Assessing Barriers To Household Waste Recycling: A Case Study Of Coventry University Postgraduate Students

Jatau Sarah and Binbol N.L

Geography and Planning Department, University of Jos, Nigeria

Abstract- Household waste recycling requires the participation of all individuals which include student's population who are transient in nature but contribute largely to waste generation. A case study of Coventry University Postgraduate (CUPG) students, with the objective to identify the barriers facing these group of students. To give every student an equal opportunity of selection, simple random sampling was used for data collection. To get at least 100 responses, a number of 150 CUPG students were sampled, using questionnaires as a tool for data collection. Out of 150 questionnaires administered, 128 questionnaires were retrieved. SPSS was used for data analysis to identify the various barriers that CUPG students face in recycling household waste. Findings obtained show that behaviour and attitude barrier are interdependent on knowledge barrier as results reveal that although 67% are in the habit of recycling, 82% are too busy to sort out their recyclables (Behaviour Barrier) and 85% are of the opinion that they will recycle more if they understand the benefit of recycling (Attitude Barrier); majority of the students (93%) were in need of bigger bins and more storage space for their bins (Situational barrier). Emphasis was made on knowledge barrier being a major challenge therefore, this study recommends the need for more awareness for students to understand the need and benefit of recycling.

Index Terms- Household Wastes, Recycling barriers, Transient Students, Awareness level, Recycling habits, Postgraduate Students

I. Introduction

House of Commons (2014) report on waste management in England reported that approximately 177 million tonnes of waste is discarded yearly in England. 22.6million tonnes of the total waste discarded are household waste, which weighs averagely 423kg waste per person. Discarding this amount of waste shows poor waste consumption which has negative impact on the environment. House of Commons (2014) identified household waste recycling to be a top priority in recovering back lost resources.

Increased recycling is a vital way of mitigating waste generation as it reduces dependency on landfill which is detrimental to the environment and leads to air pollution, groundwater contamination, methane emissions and increase in resource loss Hershkowitz, (1997) and WRAP (2010a). According to WRAP (2008) effective recycling has a link with individual participation. Four basic barriers were identified that are likely to hinder public participation in recycling: Knowledge, Behavioural, Attitude and Situational barrier. Perrin and Barton (2001) pointed out the key barrier as knowledge barrier. Their survey on two kerbsides identified the main reason given by respondents before scheme implementation were lack of time and inconvenience, of which after implementing the scheme, the participation level of individuals increased by half the population compared to the previous scheme. According to WRAP (2008) knowledge barrier could be seen as a challenge, as there could be poor understanding on why people should recycle. This was further agreed by (Mori 2002) survey which identified that people are unaware of recycling and its importance. Furthermore, DEFRA (2002); Mee et al. (2004) and Zen et al. (2014) also agree that storage space and insufficient facilities are possible factors that limit household waste recycling. In addition, Hernandez et al. (1999) in Ecuador ascertained that economic incentives to sell recyclables are a motivating factor to individuals especially to those who earn a low income thus enhancing their attitude towards recycling.

The University population is a large, transient group which significantly contributes to the environment. Assessing their behaviour and attitude towards the environment is imperative in enhancing recycling rate and similarly reducing waste generation. Adomssent (2013), Corcoran and Wals (2004) opined that higher institutions have key roles to play towards effective recycling rate. Based on previous studies, to enhance the recycling rate and reduce waste generation. Students are special group of the public that their recycling behaviour need to be explored. Studies by Robertson and Wallington (2009) discovered that recycling participation is centred on other populations with little or no attention given to the younger population such as the University Students. This propelled a study to investigate Oxford University student's behaviour on recycling.

