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Signalized Midblock Crosswalks Experience In Dar Es Salaam, Tanzania: An Evaluation Of Awareness And Utilization

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***Abstract*— In the attempt to improve pedestrian safety in the city of Dar es Salaam, Tanzania signalized midblock crosswalks were introduced at two locations with high pedestrian activities. Being a new technology for most of the city's residents, this study assessed the resident's awareness and utilization of the facilities. The data for utilization assessment were collected using a video camera while interviews were used for awareness assessment. The descriptive analysis of the data revealed that overall, 21% of pedestrians use the pushbutton, and out of those, 83% properly crossed by waiting for a walk signal. Moreover, only 13% of the interviewed pedestrians were aware of the proper procedures for crossing at the midblock crosswalks. Furthermore, the logistic regression results revealed that older pedestrians are less likely to utilize the crosswalk effectively. Considering the awareness assessment, the logistic regression results show that older pedestrians are less aware of the pushbutton use and waiting for a walk signal. Moreover, females and participants with low education levels reveal less awareness of the facilities. These study findings can be utilized by the engineers and planners to improve pedestrian safety in Tanzania and other African cities, considering the similarities in technology advancement across the African continent.**

Keywords*— *Awareness; Pushbutton; Signalized midblock crosswalk; Temporal compliance; Utilization

I. Introduction

Pedestrians' safety has been one of the major increased traffic safety concerns around the world. According to the World Health Organization (WHO), more than one-fifth of the people killed on the world's roads annually are pedestrians [1]. The majority of pedestrian crashes occur when pedestrians are crossing the streets at either intersection or midblock. Midblock crashes are more severe than those at intersections [2]; [3]. To facilitate safe crossing at midblock crosswalks, signalized midblock crosswalks are installed. Different types of signalization are used; these include Rectangular Rapid Flashing Beacons (RRFBs), Circular Rapid Flashing Beacons (CRFBs), Circular Flashing Beacons (CFBs), Traffic Control Signal (TCSs) and Pedestrians Hybrid Beacons (PHBs) [4].

Traditionally, the crossing phase of pedestrians at the mid-block crosswalks is activated using pushbuttons. The utilization of pushbutton has been a challenge in most locations in developed countries, as reported in several studies that evaluated pushbutton utilization ([5]; [6] ; [3]. Moreover, the temporal crossing compliance has also been previously studied, where the high number of jaywalking has been reported in several locations in the United States [7];[8] Europe [9] and Asia [10]; [11]; [12] to mention a few.

Signalized midblock crossings are very common in developed countries such as the United States [4] and European countries [13]. Contrarily, in most African countries, the signalized midblock crosswalks are a relatively new technology. Tanzania has 33% of crashes involving pedestrians, where 46% of those crashes are fatal. [14]. The pedestrian pushbutton technology was introduced in 2018.

Two locations in Dar es Salaam were equipped with Traffic Control Signal (TCSs) at midblock crosswalks. Before the introduction of the two signalized midblock crosswalks, pushbutton had been installed at one signalized intersection in the city center. However, this location is geographically and functionally different since it is at the intersection; therefore, drivers wouldn't stop. The signalization used for both locations is Traffic Control Signals (TCSs), which, when activated turns from green, then yellow to red for vehicles to stop, and the “WALK” signal appears to allow pedestrians to cross. To activate the “WALK” signal, pedestrians are supposed to use the pushbutton.

Being a new technology to the road users, awareness and the resulting utilization are very important aspects to be understood. Thus, this study attempted to assess the extent of awareness and usage of the midblock crosswalk features. Specifically, the study focused on the utilization of the pushbuttons, awareness of the proper use of the installed pushbutton, and temporal crossing compliance. The rest of the paper is organized as follows: the literature review from previous studies is first presented, followed by study methodology, then the discussion of results and finally conclusions and recommendations drawn from the study.

