



Color preferences among selected adults in Ghana

ABSTRACT

This paper presents a study on color preferences among a sample of Ghanaian adults. Two surveys were conducted, with a total of 143 participants (50 in Survey 1, and 93 in Survey 2). The participants completed both printed and digital questionnaires to gather data on their color preferences. The results showed that blue was the most preferred color by both males and females in general, but not for specific items. In survey 2, a chi-square test on categorical variables revealed a significant relationship between gender and preference for light, dark, or bright colors ($p=0.025$), as well as gender and number of preferred colors per personal item ($p=0.02$). However, no significant relationships were found between gender and change of colors from childhood ($p=0.73$), gender and number of preferred colors ($p=0.204$), gender and most preferred colors ($p=0.216$), age, and the number of preferred colors ($p=0.19$). Interestingly, 66.3% of the participants in Survey 2 indicated that their preferred colors were based on innate attraction, regardless of whether their color preferences had changed or remained the same since childhood. Overall, blue and red were the most preferred colors, with a score of 34.4%. These findings provide valuable insights for design practitioners and communicators and offer a basis for future research on color preferences among Ghanaians.

KEY WORDS

Color, preference, favorite, light, bright, dark

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Introduction

The changing world of technology has diversified the use and application of color in printing, publishing, product design, and architecture. Color significantly impacts the appearance of a product as it is employed in designing, printing, and producing various artifacts. Many people express how they feel through the colors they choose as color carries meanings that go beyond mere valuation (Jonaskaite et al., 2018).

Globally, color is used in all areas of endeavors because they communicate emotion and philosophy. In Ghanaian traditional functions, for example, black and red are used for mourning. The use of color in emblems represents the philosophies of a group or society. The Ghanaian national flag is made of two hues and one achromatic color viz; red, yellow, green, and black – red symbolizing the blood of the forefathers who fought for political freedom gold symbolizing the rich mineral resource (Bowell, 1992),

green for her rich forests and natural wealth and black for the African race/heritage. Traditional Ghanaian art made use of colors from nature (Owens & Green, 2016).

Colors are used in all production or manufacturing processes. People make choices every day about colors; eg. buying from a grocery shop, choosing consumable products, etc. A typical bookstore is filled with book covers in different colors. Also, a cosmetic store is filled with products that have labels in different colors. Consumers can develop preferred color associations for a particular product category in advertising and marketing.

Color preference study has ignited a very insightful debate among researchers, and has been investigated by various topics; eg. mood, age, sex, personality, etc. (Hanafy & Sanad, 2015). These studies have mixed results because of different focal areas. Universally, many researchers have tried to establish patterns of color preference.

A very common color preference pattern cited in previous studies is cool colors for males and warm for females. Among the factors that account for color preferences are biological and psychological influences (Palmer & Schloss, 2010; Baniani & Yamamoto, 2014).

The psychological process of associationism is a causative factor in how people relate and give meaning to color (Hurlbert & Ling, 2007, Baniani & Yamamoto, 2014).

According to Palmer & Schloss (2010), everybody's color preference is determined by their affective response to objects in the environment. The environment in which a person lives may also have cultural and philosophical ideologies that come to play concerning color. Crozier (2008) also agrees that human color preference is not innate but a result of social life. Therefore, man's response to color is influenced by different life experiences.

Saito (1996) discovered among nine cultural groups that blue was generally the most preferred color. He also found that respondents from four large cities in Japan had a profound inclination toward white because of its associative image with purity and freshness.

From that same research, subjects from Taipei preferred blue and green because of their association with the natural environment. He concluded that culture influenced color choices. In cross-cultural research conducted by Baniani and Yamamoto between 2011 and 2012, 319 participants made up of Iranians, Japanese, and foreigners living in Japan were given two drawings (interior and exterior) and a set of colored pencils, 24 each.

This research aimed to compare how participants simply used their favorite colors and how they relate them to other objects. It was surprising to note that most people used their favorite colors in painting small objects and bedroom walls. At the end of that study, participants who lived close to the coast used a lot of blue in their drawings.

This stands to reason that people are attracted to colors they can relate to. Positive feelings are evoked towards green because it represents vegetation; and others are repelled by colors that connote negative reactions like brown which represents rotten fruits (Bawa & Osei, 2022).

