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RESEARCH PAPER

The adoption of electric vehicles in Dushanbe, Tajikistan

Ashurzoda Shahboz*, Ahyahudin Sodri, Hayati Sari
University of Indonesia, Indonesia

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Abstract. Switching from conventional fossil fuel vehicles to electric vehicles (EVs) offers a promising way to reduce carbon emissions, especially if we also decarbonize our electricity sources. This study focuses on Dushanbe, the capital of Tajikistan, where EV adoption is still in its early stages. Understanding local perceptions is crucial for making informed decisions to promote the use of EVs. There has been used a qualitative approach, gathering data through questionnaires from a diverse group of Dushanbe residents. The analysis showed varied perceptions as older respondents were more likely to agree with EV adoption, and there were notable differences based on gender and education level. Women showed greater enthusiasm for EVs, and those with a Master's degree were more likely to support the transition. Residents recommended increasing salaries, improving infrastructure, and providing government support to make the shift to EVs easier. This study highlights the importance of understanding local views in shaping policies for sustainable transportation in Dushanbe. Further research and targeted actions are needed to overcome challenges and encourage widespread EV adoption.

Keywords: Demographic analysis; Dushanbe; Electric vehicles; Local perceptions; Sustainable transportation.

1. Introduction

Substituting traditional diesel, petrol, and gas-powered consumer vehicles with electric vehicles (EVs) holds the potential to significantly reduce air carbon emissions, provided the electricity the electricity used to power them is derived from decarbonized sources (Albrechtowicz, 2023). An essential aspect of this transition is the shift from non-renewable to renewable and cleaner energy sources (Rietmann & Lieven, 2019). This transition has gained acceptance in many developed and developing countries, marking a significant step toward a future characterized by environmentally friendly vehicles and the wide adoption of renewable energy (S.-J. Ahn et al., 2018). The International Energy Agency (IEA) emphasizes the need for a substantial increase in the number of EVs, projecting growth from 11 million in 2020 to 350 million in 2030, and targeting 2 billion EVs across various vehicle types, including 50 million buses, by 2050 (Shahboz & Koestoer, 2023).

In the contemporary world, the variety of EVs is extensive, primarily influenced by their different types of engines they use (Choi et al., 2023). However, EVs can be broadly categorized

*Corresponding author. E-mail: ashurzodashahboz7@gmail.com
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into five types, which are discussed in the following paragraphs. The first category is Battery Electric Vehicles (BEVs), which exclusively relies on electricity for propulsion and does not utilize any liquid fuel (Sałabun & Karczmarczyk, 2018). An example of a BEV is the Nissan Leaf, capable of covering 300–500 km on a single charge (Alochet et al., 2023). The second type is Plug-In Hybrid Electric Vehicles (PHEVs), employing both a combustible engine and an electric engine. PHEVs operate by using stored electricity from the grid during regular driving conditions, thereby reducing reliance on fuel (Kanimozhi et al., 2022). A well-known PHEV is the Mitsubishi Outlander (Sanguesa et al., 2021). The third category encompasses Hybrid Electric Vehicles (HEVs), which utilize both in internal combustion engines and electric engines. However, unlike PHEVs, HEVs do not recharge from the grid but generate electricity through their own engine (Karoń, 2022). A notable example is the Toyota Prius. The fourth type in Fuel Cell Electric Vehicles (FCEVs), which are considered "zero emission" vehicles as their engines utilize compressed oxygen obtained from the air to generate power (Bacquart et al., 2022). The Hyundai Nexo is an example of an FCEV that can travel up to 650 km without refueling (Sanguesa et al., 2021). Finally, Extended-Range Electric Vehicles (ER-EVs) are similar to BEVs but are equipped with additional engine that recharges the battery when necessary. The BMW i3 is an example of an ER-EV, capable of traveling 260 km, with a supplementary engine providing an additional 150 km (Jing et al., 2021; Lee et al., 2019).

To achieve a sustainable use of nonrenewable natural resources and mitigate CO_2 emissions, the transition from conventional vehicles - one of the major contributors to this issue - to environmentally friendly alternatives like EVs is crucial (Jing et al., 2021). Despite the numerous advantages associated with EVs, it is important to acknowledge that, like any technology, they come with drawbacks and challenges (Shafiei & Ghasemi-marzbali, 2022). One significant challenge hindering the widespread adoption of EVs is the high cost, especially in developing countries where the prices are relatively expensive compared to local incomes (Yang et al., 2022). Another obstacle is the extended charging time, which is significantly longer than the quicker refueling process of traditional petrol vehicles (Ziemba, 2020). Furthermore, the source of electricity used to charge EVs poses a potential disadvantage, especially in countries like India and China, where rely heavily on coal, leading to emissions that may surpass those of gasoline and petrol cars (Ajanovic et al., 2021).