II. Literature review

Midblock crosswalks allow a safe driver-pedestrian interaction at schools, shopping centers, parks, and bus stops, to mention a few. Signalized midblock crosswalks are necessary at locations far from intersections where there is either high traffic with either rare gaps and high speeds or low traffic where the elderly and disabled are expected to cross [15]. The crosswalks equipped with Traffic Control Signals (TCSs) have traffic signals with pedestrian signals or pedestrian countdown signals, which informs the pedestrian allocated crossing time the activation of the pedestrian crossing phase is traditionally done by the use of pushbutton. Pedestrian pushbutton at signalized midblock crosswalks is used to request for crossing phase and eliminate pedestrian-vehicle conflicts. Although pushbuttons are mostly placed on the outer shoulder, it is also important to place the pushbuttons at the medians to allow pedestrians who start late to cross or the elders to obtain sufficient crossing time [16].

The utilization rates of pushbuttons vary at different locations. In the United Kingdom, [17] observed that more than half of the pedestrians did not use the pushbutton installed at signalized crosswalks. Similarly, in the United States, a before-and-after study by [6] reported a low percentage of pedestrians who used the pushbutton at signalized intersections, even after installing illuminated pushbuttons. They stated some of the possible reasons for not using the pushbutton include lack of awareness by pedestrians that pushing the button is necessary for them to obtain a Walk signal. Furthermore, the button may be located too far away or at a hidden view and not visible. Also, many pedestrian signals do not have pushbuttons, and hence pedestrians may automatically expect a Walk signal where there is a pedestrian signal without utilizing the pushbutton. Other factors deterring utilization of pushbutton are such as pedestrians' knowledge of pushbutton necessities and where there is improper allocation of the pushbutton [6].

It is important for pedestrians to comply with the walk signal (temporal compliance) after pressing the pushbutton when attempting to cross the crosswalk. However, in some instances, pedestrians may not wait for the walk signal indication after pushing the pushbutton [18]. Compliance is strongly related to trust in the system [19]. Pedestrians may cross before the walk signal appears if they find an appropriate gap or if they believe the system isn't working. If the Walk signal doesn't appear shortly after the pushbutton is pressed, pedestrians may conclude that the system isn't working and decide to cross [6]. [19] showed that the number of people who used the pushbutton and their compliance increase with the installation of visual and auditory feedback.

In many African countries, pushbutton activated signalized midblock crosswalk is still a new technology. Pushbuttons have been installed in some African countries, including Cape Town, South Africa [20], Nairobi, Kenya [21], Kampala, Uganda [22], and Dar es Salaam, Tanzania to mention a few. Being a new technology in most African countries, much is not yet done on the awareness and utilization of pedestrian pushbuttons. A previous study in South Africa, which was based on the design of innovative pedestrian information signs stated that where pushbuttons were installed, pedestrians failed to use it because they were not fully aware of the pushbuttons and at certain times pedestrians didn't wait for the sign to turn green [23].

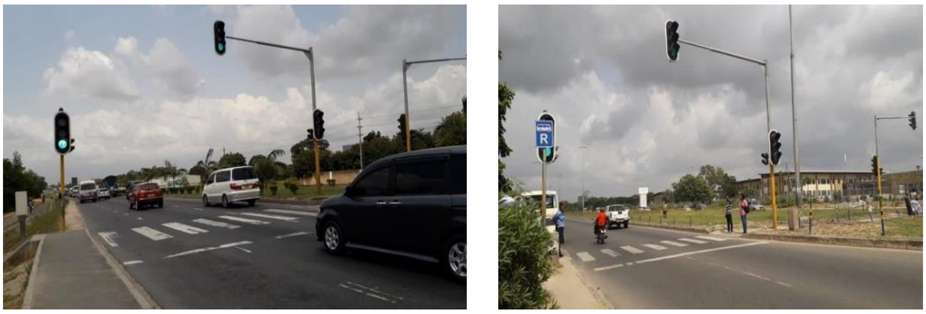
It is apparent that researchers have shown that pushbutton utilization is low in both developed and developing countries. Most of these studies, especially in developing countries, have cited awareness as a major reason. However, the pedestrians' traits that influence its use and awareness have not been explored extensively. Moreover, in Tanzania, this technology is relatively new, thus understanding the pedestrians' awareness is crucial for its success. This study attempted to associate the pedestrian's characteristics and awareness and utilization of pushbutton.