Timlett and Williams (2009) studied the impact of transient or temporary students on recycling using a survey of 1300 households. 40% of the households surveyed, lived in houses for over three years which he termed as long-term residents and about 48% lived in houses for about a year or less. Based on the results obtained from these two groups, the study concluded that the longer the students live in a particular house the better their recycling participation. It was further discovered that 21% out of the 1300 households surveyed were students who live in rented

houses of which 92% of the students' population live in a house a maximum of one year. He then concluded that because of student's short-term residency, they tend to recycle less as they are not attached to a particular location as shown in figure 1, where long term residents recycle more than short term residents.
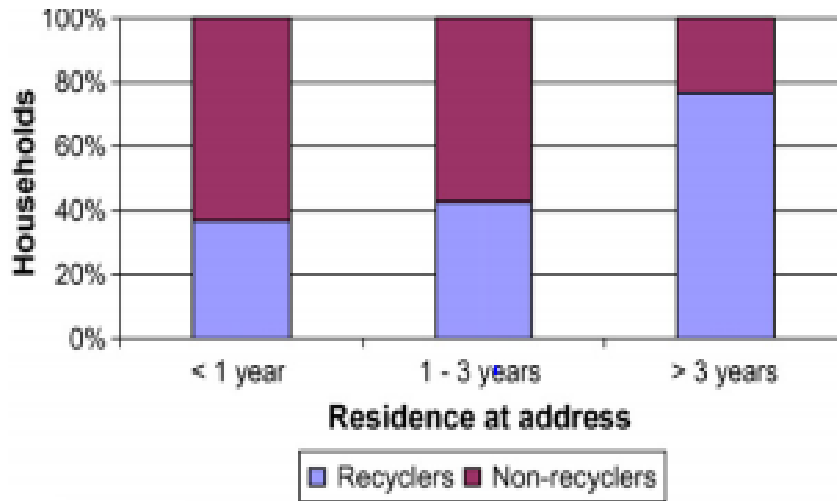

Figure 1 Residence duration of stay and their recycling rate. Source: (Williams and Timlett 2009)

Therefore, using CUPG students as a case study, this study aims at assessing the various barriers that impedes the recycling rate of this group of the public. Thereby suggesting ways through which their recycling behaviour could be improved.

II.   MATERIALS AND METHODS

Study Area

Coventry University is situated in Coventry City on coordinate 52º24'29" N 1º30'38" W. Coventry City is 31km east-southwest of Birmingham, 39km southwest of Leicester, 18km north of Warwick and 151km Northwest of London. Coventry is an urban area in the West Midlands of England in the central part of the British Islands with an approximate population of over 300,000 people.

2.1   Method of Data Collection

This study employed the use of questionnaire using the 5 point likert-scale from strongly agree, agree, strongly disagree, disagree and I do not know. Using simple random sampling technique, the questionnaires were distributed at random giving every respondent equal opportunity to respond to the questionnaire administered.

2.2 Population and Sample Size

CUPG students were used for this study which were students from Engineering, Arts and Social Science department. The CUPG students are a typical example of transient students, as most of the student's duration of study was for a period of one year.

To determine the sample size from an unknown population size, this study used the formula suggested by Saunders et al. (2012) which is;

$$N^A = \frac{n \times 100}{re\%}$$

Where, N^A = actual sample size, Re = estimated response rate 100= Constant Value

$$N^A = ? \qquad n=100 \qquad re\% = 95\%$$

$$N^A = \frac{100\ (minimum\ sample\ size) \times 100(constant\ value)}{95\%\ (estimated\ response\ rate)}$$

Using the formula above the sample size required for this survey is:

$$N^A = \frac{100 \times 100}{95}$$

N^A = 105 questionnaires, the actual sample size for this study

According to (Moore 2000), for a population, a sample size of at least 100 should be used for a survey. To obtain at least a 100, this study administered about 150 questionnaires at random to the CUPG students mainly in the Engineering, Arts, Social sciences and Humanities department. A number of 128 questionnaires were retrieved for analysis. This study observed ethical consideration and approval before administering the questionnaires.

2.3 Method of Data Analysis

This study used Statistical Package for Social Sciences (SPSS) to analyse the data obtained from the CUPG students and to derive descriptive statistics. Figures in form of graphs were drawn out for better discussion and clarification of the data obtained. Each column of the figures represents a question and responses of the 128 CUPG students.

