

Consumer Knowledge about Electric Buses in Underserved Communities in Huntsville, Alabama

Eyitayo Olaleye^{1*}, Jacob Oluwoye¹, Deden Rukmana¹, Joyce Pressley¹, Aschalew Kassu²

¹Department of Community and Regional Planning, Alabama A & M University, Normal, USA

²Department of Civil Engineering, Alabama A & M University, Normal, USA

Email: *eolaleye@bulldogs.aamu.edu

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Abstract

The major offshoot of innovation of electric vehicles (EVs) is sustainability. Given the prevailing challenges of carbon emissions from automobiles and the consequent effects on climate change, the introduction of EVs is timely to serve as an effective mechanism for reversing global warming. However, knowledge of EVs is not well distributed among the general population. This study is therefore aimed to analyze the familiarity of Americans with the basic features of EVs. One hundred respondents were selected from two underserved communities in Huntsville, Alabama, using a simple sampling technique. Nonetheless, only 71 residents returned the filled questionnaires. Data were analyzed using frequency counts and descriptive statistics. Findings revealed that the respondents were generally aware of EVs, but EVs are not yet common on their roads. The respondents also signaled low preferences for EVs. The purchase price, charging stations, and limited supply are the candid explanations for why EVs are not a priority in the respondents' choice of cars. To bolster peoples' taste toward EVs, the study, therefore, concludes that government authorities and city planners should popularize incentives among the people in underserved communities.

Keywords

Electric Vehicles, Consumer Knowledge, Descriptive Statistics, Underserved Communities, United States

1. Introduction

Electric vehicles (EVs) are not entirely new in the world. At the beginning of the twentieth century, the share of EVs in the total count of automobiles in the U.S.

was about 28% [1]. However, due to their limited capacity to travel a long distance and low rate of flexibility, EVs were displaced by internal-combustion vehicles that rely on gasoline [2]. More than a century after, the world has recognized the risks associated with the reliance on fossil fuel products as a main source of energy. Not only has the earth gotten warmer, but the balance of life in the ecosystem has also been under pressure [3]. The United Nations COP summits occur every year with the intention of aggregating deliberations among countries towards greening the earth—the latest was held in November 2021 in Glasgow, UK.

Although the summits have been criticized for championing more talks than actions [4], efforts have been underway, most notably since 2010, to shift the preferences of the world towards environmentally friendly EVs [2]. According to [5], the share of EVs in the global market for automobiles is roughly 3%, up from 2.5% in 2019. Although the re-introduction of EVs has a sluggish growth compared to its previous penetration more than 110 years ago, their future outlook seems promising as their production and consumption are supported by different government incentives around the world [6].

However, many researchers [7] [8] [9] have cast doubt on the success of EVs among consumers. They have reported not only limited awareness of individuals, especially those in major cities, but also unimpressive preferences of car lovers towards acquiring EVs. The scholarly findings have identified the sheer cost of acquiring and maintaining EVs coupled with charging burdens as the major barriers limiting the popularity of EVs. This low pace of familiarity seems to be majorly evident in populous countries of the world, notably the United States. A pointer to this uncirculated knowledge among Americans is that the U.S. currently lags behind China and Europe in the annual sales of EVs [5]. Even some residents of the U.S. are ignorant of existing government incentives for making EVs attractive to the general population [8]. It is against this background that this study intends to examine the knowledge of basic properties of EVs among residents of underserved communities in the U.S. This work is a follow-up and expansion of previous work done by [10].

The remainder of this paper is organized as follows. The next section reviews previous studies that have assessed the extent of knowledge diffusion of EVs in the U.S and elsewhere. This is followed by a theoretical background of consumers' familiarity with new products. Then a methodological technique used in this study is presented and the results of the data analysis are discussed. Finally, concluding remarks and recommendations for policy design mark the end of the study.

2. Review of Existing Literature

As the world's attention was shifting toward EVs by the end of the first decade of the 21st century, [1] conducted interviews among automobile executives and consumers in the U.S. Their research was intended to analyze the chances of the

popularity of EVs among Americans. They found that less than half of the executives were aware of the innovation in EVs, but the majority of consumers were enthusiastic about the experience of riding EVs. Their research therefore suggested hubris among U.S. consumers towards EVs in the early days of the campaign for them.

[11] were early researchers who were interested in estimating the consumer knowledge of electric vehicles in the United States. They surveyed 2302 experienced drivers in twenty-one cities in the U.S. Their findings pointed out that 75% of the respondents were unaware of the basic properties of EVs, and more than 94% denied the existence of government incentives for promoting the interest of the general population on EVs. They further explored the causative factors of this knowledge diffusion about EVs and reported that misinformation about acquisition cost and properties of EVs is a major barrier limiting the spread of information about EVs in the U.S. In a similar vein, using a survey conducted in 2011, [12] noted the purchase price as a push-off factor to respondents' awareness of the characteristics of EVs.