III. Methodology

This section presents a detailed study area, study design, data collection procedures, and statistical model development.

A. Selection of study area

This study utilized data collected from two signalized midblock crosswalks located in Dar es Salaam, Tanzania, as shown in Fig. 1. These locations were chosen because they are the only signalized midblock crosswalks found in Dar es Salaam. Pedestrian signals in the two mid-block crossings, Mlimani City shopping mall along Sam Nujoma Road and Makongo army base along Bagamoyo road, were installed in 2018 to facilitate pedestrian crossing.



a) Signalized midblock crosswalk at Makongo, Dar es Salaam

b) Signalized midblock crosswalk at Mlimani city Dar es Salaam

Fig. 1. *Signalized midblock crosswalks at two locations in Dar es Salaam, Tanzania*

Both signalized midblock crosswalks are activated using a pushbutton. Fig. 2 shows the similarities in terms of the design of the pushbutton for the crosswalks in Dar es Salaam, Tanzania, and the one in Melbourne, Australia, and in Las Vegas, Nevada. The pushbutton in Melbourne, Australia, is similar to that in Dar es Salaam except for the added description of the signals for pedestrians to understand what signals imply. The pushbutton in Las Vegas, USA, is very different from the other two in terms of design. Although both two (Australia and USA) have signal descriptions, the one in Las Vegas is large enough for pedestrians to see.

Both roadways have a posted speed limit of 40 mph. The crosswalk at Mlimani City shopping mall is located adjacent to a commercial-residential neighborhood while the one in the Makongo army base is in a special zone (Army).

B. Data collection procedures

Two approaches, video camera, and interview were used for data collection. The video camera approach aimed to collect pushbutton utilization and crossing compliance while the interview approach focused on determining the awareness extent.

The video camera was positioned in such a way that pedestrians would not notice that they were being recorded. The aim was to record the natural usage of the pushbuttons as well as the temporal crossing compliance of pedestrians. The video recording was done three times per day for one week. The recording hours were morning peak (7:00-9:00 am) due to a significant number of people moving to workplaces and schools, afternoon peak (12:00-01:00 pm) during for lunch breaks, and evening peak (04:00-6:00 pm) due to a significant number of people returning to their homes. Similar times of the day were used in the previous studies [24]; [4]. Data extraction was done by reviewing the videos and collecting the relevant information. This involved the utilization of pushbutton by pedestrians and their crossing compliance after using the pushbutton based on the different attributes of pedestrians.

A total of 922 pedestrian crossing instances were observed at the two signalized midblock crosswalks. The collected information for each crossing incident was summarized in the excel sheet for further analysis.

Using the interview approach, the data for awareness part of the study was collected. The interviews involved pedestrians who crossed midblock crosswalks. The researcher introduced herself and stated the aim of the interview so that the respondents can be open to answering the questions. The interview covered different characteristics of pedestrians, which include age, gender, level of education, and their awareness of the utilization of pushbuttons and waiting for the walk signal. During data collection, a total of 152 pedestrians were approached; however, only 146 agreed to be interviewed.

a) *Pedestrian pushbutton* Mlimani city, Dar es Salaam b) *Pedestrian pushbutton at* Caulfield, Australia [25] c) *Pedestrian pushbutton at Las Vegas,* USA [4]

Fig. 2. *Pedestrian Pushbutton and signalized midblock crosswalks at various location*

C. Descriptive statistic

Table 1 below presents a descriptive summary of the variables. There are three dependent variables, and for each, three independent variables. The number of observations and percentage composition of each variable is shown in Table 1.

