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Research Article

Comprehension of Traffic Signs among Aeta Motorists: From Challenges to Solutions

Clariza Buay Inong*

Graduate School, Philippine College of Criminology, 641 Sales St, Quiapo, Manila, 1001 Metro Manila Philippines

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**Corresponding author:*
E-mail:
clariza.inong@my.pccr.edu.ph

ABSTRACT

Traffic signs are vital for ensuring motorists safety on the road, but their effectiveness relies on drivers comprehending their meaning and demonstrating the appropriate actions. This study investigated the traffic sign comprehension of 324 Aeta respondents using a three-part questionnaire: a survey on respondents' agreement with traffic sign meanings and actions, a matching test to identify traffic sign names, both using convenience sampling, and an interview using purposive sampling. The researcher utilized a convergent parallel mixed method design, examining quantitative data with descriptive statistics and qualitative data with thematic analysis. The key findings indicate that the overall traffic sign comprehension mean score of the respondents was 3.35, interpreted as "Average," suggesting a general understanding of traffic signs with room for improvement in specific areas. The data also reveals that the most correctly identified signs in the matching test were those reinforced with both verbal and non-verbal elements and those frequently encountered, such as the informative sign "Slow Vehicles Use Right Lane" (49.4 %), the warning sign "Slippery When Wet" (47.8%), the regulatory sign "Stop Sign" (66.0%) and the road marking "Single Solid Yellow Line" (46.6%). Most Aeta motorists began driving at a young age without formal training, mostly learning through observations and guidance from family and relatives, leading to misunderstandings of traffic signs. Interviews highlighted that financial difficulties, lack of resources, and illiteracy prevent many Aeta motorists from obtaining driver's licenses and vehicle registrations. Additionally, they often face prejudice and discrimination, being unfairly blamed for motor vehicle accidents. These findings emphasize the importance of specialized educational initiatives and culturally appropriate driving instruction to promote traffic sign literacy among Aeta motorists. Proposed initiatives include the development of simple, engaging materials, such as a trifold brochure containing locally translated traffic sign names,

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explanations of Kapampangan language, and pictures. Other recommendations include free or subsidized driver education courses and improved traffic signs combining verbal and non-verbal elements to enhance comprehension.

Keywords: *Aeta motorists, Kulut, traffic sign comprehension, Traffic signs, Tri-fold brochure*

Introduction

Traffic signs are critical visual aids that communicate traffic laws, regulations, acting as a reminder, directions, or warnings (Koyuncu & Amado, 2008). These signs utilize various shapes, colors, and sometimes words to control traffic and are the most frequently employed methods of traffic regulation (Wogalter et al., 1997)

Research into traffic sign comprehension began in 1966. Early studies primarily assessed local traffic sign comprehension levels and frequently found that overall comprehension was inadequate. Subsequent research identified several individual factors such as age, gender, driving history, educational background, and other factors that can significantly affect comprehension (Johansson & Rumar, 1966). More recently, researchers have also examined the impact of cognitive features of signs, including familiarity, concreteness, simplicity, meaningfulness, and semantic distance.

Accurate comprehension is critical for the effective operation of a traffic sign system. Poor comprehension diminishes the likelihood of drivers remembering sign meanings and responding appropriately (Charlton, 2006). Drivers may even misinterpret unclear or unfamiliar signs, mistakenly believing certain actions are permissible when they are actually risky (Al-Madani, 2000). When traffic signs are not well understood, their benefits can be negated, potentially making them a significant contributor to accidents. According to Kraft (2009), an effective traffic sign meets specific needs, captures the road user's attention, and conveys messages clearly and simply, allowing ample time for proper response. To prevent conflicts or accidents, traffic signs must be designed to be easily and accurately understood (Ou & Liu, 2012). The ability to comprehend traffic signs is vital for road safety, and inadequate comprehension can lead to serious issues (Kirmizioglu & Tuydes-Yaman, 2011).

While numerous studies have focused on urban populations, research on traffic sign comprehension among indigenous communities is notably lacking. for instance, the DriveSafe NT Remote project in Australia highlights the necessity of tailored approaches to enhance traffic sign comprehension among indigenous populations (Job et al., 2013). This study aims to address this critical gap by focusing on Aeta motorists in the Philippines. By drawing comparisons with overseas research, this study emphasizes the global importance of culturally specific traffic safety interventions.

Literature Review

Traffic signs play a critical role in communicating traffic laws and regulations, using shapes, colors, and sometimes words to direct, remind, or warn drivers (Koyuncu & Amado, 2008; Michael, Russell, & Brelsford, 1997). Since the inception of traffic sign comprehension research in 1966, numerous studies have found overall comprehension to be inadequate, prompting further investigations into individual factors such as age, gender, driving history, and educational background (Johansson & Rumar, 1966; Al-Madani et al., 2002).

