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Mode Choice of Undergraduates : A Case Study of Lecture Trips in Nigeria.

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Abstract Travel behavior and determinants of mode choice of university students in Nigeria are neither well understood nor well represented in literature. This study model is modal choice of undergraduates, using data from students travel survey and logistic regression to determine factors influence modal choice of undergraduate students in Obafemi Awolowo University Ile-Ife, Nigeria. The results indicate that walking dominate modes for on-campus and commercial bus for off-campus students, while motorcycles taxi is used by few of the sample. Mode choices are influenced by a combination of socio-economic and trip factors. A key finding is extent that these variables positively affect the odds of using walk and commercial bus modes especially with reference to student residence: on and off-campus. The results suggest investment in pedestrian infrastructure and development of intermodal transport system as a means of making the university livable and attractive.

Keywords: Mode choice, students, lecture trip, Obafemi Awolowo University, Nigeria

Abstrak *Kebiaasaan perjalanan dan penentu moda dari mahasiswa di Nigeria tidak juga dipahami dengan baik atau dijelaskan dalam literatur. Model penelitian ini adalah pemilihan moda mahasiswa menggunakan data dari survei perjalanan mahasiswa dan regresi logistik untuk menentukan faktor penyebab pilihan moda dari mahasiswa di Universitas Obafemi Awolowo, Ile-Ife, Nigeria. Hasilnya menunjukkan berjalan mendominasi pilihan untuk ke kampus dan kendaraan bus umum untuk mahasiswa di luar kampus, sementara sepeda motor taksi digunakan oleh beberapa sample. Pilihan cara dipengaruhi oleh kombinasi dari sosial-ekonomi dan faktor kunjungan. Inti penelitian adalah luasnya variabel positif mempengaruhi peluang dari berjalan dan kendaraan bus umum terutama rujukan ke asrama mahasiswa, dalam maupun luar kampus. Hasil penelitian menyarankan investasi pada infrastruktur pejalan kaki dan pengembangan dari sistem transportasi antarmoda sebagai sarana membuat universitas layak huni dan menarik.*

Kata kunci *: Pilihan moda, mahasiswa, perjalanan kuliah, Universitas Awolowo, Nigeria.*

1. Introduction

Universities are major trip generators [Tolley, 1996]. This is especially true in several medium sized university towns in Nigeria where campuses serve as the major trip attractors for students and employee alike [Abiola & Ayodeji, 2012]. In recent years, due to rapid growth in students' population, many universities in Nigeria find it difficult to provide adequate accommodation for their students on campus. This creates differences in travel demand and behavior between students living on campus and those staying off-campus. As a social group, according to [Limanond, et al., 2011], on and off-campus university students tend to have complex and unique travel behavior.

Studies on students travel behaviour are recent and few in Nigeria [see Ipingbemi & Aiworo, 2013; Abiola & Ayodeji, 2012]. These studies are inadequate to the understanding of university students' travel behavior and mode choice. In addition, the studies are also not sufficient for the formulation of university transport policy. Against this background, this study aims is to examine mode choice and other aspects of students lecture trips in Obafemi Awolowo University, Ile-Ife, Nigeria. The objective of the study is to investigate differences in lecture trip characteristics between on and off-campus students; model and determines factors influencing students mode choices.

The rest of the paper is organised as follows. The next section presents a review of related

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studies, followed by description of the study area, data and analytical methodology. The study findings and discussion are presented in the last section. The paper concludes with a summary of key findings.

Travel mode and their determinants of mode choice among university students have extensively been investigated in many parts of the developed countries and in some developing countries [Limanond et al, 2011; Delmelle & Delmelle, 2012; Zhou, 2012; Zhan et al, 2016; Abiola & Ayodeji, 2012]. For instance, Delmelle & Delmelle [2012] examined spatial, temporal and gender differences in mode choice among student commuters and found that availability of lower-cost parking permits enable shorter distance car commutes during winter. They also found that male students are more likely to switch commuting modes throughout the year while females are generally more likely to drive. In a recent study Zhan et al. [2016] applies an hierarchical tree-based regression (HTBR) model to explore university students travel frequency and mode choice patterns in China, using the data collected from a web-based travel survey and found that student grade, school location city, public transit station coverage ratio (PTSCR) and family income have impacts on student travel frequency. Travel distance, bicycle ownership, school location city, PTSCR and student gender were also found correlate with student mode choice.