Out of 922 crossing instances, only 21% involved the use of the pushbutton. Males with a higher proportion of a number of observations (49%) had lower pushbutton utilization extent (13%) than females (17%). Males and females category represents a group of males and females crossing together. This category was observed to have the highest utilization extent (43%) and temporal compliance (88%). Females had a higher temporal compliance extent (89%) than males (75%). Adults/elders have the highest proportion of a number of observations (80%) but the lowest utilization extent (13%) among the age groups. Children crossing alone have the highest utilization extent (65%). Pedestrians with different age size could cross together in a group. When in a group, adults crossing with children had higher utilization extent (58%).

Considering the hour of the day, the afternoon (42%) and evening peaks (37%) have higher proportions of a number of observations than the morning peak (21%). Morning (22%) and evening peaks (24%) have a higher utilization extent than the afternoon peak (18%). The evening peak had the lowest temporal compliance extent (81%) while morning (84%) and afternoon peak (85%) had a greater temporal compliance extent.

The awareness assessment revealed that only 13% of the interviewed pedestrians were aware of the pushbutton. Females with a higher proportion of the number of observations (55%) had a lower awareness extent (22%) than males (45%). Pedestrians aged less than twenty-four years had the highest proportions of the number of observations (29%) and awareness extent (58%). Similarly, pedestrians aged between twenty-four and thirty-five years had the highest proportion of the number of observations (29%) but a lower awareness extent (32%). Pedestrians with age above fifty-five years had the lowest awareness extent (15%). Pedestrians with higher education and above had the highest proportion of the number of observations (42%) and awareness extent (48%) among the education levels. Pedestrians with primary and lower education levels had the lowest percentage of observations (23%) and awareness extent (19%).

D. Modeling methodology

Utilization and awareness of the pushbutton can be presented as a choice (yes/no); thus, a binary logistic regression method becomes one of the major candidate statistical models. Three binary logistic models were developed, one to determine the factors that influence the likelihood of a pedestrian using the pushbutton, second to determine the influential factors for pedestrians on the awareness and temporal crossing compliance, respectively.

In a binary logistic regression, let variable Y be the dependent variable of the pedestrian. For instance, $Y_i = 1$ if the pedestrian utilized the pushbutton in an observation i while $Y_i = 0$ if the pedestrian didn't utilize the pushbutton [26]. Variables $\mathbf{X} = (X_1, X_2, \ldots\ldots, X_k)$ are the set of explanatory variables that can be either discrete, continuous or both. X_i is the observed value of the explanatory variable for observation i. The probability P_i can be expressed as an inverse logistic function of a vector X_i of the explanatory variables as (1):

$$Pi = \frac{1}{1+e^{X_i\beta}} \quad (1)$$

The logistic function can be linearized and rewritten as shown in (2), whereby β are the variable coefficients to be estimated, including β_0, which is a constant term:

$$logit(Pi) = ln\left(\frac{Pi}{1-Pi}\right) = \beta_0 + \beta_1 X_{i1} + \cdots \beta_k X_{ik} \quad (2)$$

The model interpretation is based on the odds ratio and p-values.

The odds ratio reveals that there is either positive (OR>1) or negative (OR<1) association between the respective variable and the dependent variable [27], [28]. On the other hand, p-value shows the significance levels, and since this study is not very sensitive as it doesn't have extremely destructive consequences, a p-value of 0.1 was considered for the significance levels.