Using Amazon Mechanical Turk, [7] investigated the potential of market penetration of plug-in EVs. The study analyzed the perceptions of 1000 U.S. residents. In their analytical technique, which was anchored under the agent-based model, they identified that the predisposition of respondents towards the need to control greenhouse emissions determined their odds of knowledge about EVs and whether EVs would feature in their consumption bundles. The research further reported that respondents were mentally prepared to pay extra dollars for extra benefits associated with EVs. But only a few would think that way.

To quantify consumer attitudes toward plug-in electric vehicles, [13] conducted a survey among 1015 households in the U.S. Among other findings, he stated that about 50% of the respondents had seen electric vehicles in parking lots, but only 48% could name the make or model of a specific EV. To capture the preferences of the respondents, they were asked to state their next vehicle option (whether traditional or electric). Less than one-quarter would consider EV when buying their next vehicle. [13] therefore demonstrated the low expected utility of Americans in their decision to replace traditional vehicles with electric vehicles.

[8] collected quantitative data (from an online survey) and qualitative (from in-person interviews) from Americans living in California, Oregon, Washington, and other Northeast states. The authors were interested in measuring the valuations of respondents of new EVs that guarantee zero emissions. Their findings pointed out that awareness, experience, and consideration of EVs are generally low among the respondents. Even in California, which is popular with residents with a sophisticated taste for cars, only 38% of respondents were sufficiently aware of the basic elements and functioning of EVs.

In an attempt to update these surveys, [14], a U.S.-based think-tank that specializes in analyzing evidence-based consumer preferences, reported that 98% of sampled 3392 adult drivers in the U.S. were aware of plug-in and battery EVs.

Nevertheless, only 38% could describe their knowledge of EVs. This report suggested that an increasing number of Americans were getting familiar with available of EVs in automobile markets.

The U.S. is not isolated in the list of countries with unimpressive knowledge of EVs among the residents. The study of [15] was based on two samples of Canadian populations obtained in 2013 and 2017. The research identified that awareness (having heard of), familiarity (knowledge to describe) and experience (having driven) of EVs are generally low among the 2013 sample. But there was an improvement in only the awareness stage among the 2017 sample - familiarity and experience were still considerably crude among Canadians. Similar results were reported by [9] among more than 1800 respondents in the UK.

[16] reviewed factors that play an important role in affecting the familiarity of consumers with EVs. The authors grouped such factors as internal (such as ownership costs, driving range, and charging time) and external factors (such as relative fuel prices, consumer characteristics, availability of charging stations, and social perceptions). In another review by [17], the factors were rather grouped as political (government incentives, investment, and legislation, social infrastructure) economic (relative fuel costs, vehicle longevity, battery charging, and maintenance), and social (perception of accident/safety, eco-friendliness, and social judgment). Both [16] and [17] associated knowledge diffusion of EVs to be more related to non-financial factors than financial factors.

Using an aggregated binomial logit technique, [18] analyzed the awareness of residents across major cities in the U.S from 2003 to 2011. The researchers proved that electricity prices are correlated with the awareness of Americans of EVs. Because car users expect EVs to be sensitive to electricity, they are more likely to patronize EVs if electricity prices are low and less likely to do so if otherwise. If the findings of [18] were any guide, the current uptake of energy prices in the U.S. suggests that plummeting demand for EVs is imminent. In a similar vein, [19] surveyed potential EV users in the emerging markets of India and Sri Lanka. Their findings extended the existing argument that EVs are more popular among upper-income households than lower-income households. Also, government incentives play a significant role in the diffusion rate of EVs, especially in urban centers.

[20] asked 1216 residents of Beijing, China, about their propensities to patronize EVs. Having built the framework around the choice models, Ling et al. showed that gender and income level influence the chances that a Chinese person is aware and drives an EV. In particular, their findings suggested that male users of cars are early adopters of EVs. Also, individuals with high household incomes are more likely to be familiar with EVs than those with less than a median income level in China. Nonetheless, households with a previous strong inclination for traditional vehicles have low preferences for EVs. Similarly, [8] noted the future of EVs in the U.S. relied more on the decisions of men than women. Furthermore, male users have greater chances to describe EVs more

technically on driving and charging limits, while female respondents are more likely to base their judgment on the aesthetics of and their adaptability mechanisms with EVs.

3. Theoretical Framework

This study is anchored under the framework of the norm activation model (NAM), which is credited mostly to [21]. The main proposition of the NAM is that an individual's environmental behavior is conditioned on their personal norms and judgment [22]. The relevance of the NAM is explained by the major motivation for EVs in the contemporary world - to partly reverse climate change by eradicating pollution from automobiles. As supported by many studies in the literature, the concern of individuals about the environmental effects of fossil fuel products determines their propensities to be familiar with and patronize EVs [7] [19].

Figure 1 below is a schematic description of the Norm Activation Theory.

