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Original Research Article

Preferred Facial Profile in Tanzanian Populations

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Abstract: There is a difference in the ideals of facial beauty and aesthetic assessment used in orthodontics, from what public opinion believes. For instance, having a light skin in some of Asian societies is considered as among the important factors for female beauty. Consequently, skin whitening products are very widespread. Occasionally, an orthodontist or any other dental practitioner ignores the public's perceptions of dental esthetics, and this might lead to dissatisfaction with the treatment outcomes since the patients' perception may be different from that of the clinician. This study determines the facial profile preferred by Tanzanians population. Study involved 160 adult participants of both sexes from Dar es salaam, Tanzania. Images of participants were modified to generate four types of solid black silhouettes facial profiles. Special questionnaires inquiring demographic information, comprised of eight profile silhouettes, were given to the raters. Correlation and descriptive statistical analysis were computed by Stata15. Associations of the responses were compared according to gender, age, skin color, and income. A t-test was used to compare between genders, while ANOVA was used to compare between, skin color, income and age groups. All statistical significance was accepted at CI 95% and *p*-values less than 0.05 were considered significant. Interdependence among variables in the sample was determined by multiple regression analysis. Significant correlation was set at $p < 0.05$. In conclusion, female Straight profile and male Class I profile were the most preferred profiles while, Class III was the least preferred regardless of gender, age, skin color and income differences.

Keywords: Tanzania, income, preferred profile, skin color, gender.

INTRODUCTION

Dentofacial aesthetics studies typically approach their subject from the anterior aspect, i.e., aesthetics of teeth, smile, or concordance of a face, and the lateral aspect, i.e., facial profile (Romsics L *et al.*, 2021). A harmonious, good- looking profile is necessary since the purpose of orthodontic treatments is not just achieving the functional occlusion but similarly creating an aesthetic profile (Ioi H *et al.*, 2005). Because the conception of aesthetics is subjective, it is very difficult to determine objective criteria for defining a concept of beauty (Türkkahraman H *et al.*, 2004). As it was said by Plato that beauty lies in the eyes of the beholder, it seems that perceptions of beauty vary widely not only among individuals, but also between communities as well as between countries (Naqvi Z *et al.*, 2015). Ideals of facial beauty and aesthetic assessment in orthodontics are not at all like the public opinion's valuation (Lhotellier J *et al.*, 2009). For instance, in various Asian cultures, to have a white skin is considered an essential part of female beauty, so whitening is very popular (Samizadeh S *et al.*, 2018). Occasionally, orthodontist or any other dental practitioner ignores the public's perceptions of dental esthetics, and this might lead to the dissatisfaction with the treatment outcomes since the patients' perception may be unlike from that of the clinician (Mahmoudzadeh M *et al.*, 2017). However, a study conducted among black Americans, regardless of the respondent's skin color (black or white) or occupation (layman, orthodontist, or general dentist) a slightly convex profile was shown to be considered the most attractive facial appearance (Carneiro E *et al.*, 2018). Other studies have suggested that men prefer a straighter profile with a more protruding chin, while women prefer more protruding lips (Cala L *et al.*, 2010). Conversely, orthodontic patients come from

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distinctive backgrounds, including different ancestry, educational levels, social status, gender, and perceptions of beauty. From this perspective, orthodontists must recognize that patients are unique and post-treatment self-esteem is as important as technical results (Oliveira M *et al.,* 2015). Studies on dental facial aesthetics that have been restricted to particular ethnic or racial groups have had either very small or biased sample size, or the relationships between magnitude of profile variation and attractiveness has not been fully explored (Connor A *et al.,* 1985). Several people failed to take into account the differences in perceptions of attractiveness between male profile image and profile image from female. Additionally, there is ongoing debate about which of the vertical lower facial proportions should be considered as more attractive, and whether there are differences in perception of attractiveness between male and female profile images of lower facial height. Various investigators have evaluated the perceptions of attractiveness and facial profile benchmarks of White and Black Americans (Polk M *et al.,* 1995), Japanese (Mantzikos T, 1998), Chinese (Maganzini A *et al.*, 2000) and Turkish (Türkkahraman H *et al.,* 2004), except Tanzanian populations, at the best of our knowledge. Therefore, the aim of our study was first, to determine the preferred facial profile among Tanzanian population, and second, whether this preference is influenced by age, gender, income or skin color.