The preferred color (hue) of an individual may not extend to other items or products due to the influence of value (lightness or darkness) and chroma (saturation).

Jonauskaitė et al. (2016) conducted a study in Australia on psychology students and observed that the chromaticity of colors chosen for walls was relatively lower compared to other items. Additionally, the colors

preferred for T-shirts were darker than those for other products. Similarly, Fortmann-Roe (2011) found that in a sample of one million Twitter users, males demonstrated a higher affinity towards blue, while females preferred pink-themed colors. Furthermore, males preferred darker and lighter tones, whereas females preferred brighter ones. Jiang et al. (2020) also conducted research among 508 Chinese children between the ages of 12 and 16 and observed that their color preferences influenced their furniture choices, although this varied for different furniture categories.

Being male or female plays a major role in color preference. According to Silverman, Choi & Peters (2007), gender accounts for the spatial differences in activities between males and females. This difference has been developed from 'survival pressure'. A woman's brain is wired for gathering activities like locating ripe fruits or green berries engulfed in foliage. A woman will consequently show a strong liking for 'warm' colors (Red-Yellow hues). The man, on the other hand, will go for 'cool' colors seen in his environment like sky-blue (Hurlbert & Ling, 2007, He et al., 2011).

Other researchers who agree with the warm-cool color preferences of males (blue-green hues) and females (pink-red hues) include He et al. (2011); Ou et al. (2011); Hurlbert & Ling (2007); Bonnardel et al. (2018) and Jiang et al. (2020). He et al. (2011) mention that gender differences accounting for color preferences arise from stereotyped gender roles and ways of thinking and behaving.

The influence of age on color preferences has been studied extensively, with research indicating that most people's reaction to colors changes at different stages of their life, although it may not necessarily be a decisive factor in selecting a particular hue.

Dittmar (2001) conducted a study involving 842 German adults aged between 19-90 years and found that older adults (55-90 years) exhibited a decreasing preference for blue, red, green, and yellow. This trend was attributed to a reduction in visual function in older people. Similarly, Ou et al. (2011) found that lighter colors were rated as less active but cooler among older participants.

Despite the abundance of evidence on color preferences, further investigation is still relevant as research approaches and conditions can impact the results. Although the majority of research on color preference has focused on Asia, America, and Europe, a study of a cross-section of Ghanaians can provide additional knowledge to the field.

Therefore, this research aims to explore the general and specific color choices for various items among Ghanaians, given the limited existing research on color preferences in Africa.

Four important research questions arise from this objective. These are:

1. What are the most preferred colors (general and specific) of males and females in Ghana?
2. Is a color's property (dark, light, bright) a factor in preferred colors for males and females?
3. Have males and females in Ghana changed their preference colors from childhood?
4. Is there a difference in the number of preferred colors for adults between 25 and 60 years?

Method and Data

To answer our research questions, we conducted two surveys within 3 months. Initially, 50 subjects (21 females, 29 males) from 6 institutes of the Council for Scientific and Industrial Research (CSIR-Ghana) participated. These institutes are the CSIR-Food Research Institute (CSIR-FRI), CSIR-Institute of Industrial Research (CSIR-IIR), CSIR-Science and Technology Policy Research Institute (CSIR-STPRI), CSIR-Soil Research Institute (CSIR-SRI), CSIR- Institute of Scientific and Technological Information (CSIR-INSTI), and CSIR-Water Research Institute (CSIR-WRI).

The selection of these institutes was due to the availability of adults within the age groups, proximity, and convenience of administering questionnaires. Participants in the first survey were handed printed questionnaires for data collection. About a month later, about 100 participants were sent an electronic questionnaire (Google Forms). The second survey was necessitated because more data was needed on other variables. This sample size included respondents from CSIR and other government and private companies. A total of 93 participants responded. These participants were workers with different professional backgrounds eg., engineers, administrators, and accountants to mention but a few.

In all literature, one basic method that exists for getting information about color preferences is the presentation of color; either on calibrated screens or printed color cards with color names. The data collection instrument designed for this study was a questionnaire that followed a similar pattern to the one used by Bakker et al. (2013) which tested participants on general and specific color preferences for other items.