The focus of some studies have been on travel based activity patterns of students and enjoyment of commuting [Chen, 2012; Limanond et al, 2011; Eom et al, 2009; Mokhtarian & Salomon 2001; Páez & Whalen, 2010]. For instance, Redmond & Mokhtarian [2001], Chen [2012] studied student travel behavior at Virginia Commonwealth University and suggested that that university student travel behavior is different from that of the general population; on-campus students make more frequent trips than off-campus students; and the most frequent student activities are home and academic activities. Redmond & Mokhtarian [2001], found that that very few individuals in a sample of commuters in California expressed a desire to either avoid their commute altogether or a preference for very short commutes (1.2% reported an ideal commute time of zero minutes, and 0.6% reported an ideal commute time of 1–4 minutes). In another study, Ory, et al. [2004] found that "only 40% of the sample dislikes (31%) or strongly dislikes (9%) commuting, while 21% actually enjoy the activity".

Several studies have focused on the relationship between residential location and mode choice of university students [Shannon et al, 2006; Khattak, et al, 2011; Wang et al, 2012; Zhou, 2014]. For instance, Wang et al. [2012] using an Internet-based survey of 1,468 students at Old Dominion University in Virginia, examined travel behaviour of university students and also model the relationships between students attributes : personal characteristics, residential location [residing on campus or off campus], and academic status. The study showed that students living on campus or near campus were significantly more likely to walk; bicycle and less likely to drive automobiles than of campus students. Zhou [2014] examined the issue of reducing car dependence using university students as samples and found that mode share among students are: car (41.2%), transit (30.9%), biking and walking (24.8%). The study also shows that university students are more likely to share a residence in exchange for rent affordability, bus proximity and short commute. The study also revealed that undergraduates have shorter commute and use alternative transportation more.

Studies have used different techniques to mode choice of university students [McMillan et al, 2006, Gonzalo-Orden et al., 2012; Abiola & Ayodeji, 2012; Mohammed & Shakir, 2013]. Gonzalo-Orden et al. [2012] developed a multinomial logit model using a sample of 2500 students and staff members at the University of Burgos, Spain to study their mode choice behavior. Several factors appeared to be significantly affecting this choice including travel time, travel cost, car availability, bus access time, bus frequency, and gender. The results indicated that interventions targeting car travel time (such as restrictions in some streets) and parking cost (for example charging vehicles with less than three users) significantly affect car market share. Changes in bus fares were not very effective to encourage its ridership; however, reductions in bus travel time and headway showed significant outcomes.

In a study of students' mode choice at the North Dakota State University, Ripplinger et al. [2009] developed a mixed logit model with the independent variables being travel time, automobile cost, and a dummy variable

representing the previous use of transit, and found that students prefer walking and biking to automobile or transit. Using that model, they predicted that an increase in fuel prices will only result in modest increases in transit ridership and pedestrian travel. An express bus service between campus and off-campus areas with high student populations could attract a significant number of transit riders from other modes.

In a study conducted in Nigeria, Abiola & Ayodeji [2012], model travel demand in a Federal University of Agriculture, Abeokuta, Nigeria using Multinomial logit (MNL) to examined number of trips and the choice of mode to campus. The results showed that 52% of student population makes a single trip per day and about 40% make two trips per day, majority (54%) of whom lived off-campus. The MNL model for mode choice to campus showed that location, waiting time at bus stop, number of trips, cost to school and time to bus stop are the significant variables.

The foregoing literature lends credence to the assertion that campus settings, with their diverse commuter populations, permit the study of modes that would otherwise be difficult to capture elsewhere.

2. The Methods

This study was carried out in Obafemi Awolowo University (OAU), Ile-Ife, Southwestern Nigeria. OAU is a comprehensive public institution established in 1962 as The University of Ife. In terms of its spatial extent, OAU is situated on a vast expanse of land totaling 11,861 hectares of land lying approximately within Longitudes 4^0 30'E and 4^0 34'E and Latitude 7^0 29'N and 7^0 33'N. The University falls within the margin of the Koppen's Agroforest wet equatorial climate [Ogunfowokan et al., 2009].

The University comprises the central campus made up of the academic and administrative areas, the student residential area, the Staff Quarters and a Teaching and Research Farm (figure 1). The academic and administrative areas contain the facilities for several departments that constitutes 14 faculties. The students and staff residential areas are located on the opposite sides of the core campus. The student's residential area is made up of 10 undergraduate hostels and a postgraduate hall of residence. The 14 faculties in the central campus, the students and staff residential areas are linked together by a system of road network (Figure 2). Several car parks, pedestrian walkways, pedestrian traffic lights and zebra crossing sites are common transport infrastructure available on the university campus.