III.   RESULTS AND DISCUSSIONS

A sample size of 128 students was used for the study. The data obtained was analysed and represented in a descriptive format with frequency tables and graphs. To achieve the objectives,

graphs were used to summarise the responses of CU students to identify the different barriers that could be a challenge to students recycling efficiently, using the 4 identified barriers; knowledge, behaviour, attitude and situational barrier as key indices to understand the students level of recycling participation. The following questions were used to describe the knowledge barrier;

3.1 KNOWLEDGE BARRIER

Table 1 summarises CUPG student's responses to the behavioural pattern;

s/no	Variables	Scores	%
1	I am aware of recycling	25	98
2.	I agree that recycling is good	121	99
3.	I do not think recycling is important	4	2
4.	I am aware of the collection days	68	54
5.	I am of the opinion that there should be more collection days	76	59

Table 1 showing the frequency table of CUPG students responses to recycling

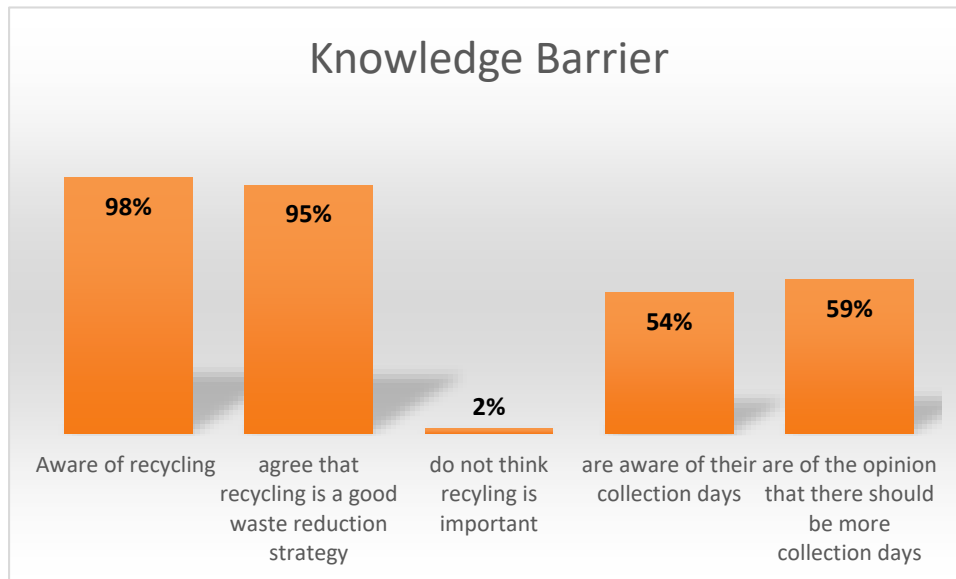**Figures 2 and 3 describes the knowledge barrier:**

Figure 2 identifying the knowledge barrier of students recycling habit

Table 1 and Figure 2 summarises that 98% of students are aware of recycling, 95% agree that household recycling is a good waste reduction strategy although 2% do not think recycling is important, 54% are aware of their collection days, 84% are aware of their local councils being responsible for taking away their waste and 59% are of the opinion that there should be more collection days.

The results obtained indicates that CUPG students are familiar with the practise of recycling and agree that recycling is important this is in accordance with Thang (2011) survey on students are being aware of recycling and agreeing that recycling is important. CUPG students see the importance of recycling but only 54% of the students actually know when their recyclables are being collected by the local council. This shows that it is one thing to be aware of recycling and it is another thing to participate fully this is in line with Aini et al. (2007) whose study reveals that

students are generally aware of recycling but a lesser number actually participate in recycling.

To further understand the actual waste that CU postgraduate students recycle, Fig 2 and table summarises their responses and awareness of the recyclables they should recycle.