MATERIAL AND METHODS

Study Type, Area and Population

This descriptive study involved 160 participants was carried out in the city of Dar es salaam, Tanzania. The ideal population sample was obtained from Tanzanian adults of both sexes, students from Muhimbili University of Health and Allied Sciences (MUHAS), and other volunteers of whom attended an out-patients health service at Muhimbili National Hospital (MNH). Ethical clearance was approved by the ethical committee of the Muhimbili University of Health and Allied Sciences (MUHAS-REC-12-2021-918).

Making the Modified Digital Profile Photos

The original images in JPEG format of the male and female subjects were taken with a camera, Nikon D7000 (Nikon Corporatio, Tokyo, Japan) and imported to the WebCeph® (Medical Image Analysis Software, Republic of Korea) to generate four modified facial types: Class I, normal profile; Class II, convex appearance; Class III, concave profile and Straight profile) by altering the hard and soft tissues cephalometric normative values. Profile images of the face were digitally manipulated in an anterior-posterior plane with little change in the vertical plane by using a plan tool so that all generated profiles had normal vertical proportions. A set of four profiles was considered for possible maxillary and mandibular anteroposterior growth variations. By using the graphic design software Paint Expert (Version 3.1) the computerized profile images were transformed in to solid black silhouettes and marked with only an identification number. Each profile silhouette extended from above the glabella to below a throat point. Four facial profiles of each gender were generated and printed on papers in an image size of 15-20 centimeters.

Data Collection

During data collection process, a special designed questionnaire comprising with eight (4 male and 4 female) profile silhouettes coded MA, MB, MC and MD for male profiles, and FA, FB, FC and FD for female profile (Fig 1 and Fig 2) as well as demographic survey inquired age, gender, income and color of skin were given to the raters. Information in depth about the age, gender, income, and skin color was presented in Fig 3. Those four parameters were categorized as:

- **Gender:** Males and females.
- **Age in year:** 18-20, 21-25 and 26+.
- **Income:** Classified as <300,000/=, 500,000-1,000,000/= and >1,000,000/=.
- **Skin color:** Classified as black, white and brown.

Initially, the participants were given a brief introduction and then asked to rate the four male and four female profiles in a questionnaire on a hierarchy of 1 (the least attractive) to 4 (the most attractive) at a single session without repeating the ratings. Silhouettes were placed in the questionnaire in random order to minimize the potential for bias. Only completely, filled questionnaires were evaluated for the analysis.