The University campus is well connected to the center of town through two routes: Road 7 - Sabo route and Campus /Mayfiar / Sabo /Opa route. The means of commuting of between the central campus and the halls of residence are mainly trekking and commercial motorcycle transport (*Okada*). Students living in the city of Ile-Ife and its environs commute to campus by motorcycle taxi and commercial buses popularly known as Sabo/Lagere which ply Campus main gate / Mayfiar / Sabo / Opa route. Commercial buses are also used by students living on campus to commute from their residential areas to the central campus. In addition, the commercial motorcyclist provides transport services to students living adjacent to the University main gate along Ile-Ife – Ede/Osogbo road.

This study uses data from a student travel survey conducted by the author in Obafemi Awolowo University Ile-Ife, Nigeria in February, 2014. The aim of the survey was to collect one-day travel information, socio-economic characteristics, transport mode use, opinions about determinants of mode used and the importance of transport facilities/services available on the campus. The survey took the form of self-administered questionnaires. Questionnaires were distributed to students from all departments in the University who registered for SEO 002 course and participate in the course mandatory field trip exercise. The course is one of the special electives required for completing a degree programme in the University.

The survey instrument was divided into tree sections. Section 1 consisted of general questions on the students' residential location, sex, age, levels and mobility status. Section 2 consisted of 9 questions on students' trip patterns, trip frequencies, trip modes and determinants of travel modes. The transportation infrastructure and commuting environment on campus was assessed in Section 3 with several questions on quality, important and adequacy of available transport infrastructure and services on campus. Surveys typically took 10 to 15 minutes to complete.

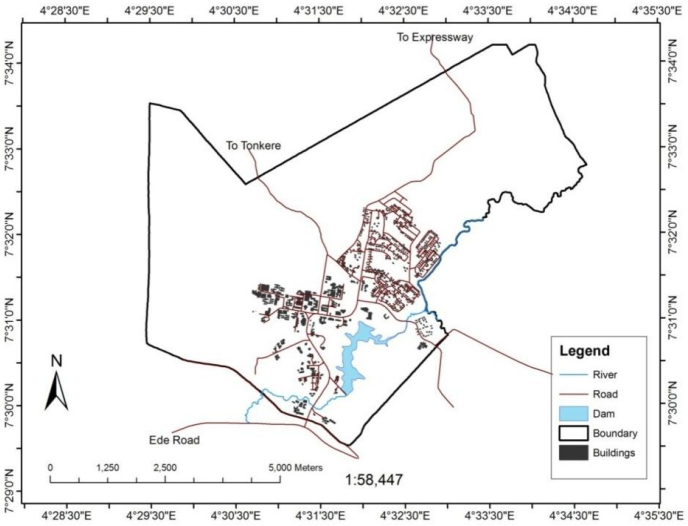

Figure 1. Map of Obafemi Awolowo University, Ile-Ife, Nigeria

Data were analysed using descriptive and multivariate statistics. Chi-square tests were used to examine difference in trip characteristics between students living on campus and those living off campus. Logistic regression, a multivariate regression technique, was also used to analyse factors associated with three modes used by the students: walking , motorcycle taxi and bus . The objective for applying the model was to determine the most significant factors accounting for students' mode choice. The Logistic regression model is a generalisation of the binary logit model and is often used to estimate the relationship between binary or ordinal responses and a set of numerical and categorical explanatory variables.

In the analysis, the three modes: walk, motorcycle taxi and commercial bus represent the dependent variables. Each of the modes was separately coded (1), other modes were group together and assigned the value [0]. For instance, when walk =1, motorcycle taxi and commercial bus were coded (0). The independent variables included in the model consist of socio-economic attributes of the students (gender, age, monthly allowance) and trip attributes (travel distance, trip frequency and travel time and transport cost).