S/No	Variables	Score	%
1.	I recycle glass	24	19
2.	I recycle green waste	32	25
3.	I recycle paper	51	40
4.	I recycle plastics	39	30
5.	I do not know	17	13

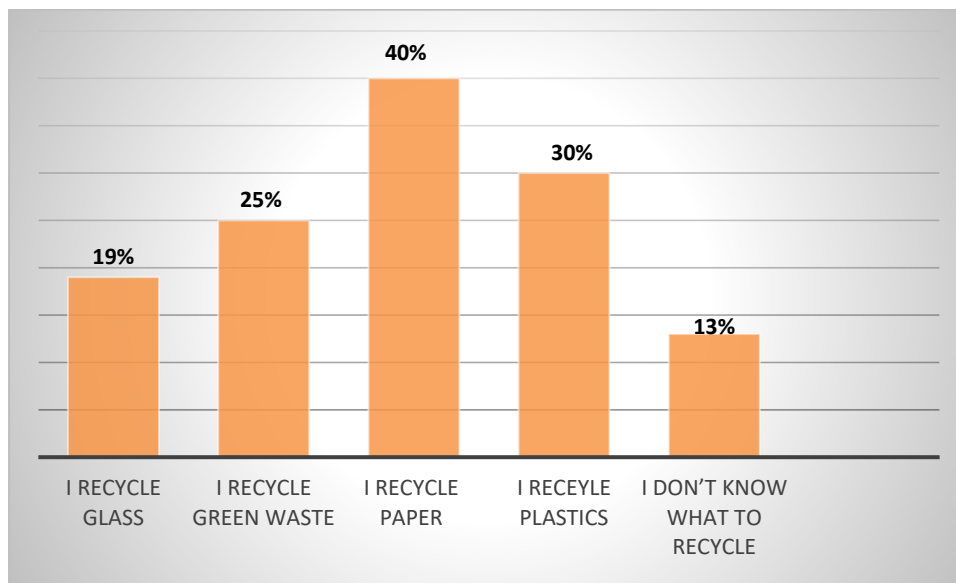**Table 2 showing the frequency table of the recyclables CUPG recycle**

Fig. 3 showing the recyclables students recycle more

Students understanding of what to recycle is imperative as it was discovered that 19% of the CUPG students recycle glass, 25% recycle green waste, 40% recycle paper, 36% recycle plastics and 13% do not know what to recycle. From results shown, students recycle more of paper and plastics, this is similar to Wilcox (2014) research study in Wartburg College, 100% of students in the study recycle paper, 91% plastics, 15% glass and only 6% recycle organic materials, Wilcox concluded that students find it easy to recycle paper and plastics as they are more aware of recycling paper and plastics. This makes it a challenge when students do not know what to recycle, this is in line with previous studies such as Foltz (1999); Barr et al. (2003), Mc Donald and Oates (2003). Furthermore, study carried out by Tonglet et al. (2004) pointed out that availability of kerbside scheme is not enough to increase recycling rate as in-depth knowledge on what and how to recycle needs to be clearly communicated to postgraduate students as it is to the general public. Similarly, Miranda and Blanco (2010) investigation on high paper recovery in European countries came to a conclusion that awareness is the major factor influencing high recycling rate.

This indicates that CUPG students recycle more of paper and plastics probably because they are more aware of recycling paper and plastics. Enlightening CUPG students frequently on what to recycle as well as making it easier for them to recycle will probably enhance them to recycle more items. This is in line with the study carried out by Kelly et al. (2006). However, the reason 13% of the CUPG students do not recycle, may include not being bothered or having time to recycle as this cannot be considered as a knowledge barrier but a mindset towards recycling. Nevertheless, if these 13% of residents are more knowledgeable about the benefits of recycling they might have a positive perspective towards recycling.

3.2 BEHAVIOUR BARRIER
To understand the behaviour of the students, Table 3 and Fig. 4 shows that 23% of students are not in the habit of recycling,

8% have no idea why they should recycle and 32% forget to recycle. Most of the students (82%) are too busy to sort out their waste which is in line with Perrin and Barton (2001) on kerbside survey in Leeds which identified that individuals find it difficult to sort out waste, (95%) have a challenge of identifying recyclables and therefore finding recycling complicated. Mori (2002) identified that individuals have no time to sort and store recyclable waste which affects the recycling behavior of individuals. It is therefore suggested that a simplified separation and collection system could result to an increased recycling rate. Provision of a wide range of collection bins will make it easier for the CU PG students to recycle more. On the overall, analysis of behavioral barriers shows that 77% are of the habit of recycling but only 33% take extra effort to separate their waste.

