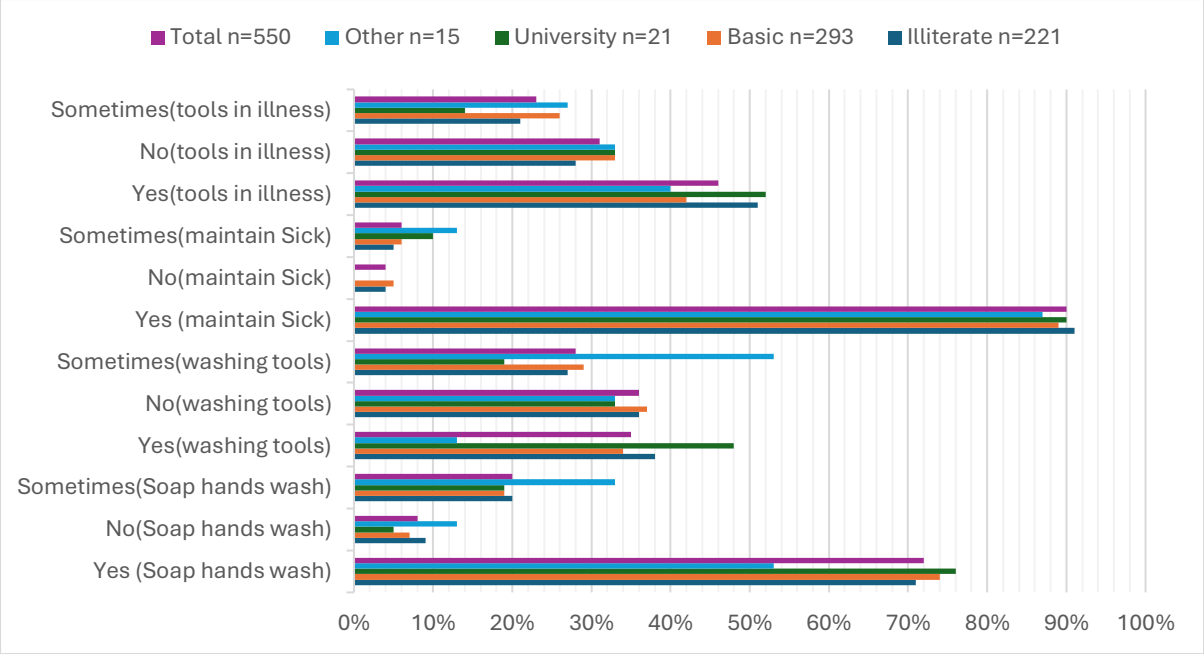

Figure 1. Description of the participants by proportions of self-hygiene according to education level.

Table 2, Fig. 2, summarizes the distribution of the study participants by education level and oral care. Only 4/550 (0.07%) rarely clean their teeth regularly. About 47 (8.5%) don't use toothpaste at all, and 33 (6%) use it sometimes. Of the 47 who don't use toothpaste, 16/221 (7.2%) were illiterate, and 25/293 (8.5%) had a basic education. Total unavailability of oral care tools was indicated by 190/550 (34.5%), and sometimes available for 91/550 (16.5%).

Table 2. Distribution of the study participants by education level and oral care

Variable	Illiterate n=221	Basic n=293	Graduated n=21	Other n=15	Total n=550
How many times do you clean your teeth daily					
Once	19	42	4	2	58
Twice	135	253	13	6	319
>Two	66	137	4	7	170
Rarely	1	3	0	0	4
Do you use toothbrush and toothpaste?					
Yes	193	250	17	11	471
No	16	25	2	3	46
Sometimes	12	18	2	1	33
Do you have oral care tools available					
Yes	107	144	12	6	269
No	86	94	6	4	190
Sometimes	28	55	3	5	91