The current research focuses on the capital city of Tajikistan, Dushanbe, where there are limited studies on air quality in Central Asian capital cities. Transportation in contemporary capital cities is identified as a major contributor to air pollution, exacerbated by the outdated and underdeveloped public transit systems in Dushanbe and other cities in the former Soviet Union (Shvets & Györök, 2023; Tursumbayeva et al., 2023). Despite the fact that over a quarter of the 1600 registered EVs in Tajikistan were imported in 2023, the country has yet to establish a significant market for EVs, both in the capital city and nationwide (ASIA-Plus, 2023). Contrary to the World Health Organization's (WHO) recommended higher standards for air quality, Dushanbe's air quality, according to the Air Quality Index (AQI, 2023) data, is only classified as moderate. The primary contributors to air pollution in Dushanbe are identified as vehicles, dust, and industrial processes.

Tajikistan, located in central Asia, spans 141.3 thousand km^2, with 93% of its terrain consisting of mountains (Hofman & Visser, 2021). The country has a population of over 10 million, with one million residing in the capital city of Dushanbe (World Bank Group, 2022). Positioned upstream of two major rivers, the Amu Darya and the Syr Darya, Tajikistan is recognized for its significant hydroelectric potential, contributing to 90% of its energy derived from water sources (Xu et al., 2020). Notably, Tajikistan ranks among the top 10 countries globally in terms of hydroelectric power supplements (Nabiyeva, 2015). Compared to other Central Asian nations, Tajikistan boasts substantial hydroelectric power, with 60% of its reliance on water resources (Y.-J. Ahn & Juraev, 2024). The country is actively developing hydroelectric projects, such as the Rogun

project, which has a capacity of 605 MW and aims to provide clean electricity to all Central Asian countries (IHA, 2019).

This research considers the transition to EVs as a pivotal aspect of the broader shift away from traditional automobiles. Understanding the perception of EVs, particularly in alignment with user preferences, is crucial for informed decision- making and successful implementation. This investigation specifically focuses on Tajikistan, with a emphasis on its capital city, Dushanbe, where the transition of EVs is still in its early stages and not as advanced as in more developed nations. The study places emphasis on scrutinizing both the advantages and disadvantages of the EV transition within the context of Dushanbe. Additionally, the research highlights the importance of assessing the residents' knowledge of EVs, recognizing its potential as a key factor in facilitating the transition. Strategies to enhancing the appeal of adopting EVs and reshape public perceptions are considered essential, as the success of the transition relies heavily on the acceptance and preferences of the local population.

2. Material and method

This research employs a quantitative approach, primarily centered on the utilization of questionnaires. The rationale for adopting this approach lies in the study's focus on gathering data through the structured framework. The primary data will be collected from a diverse population in the capital city of Tajikistan, Dushanbe, which, as of 2023, has a population of 986,899, according to the (World Population Review, 2023). To determine the research sample, the Slovin formula was rigorously applied, resulting in a calculated sample size of 99.98 respondents, rounded up to 100 for practicality. This purposive sampling method is strategically chosen to ensure representation across various demographics, considering factors such as income levels, educational backgrounds, and car ownership.

The questionnaires will be directed towards ordinary residents of Dushanbe, directly engaging them in the research process. The design of the questionnaires focuses on key variables, with a primary emphasis on public perception. A mixed-method format is used incorporating both open-ended and closed-ended questions offering a comprehensive exploration of the participants' perspectives. The core objective of the research is to examine how individuals in Dushanbe perceive the transition to electric vehicles. To address this question comprehensively, an online survey is deemed the most suitable method, aligning with the qualitative nature of the study. The data will be analyzed using descriptive statistical methods, providing a nuanced understanding of the gathered information and shedding light on the diverse perspectives held by Dushanbe residents regarding the shift to EVs.

3. Result and discussion

3.1. Result

The primary focus of this chapter is to delve into the perceptions of individuals in Dushanbe concerning the transition to EVs, shedding light on their knowledge levels about EVs. To comprehensively explore these aspects, we employ a robust descriptive statistical analysis. This method considers key demographic factors such as gender, age, educational level, and vehicle ownership, aiming to unveil nuanced insights into the perceptions of various subgroups within the population.

We begin by calculating the mean perception scores for each subgroup based on gender, age, educational level, and vehicle ownership, allowing for a detailed understanding of the average perception within each category and enabling comparisons across groups. To complement these measures of central tendency, we also include the standard deviation or variance to illustrate the spread of perception scores within each demographic group. This approach not only highlights variations but also offers a deeper perspective on the distribution of perceptions. Visual aids, including bar charts, box plots, and histograms, are employed to present the data graphically.