TABLE I. PUSHBUTTON UTILIZATION, AWARENESS AND CROSSING COMPLIANCE

Pushbutton utilization				
	Number of observations	Percentage of observations	Utilized the button	Percentage utilization
Hour of the day				
Morning	194	21%	43	22%
Afternoon	385	42%	68	18%
Evening	343	37%	83	24%
Gender				
Male alone	448	49%	60	13%
Female alone	267	29%	46	17%
Males and females	207	22%	88	43%
Age				
Children	68	7.4%	41	60%
Adults/ Elders	739	80%	93	13%
Children and adults	77	8.5%	45	58%
Children, Adults and Elders	38	4.1%	15	39%
Compliance with Walk Signal				
	Number of observations	Percentage of observations	Temporal crossing Compliance	Percentage compliance
Gender				
Males	60	31%	45	75%
Females	46	24%	41	89%
Males and females	88	45%	77	88%
Age				
Children	41	21%	34	83%
Adult/Elders	93	48%	76	82%
Children and adults	45	23%	38	84%
Children, adults and elders	15	8%	15	100%
Hour of the day				
Morning	43	22%	36	84%
Afternoon	68	35%	58	85%
Evening	83	43%	69	83%
Signalized Mid-block Crosswalk Awareness				
	Number of observations	Percentage of observations	Aware of the button	Percentage awareness
Gender				
Male	67	45%	30	45%
Female	79	55%	25	22%
Level of Education				
Primary Education and less	43	23%	6	19%
Secondary Education	36	25%	8	22%
Higher Education and above	67	42%	32	48%
Age				
Less 24	42	29%	23	55%
25-34	42	29%	16	38%
35-44	18	12%	5	32%
45-54	25	17%	8	28%
Above 55	19	13%	3	15%

IV. Results and Discussions

A. *Results and discussion for signalized crosswalk awareness*

As discussed earlier, the assessment of the awareness of the signalized midblock crosswalk and the pushbutton was evaluated by age, gender, and education level. The following section provides the model results and discussion regarding awareness of the pushbutton at the signalized mid-block crosswalk.

a. Respondent's Age

The results for this variable revealed a negative association with the awareness of the pushbutton as shown in Table 2. As the age of pedestrians increased, the odds of being aware decreased. The relationship between awareness of the pushbutton and age groups was statistically significant at a 90% confidence level (p-values<0.1). Compared to pedestrians aged less than 24 years, pedestrians aged between 25-34 years were less likely to be aware of the pushbuttons (OR=0.39). Pedestrians aged between 35-44 years (OR=0.33) and 45-55 years (OR=0.31) were at lesser odds of being aware of the pushbutton use compared to those of less than 24 years. Similarly, pedestrians with age greater than 55 years were at the least odds (OR=0.20) of being aware of the pushbutton.

This observation is similar to a previous study [29], where elders were found to have difficulties understanding traffic control devices. The possible reason for this is the difficulties in learning and adapting to new technology as people advance to older ages. It was proven that older pedestrians are prone to injury severity risk due to their reduced physical and cognitive ability [30]. During the interview, some elderly respondents replied that pressing the pushbutton would change the signal cycles for cars, which might cause accidents when pedestrians attempt to cross.

b. Respondent's Gender

According to the results in Table 2, females were less likely to be aware of the utilization of pushbutton and waiting for the crossing phase (OR=0.49) compared to males. This variable was statistically significant at a 90% confidence level (p-value=0.1). The most probable reason for this is that women are less optimistic about new technology than men, and they exhibit higher levels of risk-aversion [31]. This is similar to the previous study, which stated that males were generally better than females with regard to comprehension of traffic control devices [29].

TABLE II. AWARENESS MODEL RESULTS

Awareness		Odds Ratio	Std. Err.	z-stat	*p*-value
Age					
	Less than 24	Base category			
	Between 25-34	0.39	0.19	-1.93	0.05
	Between 35-44	0.33	0.21	-1.74	0.08
	Between 45-55	0.31	0.17	-2.11	0.04
	Above 55	0.20	0.15	-2.17	0.03
Gender					
	Male	Base category			
	Female	0.49	0.19	-1.84	0.07
Level of Education					
	Higher education and above	Base category			
	Secondary education	0.68	0.28	-0.95	0.34
	Primary or lower education	0.25	0.14	-2.39	0.02
_cons		2.95	1.36	2.35	0.02
Model summary					
Number of observations		146			
LR chi2(7)		18.5			
Prob > chi2		0.0099			
Log-likelihood		-84.052			
Pseudo R2		0.0991			