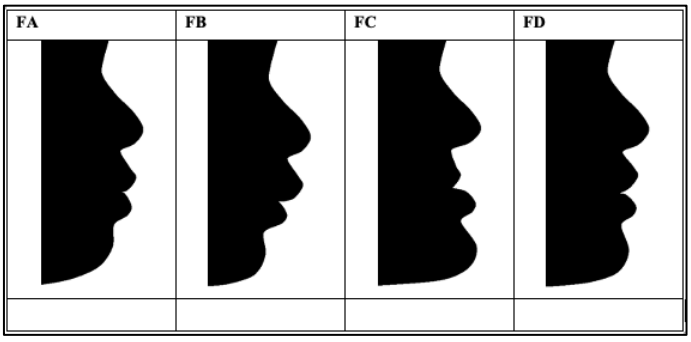

Figure 1: Female profile silhouettes

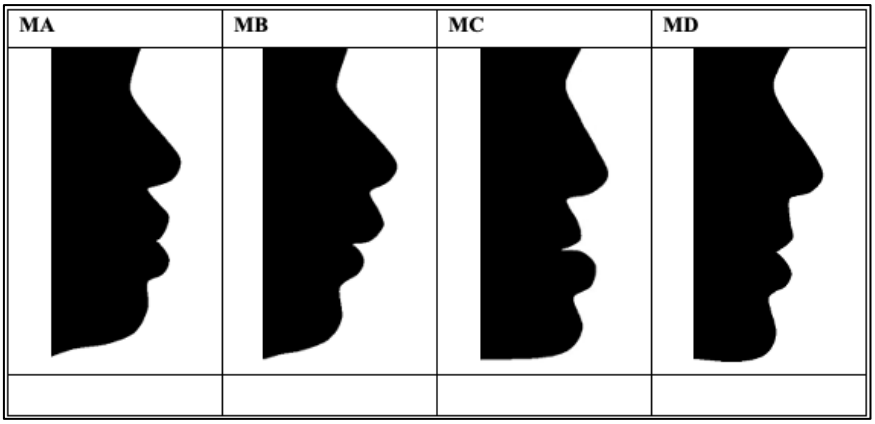

Figure 2: Male profile silhouettes

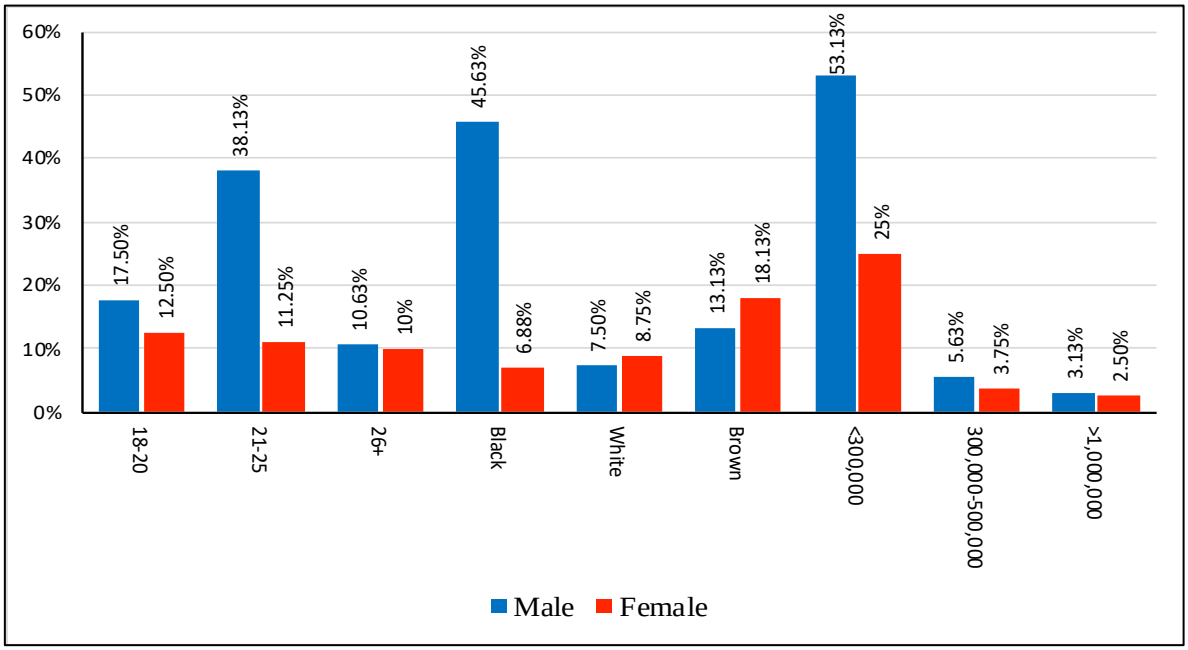

Figure 3: Distribution of the raters according to sex, age, skin color and personal income

Statistical Analysis

After interviewing 160 raters, the results and grouping criteria were entered into Statistics/Data Analysis (Stata 15) (Lakeway Drive College Station, Texas 7785 USA). Relative frequency, correlation and descriptive statistical analysis were computed. The association of the rater responses was compared according to sex, age, color of skin, and income. The *t*-test was used for comparing between genders while, ANOVA was used for comparing age, skin color, and income groups. All statistical significance was accepted at CI 95% and p-values less than 0.05 were considered significant. Interdependence among variables in the sample was determined by multiple regression analysis. The method of multiple regression analysis was used to determine interdependence among variables in the sample. Significant correlation was set at $p < 0.05$.

RESULTS

Of the 160 interviewees, 66.25% male and 33.75% female responded to evaluate and rate the profiles. Most of the interviewees were in the age group of 21-25 and earning less than three hundred thousand Tanzanian shiling per month as a minimum income. Regarding color of the skin, the sample involved 52.5% black, 16.25% white, and 39% brown.

Ranking of Profile Images by Entire Sample

The relative frequency distributions of the facial profiles for both genders by ranking of the entire sample size are shown in Table 1. Based on the distribution of each profile, the Straight female profile and the Class I male profile were ranked as the most attractive facial profiles with better acceptances by the majority of participants for female and male, respectively. However, the difference was not statistically significant between Class I and Straight profiles for female profile. Additionally, Class III facial profiles were ranked as the least attractive profiles for both genders ($p<0.05$).