Recent research has focused on cognitive features of signs, including familiarity, concreteness, simplicity, meaningfulness, and semantic distance (Liu et al., 2019). Studies by Ben-Bassat et al. (2019) and Bañares et al. (2018) suggest that alternative and ergonomic designs significantly improve sign comprehension. For instance, Charlton (2006) found that warning signs for schools and road construction had the highest detection and comprehension rates, while slippery surface warnings were the least understood. Similarly, Shinar and Vogelzang (2013) observed that text-based

signs were generally easier to understand than symbolic ones.

Choocharukula et al. (2016) explored tourists' perceptions of Thai road signs, identifying significant factors such as age, possession of a driver's license, driving experience abroad, and nationality. In Iraq, Abduljabbar et al. (2020) reported an average comprehension rate of 68.5%, with pedestrian crossing signs being the most accurately understood.

In the Gulf Cooperation Council states, Al-Madani et al. (2002) found that education, income, and nationality significantly influenced sign comprehension. Zhang and Chan (2013) also highlighted that drivers with more education performed better on comprehension tests, although familiar signs were consistently better understood.

Local studies in the Philippines have shown similar trends. Fernandez et al. (2020) revealed that drivers' training methods and educational attainment significantly impact their comprehension of traffic signs. Brucal, Canuto, and Garcia (2013) emphasized the importance of ergonomic design principles in improving sign comprehension.

Despite extensive research on traffic sign comprehension, there is a notable gap in studies focusing on indigenous communities such as the Aeta motorists in the Philippines. The DriveSafe NT Remote project in Australia underscores the necessity of tailored approaches for enhancing traffic sign comprehension among indigenous populations (Job et al., 2013). By addressing this critical gap, the current study aims to understand the unique challenges faced by Aeta motorists and emphasizes the global importance of culturally specific traffic safety interventions.

Methods

The study utilized a convergent parallel design, a mixed method approach combining quantitative and qualitative elements, to determine the level of comprehension of traffic signs among Aeta motorists and to identify the challenges they faced in understanding these signs.

Quantitative data was gathered through the distribution of 324 survey questionnaires to respondents using convenience sampling with a three sections: demographic profiling, a traffic sign comprehension test using a 5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree" to measure agreement with specific actions for traffic signs, and a matching test aligning traffic sign images with their names, similar to the Land Transportation Office's written driver's license exam, divided into categories: regulatory, warning, guide/informative signs, and road markings. The survey results from SOPs 1 and 2 were analyzed using SPSS software. Data from SOP 1 was analyzed using descriptive statistics to determine the overall traffic sign comprehension score, while SOP 2 findings were examined to determine the frequency and percentage of correct and incorrect answers.

For the qualitative component, the researcher conducted semi-structured interviews using purposive sampling. Data saturation was achieved with eight participants. The interviews were structured in three sections: introduction which welcomed the participants, introduced the researcher and the study's objectives, and outlined basic instructions and reminders for the interview; a series of open-ended and follow-up questions to probe participants challenges in understanding traffic signs; and concluding remarks where the researcher thanked participants for their involvement and formally concluded the interview.

Interviews, lasting between 3 and 12 minutes, were conducted at convenient times and locations for participants. Interviews were conducted primarily in Kapampangan, with Tagalog used as needed, and questions were rephrased in simpler terms for clarity. Thematic analysis was performed on the qualitative data from SOP 3, with five main themes emerging from the analysis. The data from all three SOPs (1, 2, and 3) were integrated to provide a comprehensive understanding of the connections between quantitative and qualitative findings. Based on these findings, solutions were developed to enhance Aeta motorists' comprehension of traffic signs.

Participants included Aeta motorists of either gender, aged 18 or older, who know how to drive, with at least two years of driving experience, living in Barangay Bueno, willing to

participate, and able to sign the informed consent. Exclusion criteria included unwilling participants, those with a student driver's license, individuals with disabilities, and those with expired licenses.

Convenience sampling was chosen for the quantitative component due to the ease of accessing available and willing Aeta motorists, allowing efficient data collection within a limited timeframe. Purposive sampling was used for the qualitative component to ensure representation of specific characteristics, such as age, driving experience, and familiarity with traffic signs, in the sample. This approach provided in-depth information from individuals likely to offer valuable insights.

While these sampling methods are practical, they can introduce biases. Convenience sampling may not fully represent the entire Aeta motorist population, potentially biasing findings. To mitigate this, participants from diverse backgrounds and locations within the Aeta community were included. Purposive sampling might introduce selection bias, which was addressed by clearly defining the inclusion criteria and ensuring a transparent selection process. Additionally, triangulation methods, such as cross-referencing findings with existing literature and conducting follow-up interviews, were used to validate the results.