These visual representations help to clarify the disparities in perception scores among different demographic groups, making the finding more accessible and comprehensible.

Table 1 (Survey respondent profile) shows the total of 122 respondents, with 86,1% from Dushanbe and the remaining 13,9% from other cities. Within this sample, 43 respondents (33%) were female, while the remaining 79 (67%) were male. This gender distribution, depicted in a pie chart, serves as a foundational observation for further nuanced analyses.

The first age cohort consists of individuals aged 18 to 35, a group often associated with heightened productivity and dynamic engagement with societal changes. The second age cohort spans from 36 to 60, a group closer to retirement that may have different perspectives and considerations. Notably, the allocation of respondents between these two age groups has been balanced, with 75% selected for the first age group and 25% for the second.

The educational sampling encompasses individuals ranging from those with Middle High School education to those with Bachelor's and Master's degrees, acknowledging the pivotal role that education plays in shaping perspectives. The breakdown of respondents across these educational categories is as follows: 7 individuals (6%) have an educational background up to Middle High School, indicating a foundational level of education. Additionally, 19 respondents (16%) have completed High School, reflecting a slightly advanced educational tier. Further, 42 respondents (34%) hold Bachelor's degrees, highlighting higher level of academic achievement. Notably, 18 respondents (15% have obtained Master's degrees, reflecting the most advanced level of academic achievement in this sample. The remaining 36 respondent (29%) choose not to disclose their academic background, selecting “other”.

This deliberate inclusion of respondents from various educational background is crucial for understanding the diverse perspectives that individuals bring to the discourse on EVs and their transition. Education often shapes cognitive frameworks and worldviews, so this stratified approach ensures a holistic examination of the attitudes and perceptions prevalent among individuals with varying educational backgrounds. As the analysis progress, this meticulous consideration of educational diversity will unveil nuanced insights into how education influences perceptions and attitudes toward the transition to EVs. It enriches the study by capturing the complex interplay between education and perspectives, thereby enriching the depth and comprehensiveness of the findings.

Table 1. Survey Respondent Profile

Address	Dushanbe 86%			Other 14%		
Gender	Female 33%			Male 67%		
Age	18 to 35 75%			36 to 60 25%		
Educational Level	Middle School 6%	High School 16%		Bachelor’s Degree 34%	Master’s Degree 15%	Other 29%

Conducting cross-tabulation analysis to scrutinize the age distribution among respondents, notable disparities emerge across various variables. A prevailing trend shows respondents expressing agreement with the provided statements. The survey encompasses a series of consistent statements across different demographic groups, systematically categorized by gender, age, and educational status. These statements serve as focal points for examining perceptions and awareness levels regarding EVs. Respondents perceived that EVs offer superior comfort compared to conventional vehicles. The study also assesses respondents' familiarity with the regulatory framework governing EVs in Tajikistan and evaluates their awareness regarding the potential of EVs to reduce carbon dioxide emissions in Dushanbe. Additionally, recognition is

sought concerning the role of EVs in mitigating Tajikistan's dependence on foreign fossil fuels, given the governmental control over electricity production.

The analysis further explores respondents' anticipation of the gradual displacement of conventional vehicles in Dushanbe. The level of knowledge pertaining to EVs among residents of the city is also assessed. Along with the adequacy of facilities in Dushanbe that could influence purchasing decisions regarding EVs.

This study aims to delineate nuanced insights into attitudes and perceptions surrounding EVs across distinct demographic cohorts, thereby contributing to the scholarly discourse on sustainable transportation and policy formulation endeavors in Tajikistan. A focus is on understanding the influence of age on respondents' agreement and disagreement rates, particularly in light of the Post Civil War period in Tajikistan and its potential impact on the knowledge and opinions of older age groups. The sample comprised two primary age groups: respondents aged 18 to 35 years and those aged 36 to 60 years (Figure 1). The group aged 36 to 60 years made up 18.68% of the total sample and exhibited a notably higher level of agreement across all survey questions, averaging 59.46%. This significant difference in agreement rates suggests that older respondents, having likely lived through the Post Civil War period and subsequent socio-political changes in Tajikistan, may hold more consolidated views or greater knowledge on the subjects addressed in the survey. The historical context appears to have shaped their perspectives, possibly influenced by shared experiences and a stable career, reflecting a deeper understanding of the topics discussed.