According to the NAM, the behavioral patterns in the environment exhibited by an individual are conditioned on their perceptions of the need for such behavior and the consequent responsibility [23]. That is, recognizing the need to save the environment precedes the behavior towards the environment (responsibility). If the need is established, responsibility follows with minimum external inducement [24]. By extension, if a consumer is conscious of the need to save the earth through decarbonization, they will not only be aware of the introduction of EVs, but they will also understand how EVs function and work towards driving them.

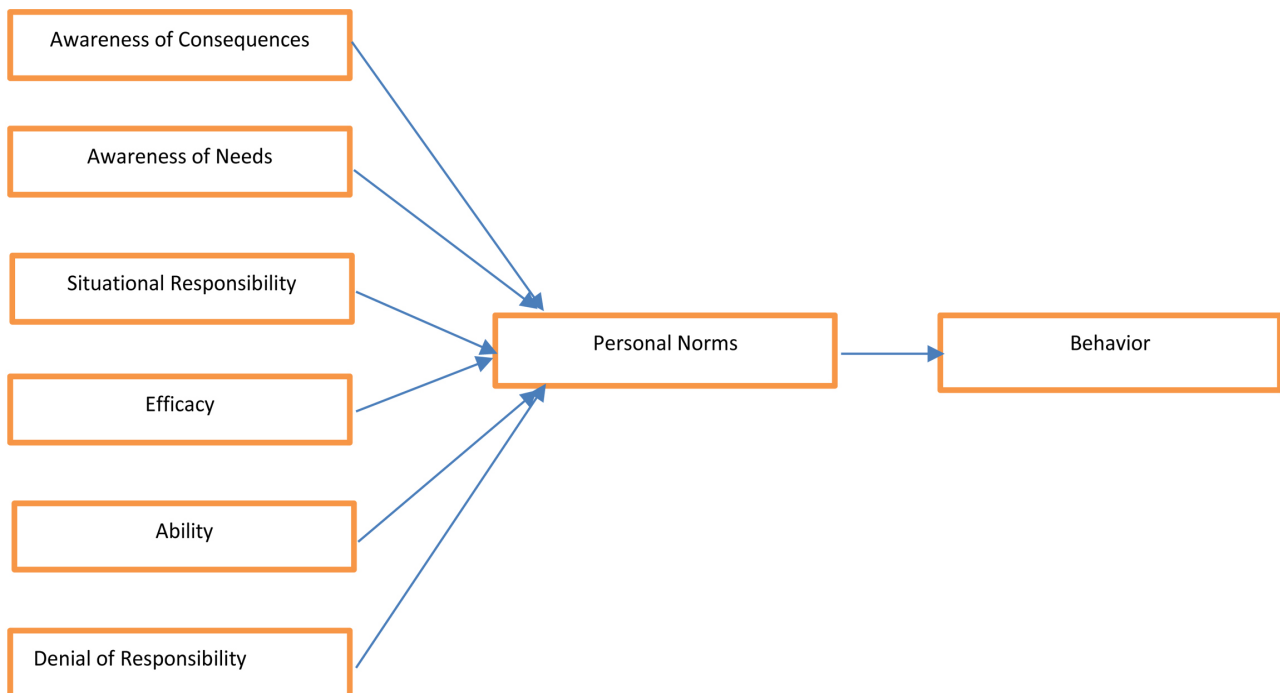


Figure 1. A schematic description of the norm activation theory [21].

The NAM is also linked to the individual's willingness to pay [23]. As the consumer satisfies the need and responsibility requirements of EVs, they would be willing to pay for EVs. This suggests that the evidence of high purchase price being a barrier to low diffusion of EVs applies mostly to people with an indifferent attitude towards global warming and the consequent health hazards that have followed it. On the other hand, those with adequate respect for human habitation and sustainability are knowledgeable about EVs. In essence, personal norms and standards of environmental conditions influence people's perception of the role of EVs in correcting the hazardous effects of climate change.

According to [24], intrinsic ethical behavior is the mechanism by which the tenets of NAM hold. And such behavior does not call for planning. This implies that the personality of an adult explains their attitude towards EVs. That is, if a person is ethically aware of risks associated with their assets, they will work towards downsizing such risks. Consequently, an individual that drives a conventional internal-combustion vehicle might recognize the risks with such a vehicle instantly and make an early switch to EVs as they are introduced.

4. Methodology

This study adopted a survey design to explore the knowledge of Americans about EVs. To do this, a questionnaire was designed to collect data on the familiarity of respondents with EVs. This instrument obtained the status of awareness about EVs, sources of such awareness, and the perceived causes of (low or high) information distribution about EVs. While most studies in the literature on EV knowledge considered major cities, this study takes a difference by simply sampling 100 respondents from two underserved communities in Huntsville, Alabama. These communities (Meadow Hills and Edmonton Heights) are known to have insufficient infrastructure packages relative to other urban centers. Participation in this study was entirely voluntary as the respondents were not previously induced before agreeing to fill the questionnaire. And the novelty of the study area in this study is believed to partly extend the existing literature on the awareness of EVs among the general population of the U.S.