This study employed statistical software, SPSS, to estimate logistic regression models. However the basic formula for logistic regression equation is:

$$\text{logit}\,[p(x)] = \log\left[\frac{p(x)}{1-p(x)}\right] = a + b_1x_1 + b_2x_2 + b_3x_3 \ldots \qquad (1)$$

Simple rearrangements of the above formula give the expression for the calculation of p as shown below:

$$p = \frac{exp^{(a+b_1x_1+b_2x_2+b_3x_3\ldots)}}{1+exp^{(a+b_1x_1+b_2x_2+b_3x_3\ldots)}} \qquad (2)$$

Where:

p = the probability that a case is in a particular category,
exp = the base of natural logarithms [approx 2.72],
a = the constant of the equation and,
b = the coefficient of the predictor variables.

campus residing and off campus students were found in all characteristics. Table 1 demonstrates that there were more male off-campus than on-campus students (63.39% vs. 52.64%) and that there were more female students living on campus than students living outside the campus (47.36% vs. 36.61%) in the sample . The age of these students ranged from 18 to 27 years (Mean =21.57, SD =2.48 years). More of older students aged 25 years and above lived off-campus than those living on campus (9.09% vs. 5.04%). The majority of the students: on-campus (76.90%), and off-campus (76.90%) reported a monthly stipend (income) of between ₦10,000 and ₦20,000 (table 1).

To test the strength and reliability of the models, both the Hosmer and Lemeshow test and Nagelkerke R square values are reported. The Hosmer and Lemeshow test examines whether the model for the predicted probabilities is a good match; in this test a large *p*-value (p>0.05) is required [Lemeshow & Hosmer, 1982, Larsen, et al., 2012]. The Nagelkerke R-square value attempts to explain the proportion of variance explained by logistic regression [Nagelkerke, 1991].

3. Result and Discussion

A total 1638 students - on-campus: 1231 (75.2%), and off-campus: 407 (24.8%) participated in this study. Differences between The distributions of travel distance to academic area differ substantially between the on-campus and off-campus students. Off-campus students travel longer distances, on average of about 4 times longer than students living on campus (3.7 km versus 0.9 km). Figure 2 present differences in travel distances of students.

Table 1. Profile of the respondents

Item	Elements	Off-Campus		On-Campus	
		Frequency	Percent	Frequency	Percent
Residence Location		407	24.85	1231	75.15
Sex	Male	258	63.39	648	52.64
	Female	149	36.61	583	47.36
Age Group	Below 19 Years	42	10.32	392	31.84
	20 To 25 Years	328	80.59	777	63.12
	Above 25 Years	37	9.09	62	5.04
Monthly stipend	Below ₦10,000.00K	78	19.16	241	19.58
	₦10,001.00K to ₦20,000.00K	313	76.90	938	76.20
	₦20,000.00K to ₦30,000.00K	16	3.93	52	4.22

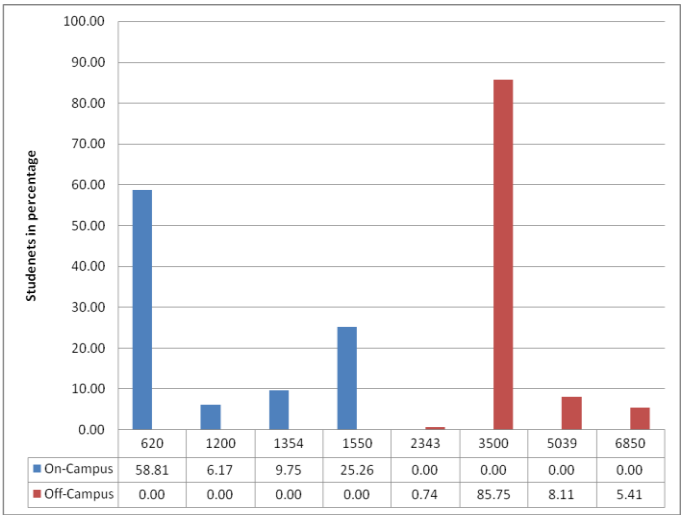

Figure 2. Distance travel by on and off-campus students

Figure 3 shows trip frequency of the sample students. Majority of trips frequency is also dominated by two trips per student : on-campus (79.61%) and off-campus (58.72%) students. The mean trip frequency by students living on campus (M = 2.16, SD = 0.42, N = 1231) is slightly higher than the mean trip of students living off-campus (M = 1.59, SD = 0.49, N = 407). Frequency of trips to academic area are significant among the students living on campus ($x^2(1231) = 1235.5$, $p < 0.01$) and among those living off-campus ($x^2(407) = 12.38$, $p < 0.01$).

Transport mode is an important indicator of both the level of mobility that people enjoy and the social and environmental externalities associated with transportation. In general, in choosing a travel mode for a particular trip, people consider both travel time and cost, together with factors such as the comfort, safety, and reliability of travel using that mode [Salon and Aligula, 2012].