The researcher reached out to the National Commission on Indigenous Peoples (NCIP) Central Office via email to obtain approval for the study. The request was subsequently endorsed to the NCIP Region III Office. Following the submission of the necessary documents, a Certificate of Precondition was issued, permitting data collection in the specified area. The researcher then prepared permission letters, which were signed by the Dean of the PCCR Graduate School and the Barangay Captain, allowing the data collection process to proceed. Data collection was conducted over four visits in February and March 2024, involving 324 respondents. During these visits, survey questionnaires were distributed and collected, and interviews with respondents were completed. Informed consent forms were provided in Kapampangan, Tagalog, or English, detailing the study's objectives, participant rights, and the option to withdraw. Participants were assured that their information would be used exclusively for academic purposes, with confidentiality maintained in accordance with the Data Privacy Act of 2012.

Result and Discussion

The survey questionnaire captured the demographic profile of 324 Aeta motorists, including age distribution, years of driving experience, gender distribution, types of driver's licenses held, and types of vehicles owned.

- Age Distribution: The majority of Aeta motorists were between the ages of 21-30, accounting for 34.9% (113 respondents). In contrast, the age group of 51 and older had the lowest representation, with 5.9% (19 respondents).
- Driving Experience: The most frequent range of driving experience was two to five years, with 49.1% (159 respondents). Those with over 15 years of driving experience made up the smallest group at 13.0% (42 respondents).
- Gender Distribution: Out of the 324 respondents, 317 were male (97.8%) and 7 were female (2.2%), indicating that male motorists dominated in the research area.
- Driver's License Type: The "no driver's license" category was the most common, with 99.4% (322 respondents). Both the non-professional and professional driver's license categories had only one respondent each, accounting for 0.3% each.
- Vehicle Ownership: "Single motorcycle" was the most prevalent form of vehicle ownership, with 53.1% (172 respondents). The "all kinds of vehicles owned" category had the fewest representations, with only one respondent (0.3%).

The demographic profile indicates that young adults (ages 21-30) and males are the primary drivers among the Aeta community. This is consistent with findings in other studies, such as Charlton's (2006) research, which showed a predominance of younger male drivers in certain driving populations. The high percentage of respondents without a driver's license (99.4%) highlights a significant issue in terms of legal driving compliance and formal

driving education within the community. This aligns with findings by Bañares et al. (2018) in the Philippines, which emphasized the need for improved driver education and training.

Quantitative Findings

Traffic Sign Comprehension Level of the Respondents

Overall Comprehension. Table 1 displays the overall comprehension of traffic signs among respondents. Aeta motorists had an overall mean of 3.35, translating to an "Average" comprehension level. This underscores the necessity for additional educational initiatives to enhance traffic sign comprehension among Aeta motorists. The indicator "As soon as I saw the traffic signs depicted in this study, I knew what they meant and what I should do if I came across them while driving" received the highest mean score of 3.41 ("Good"), indicating that most Aeta motorists felt confident in their ability to recognize and understand traffic signs. Conversely, the indicator "I understand the meaning of the traffic signs provided by this study, and I immediately know what to do" received the lowest mean of 3.28 ("Average"), suggesting that some Aeta motorists might not fully understand certain traffic signs, leading to delays in responding appropriately.

Table 1. Level of Comprehension of Respondents to Traffic Signs (Test 1, Part 1)

	Descriptive Statistics					
	Indicator	**X**	**VI**	**SD**	**V**	**RANK**
1.	All traffic signs provided or shown in this study are clear to me. (Ang lahat ng mga senyas trapiko na ibinigay o ipinapakita sa pag-aaral na ito ay malinaw sa akin.)	3.36	A	.984	.967	3
2.	I understand the meaning of the traffic signs provided in this study and will act appropriately if I see them on the road. (Naiintindihan ko ang kahulugan ng mga senyas trapiko na ibinigay sa pag-aaral na ito at kikilos ng naaangkop kung makita ko ang mga ito sa daan.)	3.31	A	.995	.989	4
3.	As soon as I saw the traffic signs depicted in this study, I knew what they meant and what I should do if I came across them while driving. (Sa sandaling nakita ko ang mga senyas trapiko na inilalarawan sa pag-aaral na ito, alam ko kung ano ang ibig nila at susunduin ko ito.)	3.41	G	1.002	1.004	1
4.	I recognized the signs depicted in this study and will follow their instructions whenever I drive down the road. (Kinikilala ko ang mga senyas na inilalarawan sa pag-aaral na ito at susundin ko ang kanilang mga tagubilin sa tuwing nagmamaneho ako sa kalsada).	3.40	A	1.098	1.206	2
5.	I understand the meaning of the traffic signs provided by this study, and I immediately know what to do. (Naiintindihan ko ang kahulugan ng mga senyas trapiko na ibinigay ng pag-aaral na ito, at alam ko kaagad kung ano ang gagawin.)	3.28	A	1.117	1.248	5
	TOTAL	**3.35**	**A**	**1.039**	**1.083**	