In contrast, respondents aged 18 to 35 years demonstrated a lower agreement rate of 40.79%. This younger cohort, with their diverse and evolving viewpoints, appears less inclined to uniformly concur with the survey statements. The lower agreement rate among younger respondents might be attributed to their different life experiences and the absence of direct exposure to the post-conflict transitions experienced by the older group. Their perspectives are likely influenced by contemporary issues and a rapidly changing socio- economic environment, contributing to a wider spectrum of opinions. When examining disagreement rates, a clear disparity emerged between the two age groups. Younger respondents exhibited a disagreement rate of 6.22%, whereas only 1.62% of those aged 36 to 60 years disagreed with the survey statements. This suggests that younger individuals tend to have more diverse or opposing views compared to their older counterparts, who show a greater tendency towards consensus. The higher disagreement rate among the younger group may reflect a more critical stance on current issues and a propensity to challenge established norms, contrasting with the older group's more settled perspectives.

Additionally, a notable preference for neutrality was observed among the younger cohort. Specifically, 23.74% of respondents aged 18 to 35 chose neutral responses, significantly higher than the 15.67% neutrality rate among the older respondents. This difference of 8.06% suggests that younger individuals may be more uncertain or balanced in their viewpoints. Their tendency towards neutrality could indicate a cautious approach to forming opinions, possibly reflecting a broader range of experiences or lesser exposure to the historical context that influences the older group's perspectives. Regarding strong agreement, the two age groups exhibited comparable levels of endorsement. Respondents aged 18 to 35 years showed a strong agreement rate of 23.97%, while those aged 36 to 60 had a slightly lower rate of 22.58%. This marginal difference of approximately 1% indicates that both age groups similarly endorse strong agreement, despite other disparities in their responses. It suggests that, when strongly convinced, both younger and older individuals can exhibit similar levels of strong support for certain statements.

In stark contrast, the strong disagreement category revealed a substantial discrepancy between the age groups. A markedly higher proportion of younger respondents, constituting 6.65% of the total sample, strongly disagreed with the survey statements, compared to a mere 0.92% among the older respondents. This significant difference underscores the younger indivi-