Table 2 presents the breakdown of travel mode of students to academic area. Overwhelming majority of lecture trips were made on foot (81.64%) by on-campus and commercial buses (84.28%) by off-campus students. About 12.2 % of students living on campus used motorcycle taxi for lecture trips as compared to 5.41% of students living off-campus. A few of on-campus students (6.09%) used commercial buses as travel mode to shown in Table 2. Walking, only complement the main mode of students living off as majority of them walk to the bus stops before boarding buses to campus.

Factors determining the modes most frequently used by the sampled students are shown in Table 3.

Of these factors, the most important factors determining mode choice of students living on campus include distance to academic area (12.87%), health/fitness (18.13%) and cheapest means of transport (11.95%). academic area, while less that 1% of the students living on campus travel by private car. The modal split of off-campus students further showed that the use of Private Car accounted for 10.32% as

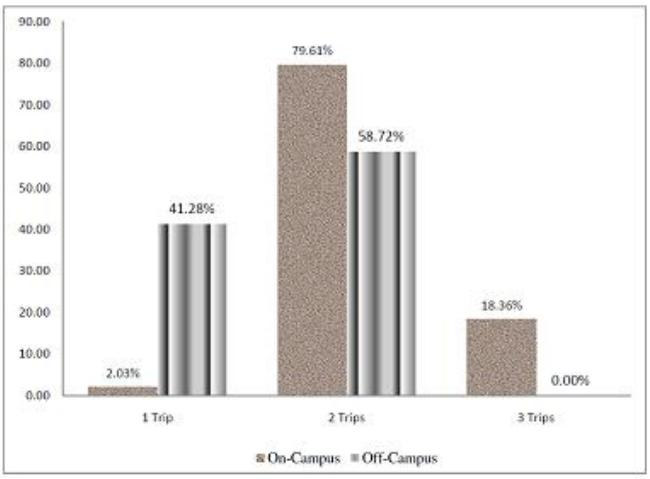

Figure 3. Trip frequency

Table 2. Travel mode of students

Transport Mode	Campus		Town	
	Frequency	Percent	Frequency	Percent
Walk	1005	81.64	0	0
Motorcycle	148	12.02	22	5.41
Bus	75	6.09	343	84.28
Private Car	3	0.24	42	10.32
Total	1231	100	407	100

Less important among the reasons for choice of mode were speed associated with the mode (1.77%), having heavy loads to carry (0.82%) and quality of walkway (3.84%).

In terms of factors influencing the preferred mode choice of off-campus students, the most important factors are distance travel (23.39%) and having heavy load to carry (12.77%). Other important include service frequency (10.77%), safety while on board vehicle (10.71%), safety at bus stops (7.16%) and quality of vehicle (6.18%).

The determinants of mode choice are not the same for on-campus and off-campus students (table 3). For example, as low as 4.99% and as much as 11.95% of off-campus and on-campus student respondents respectively mentioned the cost of transport (affordability) for choosing their preferred modes. Similarly, timeliness of mode (fits my schedule) was mentioned by off-campus (2.74%) and on-campus (5.86%) students respectively .

Comparing factors influencing the choice of mode for the on and off – campus students, , the first point that emerges is that cost of mode and accessibility to bus stop are much less important for on-campus students than the off-campus students (table 3). There is also a large difference between the importance placed on distance, fitness and hours of service provision by the two groups of students. However, both groups shares about the same perception on the influence of travel mode on their preferred mode on their mode choice behavior. Speed of mode attracted 1.07% and 1.17% respectively for off-campus and on-campus students.

Travel time for lecture trips is shown in Figure 4. The travel time of students living on campus differs significantly from off-campus students ($x^2(1638) = 586.84$, $p < 0.01$). The most common trip length in terms of time was 10 minutes or less for students living on campus (48.25%) and 15 minutes for students living off campus (23.34%). The second most common time for on campus students (27.70%) was 15 minutes and 30minutes for off-campus students (20.64%). More on-campus than off-campus students (24.05% versus 20.15%) spend 20 minutes to travel to school. About 20.15% of students living outside the campus commute to the academic area under 5 minutes. In this group are students staying opposite the campus 'gate 1' and use motorcycle taxis to travel to campus.