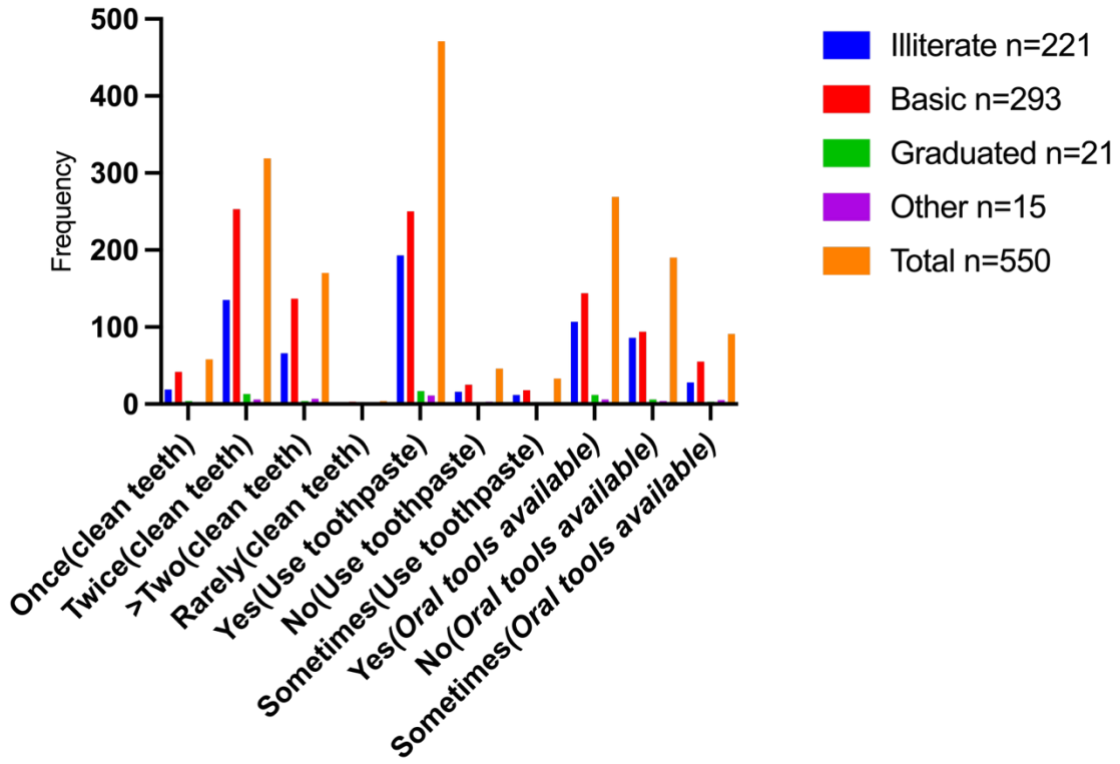

Figure 2. Description of the study participants by education level and oral care

Table 3 summarizes the distribution of the study participants by education level and body care. About 433/550 (78.7%) participants claimed that they bathed twice or more per day. However, around 118/550 (21.5%) indicated that they don't use soap in most instances. Out of the 118 participants, 46/221 (20.8%) were illiterate, and 64/293 (21.8%) had basic education. About 23 (4.2%) don't wash their hair within a month, of whom 18/23 (78.3%) are either illiterate or have a basic education.

Table 3. Distribution of the study participants by education level and body care

Variable	Illiterate n=221	Basic n=293	Graduated n=21	Other n=15	Total n=550
How many times do you bath per day					
Once	40	58	8	4	110
Twice	135	170	6	5	316
More	45	60	6	6	117
I don't bath	1	2	1	0	4
Twice a week	0	3	0	0	3
Do you use soap and other bathing tools					
Yes	175	229	17	11	432
No	13	23	2	2	40
Sometimes	33	41	2	2	78
How many times do you wash your hair per month					
Once	28	48	5	3	84
Twice	67	69	4	5	145
More	99	150	8	5	262
I don't wash	7	11	4	1	23

Once in a week	17	12	0	1	30
Twice in a week	3	2	0	0	5
twice in a day	0	1	0	0	1
Do you use hair care tools					
Yes	180	232	19	9	440
No	38	50	2	4	94
Sometimes	3	22	0	2	16
Do you share hair removal tools with others					
Yes	18	35	3	2	58
No	197	256	17	9	479
Sometimes	6	2	1	4	13
Do you regularly trim and clean your nails					
Yes	217	280	21	15	533
No	2	4	0	0	6
Sometimes	2	9	0	0	11
How many times do you wash your feet daily					
Rarely	7	5	0	0	12
Once	34	34	1	1	70
Twice	54	74	6	2	136
5 times	87	121	11	7	226
More	39	59	3	5	106

Table 4 summarizes the distribution of the study participants by education level, washing clothes, and disposing of waste. Most participants wash their clothes twice a week, followed by those who wash them more than twice, those who wash them once, and those who wash them less than once, depending on the availability of water and soap; these groups represent 267 (48.5%), 169 (30.7%), 62 (11.3%), and 52 (9.5%), respectively. The distribution is relatively similar among different education levels.