c. Respondent's Education Level

The results in Table 2 show that pedestrians with lower education status were less likely to be aware of the pushbutton. In comparison to higher education and above, secondary education level was at lesser odds (OR=0.68) of being aware while primary education level was at least odds (OR=0.25). Primary education is statistically significant at 90% confidence level (p- value= 0.02) while secondary education is not statistically significant at 90% confidence level (p-value=0.34). This is similar to other awareness studies, which proved that people with a higher degree or bachelor had a better understanding of traffic signs than those with lower educational backgrounds [29]. This can be explained by the fact that traffic education is less taught among the different educational levels.

B. Results and discussion for pushbutton utilization and crossing compliance

As discussed earlier, the assessment of the utilization of the signalized midblock crosswalk and the pushbutton was based on age, gender, and hour of the day. The following section provides the discussion of the model results regarding the utilization of the pushbutton and temporal crossing compliance.

a. Hour of the Day

The results of this variable in Table 3 revealed a positive association with the utilization of pushbutton during the evening peaks and a negative association during the afternoon peaks. According to results in Table 3, pedestrians are more likely to utilize the pushbutton during evening peak (OR=1.04) but less likely to utilize it during the afternoon peak (OR=0.63). However, in comparison to the morning peak, the afternoon peak was statistically significant at a 90% confidence level (p-value of 0.07). The evening peak was observed to be not statistically significant at a 90% confidence level (p-value of 0.874). Since the variable is not statistically significant, it implies that there is no variation in the utilization of the pushbutton during the evening peak. This contrasts one of the previous studies, which stated that the hour of the day has an impact on pedestrian behavior [32].

In comparison to the morning peak, pedestrians are less likely to comply with the walk signal during evening peak (OR=0.80) but more likely to comply during the afternoon peak (OR=1.06). The number of vehicles during the evening and morning peak is higher due to people moving to and from workplaces. The speed of vehicles during these times of the day is usually low due to traffic jams, which cause pedestrians to prefer gaps. Hence less use of the pushbutton during this time. With the increased traffic during this time of the day, the time taken from pressing the button to the activation of the signal becomes greater. This is due to the need to balance the high demand of the right of way for both pedestrians and cars. Both afternoon and evening peak periods were observed to be not statistically significant at a 90% confidence level (p-value of 0.911 and 0.669, respectively).

b. Gender

With the odds ratio of 3.27 and p-value of 0.0001, which is statistically significant at a 99% confidence level, a group of females and males crossing together revealed a positive association with the utilization of pushbuttons. Moreover, results in Table 3 reveal that females are more likely to utilize the pushbutton (OR=1.12) compared to males. Females have a p-value of 0.639, which is not statistically significant at a 90% confidence level. This implies there is no statistically significant difference in pushbutton utilization by females alone except when with males. This observation is similar to a previous study, which revealed that male pedestrians are less likely to use the button [4]. Similarly, these observations of males being lesser users of pushbutton can be explained by a study that stated men are more willing to violate regulations and make unsafe crossing decisions [33].

Gender also has a positive association with temporal compliance. In comparison to males, females are at greater odds of complying with walk signals (OR= 2.74) than when accompanied by males (2.06). This could be due to the fact that females have a positive attitude to road rules since they tend to be more cautious in their decision making than males [34]. Females have a p-value of 0.076, which is statistically significant at a 90% confidence level. Compared to females and males with a p-value of 0.124, which is not statistically significant at a 90% confidence level.

c. Age groups

From the results in Table 3, the variable age group revealed a negative association with the utilization of pushbutton. In comparison to children (less than 18 years old), adults/elders (above 18 years old) were at lesser odds of using the pushbutton (OR=0.09). When pedestrians crossed in groups with different age groups, children and adults were at lesser odds (OR=0.55) of utilizing the pushbutton while children, adults, and elders were at least odds (OR=0.27) of using the pushbutton. When crossing in groups, those accompanied by children had greater odds of utilizing the pushbutton. This can be explained by the fact that children are born inquisitive; they are naturally born eager to learn and explore new things in their surroundings compared to other age groups [35]. The inquisitive nature is observed by the multiple times the pushbutton was pushed by children who arrived together at the crosswalk.