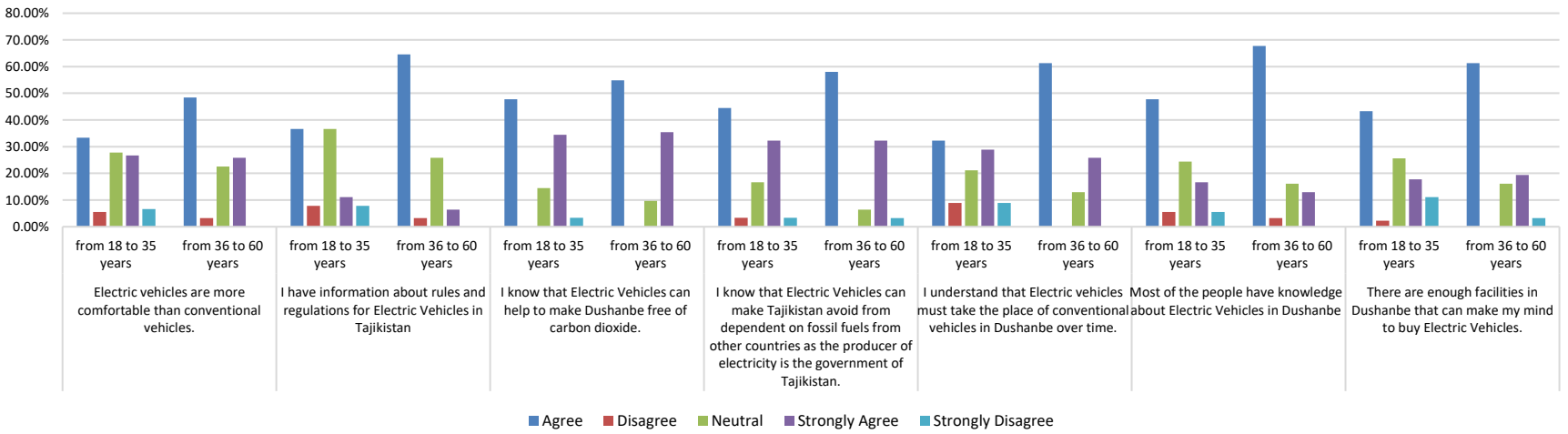

Figure 1. EV Perception by age

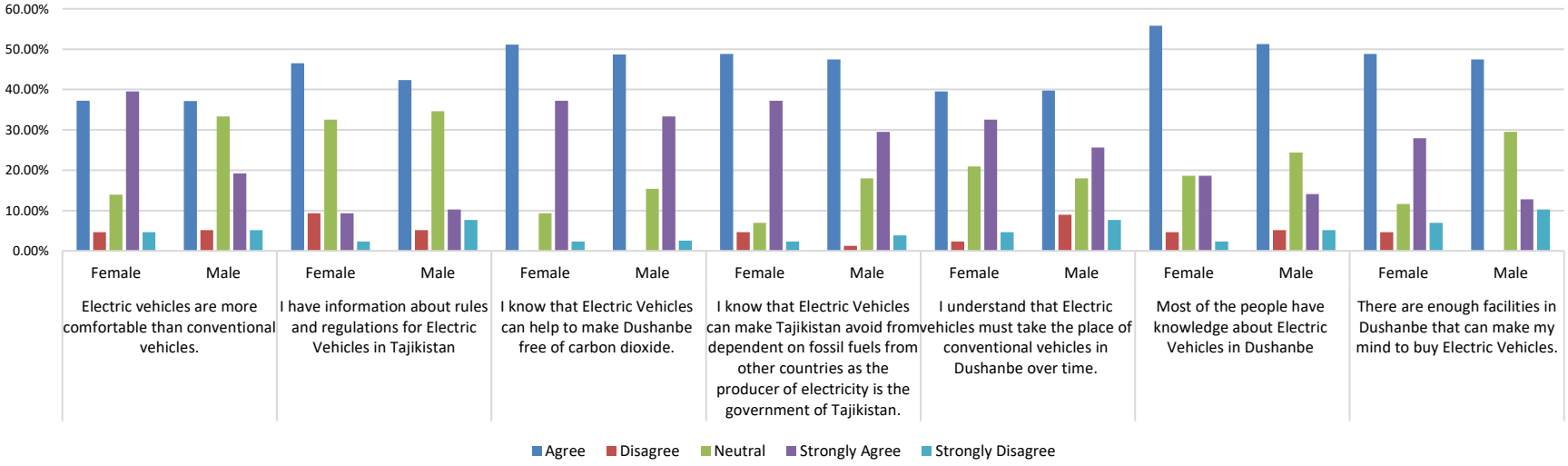

Figure 2. EV Perception by gender

dual's higher propensity for strong dissent, highlighting generational differences in opinion and potentially reflecting their differing life experiences and perspectives. The stronger disagreement among younger respondents may be linked to their dynamic, questioning nature, often challenging the status quo and expressing critical views more freely.

The analysis reveals that respondents aged 36 to 60 years, who experienced the Post Civil War period in Tajikistan, exhibit higher levels of agreement and lower levels of disagreement. This suggests a more homogeneous viewpoints likely shaped by shared historical experiences and a period of stability in their careers and lives. In contrast, younger respondents, aged 18 to 35 demonstrate greater diversity in their opinions, with higher rates of disagreement and neutrality, indicating a broader range of perspectives and less influence from the historical context experienced by the older generation. These findings provide valuable insights into the dynamics of opinion formation across different age groups in a post-conflict society, highlighting the impact of historical and socio-economic contexts on shaping attitudes towards sustainable transportation initiatives like electric vehicle adoption.

The analysis delves into gender-based disparities in perceptions of EVs in Dushanbe, providing nuanced insights into how male and female respondents view EV adoption (Figure 2). By maintaining consistency with previous survey questions focused on age cohorts, this analysis ensures a robust comparison of responses among different genders. It becomes apparent that females exhibit a slightly higher inclination towards supporting the adoption of EVs compared to their male counterparts. Specifically, 48.84% of female respondents expressed agreement, surpassing the 44.87% agreement rate among males by 3.97%. This marginal lead suggests that, on average, women are more supportive of transition to electric vehicles.

Both genders show relatively low levels of disagreement regarding EV adoption. Female respondents reported a disagreement rate of 5.04%, slightly higher than the 4.27% recorded by the male respondents, with a minor disparity of 0.77%, indicating broad consensus in not opposing the shift to EVs. However, a more pronounced disparities emerges in the rate of neutrality. Male respondents demonstrate a significant higher tendency to remain neutral stance, with a rate of 24.73% compared to 16.28% among females. This 8.45% margin suggests that men are more likely to adopt a wait-and-see attitude or are less decisive about their stance on EV adoption, whereas women are more committed to take a definitive position. Strong agreement towards EV adoption also highlights gender differences. Female respondents display remarkable enthusiasm, with 28.90% more females than males expressing strong agreement. This translates to 20.70% of females strongly endorsing EV adoption, compared to a lower rate among males. This significant enthusiasm among women underscores their strong support for sustainable transportation solutions.