Through a pilot test, the validity and reliability properties of the questionnaire were established to be high. With the aid of gatekeepers, the questionnaires were administered - 50 copies in each community. However, the retrieval rate was higher in Edmonton Heights (84%), but lower in Meadow Hills (58%), making the study feature opinions of only 71 respondents. The reason for the low retrieval rate in Meadow Hills may be due to the fact that it appeared that there were more people in the working-class status as there were fewer people home, compared to Edmonton Heights, which appeared to have more retirees resident at home during the survey period. After transforming the collected qualitative data into quantitative data, the analysis begins with the demographic information about the respondents and ends with a discussion of the findings. Descriptive statistics (frequency count, mean and standard deviation) was the method of

data analysis used.

5. Results

5.1. Demographic Information about the Respondents

Table 1 shows that most of the respondents (47) were female, 22 were male and 2 did not fill their gender on the questionnaire. It follows that the succeeding analysis will predominantly feature the opinions of females in this study. This happened randomly as the researcher did not deliberately choose more females than males to participate in the study. The gender distribution was also analyzed at a disaggregated level. Male respondents were more in Edmonton Heights (14) than in Meadow Hills (8). Similarly, female respondents were more in EH (27) than in MH (20). Only one respondent did not fill out the questionnaire in each neighborhood.

Table 2 presents the marital status of the respondents. Thirty claimed that they were single while 37 filled that they were not single. *Not single*, in the context of this study, means that the respondent was married or has a partner as of the period of administering the research instrument. Nonetheless, 4 respondents declined to supply information on their marital status. When looked at across the neighborhoods, the marital status of the respondents showed that the number of single and not-single people is almost the same in Meadow Hills. But the number of not-single people is higher than single people in Edmonton Heights. Two respondents did not reveal their marital status in each neighborhood.

Table 1. Gender of respondents.

| | Meadow Hills | Edmonton Heights | Total |
|-------------|--------------|------------------|-------|
| Male | 8 | 14 | 22 |
| Female | 20 | 27 | 47 |
| No response | 1 | 1 | 2 |
| Total | 29 | 42 | 71 |

Source: Authors' fieldwork, 2022.

Table 2. Marital status of respondents.

| | Meadow Hills | Edmonton Heights | Total |
|-------------|--------------|------------------|-------|
| Single | 14 | 16 | 30 |
| Not single | 13 | 24 | 37 |
| No response | 2 | 2 | 4 |
| Total | 29 | 42 | 71 |

Source: Authors' fieldwork, 2022.

As **Table 3** indicates, twenty-four respondents were at least 61 years old. This is the modal age group, followed by youths in the age bracket 36 - 44 years, who were 14. Participants aged 27 - 35 years were 11. The elderly in the age group 54 - 60 years were 10. The study represented only 1 person in the age range of 45 - 53 years. Young people of the age group 18 - 26 years were 9. Despite the assurance of confidentiality of their data, 2 respondents chose not to reveal their age. Taking the neighborhoods separately, it is evident that elderly people that are 60+ years are more in Edmonton Heights (21) than in Meadow Hills (3). This is also true for respondents in the age group 54 - 60 years, 27 - 35 years, and 18 - 26 years. However, youths that are 36 - 44 years old are more represented in Meadow Hills (13) compared to only 1 in Edmonton Heights. The only 1 respondent whose age falls in the bracket 45 - 53 years is from Meadow Hills.

Table 4 summarizes that all the respondents have formal education-reflecting the high literacy rate in the United States. But there are differentials in the levels of their educational qualifications. While the majority (48) completed College, 17 stopped at high school. A minority (4) did not have more than primary education, and only 2 persons did not reveal their educational attainment. Respondents at Edmonton Heights are relatively more educated than those at Meadow Hills—27 are college graduates at the latter against 21 at the former. Also, 11 are

Table 3. Age of respondents.

| | Meadow Hills | Edmonton Heights | Total |
|---------------|--------------|------------------|-------|
| 18 - 26 years | 3 | 6 | 9 |
| 27 - 35 years | 5 | 6 | 11 |
| 36 - 44 years | 13 | 1 | 14 |
| 45 - 53 years | 1 | 0 | 1 |
| 54 - 60 years | 3 | 7 | 10 |
| 60+ years | 3 | 21 | 24 |
| No response | 1 | 1 | 2 |
| Total | 29 | 42 | 71 |

Source: Authors' fieldwork, 2022.

Table 4. Education qualification of respondents.

| | Meadow Hills | Edmonton Heights | Total |
|----------------|--------------|------------------|-------|
| Primary school | 1 | 3 | 4 |
| High school | 6 | 11 | 17 |
| College | 21 | 27 | 48 |
| No response | 1 | 1 | 2 |
| Total | 29 | 42 | 71 |

Source: Authors' fieldwork, 2022.

high school leavers at Edmonton Heights compared to 6 at Meadow Hills. Finally, 3 respondents are primary school certificate holders at Edmonton Heights relative to only 1 in Meadow Hills. Only 1 respondent did not reveal their educational qualification in each neighborhood.