Questions in both surveys were multiple choice questions. In the first part of both questionnaires, demographic characteristics included age, sex, professional background, region of birth, and place of work. Ages were grouped into three categories namely: 25-35,

36-45, and 46-60 to represent young, middle, and old. Age restriction to 60 years was due to visual deficits in old age (Ishihara et al., 2001). The second part involved the selection of general and specific color preferences for personal items. A color palette made up of primary, secondary, and tertiary colors from the color wheel, bearing in mind the properties of hue, value, and chroma as employed in the Berkeley Color Project (Palmer & Schloss, 2010; Bakker et al., 2013; Baniani & Yamamoto, 2014) was used.

A total of 64 colors including achromatic colors were used in this study. This procedure of simply selecting colors from printed cards or screens is common in literature because it is the first step to getting information about color preferences (Bonnardel et al., 2018, Yu, Westland & Li, 2020). The second part of the questions was tailored towards preferred colors for personal items, number of preferred colors, change of colors over a period, and effect of dark light and bright color properties on color preference.



» **Figure 1:** Colors presented to participants

Data collated from this assessment were treated as ordinal values in SPSS. This study employed the chi-square (χ^2) test to assess the relationship between categorical variables. It helps ascertain whether the distribution varies from what is expected by chance. This test checks the difference between the observed and expected value. Mathematically, the chi-square is expressed as:

$$\chi^2 = \sum_{i=1}^n \frac{(O_i - E_i)^2}{E_i} \quad (1)$$

O_i = observed (actual) value E_i = expected value

In this study, we employed the p-value approach to make our decisions, and our significance level was set to 0.05 (α). The chi-squared test was computed using the 'crosstab' command in SPSS. The null hypothesis (H_0) for the chi-square test is: There is no relationship between variables A and B.

If a p-value is less or equal to 0.05 means that there is a significant relationship between variables. To determine the strength of the relationship between variables, an effect size (Cramér's V) was computed by ticking the option in the 'crosstab' dialog box.

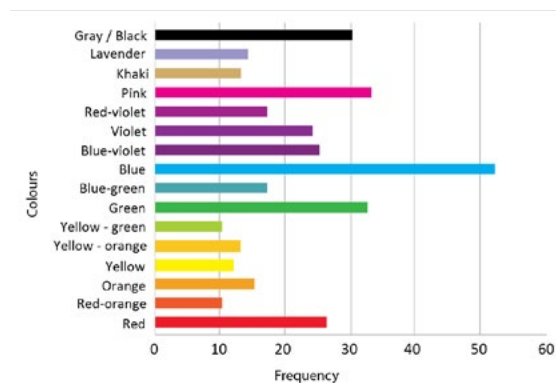
A Cramér's V (effect size) has a reference range of 0 to 1. A value of 1 gives a perfect relationship (Cramér, 1946). If the value is greater than 1 but less than 0.39, it is a weak association. A value above 0.39 - 0.69 is a moderately strong relationship; 0.69 and above indicates a strong relationship (David & Sutton, 2004).

Results and Discussion

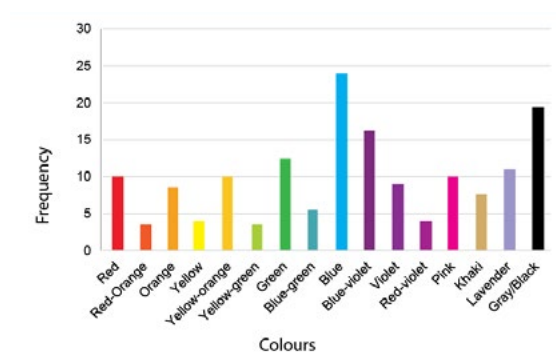
In both surveys, participants were instructed to select their favorite color randomly, without considering its association with any object (see Figures 2, 3, 4).

A total of 16 color names were shown to the participants for selection (see Figure 1). Upon analyzing the data from all 50 participants in the first survey regarding color preferences, it became evident that blue scored the highest (41%) in its category, corroborating the findings of Saito (1996) and Bonnardel et al. (2018) as the most preferred color for both males and females.