Conversely, the rate of strong disagreement is relatively low overall but reveals that males are more likely to strongly oppose EV adoption. Specifically, 6.04% of male respondents indicated strong disagreement, compared to 3.66% of females. This finding highlights a higher level of resistance among men towards the adoption of EVs. These findings underscore the gender-based variations in perceptions of EV adoption in Dushanbe. Women generally show a greater inclination to agree and strongly agree with the transition to electric vehicles, reflecting a more positive outlook on sustainable transportation. In contrast, men exhibit higher rates of neutrality and strong disagreement, indicating a more cautious or resistant stance. The analysis emphasizes the importance of considering these gender differences in future policy and advocacy efforts aimed at promoting EV adoption. Understanding the nuanced perspectives of different demographic groups can inform targeted strategies to encourage broader acceptance and support for sustainable transportation initiatives in Dushanbe. A deeper comprehension of gender dynamics in EV perceptions can ultimately contribute to more effective and inclusive policy-making, fostering a more sustainable future for all residents.

The exploration of attitudes towards transitioning to EVs among residents of Dushanbe reveals significant insights when stratified by educational attainment. Examining responses from individuals with varying levels of education, from Middle High School to Master's degrees, as well as an "Other" category for those with unspecified educational status, a clearer picture of the general disposition towards electric vehicle adoption. Interestingly, respondents with lower levels of formal education, particularly High School and Middle High School graduates, show a notable inclination towards agreeing with the transition to EVs. High School graduates lead with an impressive average agreement rate of 53.06%, closely followed by Middle High School graduates at 51.31% (Figure 3). This trend suggests that individuals with less advanced educational backgrounds are more likely to support the adoption of EVs. On the other hand, disagreement rates across all educational levels remain relatively low. Master's degree holders exhibit the highest disagreement rate at 9.52%, while Bachelor's degree holders display a lower rate of 3.83%. Those with High School diplomas, Middle High School education, and those classified under the "Other" category show even lower disagreement rates, averaging 2.04%, 1.50%, and 2.78%, respectively. The minimal opposition across various educational groups indicates a broad consensus in favor of EV adoption.

A noteworthy trend emerges in the neutrality of responses. Bachelor's degree holders exhibit the highest preference for neutrality, with 27.24% opting for neutral answers. This is followed by High School graduates at 23.81% and respondents in the "Other" category at 20.37%. Conversely, Master's degree holders and Middle High School graduates show lower neutrality rates at 17.59% and 18.42%, respectively. These findings suggest that individuals with higher education, particularly those with Bachelor's degrees, may adopt a more balanced or uncertain stance regarding the economic feasibility of transitioning to EVs. Strong agreement further elucidates the relationship between educational attainment and support for electric vehicle adoption. Master's degree holders demonstrate the highest level of strong agreement, averaging 27.78%, closely followed by Bachelor's degree holders at 26.13%. This strong endorsement indicates a significant level of enthusiasm among individuals with higher educational qualifications.

Conversely, the rates of strong disagreement are relatively low among those with higher education. Master's and Bachelor's degree holders average 0.79% and 4.88%, respectively, in strong disagreement. In contrast, Middle High School graduates, High School graduates, and respondents in the "Other" category show higher rates of strong disagreement, averaging 4.51%, 6.12%, and 7.94%, respectively. This pattern highlights a more pronounced skepticism or opposition towards EV adoption among those with lower educational levels.

Overall, the analysis underscores the nuanced relationship between educational background and perceptions of EV adoption (Figure 4). Individuals with higher educational attainment, particularly those with Master's and Bachelor's degrees, display stronger support and less opposition towards EV adoption. Conversely, while individuals with lower educational levels generally agree with the transition, they also exhibit higher rates of strong disagreement. These findings suggest that educational background significantly influences attitudes towards sustainable transportation initiatives and should be considered in the formulation of policies and strategies to promote EV adoption in Dushanbe.

The following table illustrates the recommendations provided by residents of Dushanbe for enhancing and facilitating the transition to EVs in the city. Analysis reveals that out of 119 respondents, 49% individuals emphasized the necessity for increased salaries, suggesting that the current level of remuneration is insufficient to support the transition to EVs. Additionally, 22% respondents expressing dissatisfaction with the availability of facilities, highlighting a perceived inadequacy in the infrastructure supporting Evs in Dushanbe and indicating a need for improvement in this regard. Furthermore, 18% respondents identified the need for assistance or cooperation from governmental and other entities to facilitate the transition to EVs. Notably, 11% respondents believe that no improvements are necessary.