Table 1: Relative frequency distributions of preferred facial profile

Ranks	Female facial profile				Male facial profile			
	Class I	Class II	Class III	Straight	Class I	Class II	Class III	Straight
*	6.9%	14.4%	72.5%	6.2%	9.4%	18.8%	60.0%	11.9%
**	16.2%	54.4%	13.8%	15.6%	5.0%	52.5%	24.4%	18.1%
***	42.2%	20.6%	7.5%	29.4%	25.6%	21.9%	7.5%	45.0%
****	34.4%	10.6%	6.2%	48.8%	60.0%	6.9%	8.1%	25.0%

* = least attractive, ** = attractive, *** = more attractive, **** = most attractive

Influence of Gender

The distribution of the responses regarding the most attractive profile according to gender and the *t*-test comparison results is presented in Table 2. In both genders, the results showed that straight female profile was the most attractive one while the Class III profile was the least attractive. On the contrary, both male and female participants preferred Class I male facial profile to the rest of the profiles. However, the Class I male profile presented less acceptance among the participants belonging to female group, while, the Straight female profile had better acceptance among the group belonging to male. There was no significant difference between male and female preferences for any images of the male profile, with the exception of ranking of female straight profile ($p < 0.05$).

Table 2: Comparison of preferred facial profile according to gender

Participants	Ranks	Female facial profile				Male facial profile			
		C1	C2	C3	S	C1	C2	C3	S
Female	*	1.9%	5.6%	24.4%	1.9%	0.6%	8.1%	20.0%	5.0%
	**	6.2%	20.0%	5.6%	1.9%	3.8%	17.5%	10.0%	2.5%
	***	15.0%	6.2%	1.9%	10.6%	11.2%	5.6%	2.5%	14.4%
	****	10.6%	1.9%	1.9%	19.4%	18.1%	2.5%	1.2%	11.9%
Male	*	5.0%	8.8%	48.1%	4.4%	8.8%	10.6%	40.0%	6.9%
	**	10.0%	34.4%	8.1%	13.8%	1.2%	35.0%	14.4%	15.6%
	***	27.5%	14.4%	5.6%	18.8%	14.4%	16.2%	5.0%	30.6%
	****	23.8%	8.8%	4.4%	29.4%	41.9%	4.4%	6.9%	13.1%
p-value		0.797	0.118	0.755	0.049	0.802	0.293	0.431	0.149
t-test		0.256	1.571	0.311	-1.980	-0.250	1.055	0.790	-1.448

* = least attractive; ** = attractive; *** = more attractive; **** = most attractive

C1 = Class I profile; C2 = Class II profile; C3 = Class II profile; S = Straight profile

Influence of Age

Class I profile was selected as the most attractive facial profile for male by all participants. A significant difference was found in the agreement of ranking of the most preferred facial profile by all age groups ($p<0.05$). Additionally, there was a significant difference in the agreement of ranks given by all age groups to straight female profile as the most attractive profile for female ($p < 0.05$). The preferred image (Straight female profile) had better acceptance among the group belonging to 21-25 years old, followed by age groups 18-20. Class III female profiles were ranked as the least attractive profiles in each age group compared to class I, class II, and straight profiles.

Table 3: Comparison of preferred facial profile according to age

Participants	Ranks	Female facial profile				Male facial profile			
		C1	C2	C3	S	C1	C2	C3	S
18-20	*	2.5%	4.4%	21.9%	1.2%	3.1%	6.2%	16.9%	3.8%
	**	6.9%	16.9%	3.1%	3.1%	1.9%	14.4%	8.8%	5.0%
	***	15.6%	3.1%	4.4%	6.9%	10.6%	5.6%	3.1%	10.6%
	****	5.0%	5.6%	0.6%	18.8%	14.4%	3.8%	1.2%	10.6%
21-25	*	3.8%	8.8%	32.5%	4.4%	6.2%	9.4%	28.1%	5.6%
	**	7.5%	23.8%	8.8%	9.4%	2.5%	26.2%	10.6%	10.0%
	***	20.0%	12.5%	3.1%	13.8%	10.0%	11.9%	3.8%	23.8%
	****	18.1%	4.4%	5.0%	21.9%	30.6%	1.9%	6.9%	10.0%
26+	*	0.6%	1.2%	18.1%	0.6%	0.0%	3.1%	15.0%	2.5%
	**	1.9%	13.8%	1.9%	3.1%	0.6%	11.9%	5.0%	3.1%
	***	6.9%	5.0%	0.0%	8.8%	5.0%	4.4%	0.6%	10.6%
	****	11.2%	0.6%	0.6%	8.1%	15.0%	1.2%	0.0%	4.4%
p-value		0.001	0.606	0.261	0.039	0.028	0.734	0.211	0.511
correlation		0.309	-0.048	-0.111	-0.149	0.231	-0.031	-0.131	-0.069