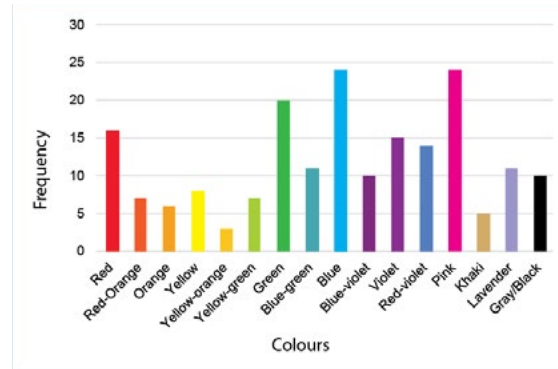
The next most preferred colors were black/gray (37%), red (33%), and violet/purple (29%). In the second survey, blue was still the most preferred with (37%). A compilation of the results from both surveys (n = 143) amplified the general preference for blue.



» **Figure 2:** General color preferences for males and females (surveys 1 and 2)



» **Figure 3:** General color preferences for males for surveys 1 and 2



» **Figure 4:** General color preferences for females for surveys 1 and 2

Table 1

Data Summary for best two colors for personal items in Survey 1

Item	1 st color	Color Property	Score	2 nd color	Color Property	Score
Bedroom wall	Gray	Light	17%	Yellow	Light	10%
Living room	Yellow	Light	34%	Gray	Light	26%
Blouse / Shirt	Yellow	Light	27%	Gray	Light	26%
Business card	Gray	Dark	26%	Blue-violet	Dark	8%
Couch	Khaki brown	Dark	17%	Black	Dark	17%
Laptop	Black	Dark	28%	Gray	Light	21%

Results in Table 1 display the most preferred colors for specific items. A total of six personal items were listed for the 50 participants in the first survey. Lighter colors of yellow or cream-yellow recorded the highest for room walls as observed by Jonauskaitė et al., (2016). A sense of color harmony was observed in the choice of colors for couches and room walls.

Dark brown and black were selected in combination with cream-yellow or light yellow. Of all the colors selected for personal items, achromatic colors (black and gray) were the most preferred. This is consistent with Jiang et al's. (2020) study that reported, reported that dark colors were the most preferred by adults for furniture. The results indicate that pure hues are not preferred for personal items.

To answer objective 1, three different tests were run: 'the number of preferred colors (males and females)', 'most favorite color for (males and females), and 'favorite colors for personal items for males and females). Table 2 gives a representation of the relationship between gender and the number of preferred colors. The null hypothesis for this test assumed there is no relationship between gender and the number of preferred colors.

Table 2

Relationship between Gender and most favorite color (Survey 2)

			Number of preferred colors					Total
			1	2	3	4	5	
Gender	Female	Count	5	4	10	19	14	52
		% within Gender	9.6	7.7	19.2	36.5	26.9	100
	Male	Count	2	6	15	11	7	41
		% within Gender	4.9	14.6	36.6	26.8	17.1	100
Total		Count	7	10	25	30	21	93
		% within Gender	7.5	10.8	26.9	32.3	22.6	100

$\chi^2 = 5.934$ $df = 6$ $p = 0.204$ Cramér's $V = .25$

The chi-square test retains the null hypothesis ($\chi^2 = 5.934$ $df = 6$ $p = 0.204$ Cramér's $V = .25$). The effect size (.25), however, was moderate in the group. The highest count for males was recorded for three colors.

The females scored 36.5% for four colors. Among males and females, it was realized that there was a wide preference selection because the conditional probability of choosing only one color was 7.5%. Males and females had a 32% probability of selecting four colors. Even though females have been found to have a stronger sense of variety in color naming than males (Anderson et al., 2014); and have an innate appeal for a variety of colors (Arthur, Johnson & Young, 2007); the results of this test were not significant in that regard.

Table 3 illustrates the difference between gender and most favorite colors in general. Participants were asked to select their favorite colors from all 16 sections. Colors were grouped according to the dominant hue.