TABLE III. PUSHBUTTON UTILIZATION AND CROSSING COMPLIANCE MODEL

	Utilized the pushbutton				Crossing compliance			
Variable	**Odds Ratio**	**Standard Error**	**Z-stat**	**P-value**	**Odds Ratio**	**Standard Error**	**Z-stat**	**P-value**
Hour of the day								
Morning	Base							
Afternoon	0.63	0.16	-1.84	0.065	1.06	0.59	0.11	0.911
Evening	1.04	0.25	0.16	0.874	0.80	0.42	-0.43	0.669
Gender								
Males	Base							
Females	1.12	0.26	0.47	0.639	2.74	1.55	1.77	0.076
Females and Males	3.27	0.74	5.21	<0.001	2.06	0.97	1.54	0.124
Age								
Children	Base							
Adults	0.09	0.03	-8.56	<0.001	1.03	0.52	0.06	0.95
Children and adults	0.55	0.20	-1.67	0.096	1.03	0.62	0.05	0.96
Children, adults and elders	0.27	0.12	-2.94	0.003				
Model summary								
Number of observations	922				179			
LR chi2(7)	179.59				4.53			
Prob > chi2	0.000				0.605			
Log-likelihood	-384.58				-80.24			
Pseudo R2	0.1893				0.0275			

More than one child was observed to press the button, not knowing only one push is required for activation of Walk Signal. This observation is similar to other older pedestrians were proven to be conservative in their crossing behaviors by waiting times and crosswalk use [36]. This means less likely to utilize the newly implemented technology.

In comparison to children, adults/elders were at greater odds of complying with a walk signal after using the pushbutton (OR=1.03) similar to children when crossing with adults (OR=1.03). This can be explained by the fact that adults are more cautious than children and tend to be extra cautious when accompanied by children. However, this variable is not statistically significant at a 90% confidence level. There is no variation in compliance with the walk signal with the age of pedestrians.

V. CONCLUSIONS AND RECOMMENDATIONS

This study has shown that the utilization extent of pushbuttons along signalized midblock crosswalks is low. The study revealed that only 21% of pedestrians use the pushbutton. The major reason for the low utilization extent of the pushbutton is the lack of awareness of its implementation by the pedestrians. Furthermore, the utilization of pushbutton varies with age, while it doesn't vary with an hour of the day and gender. Pedestrians in a group with different gender and age size are more likely to use the pushbutton. Awareness of the pushbutton implementation decreases with age and increases with the level of education of the pedestrian. Males were more likely to be aware of the pushbutton and wait for walk signals than females.

Since the lack of awareness of pushbutton implementation is the major reason for low utilization extent, the study recommends that the pushbutton instruction sign be installed at the crosswalks with an explanatory text in the national language, i.e., Swahili. This will enlighten the pedestrians regardless of their characteristics that it is necessary for them to press the button in order to obtain a Walk Signal before crossing the crosswalks. Pushbuttons with information signs have been installed at different crosswalks in developed countries and have shown the utilization extent to be higher [4]. Secondly, to increase awareness of the pushbutton implementation and utilization by using media such as social media, broadcasting, which includes magazines, televisions, and radios, focus group discussions on traffic education among people and provision of flyers to pedestrians. This will enlighten both illiterates and literates regardless of the age differences. Moreover, traffic education taught at primary schools should include new technologies such as pushbutton implementation and utilization. This will enable those with lower education status to be aware of the different devices, including the pushbutton, which they can use to reduce pedestrian-vehicle conflict when crossing the streets. Lastly, taking actions on motorists who don't yield on the WALK Signal of the pedestrians after using the pushbutton. There should be strict policies that punish motorists who don't yield to pedestrians when they walk signal is activated.

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