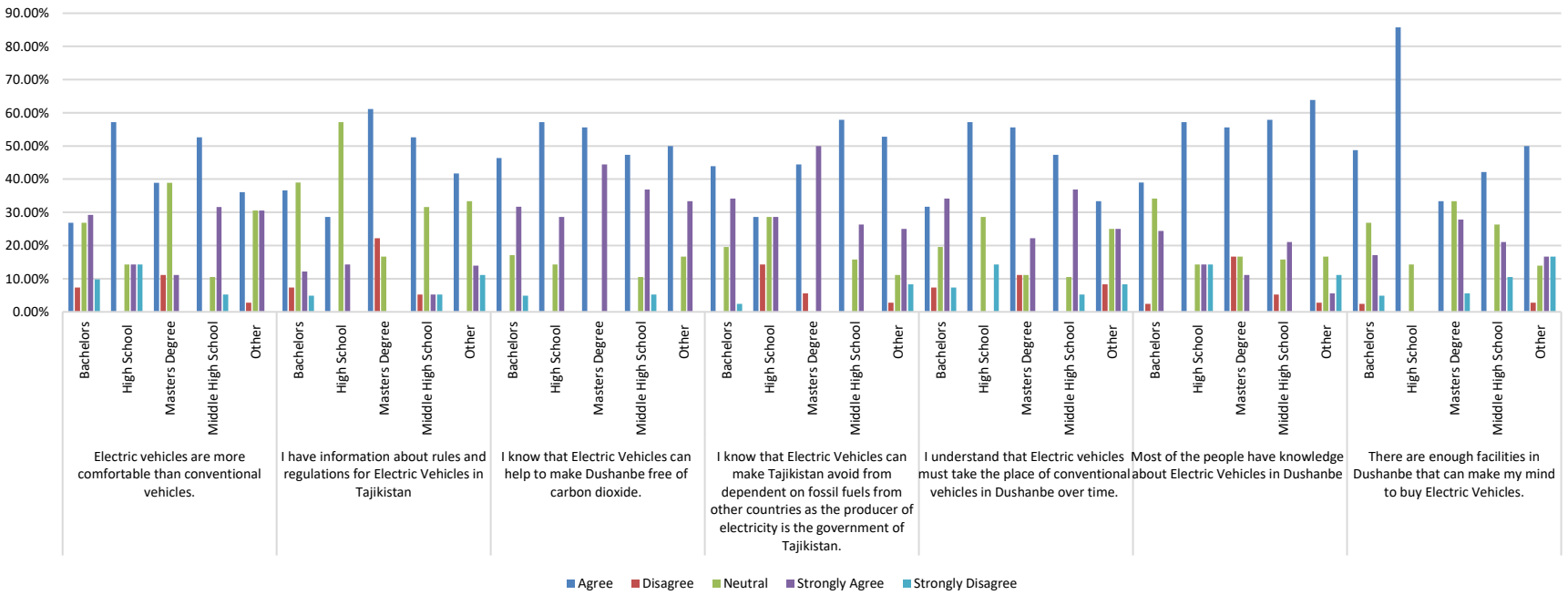

Figure 3. EV perception by educational status

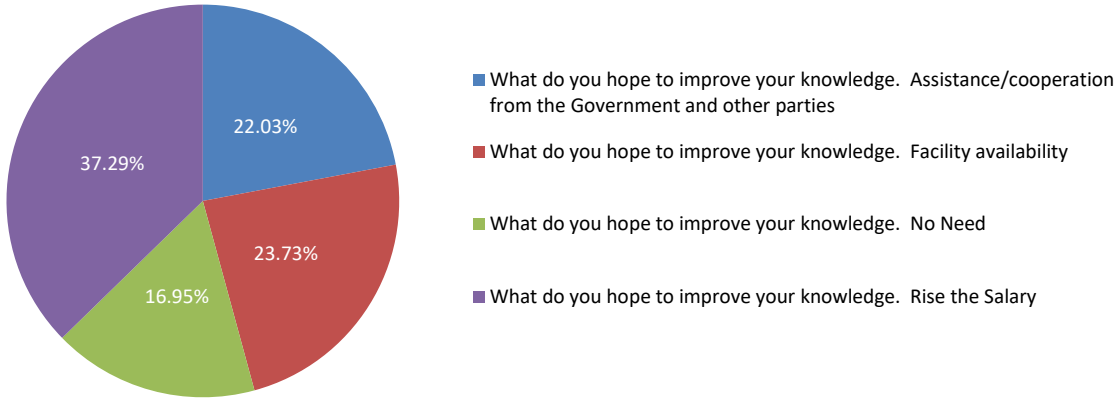

Figure 4. Preferences of respondents for perception of EV

3.2. Discussion

Surprisingly, contrary to initial initial assumption, the survey results indicate higher acceptance rates among older age groups compared to younger ones. It's important to note that Tajikistan has a larger population of younger individuals than older ones. This trend may be attributed to the historical context, particularly the civil war following the country's separation from the Soviet Union, which predominantly affected individuals aged between 18 and 35 (O'Brien, 2020). Similar study, though with different age gap from 30 to 50 years, was conducted in Netherlands, where respondents showed preference for a greater knowledge of EVs (Liao et al., 2018). However, the Netherland did not any experience civil war or political movements of the same magnitude.