Table 3. Reasons for mode choice

Reason	Category	Off-Campus Bus	On-Campus Walk
Accessibility	Walking distance to stops	1.81	10.35
	Distance to academic area	23.92	12.87
Comfort/convenience	Have to carry heavy loads to campus	12.77	0.82
	For the exercise/health reasons	2.22	18.13
	Quality of vehicle/motorcycle	6.18	3.84
	I enjoy traveling by this mode	6.1	4.81
Affordability	Cheapest means of transport	4.99	11.95
Availability	Service frequency	10.77	6.08
	Service provision hours	4.78	6.18
Reliability	Service reliability	4.78	6.86
	Faster than others modes	1.07	1.77
Timeliness	Fits my schedule	2.74	5.86
Safety	Safety at bus stops	7.16	4.22
	Safety on board the mode	10.71	6.26

Transport fares vary based on distance and mode. For instance, over 80% of the students living on campus incurred no cost of transport as most of them walked to main campus for lectures. About 39.07% of off-campus students pay ₦20 as bus fare to reach academic area for lectures from the campus' main gate, a distance of about 2km. For the same travel distance, about ₦100 is charged by motorcycle taxi operators per passenger. Only off-campus students (15.72%) pay ₦100 as transport fare for lecture trips. Bus trips from the hostel area to academic as at the time of the study was ₦20 and an average of ₦30 is charge by motorcycles taxi operators per trip from the academic area to students residential areas on campus. Figure 5 presents the distribution of transport fare between students living n campus and off-campus.

Furthermore, transport fares by off campus students vary .For instance, 21.13% of the respondents pay ₦40 to reach academic area from town as bus fare. Among the off-campus students 24.08% spend about ₦60 as bus fare for lecture trip from town to campus. Bus fare in the city is based on distance travelled. About ₦100, the highest bus fare in the city, is charged as transport fare from Abaiya-Gani on the outskirt of Ile -Ife along Ife – Osu– Ilesa road to Campus and from Obafemi Awolowo University Teaching Hospital Complex (OAUTHC), Fajuyi Road and Sabo to campus attracted ₦60 as bus fare. While ₦40 is commonly charged for trip from Lagere / Mayfair to campus.