As presented in **Table 5**, respondents demonstrate large differences in their annual income levels. 19 of them earn above \$50,000 per annum. This is followed by 12 earning between \$10,000 and \$20,000 as 10 claimed to receive \$20,000-\$30,000. Equal number of respondents (9) has their incomes fall in each of ranges \$30,000-\$40,000 and \$40,000-\$50,000. However, 5 are relatively poor with an annual income of less than \$10,000. Seven respondents decided not to make their annual income public. In general, with more than half (37) of the respondents earning at least \$30,000 per annum, it can be inferred that most participants in this study are in the upper-middle-income class. According to **Table 5**, the number of respondents with annual income in the range of \$30,000-\$40,000 is higher in Meadow Hills than in Edmonton Heights. For the income range of \$10,000-\$20,000, the number of respondents that claims it per annum is the same in the neighborhoods. But those with at least \$30,000 are more in Edmonton Heights than in Meadow Hills. There is no respondent earning less than \$10,000 in Meadow Hills, but they are 5 in Edmonton Heights. Six respondents at Meadow Hills and 1 at Edmonton Heights skipped the question asking their income level.

5.2. Knowledge of EVs among the Respondents

The respondents were asked about their awareness of EVs, the time and source of awareness, and the popularity of EVs within their localities. Analysis of their answers is as follows:

5.2.1. Awareness of EVs

As indicated in **Table 6**, sixty-six respondents, representing 93%, affirmed that

Table 5. Annual income of respondents.

| | Meadow Hills | Edmonton Heights | Total |
|--------------------|--------------|------------------|-------|
| Less than \$10,000 | 0 | 5 | 5 |
| \$10,000-\$20,000 | 6 | 6 | 12 |
| \$20,000-\$30,000 | 9 | 1 | 10 |
| \$30,000-\$40,000 | 4 | 5 | 9 |
| \$40,000-\$50,000 | 1 | 8 | 9 |
| Above \$50,000 | 3 | 16 | 19 |
| No response | 6 | 1 | 7 |
| Total | 29 | 42 | 71 |

Source: Authors' fieldwork, 2022.

Table 6. Respondents' awareness of EVs.

| | Frequency | Percentage (%) | Cumulative Percentage (%) |
|-------------|-----------|----------------|---------------------------|
| Yes | 66 | 93.0 | 93.0 |
| No | 3 | 4.2 | 97.2 |
| No response | 2 | 2.8 | 100 |
| Total | 71 | 100 | |

Source: Authors' fieldwork, 2022.

they were aware of the invention of electric vehicles. But 3 of them (4.2%) claimed they were ignorant that electric vehicles are already a reality. As the majority are aware of EVs, this lends credibility to the perceptions of these respondents on the factors that might make EVs attractive or otherwise.

Figure 2 indicates that awareness of EVs is more pronounced in Edmonton Heights (EH) than in Meadow Hills (MH).

5.2.2. Timing of Awareness about EVs

At the time of awareness, a majority (66.2%) stated that they had knowledge of EVs before 2020. 19.72% filled that they got the knowledge in 2020 and only a minority (7.04%) got the information recently in 2021. The 5 respondents that left the space for timing unfilled are a mix of 3 respondents that claimed ignorance and 2 respondents who were uninterested in answering whether they are aware of EVs or not.

Table 7 showed when respondents were aware of the availability of electric vehicles.

Figure 3 indicates that respondents at EH were aware of EVs earlier than those at MH. Before 2020, 71.4% had knowledge of EVs at EH compared to 58.6% at MH. This is similar to awareness disparities in 2020. However, in 2021, information about EVs became more circulated at MH (13.8%) than at EH (2.4%).

5.2.3. Source of Information about EVs

The main sources of knowledge for the respondents about EVs are TV/Radio and social media—42.25% credited TV/Radio, while 29.58% pointed to social media as the primary mode of information they have about EVs. This shows that, contrary to mainstream propaganda, social media has not overshadowed the traditional media as a source of information at least on EVs. 11.27% attributed their knowledge of EVs to newspapers, suggesting that newspapers are a weak channel of information about EVs. Only 1 respondent has personal experience with EVs. These sources of information were rated similarly by respondents in the two neighborhoods.

Table 8 highlights the exact source that respondents heard about electric vehicles.