In exploring the gender disparities in the acceptance rates of EVs, it's intriguing to observe that females emerge as the primary drivers of acceptance. This finding is somewhat unexpected, especially given the historical context of Tajikistan where woman traditionally held lower educational status. During the Soviet Union era, significant strides were made in female participation in education, with more women entering academic realm (Kataeva, 2024). Despite this historical trend, the findings of this research challenge conventional assumptions by showcasing a higher level of agreement among women compared to men regarding the adoption of electric vehicles. Similarly, in the Nordic countries, studies have shown that women are more concerned about environmental impact of EVs and demonstrate greater knowledge and preference for environmentally friendly technology compare to men (Sovacool et al., 2019). This suggests that knowledge of or agreement with the transition to EVs is strongly influenced by by a concern for the environment. When individuals begin to worry about environment issues, they are more likely to seek ways to minimize their impact on the environment.

This divergence from expectations prompts a deeper examination of the factors influencing gender-specific attitudes towards EV adoption. While historical educational disparities might have suggested a lower inclination among females to embrace innovative transportation alternatives, the data tells a different story (Kataeva & DeYoung, 2017). It suggests that factors beyond educational background may play a more significant role in shaping attitudes towards EVs across genders. Possible explanations for unexpected trend could include socio-cultural shifts, evolving perceptions of environmental responsibility, or practical considerations such as the convenience and cost-effectiveness of EVs. Further research into the specific drivers behind female acceptance of EVs would offer valuable insights into consumer behavior and preferences within the context of sustainable transportation.

Moreover, understanding the nuances of gender-specific attitudes towards EVs is crucial for the development of targeted strategies to promote their adoption across diverse demographic segments. By recognizing and addressing the factors that influence female acceptance of EVs, policymakers, urban planners, and automotive manufacturers can tailor their initiatives to better meet the needs and preferences of all gender groups. This not only fosters gender-inclusive approaches to sustainable transportation but also enhances the overall effectiveness and success of efforts to transition towards a more environmentally friendly transportation landscape.

As environmental awareness grow and the urgency to combat climate change becoming more pressing, understanding the public attitudes towards EVs is crucial (Bennett & Vijaygopal, 2018). As policymakers and stakeholders' endeavor to steer Tajikistan towards a greener future, the insights from this study are invaluable. They guide the development of policies and initiatives aimed at fostering more sustainable transportation ecosystem in the country. This research, backed by robust empirical evidence and analytical rigor, makes a compelling case for concerted action, driving Tajikistan towards a future where electric mobility is widespread, supported by strong infrastructure and an enthusiastic populace inspired by the vision of a cleaner, greener tomorrow.

While awareness of EVs among Tajikistan's residents is increasing each year, it remains notably inadequate. Participants in this study suggested that social media could serve as a powerful tool to enhance the public's understanding of EVs. This feedback points towards a promising strategy: leveraging social media platforms to disseminate information and educate the public about the benefits and practicalities of EVs. Such an approach could not only increase knowledge but also foster greater acceptance and use of EVs, aligning with Tajikistan's environmental objectives and contributing to the global effort to mitigate climate change. This strategy underscores the potential of targeted information campaigns to accelerate the adoption of sustainable transportation solutions within the country.

4. Conclusion

The perception of EVs in Dushanbe varies significantly across different demographic groups. Respondents aged 36 to 60 show a 19% higher inclination towards adopting EVs compared to those aged 18 to 35, likely influenced by socio-political factors stemming from the Tajik Civil War. Females demonstrate 4% greater familiarity with EV technology than males, as they tend to stay in the country and are more exposed to local environmental issues. Individuals with high school and middle high school qualifications, often within the older age bracket, exhibit considerable knowledge about EVs. The current pollution levels in Dushanbe underscore the urgent need for cleaner transportation solutions. As awareness of EVs spreads across all age groups and genders, the transition to EVs will become smoother, contributing to improved air quality in the city.

A study on the transition to EVs in Dushanbe, Tajikistan, offers insights into local perceptions and attitudes towards sustainable transportation. Utilizing a quantitative approach and descriptive statistical analysis, the research highlights demographic factors— such as age, gender, and education level—as significant influencers on attitudes towards EVs. Older respondents express higher agreement rates, while gender and educational disparities reveal varying levels of enthusiasm and awareness among different segments of the population. Recommendations from residents emphasize the need for increased salaries, improved EV infrastructure, and greater governmental and institutional cooperation to support EV adoption. The study underscores the importance of community engagement and tailored interventions to address challenges and leverage resident preferences, ultimately paving the way for a greener, more sustainable transportation future in Dushanbe.

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