Table 4. Distribution of the study participants by education level, washing clothes, and disposing of waste

Variable	**Illiterate n=221**	**Basic n=293**	**Graduated n=21**	**Other n=15**	**Total n=550**
How many times do you wash your clothes weekly					
Once	21	38	2	1	62
Twice	109	145	9	4	267
More	79	79	5	8	169
Water & Soap	12	33	5	2	52
Do you face difficulties disposing of used tools					
Not sure	49	19	1	4	73
Yes	133	189	16	10	348
No	39	84	4	1	128
Sometimes	0	1	0	0	1

Discussion

The Sudan armed conflict from 2023 to 2026 has led to a devastating crisis all over the country. Many people have lost their properties and homes. Almost half of the

population is currently displaced internally or externally. The majority of internally displaced people are living in refugee camps with scarce facilities. Such conditions result in a poor health environment, which facilitates a drop in personal hygiene. However, there are no available measures for personal hygiene among these internally displaced people in Sudan, which is important for helping such people at the governmental level or NGOs. Consequently, the present study assessed the influence of education levels on personal hygiene practices.

Regarding washing hands using soap, the findings of the present study indicated that the best personal hygiene practices increase with an elevated education level. However, regarding the availability of personal hygiene tools, the measures are relatively similar at all education levels, indicating that regardless of education, access to tools like soap and sanitizers does not significantly differ among individuals. Although we didn't come across a study that precisely assessed the impact of the education level on personal hygiene, studies done among education clusters proved that personal hygiene practices are strongly enhanced by elevated levels of education and certain health education targets [7].

Concerning oral hygiene, the findings of the current study revealed that the great majority of the participants maintain satisfactory oral health practices. Most oral health issues can be prevented and addressed early. Dental caries (tooth decay), periodontal disorders (gum diseases), tooth loss, and oral malignancies (cancers of the mouth) are the most common. Orofacial clefts, noma (severe oral gangrenous disease, usually affecting youngsters), and oro-dental injuries are also public health issues. The prevalence of oral illnesses is rising internationally due to urbanization and changes in the living environment. Insufficient fluoride exposure, high-sugar diet availability, and limited access to dental health care services are the main causes. The promotion of sugary foods, tobacco, and alcohol has increased the consumption of products that contribute to oral health disorders and other diseases, particularly among low-income populations who may lack access to healthier alternatives and education about nutrition. Oral illnesses disproportionately affect the poor and socially disadvantaged. Socioeconomic status (income, occupation, and education) strongly correlates with the prevalence and severity of oral diseases. This link persists among populations in high-, middle-, and low-income countries from early childhood to old age [8].

The findings of the present study showed that most displaced people are taking reasonable care of their bodies, but this care is somewhat insufficient due to a lack of water, soap, and difficulty in maintaining privacy. The maintenance of body care and personal hygiene within refugee camps constitutes a crucial aspect of humanitarian aid, serving as a fundamental measure to avert the spread of disease in densely populated and resource-constrained settings. The issues of overcrowding, limited access to clean water, and inadequate sanitation pose considerable risks, making the promotion of hygiene, the distribution of supplies, and the maintenance of facilities essential for safeguarding health and preserving dignity [9-11].

Camp refugees positively correlate academic education and personal hygiene. Higher education often enhances hygiene and health awareness. Individuals with higher education recognize the significance of personal hygiene in preventing disease. Formal education typically fosters exemplary hygiene practices such as handwashing and waste disposal. Education can enhance communal cleanliness practices by altering mindsets, leading to increased awareness and adoption of hygiene standards within communities. Educated individuals may possess superior health and hygiene

resources, enabling them to inform their communities. They may also utilize health services more effectively. Higher education may enhance involvement in cleanliness and health initiatives within NGOs and assistance organizations, fostering community-wide improvements in hygiene practices. They can advocate for hygiene within their communities [12].

In conclusion, academic education influences personal hygiene practices in refugee camps; however, community circumstances, resource availability, and the efficacy of educational programs may complicate this relationship. Improvement of refugee hygiene necessitates a holistic approach to addressing these factors.

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Conflict of Interest

The author declares that they have no conflict of interest to disclose.

Ethical Considerations

Ethical approval was obtained from the local government authorities, and administrative authorization was received before data collection. The study adhered to the principles of confidentiality and responsible use of routinely collected health information.

Ethical Approval

The protocol of this study had been approved by the Human Ethics Committee at Prof MRCC. Approval number: HREC 00012/MRCC.1/26).

Disclosure

This research was conducted without the use of artificial intelligence or assisted technologies, including the generation of figures.

Data Availability

The data supporting the conclusions of this article are included within the article, and further inquiries can be sent to the corresponding author.

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