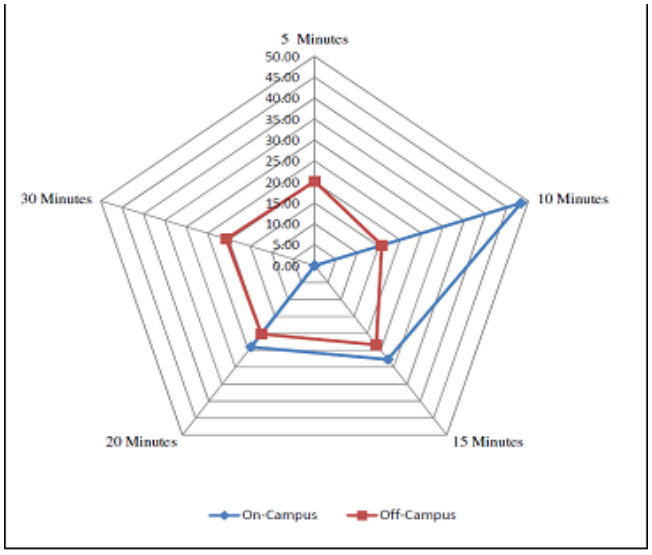

Figure 4. Travel time to campus

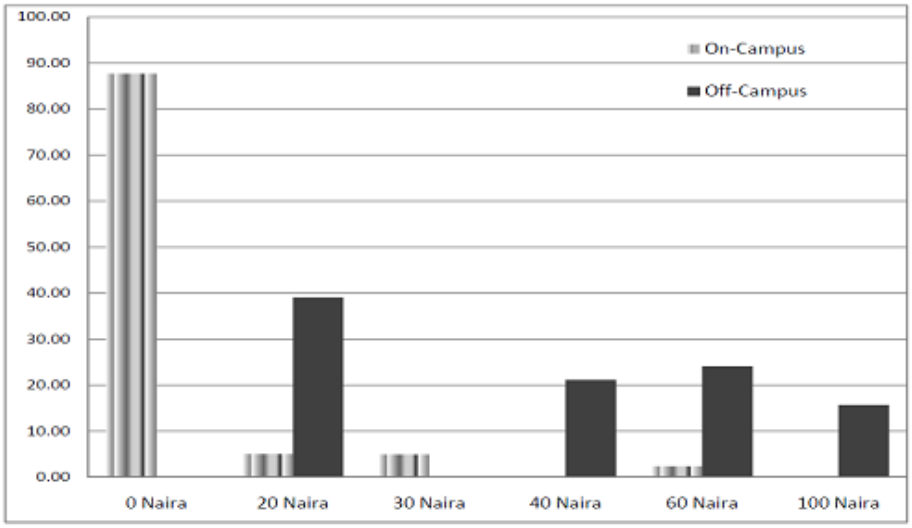

Figure 5. Travel cost

To validate and explore further factors influencing mode choice, a logistic regression was used to explore the impact of individual socio-economic and trip attributes on mode choice of students with reference to: walk, motorcycle taxi and commercial buses. In this analyses, coefficients of independent variables are evaluated according to three criteria: (1) the sign of the coefficient, (2) its magnitude, and (3) its statistical significance (see Buehler, 2011). All estimations were undertaken using SPSS Version 15.0. The estimation results are shown in tables 4

The first of the three models in Table 4 shows the results of logistic regression analysis of walk as mode choice of students for lecture trip. The amount of variations in the dependent variable (walk) explained by the model is high. About 88% (Nagelkerke R^2) of the variability is explained by the variables used in the model.

Three of the selected variables have significant influence on walking as mode choice, especially among on-campus students. Two of the socio-economic variables (age and monthly stipend) were statistically significant. As age increases, the probability of students walking to lecture also increases. For instance, an increase in age of students by a year, will increase the odds of walking as mode choice by 97.6%: (Exp(B) – 1) × 100% = (1.976– 1) × 100%. However, monthly stipend with a coefficient of 0.001 ($p< 0.05$) is a wick predictor of dependent variable (i.e the closer a logistic coefficient is to zero, the less influence the predictor has in predicting the logit).

In terms of trip characteristics, only trip frequency is statistically significant ($p<0.05$) factors determining the probability of a student walking to lecture. Travel distance, time and cost were not significant. Travel distance proved to be of less influence in determining the probability of walking as mode choice of the sampled students. An increase in travel distance, especially on-campus students by a meter , will increase the odds of walking as mode of transport by 0%: (Exp(B) – 1) × 100% = (1.000 – 1) × 100%. Of particular note is the negative influence of travel time on walking as mode choice, an increase in travel time of students by a minute, will decrease the odds of walking as mode choice by -3.1%: (Exp[B) – 1) × 100% = (0.969 – 1) × 100%.

In the second model – the motorcycle taxi model, also shown in Table 4, four variables were negatively significant. For instance, being female had substantial negative effects on motorcycles usage: an increase in total student by a female, will decrease the odds of using motorcycle taxi as mode choice by -9.7%: (Exp(B) – 1) × 100% = (0.903 – 1) × 100%. Also as age increases by a year, the probability of students using motorcycle taxi to lecture also decreases by 33.9%. Travel distance and travel time also impact negatively the odds of using motorcycle taxis by the students to lecture. Two other variables were positively significant. An increase in monthly allowance of students and travel cost increases the odd of using motorcycle taxis as mode choice for lecture trips respectively [Table 4]. The amount of variations in the dependent variable [motorcycle taxi] explained by the model is about average. About 57% (Nagelkerke R^2) of the variability is explained by the variables used in the model. The goodness-of-fit test statistic ($\chi^2 = 87.45$, df = 8, $p < 0.05$) revealed that the model is a good fit of the data.

The third model in Table 4 shows the results of logistic regression analysis of commercial bus as transport mode for lecture trips. All the four trip variables are positively significant. In the model, Travel distance proved to be of less influence in determining the probability of using commercial bus as mode choice. An increase in travel distance of especially among off-campus students by a meter , will increase the odds of using bus as mode of transport by 0.3%: (Exp(B) – 1) × 100% = (1.003 – 1) × 100%. In the other trip variables the odds of using commercial bus varies travel time (59%), trip frequency (-60.6%) and travel cost (-7.4%). Gender is the only significant predictor of the use of commercial bus as mode choice of student among the three socioeconomic variables. The amount of variations in the dependent variable (bus) explained by the model is equally high. About 71% (Nagelkerke R^2) of the variability is explained by the variables used in the model. The goodness-of-fit test statistic ($\chi^2 = 93.68$, df = 8, $p < 0.05$) revealed that the model is a good fit of the data.