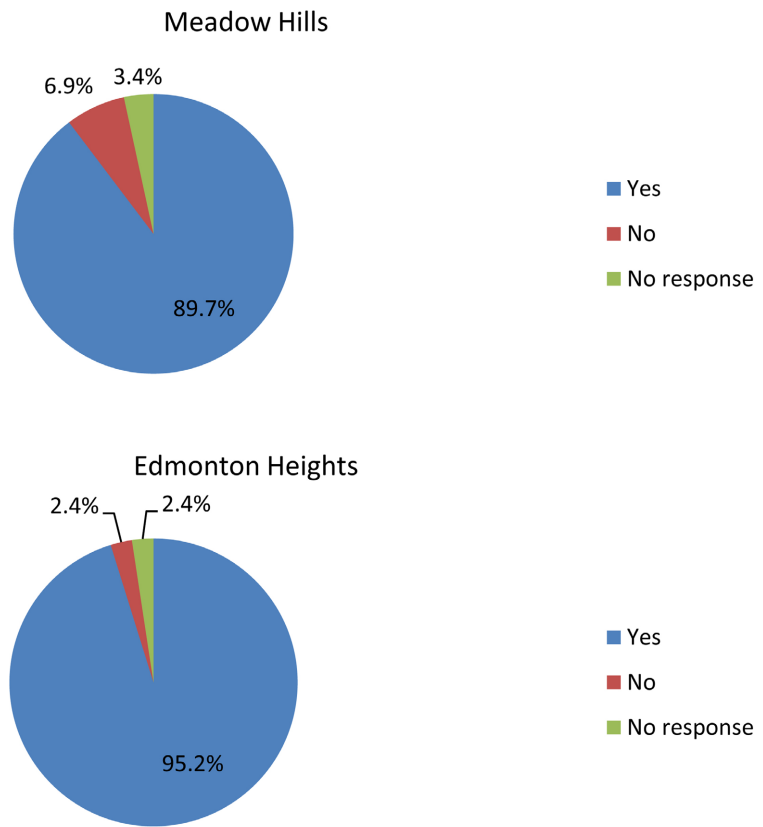


Figure 2. Awareness of EVs in each neighborhood. (Source: Authors’ fieldwork).

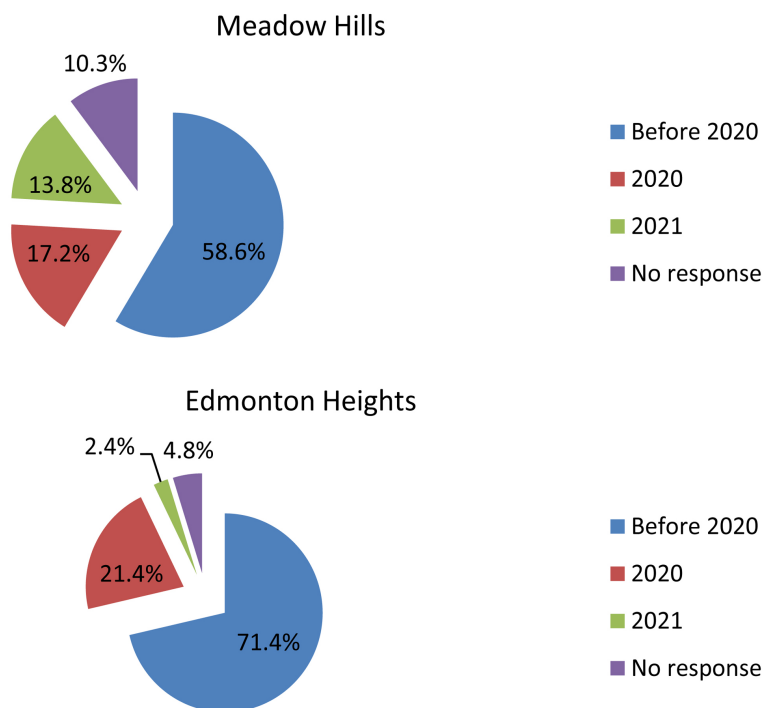


Figure 3. Timing of awareness of respondents in each neighborhood. (Source: Authors’ fieldwork, 2022).

Table 7. Time of awareness of electric vehicles.

| | Frequency | Percentage (%) | Cumulative Percentage (%) |
|-------------|-----------|----------------|---------------------------|
| Before 2020 | 47 | 66.20 | 66.20 |
| 2020 | 14 | 19.72 | 85.92 |
| 2021 | 5 | 7.04 | 92.96 |
| No response | 5 | 7.04 | 100 |
| Total | 71 | 100 | |

Source: Authors' fieldwork, 2022.

Table 8. Source of awareness of electric vehicles.

| | Frequency | Percentage (%) | Cumulative Percentage (%) |
|-------------------------------|-----------|----------------|---------------------------|
| Social media | 21 | 29.58 | 29.58 |
| TV/Radio | 30 | 42.25 | 71.83 |
| Newspaper | 8 | 11.27 | 83.10 |
| Experience of friend/relative | 5 | 7.04 | 90.14 |
| Personal experience | 1 | 1.41 | 91.55 |
| No response | 6 | 8.45 | 100 |
| Total | 71 | 100 | |

Source: Authors' fieldwork, 2022.