Table 3

Relationship between Gender and most favorite color (Survey 2)

			Most favorite color for personal items						Total	
			Blue	Green	Orange	Pink	Red	Violet		Yellow
Gender	Female	Count	13	4	4	2	22	2	5	52
		% within Gender	25	7.7	7.7	3.8	42.3	3.8	9.6	100
	Male	Count	19	3	6	1	10	1	1	41
		% within Gender	46.3	7.3	14.6	2.4	24.4	2.4	2.4	100
Total		Count	32	7	10	3	32	3	6	93
		% within Gender	34.4	7.5	10.8	3.2	34.4	3.2	6.5	100

$\chi^2 = 8.316$ $df = 6$ $p = 0.216$ Cramér's $V = .299$

The results show that there is no significance between favorite colors and gender ($\chi^2 = 8.316$ $df = 6$ $p = 0.216$ Cramér's $V = .29$) and the color blue and red are the most favorite colors across gender (34.4%). Comparing the two colors (blue and red), females recorded a higher value for red (42%) while males also recorded a higher for blue (46%). The color yellow was the least liked but most preferred for living room walls in Survey 1.

From this test, it can be suggested that colors are always considered in context. Even though males were more than females, our results show that females are in a higher probability of choosing reddish colors as found by Bonnardel et al. (2018). It was not surprising to see blue as the leading color because other researchers like Franklin et al. (2012) found that babies remarkably reacted more to blue and red. However, yellow-dominated hues (yellow, yellow-orange) were generally not preferred.

Table 4

Relationship between Gender and favorite color per personal items (Survey 2)

			Number of favorite colors for personal items				Total
			More than 5	Less than 5	None	All items	
Gender	Female	Count	13	27	1	11	52
		% within Gender	25	51.9	1.9	21.2	100
	Male	Count	7	32	1	1	41
		% within Gender	17.1	78	2.4	2.4	100
Total		Count	20	59	2	12	93
		% within Gender	21.5	63.4	2.2	12.9	100

$\chi^2 = 9.387$ $df = 3$ $p = 0.025$ Cramér's $V = .31$

Table 4 addressed the inquiry, "There are 10 items listed below. How many would you want to see in your favorite colors?: bedroom, living room wall, couch, car, t-shirt, trousers or skirt, laptop, curtains, diary, handbag, or backpack." The findings revealed a gender-based association concerning the number of colors for personal items ($\chi^2 = 9.387$, $df = 3$, $p = 0.025$, Cramér's $V = .31$). The effect size (.31) of the analysis was weak.

One intriguing observation was that about 63% of respondents chose "less than 5," indicating that males and females preferred different colors for the items mentioned. Females had a 51% likelihood of preferring less than 5 colors for personal items, while males had 78% within their group, suggesting that more males preferred less than 5 items in their favorite colors.

Table 5

Relationship between Gender and Color property (bright, dark, light, a blend of all) (Survey 2)

			Number of favorite colors for personal items				Total
			Bright	Dark	Light	Blend	
Gender	Female	Count	25	3	6	18	52
		% within Gender	48.1	5.8	11.5	34.6	100
	Male	Count	6	6	9	20	41
		% within Gender	14.6	14.6	22	48.8	100
Total		Count	31	9	15	38	93
		% within Gender	33.3	9.7	16.1	40.9	100

$\chi^2 = 12.220$ $df = 3$ $p = 0.007$ Cramér's $V = .362$

In Table 5, participants were asked to describe or select the property of colors they preferred for a list of 10 personal items, including bedroom, living room wall, couch, car, t-shirt, trousers or skirt, laptop, curtains, diary, and handbag or backpack. They rated their favorite colors for each item as either bright, light, dark, or a blend of bright, dark, and light. The relationship between gender and color property (dark, light, bright, or a blend of all three) was found to be significant ($\chi^2=12.220$, $df=3$, $p=0.007$, Cramér's $V=0.362$). Both males and females preferred an equal blend of colors the most, indicating a taste for variety.

However, females were found to opt for brighter and lighter colors more than males, while males recorded a higher preference for lighter colors. The difference in the count for dark colors was not very significant, with males recording a preference for 3 dark colors and females for 6. The overall effect size (0.362) within the group was weak, but both sexes recorded low percentages for

darker colors. Males also showed a higher preference for an equal blend of colors compared to females. These observations point to the difference between general and specific color preferences, as documented by Bani-ani & Yamamoto (2014) and Jonauskaitė et al. (2016).