S/No	Variables	Score	Percentage %
1.	I am not in the habit of recycling	29	23
2.	I have no reason why I should recycle	10	8
3.	I forget to recycle	41	32
4.	I have better things to worry about than to recycle	69	54
5.	I am too busy to sort out waste or recycle	105	82
6.	Identifying recyclables can be complicated	121	95
7.	I have an extra bin to help me recycle more	40	33

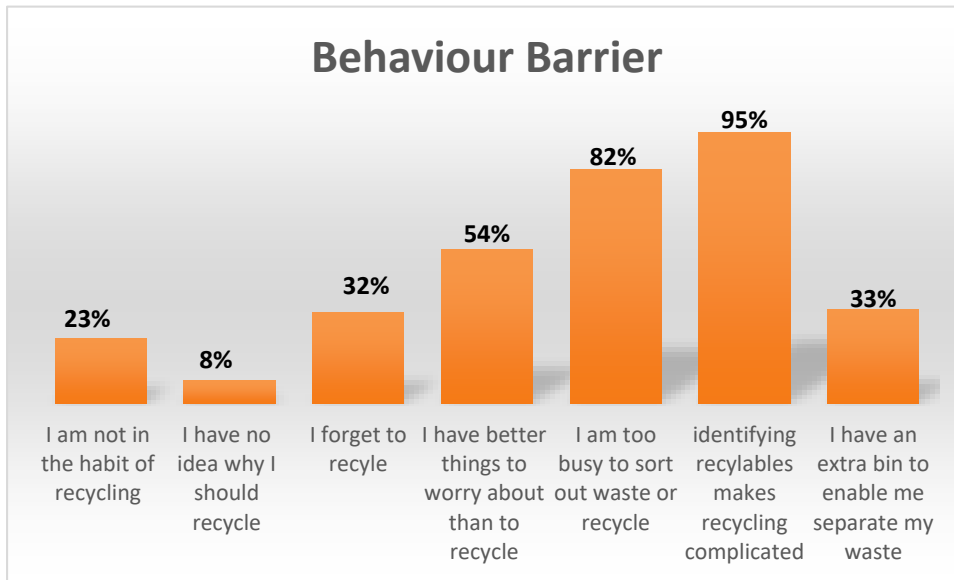**Table 3 showing the frequency table of CUPG students behavior to recycling**

Fig. 4 showing the behavior of students towards recycling

Further analysis of behavioral barrier shows that more than half of the population (54%) agreed that they had better things to worry about than to recycle, this is in line with Knuseen et al. (2004) study, they discovered that young people tend to be not concerned about recycling as student's transient and time pressured lifestyles tend to shift their interest from recycling thereby influencing their recycling behavior negatively. Furthermore, Busteed et al. (2009) opined that students do not feel a sense of belonging to a community and therefore see themselves as temporary residents this might suggest a global attitude to the environment as they do feel responsible for a particular environment Thus, CUPG students could be enlightened more on the importance of recycling. There is therefore a need for short term residents to be aware and understand the need to be responsible to their environment wherever they reside regardless of their duration of stay.