* = least attractive; ** = attractive; *** = more attractive; **** = most attractive

C1 = Class I profile; C2 = Class II profile; C3 = Class II profile; S = Straight profile

Influence of Skin Color

Assessments of the facial profile attractiveness according to the color of the skin are presented in Table 4. The Straight female profile and Class I male profile were the most attracted facial profiles ($p<0.05$), whereas Class III profiles in all groups were the least attracted. A straight female profile was more accepted among the group of white participants, while Class I male profile was more accepted among black and brown participants. Significant differences were observed between the groups in rankings of both male and female profiles.

Table 4: Comparison of preferred facial profile according to the color of the skin

Participants	Ranks	Female facial profile				Male facial profile			
		C1	C2	C3	S	C1	C2	C3	S
Black	*	4.4%	6.9%	38.1%	3.1%	6.2%	8.1%	33.1%	5.0%
	**	8.1%	25.6%	8.1%	10.6%	1.2%	26.2%	11.2%	13.8%
	***	23.8%	11.9%	1.9%	15.0%	11.2%	15.0%	2.5%	23.8%
	****	16.2%	8.1%	4.4%	23.8%	33.8%	3.1%	5.6%	10.0%
White	*	1.9%	1.9%	12.5%	0.0%	1.9%	3.8%	10.0%	0.6%
	**	2.5%	10.6%	0.6%	2.5%	0.6%	10.6%	3.8%	1.2%
	***	7.5%	3.1%	2.5%	3.1%	5.6%	1.2%	1.9%	7.5%
	****	4.4%	0.6%	0.6%	10.6%	8.1%	0.6%	0.6%	6.9%
Brown	*	0.6%	5.6%	21.9%	3.1%	1.2%	6.9%	16.9%	6.2%
	**	5.6%	18.1%	5.0%	2.5%	3.1%	15.6%	9.4%	3.1%
	***	11.2%	5.6%	3.1%	11.2%	8.8%	5.6%	3.1%	14.4%
	****	13.8%	1.9%	1.2%	13.8%	18.1%	3.1%	1.9%	8.1%
p-value		0.047	0.048	0.988	0.632	0.025	0.427	0.800	0.688
correlation		0.106	-0.147	0.001	0.039	0.002	-0.057	0.021	0.033

* = least attractive; ** = attractive; *** = more attractive; **** = most attractive

C1 = Class I profile; C2 = Class II profile; C3 = Class II profile; S = Straight profile

Influence of the Personal Income

The relationship of facial profile preferences in relation to individual income is presented in Table 5. A straight female profile and a Class I male profile were the most attracted facial profiles ($p<0.05$) followed by Class I female profile. Whereas Class III profile was ranked as the least attractive facial profile in all groups ($p<0.05$). The most attractive images (Class I and straight profiles, for male and female, respectively) were more accepted in groups belonging to incomes below 300,000 followed by other group incomes.

Table 5: Comparison of preferred facial profile according to income

Participants	Ranks	Female facial profile				Male facial profile			
		C1	C2	C3	S	C1	C2	C3	S
<300,000	*	5.0%	12.5%	55.0%	5.6%	8.1%	16.9%	43.1%	10.0%
	**	15.6%	38.8%	11.9%	11.9%	4.4%	39.4%	21.2%	13.1%
	***	33.1%	17.5%	6.9%	20.6%	20.0%	17.5%	6.2%	34.4%
	****	24.4%	9.4%	4.4%	40.0%	45.6%	4.4%	7.5%	20.6%
300,000-500,000	*	0.6%	1.9%	6.2%	0.6%	0.6%	1.9%	6.2%	0.6%
	**	0.0%	5.6%	1.9%	1.9%	0.0%	5.6%	2.5%	1.2%
	***	4.4%	1.9%	0.0%	3.1%	3.1%	1.2%	0.0%	5.0%
	****	4.4%	0.0%	1.2%	3.8%	5.6%	0.6%	0.6%	2.5%
500,001-1,000,000	*	0.0%	0.0%	6.9%	0.0%	0.0%	0.0%	6.9%	0.0%
	**	0.6%	6.2%	0.0%	0.0%	0.0%	4.4%	0.0%	2.5%
	***	3.1%	0.0%	0.0%	3.8%	1.2%	1.9%	0.0%	3.8%
	****	3.1%	0.6%	0.0%	3.1%	5.6%	0.6%	0.0%	0.6%
>1,000,000	*	1.2%	0.0%	4.4%	0.0%	0.6%	0.0%	3.8%	1.2%
	**	0.0%	3.8%	0.0%	1.9%	0.6%	3.1%	0.6%	1.2%
	***	1.9%	1.2%	0.6%	1.9%	1.2%	1.2%	1.2%	1.9%
	****	2.5%	0.6%	0.6%	1.9%	3.1%	1.2%	0.0%	1.2%
p-value		0.282	0.859	0.499	0.024	0.043	0.035	0.039	0.475
correlation		0.089	-0.014	-0.055	-0.019	0.068	0.159	-0.164	-0.062