5.2.4. Preference for EVs over Normal Vehicles

When asked if electric vehicles are better than normal vehicles, the respondents have equal likeness for the two—33 or 46.48% prefer each one to the other. This highlights that the benefits of EVs are not well appreciated by all respondents. Some still believe EVs have not come with overwhelming benefits capable of sending the normal vehicles off the market.

Table 9 shows the numbers and percentages of respondents who believe and those who do not believe that electric vehicles are better than normal vehicles.

Figure 4 shows that while more proportion of the respondents perceived EVs to be better than normal vehicles at EH (50% versus 41.4%), more thought otherwise at MH (48.3% versus 45.2%).

5.2.5. Popularity of EVs

In a question asking them when they see EVs noticeably around in their neighborhood, 71.83% of the respondents indicated that EVs are not yet popular within Meadow Hills and Edmonton Heights, while roughly 20% believed that many people are already using EVs in their localities. More than 8% did not answer this question.

Table 10 below shows how popular electric vehicles are in the two neighborhoods.

Table 9. Are electric vehicles better than normal vehicles?

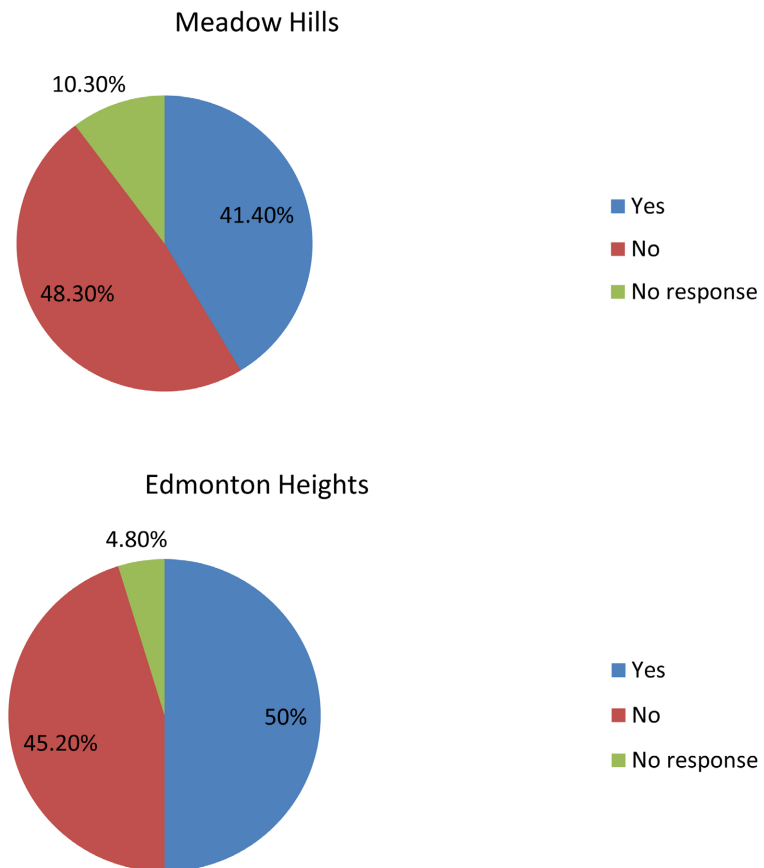
| | Frequency | Percentage (%) | Cumulative Percentage (%) |
|-------------|-----------|----------------|---------------------------|
| Yes | 33 | 46.48 | 46.48 |
| No | 33 | 46.48 | 92.96 |
| No response | 5 | 7.04 | 100 |
| Total | 71 | 100 | |

Source: Authors' fieldwork, 2022.

Table 10. Are electric vehicles popular in your neighborhood?

| | Frequency | Percentage (%) | Cumulative Percentage (%) |
|-------------|-----------|----------------|---------------------------|
| Yes | 14 | 19.72 | 19.72 |
| No | 51 | 71.83 | 91.55 |
| No response | 6 | 8.45 | 100 |
| Total | 71 | 100 | |

Source: Authors' fieldwork, 2022.

**Figure 4.** Respondents' preference of EVs over normal vehicles in the neighborhoods. (Source: Authors' fieldwork, 2022).

While 38% of respondents from MH supplied the information that EVs are popular within their area, only 7% believed the same at EH. Also, 83% of the EH respondents disagreed with the popularity of EVs within their neighborhood against 55% of MH respondents. The results are illustrated in **Figure 5** below.

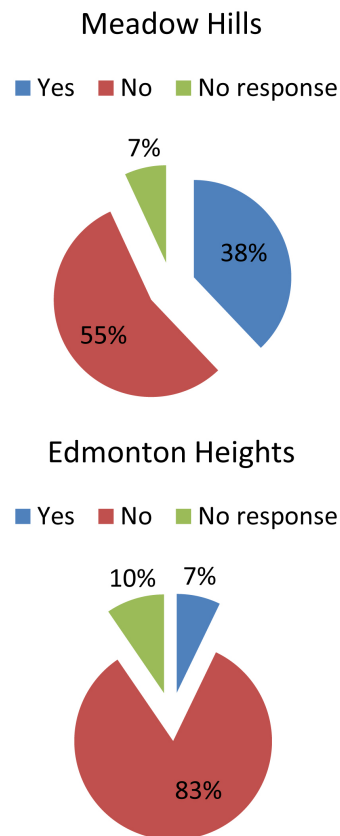


Figure 5. Popularity of EVs in each neighborhood.
(Source: Authors' fieldwork, 2022).