3.3 SITUATIONAL BARRIER

To understand the situational barrier of the students towards recycling as revealed by WRAP (2015) and Coggins (1994), unavailable space and limited bin size could be a limiting factor of recycling. When students were asked how they would react to damage/loss of recycling bins, 37% said they would report to their city council, 27% said they would report to their landlord, 32% have no idea of who they would report to. This shows that knowing who to report to plays a key role in the recycling habits of the students. Figure 4 shows how effective the students recycling bins have efficiently influenced the students recycling habit. And as seen in figure 5, majority of the population (93%) agreed that there is a need for larger sized bins while 15% were satisfied with the size of the bin, 7% were neutral of the bin size. Studies such as, Coggins (1994), DEFRA (2002) and Zen et al. (2014) opined that insufficient recycling bins and space are limiting factors to recycling.
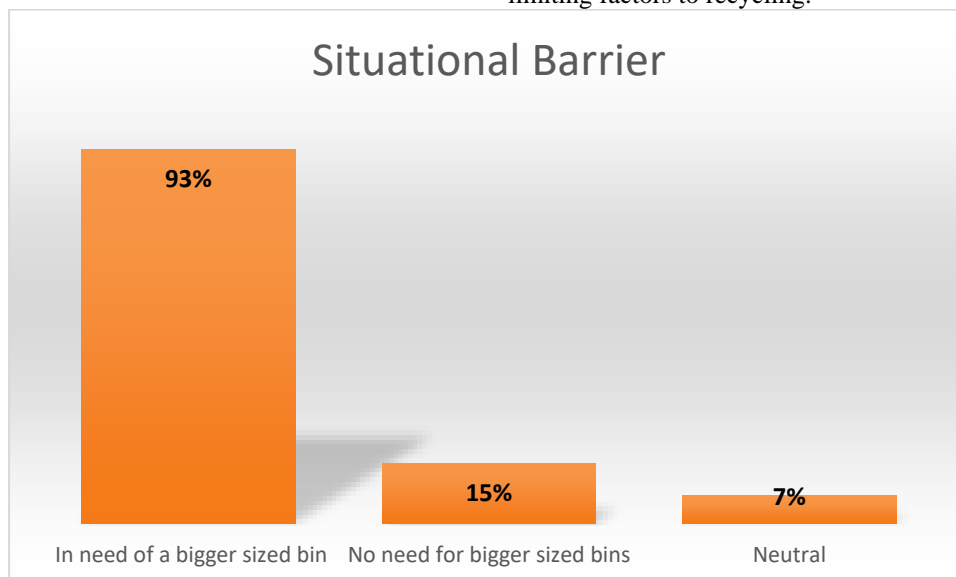

Fig 5 showing CUPG need for bigger bins to aid their recycling habit

3.4 ATTITUDE BARRIER

Figure 6 illustrates the barrier and motivating factor that influences CUPG student's attitude towards recycling. 85% of the CUPG students indicated that they will recycle more if they are aware of the benefits of recycling. Lee (2008) study on environmental attitude of American African College, explains that students with positive environmental attitude tend to recycle more. Blake (1999) identified that the main barrier to environmental issues is lack of information as information provides knowledge which shapes attitude therefore leading to a behavioral pattern. However, Sammer and Wustenhagen (2006) indicated that people may be aware of environmental issues yet it does not motivate them to participate in recycling as attitude is built on awareness. Retallack et al. (2007), attitude transformation towards recycling depends largely on incentives and regulations as indicated in figure 6 where 85% of the students indicated the need of incentives