Table 6

Relationship between Gender and change of colors from childhood (Survey 2)

			Change of colors		Total
			Yes	No	
Gender	Female	Count	21	31	52
		% within Gender	40.4	59.6	100
	Male	Count	18	23	41
		% within Gender	43.9	56.1	100
Total		Count	39	54	93
		% within Gender	41.9	58.1	100

$\chi^2 = .117$ $df = 3$ $p = 0.733$ Cramér's $V = .035$

Table 6 examines the relationship between gender and changes in favorite colors from childhood. Our study investigated whether males and females have altered their favorite colors since childhood.

The analysis revealed no significant relationship between gender and color change ($\chi^2 = .117$, $df = 3$, $p = 0.733$, Cramér's $V = .035$), with a weak effect size (.035). The proportion of females who answered 'Yes' to changing their colors was 40.4%, while 59.6% responded 'No'. For males, 43.9% answered 'Yes', and 56.1% responded 'No'.

In total, 'Yes' responses constituted 41.9%, and 'No' responses constituted 58.1%. Participants cited several reasons for their answers, which were summarized into four keywords: 'Age', 'New interests', 'Environment', and 'Innate attraction'.

Of these, 66.3% of the population chose colors based on innate attraction while 17.4% discovered new colors that became their preferences. Only 7.4% admitted to changing their preferred colors due to age, while 12% reported a shift in color preference related to different working environments. These results suggest that color wavelengths that attract the eye are complex mechanisms that can both be static and dynamic.

Table 7 provides insight into the relationship between age and the number of favorite colors. The null hypothesis assumes that there is no relationship between a person's age and the number of preferred colors.

Table 7

Relationship between age groups and Number of Color varieties (Survey 2)

			Number of Color Varieties					Total
			1	2	3	4	5	
Age Group	25-35	Count	5	4	10	22	12	53
		% within Age Group	9.4	7.5	18.9	41.5	22.6	100
	36-45	Count	1	6	12	7	7	33
		% within Age Group	3	18.2	36.4	21.2	21.2	100
	46-60	Count	1	0	3	1	2	7
		% within Age Group	14.3	0	42.9	14.3	28.6	100
Total	Count	7	10	25	30	21	93	
	% within Age Group	7.5	10.8	26.9	32.3	22.6	100	

$\chi^2 = 11.049$ df = 8 p = .19 Cramér's V = .24

Each color sample has four variants as indicated in Figure 1. The test results confirm the null hypothesis ($\chi^2 = 11.049$, df = 8, p = .19, Cramér's V = .24). The number of preferred colors ranged from 1 to 5, with 32.3% of the total population opting for 4 colors, regardless of gender. This was followed by 22.6% for 5 colors; the least common number of preferred colors was 1 (7.5%).

These results indicate that respondents had a wide range of color preferences. When examining age groups, participants in the 25-35 age group had the highest percentage (41.5%) for 4 colors. In the 35-45 age group, the highest percentage was 36.4% for 3 colors. Participants in the older age group (45-60) had the highest percentage of 32.3% for 4 colors.

Conclusion

This study has established that color is a powerful force and expression of human emotions, whether it changes over time or not. The findings are consistent with previous research that has suggested color preference as an emotional response to environmental stimuli, with warm colors preferred by females and cool colors by males. Interestingly, blue was the most commonly preferred color by both males and females in this study, reflecting its global popularity and association with the natural environment. Additionally, all Ghanaian participants in this study also favored red as much as blue. The brightness, lightness, and darkness of colors also influenced participants' preferences for specific objects. Light yellow and achromatic colors (gray/black) were the most preferred

colors for personal items in survey 1. In the chi-square analysis for survey 2, a significant relationship was found between gender and color properties (bright, light, dark, and a blend of all three) as well as gender and the number of colors for personal items.

The other three relationships (age – number of colors; gender – number of preferred colors; gender – change of colors from childhood) were not significant in the population. The study also revealed that whether an individual changes or retains a favorite color is dependent on an innate attraction. The results offer valuable insights for design practitioners and communicators, providing a general overview of color preferences among Ghanaians and a foundation for future research.

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