5.2.6. Reasons Why EVs Are Not Yet Popular

Following the general claim of the respondents that EVs are not yet popular within Meadow Hills and Edmonton Heights, the reasons for this claim were investigated. The first column of **Table 11** shows the six reasons captured by the researcher. They were asked to agree or disagree with these reasons as to what caused the unpopular status of EVs around them. For the purpose of analysis, a 2-point scale was adopted. "Agree" is scaled 2 while "Disagree" is scaled 1. The average of these scale scores is 1.5. Therefore, a reason has a strong general agreement if it is at least 1.7. A mean score of less than 1.3 suggests the respondents generally disagree on the reason. This follows the standard interpretation of the mean opinions of respondents—a very high mean score reduces the chance of committing generalization error. The standard deviation (S.D.) shows the dispersions of each respondent's response from the mean value. A low S.D. points to high statistical confidence in the opinions, while a high S.D. implies low statistical confidence in the opinions.

Table 11. Opinions of respondents on why EVs are not yet popular.

| Possible reason | Agree | Disagree | Mean | S.D. |
|---------------------------------------------------------|-------|----------|------|------|
| Electric vehicles are expensive to buy | 49 | 22 | 1.69 | 0.47 |
| Charge stations of electric vehicles are not available | 46 | 25 | 1.63 | 0.49 |
| Car dealership is not available | 30 | 41 | 1.42 | 0.49 |
| Electric vehicles are difficult to maintain | 34 | 37 | 1.48 | 0.50 |
| Electric cars are scarce in markets | 39 | 32 | 1.55 | 0.50 |
| Electric vehicles are not suitable for public transport | 24 | 47 | 1.34 | 0.48 |

Source: Authors' fieldwork, 2022.

As **Table 11** reveals, the respondents generally agree on only one reason as important to determining the low availability of EVs within their localities—electric vehicles are expensive to buy. Only its mean response is approximately 1.7. The other five reasons (charge stations of electric vehicles are not available, electric cars are scarce in markets, a car dealership is not available, electric vehicles are difficult to maintain and electric vehicles are not suitable for public transport) are not majorly responsible for why EVs are not yet popular around Meadow Hills and Edmonton Heights—the average responses are each less than 1.7.

6. Conclusions

This study was preoccupied with examining the distribution of knowledge about EVs among the residents of two underserved communities in Huntsville, Alabama, the U.S. It also captured the perceptions of respondents regarding the degree of popularity of EVs within their neighborhoods and the likely causes of the phenomenon. The findings signaled that most of the respondents were aware of the existence of EVs, with more than 85% getting the knowledge before 2021. By implication, residents of the sampled communities were generally familiar with the basic properties of EVs. However, EVs are not yet popular on the roads of Meadow Hills and Edmonton Heights. The respondents' indifference to the choice of EVs versus normal vehicles expounded the low preferences for EVs in their neighborhoods.

In their thoughts, the respondents believed they could not afford EVs and that charging stations were not immediately available within their locations. In addition, there was a shared bias that EVs were manufactured for select members of the public exclusive of those living in underprivileged areas. Based on the foregoing, government authorities and city planners should look into correcting the orientation of residents of underserved communities on the benefits that EVs come with. A mechanism of achieving this is by delivering public transport ser-

vices through EVs. This demonstrates the government's seriousness in making EVs popular in less-advantaged areas. The public campaign on EVs should emphasize available incentives to pull Americans into the markets for EVs. To do this, social media seems to have a wider reach than traditional media outlets.

One of the limitations noticed in this study had to do with time and space constraints. It was observed that the two underserved neighborhoods surveyed in Huntsville were predominantly African American communities. It would have been interesting to note what consumer knowledge about electric vehicles would have been like in underserved communities populated by persons of other ethnic origins, e.g. Caucasians, who predominantly live in north Huntsville. Additional study into underserved communities of other ethnic origins in Huntsville will provide context for contrast and comparison between them to test for any differences. Furthermore, a comparison between underserved communities in Huntsville and other cities of comparable size and features will prove an invaluable study for researchers.

7. Suggestions for Future Researchers

This study was anchored on the subjective interests of individuals in knowing about, owning, or driving EVs, and data on these interests were collected at a point in time. A longitudinal analysis by future researchers can extend the focus of this study so that the consumers are well studied over a period of time. This would not only bring consumers' preferences for EVs to the limelight, but it would also help in designing appropriate mechanisms for bolstering such interests. In addition, the scope can be blown up by interested researchers to cover the majority of underserved communities in the U.S.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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