to recycle more. Furthermore, findings show that increased fine affects recycling as shown in fig 6 where 43% agree that penalty increases recycling rate. According to Amini et al. (2014) fine penalty is one major factor which enhances recycling rate although Timlett and Williams (2011) argued that students of low financial status might not be able to cope with the payment of fines. Results show that 73% of the students see themselves as temporary residence they do not see a need to recycle as seen in the study of Timlett and William (2011) where transient residents do not feel obligated to recycle. Transient students feel that they do not need to recycle but as seen in previous studies and this study awareness on the need to recycle, provision of incentives as a motivation factor and implementation of regulations by demanding fines moderately in convenience with students of low financial class will motivate students and other transient group to recycle more no matter their duration of stay.
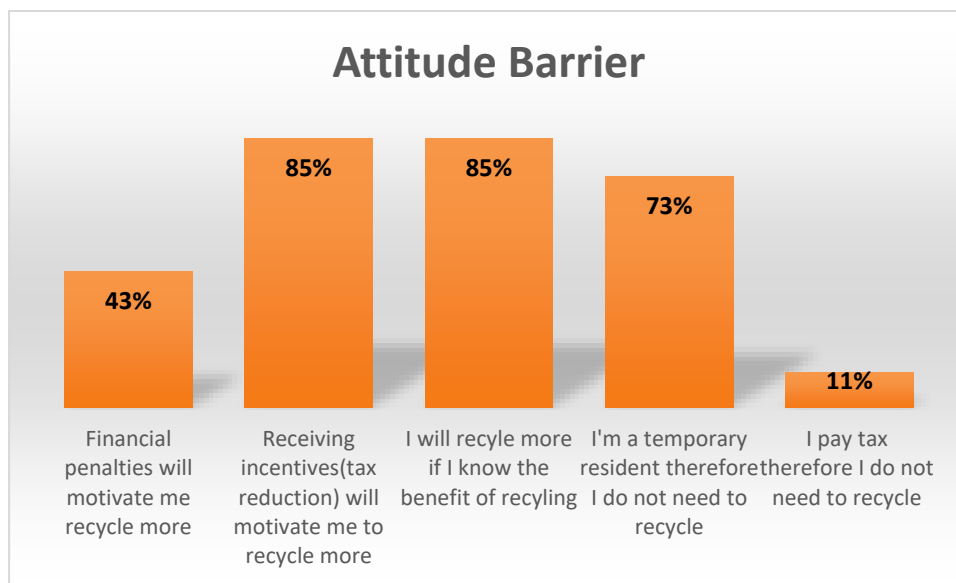

Figure 6 showing attitude of students towards recycling

In summary, this paper identified and agreed with WRAP (2015) that there are 4 major barriers that impede household waste recycling; these are knowledge, behaviour, attitude and situational

barrier. In order of importance table 6 summarises the 4 barriers that impedes the CUPG students from recycling household waste regardless of the fact that they are seen as a transient group among the population at large.

	Barriers identified	Factors
1.	Knowledge	Difficulty in identifying waste that should be recycled Unaware of the collection days
2.	Attitude	No incentive to motivate students to recycle more No understanding to why students should recycle Students being a transient group have no sense of belonging to the environment
3.	Behavioural	Students are too busy to sort out their waste Students have better things to worry than recycling
4.	Situational	Inadequate recycling bins Dissatisfaction with council's collection days

Table 3 showing a summary of barriers facing CUPG students recycling habit

From table 3, knowledge barrier is seen as the main barrier to CUPG students that impeded that recycling habit as they do not know what to recycle, how to recycle, and the benefits of recycling. To encourage them to recycle more, they need to understand the benefits of recycling and have a sense of belonging to the environment they live in (attitude Barrier). According to Byrne and O'regan (2014), Parsons et al. (2012) factors influencing behavior are knowledge, attitude and practice. Furthermore, Oskamp et al. (1999) concurs that knowledge is related to attitude and behavior comes in when people are interested in what they know and understand. This can further be enhanced by setting up the right infrastructures i.e. situational barrier. In summary the four barriers are inextricably interlinked.

IV. CONCLUSION

In conclusion, this paper using the WRAP 2015 barriers to recycling household waste model, aimed at identifying the four barriers facing CUPG household waste recycling which are Knowledge, Attitude, Behavior and Situation barrier. CUPG students were used as case study to see if this identified barriers are applicable to this set of population. This paper identified the four barriers according to importance Knowledge, Attitude, Behavior and Situational. With Knowledge barrier being the top most barrier to recycling habit of these group of students. It is therefore important that in every community no group should be overlooked and every group should feel a sense of belonging to a particular environment no matter their duration of stay.

V. RECOMMENDATIONS

Since knowledge is a key barrier, students need to be more aware of what and how to recycle as well know the benefits of recycling this can be achieved by creating awareness and campaigns to create awareness on the need for recycling as well as its benefits to the environment. Incentives can be given to students for example vouchers so as to encourage them to recycle more. Furthermore, the council need to provide larger bins as well as clearly identify the bin meant for a particular waste or wastes.

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AUTHORS

First Author – Jatau Sarah, Geography and Planning Department, University of Jos, Nigeria

Second Author – Binbol N.L, Geography and Planning Department, University of Jos, Nigeria