Table 4. Estimation of logistic regression analysis of the three models

	Walk[1]			Motorcycle[2]			Bus[3]		
	B	Sig.	Exp[B]	B	Sig.	Exp[B]	B	Sig.	Exp[B]
Constant	2.607	0.066	13.564	0.78	0.44	2.18	-3.816	0.000	0.060
Socioeconomic factors									
Sex[female][1]	-0.042	0.449	0.959	-0.101	0.011*	0.903	0.184	0.000*	1.202
Age in years	0.681	0.016**	1.976	-0.413	0.032*	0.661	0.116	0.608	1.123
Monthly stipend	0.000	0.000*	1.000	0.000	0.006*	1	0.000	0.895	1.005
Trip characteristics factors									
Travel distance	0.000	0.627	1.000	-0.002	0.000*	0.998	0.003	0.000*	1.003
Travel time	-0.032	0.312	0.969	-0.050	0.003*	0.952	0.057	0.000*	1.590
Trip frequency	1.543	0.000*	1.677	0.091	0.648	1.095	1.638	0.000*	0.394
Travel cost	-1.581	0.971	0.206	0.131	0.000*	1.139	0.077	0.000*	0.926
-2 Log likelihood		471.70			828.89			694.23	
Nagelkerke R Square		0.88			0.57			0.71	
Hosmer & Lemeshow x^2		11.94			87.45			93.68	
df		8			8			8	
Sig.		0.15			0.00			0.00	

This study has looked at lecture trip characteristic and mode choice of on-campus and off-campus students in Obafemi Awolow University Ile-Ife, Nigeria. The findings of the study show significant differences regarding lecture trips, mode choice and determinants of mode choice between students living on campus and those living outside campus.

In terms of trip frequency, the study revealed that on-campus students generate a slightly higher average lecture trips than off-campus students. This finding is in agreement with the finding of Chen [2012] on students travel behavior at Virginia Commonwealth University. This is not supervising as students living on campus can easily move from lecture halls to hostels in between lectures. This however depend free time available between lectures. Off-campus students have no such opportunity as distance, time and transport fare may hinder them from embarking of frequent lecture trips.

Another finding from this study is the extent to which walking and commercial buses for long dominated other modes for short distance and long distance trips of students living on campus and those living outside the campus respectively. Previous research Abiola & Ayodeji [2012]; Wang et al. [2012]; Zhou [2012], Ipingbemi & Aiworo [2013], Olawole & Aloba [2014] have also revealed the dominance of walking mode for short distance school trip and public transport, in this case commercial buses, for long distance school trips.

The study also found differences in factors influencing mode choice of the sampled students. In case of on-campus students, accessibility in term of walking distance to lecture area is very important. Other important factors are cost of transport and health benefits associated with walking as mode of transport. Important factors influencing transport mode choice of students living outside the campus include travel distance to lecture, service frequency, safety and service frequency. The impacts of these factors on mode choice of the students are in line with other studies as well [Gonzalo-Oren et al, 2012; Chattel et al, 2011; Shannon et al, 2006; Mokhtarian & Salomon, 2001, Ipingbemi & Aiworo 2013].

The most striking finding from this study is the extent to which different variables influenced the odds of using each of three modes: walk, motorcycle taxis and commercial. The results of three logistic models one each for walk, motorcycle taxis and commercial buses show varying statistical coefficient estimates at 95% level of significance for

several independent variables. While controlling for other variables, travel distance increases the odd of using motorcycle taxis and buses than it influence the odds of walking mode among off-campus students. Travel time and cost positively influences the probabilities of using motorcycle taxis and buses than walking. Being a female student also reduces the odds of using motorcycle taxis, while it increases the odds of using commercial buses especially for off-campus students who travel longer distance for lectures. Remarkably, monthly stipend contributes very little to the odds of walking and the use of motorcycle taxi as transport modes. This is to be expected especially with regards to walking which have not cost implication. Aligning with findings from Mokhtarian & Salomon, [2001] and Gonzalo-Orden et al. [2012] among others, findings of this study confirm that different negative and positive effect of socioeconomic and trip characteristics have on different mode choice of students.

4. Conclusion

An important conclusion from the study is that walking and commercial buses have the potential to account for a large number of trips as they are the dominant mode choice of on-campus and off-campus students travel respectively. Promoting walking through further investment in pedestrian infrastructure and safety within the university environment can be effective in improving the health of students, and introducing them to active mode, an example of sustainable transportation. In addition, investments in the inter modal system that we see student changing modes from commercial buses at the university main gate to sustainable transport mode for the last leg of trip to campus, a distance of 2km from the main gate, will not only make the university more livable for students and lecturers, but more attractive for visitors, and more environmentally sustainable.

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