* = least attractive; ** = attractive; *** = more attractive; **** = most attractive

C1 = Class I profile; C2 = Class II profile; C3 = Class II profile; S = Straight profile

DISCUSSION

A facial profile image was used as a means of stimulus presentation. Photographs have been revealed to provide acceptable and representative ratings of facial and dental appearance (Howells D *et al.,* 1985). Silhouettes, on the other hand, have the advantage of subjectivity and simplification of facial aesthetics, discarding many extrinsic (make-up, hair styles) and intrinsic (skin color, emotional expression) factors which may influence the individual's concept of beauty (Wuerpel E, 1981). In the literature, many techniques have been employed to ascertain the profile preference of populations. The current study used various colorless profile images to determine the Tanzanians esthetic preference. Accordingly, a male Class I and female straight profiles were the most attractive and preferred facial profiles, although a Class III profile was the least attractive among both males and females. These findings are consistent with a study conducted in Brazil which also showed a preference for straight female profiles (Pithon M *et al.,* 2014), as well as in Japan which showed that Class III profile with mandibular prognathism to be the least preferred facial profile (Arqoub S *et al.,* 2011). Regardless of genders of the participants, comparable findings were reported by Soh *et al.,* that a straight profile was perceived to be the most attractive by laypersons, dental students and orthodontists in the Asian community (Samizadeh S *et al.,* 2018). Our results diverge from Michiels and Sather's results, which have clearly demonstrated a preference for Class II male profile as the most attractive. In Tanzania, a Class I female profile was ranked as the second most preferred profile, while a straight male profile was considered as the second most attractive one. The literature that revealed the connection between gender and profile preferences had contradictory findings (Lu Y *et al.,* 2000). Our findings indicate that gender has no effect on profile preferences. This is supported by the previous study conducted by Lu and Zhang (2000) which also stated that gender had no effect on profile preference. However, this contradicts Cochrane's findings (1999), that females preferred Class II profile more than any other profile. Although females and males had the same overall profile rankings, females attracted more to a straight female profile than males. Moreover, females attracted more to class I male profile than males. Straight profiles are usually associated with Class I appearances, and the literature supports a straight profile as the most desirable treatment outcomes (Zulfiqar K *et al.,* 2013). Regarding the demographic aspects tested, the responses could not be associated with the participants' gender, income, or color of the skin. Similar results were found by Reis *et al.,* that there was no association between profile preference and gender. In contrast, Wang Yuan-yuan concluded that no significant difference was found between genders in facial profile preference; instead, it was influenced by age (Ali and Abuaffan, 2015). Positive but ambiguous association could be found concerning skin color. A straight profile was more acceptable in the group belonging to white skin, while class I was more acceptable in the group belonging to black and brown skin. Other literature reports that in a sample of Caucasian women, a profile with emphasized vertical features or a profile with a convex or class II tendency was considered to be the least attractive (Michiels and Sather, 1994). Conversely, the proportions of black, white, and brown participants did not match those used in previous studies to ensure sample representativeness (Carneiro E *et al.,* 2018).

COCLUSIONS

According to our results, we can conclude that, in the Tanzanian population, the female Straight profile and male Class I profile are the most preferred profile whereas the Class III profile is the least preferred one regardless of gender, age, skin color and income differences. Additionally, females prefer female Straight profiles and male Class I more than males do. Furthermore, although the gender of the raters had statistically significant effects on facial profile preference, it has not influenced the general sequence of profile preference.

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