VI – Verbal Interpretation: 4.21-5.00 Excellent (E); 3.41-4.20 Good (G); 2.61-3.40 Average (A); 1.81-2.60 Poor (P); 1.00-1.80 Very Poor (VP)

Informative Signs. Table 2 illustrates the comprehension level of informative signs among respondents. The overall mean score of 3.18 indicates an "Average" understanding of informative traffic signs, highlighting the need for improved driver education. Indicators for "Reduce Speed" and "Road Closed" signs scored the highest with a mean of 3.31, showing general understanding among respondents, though further clarification on specific actions required may be needed. Conversely, the indicator "I understand that service signs indicate the location of nearby amenities, such as hospitals, restaurants, or gas stations, and provide information to help you plan your trip." received the lowest mean of 2.84 ("Poor"), suggesting limited familiarity and exposure among Aeta motorists, resulting in difficulties in interpretation.

Table 2. Level of Comprehension of Respondents to Informative Sign (Test 1, Part 2)

	Descriptive Statistics					
	Indicator	**X**	**VI**	**SD**	**V**	**RANK**
1.	I understand that service signs indicate the location of nearby amenities, such as hospitals, restaurants, or gas stations, and provide information to help you plan your trip. (Naiintindihan ko na ang mga palatandaan na mayroong amenity ay nagmumungkahi ng lokasyon ng mga malapit na ospital, restaurant, o gasolinahan.) 	2.84	A	1.175	1.380	4
2.	I am aware that the "check brakes" sign advises you to inspect the condition of your vehicle's brakes before proceeding to ensure safe braking performance. (Alam ko na ang senyas na "check brakes" ay nagpapayo na siyasatin ang kondisyon ng preno ng iyong sasakyan bago magpatuloy sa pagmamaneho.) 	3.28	A	1.104	1.219	2
3.	I understand that the "reduce speed" sign directs you to slow down to the indicated speed. (Naiintindihan ko na ang senyas trapiko na "reduce speed" ay nagdidirekta sa iyo na bawasan ang bilis ng pagmamaneho.) 	3.31	A	1.060	1.123	1
4.	I understand that the road closed sign indicates that the road is closed and that an alternate route should be taken. (Naiintindihan ko na ang senyas trapiko na road closed ay nagsasabi na sarado ang kalsada at maghanap ng alternatibong ruta.) 	3.31	A	1.114	1.241	1

Descriptive Statistics						
	Indicator	**X**	**VI**	**SD**	**V**	**RANK**
5.	The "slow vehicles use right lane" sign, in my opinion, directs slow-moving vehicles to use the rightmost lane. (Ang karatula na "slow vehicles use right lane" ay nagtuturo sa mga mabagal na sasakyan na gamitin ang pinakaunang daanan.) 	3.16	A	1.160	1.345	3
	TOTAL	**3.18**	**A**	**1.122**	**1.262**	

VI – Verbal Interpretation: 4.21-5.00 Excellent (E); 3.41-4.20 Good (G); 2.61-3.40 Average (A); 1.81-2.60 Poor (P); 1.00-1.80 Very Poor (VP)

Warning Signs. Table 3 shows the comprehension levels of warning traffic signs among respondents. The overall mean score of 3.10 indicates "Average" comprehension, highlighting the need for enhanced education programs to ensure appropriate driver responses. The indicator "I am aware that I am approaching an accident-prone area and will proceed with caution and slow down." received the highest mean score of 3.45 ("Good"), suggesting familiarity with this warning sign due to frequent exposure. In contrast, the indicator "I'm aware that the bridge ahead is narrow" obtained the lowest mean score of 2.81 ("Average"), indicating difficulty interpreting signs that rely solely on nonverbal elements, likely due to insufficient exposure.

Table 3. Level of Comprehension of Respondents to Warning Sign (Test 1, Part 3)

Descriptive Statistics						
	Indicator	**X**	**VI**	**SD**	**V**	**RANK**
1.	I know I need to be cautious and slow down as I approach the sharp left turn. (Alam kong kailangan kong mag dahan-dahan habang papalapit ako sa matulis na daang paliko.) 	3.44	G	1.053	1.108	2
2.	I am aware that there is a narrow road ahead, and I will reduce my speed and proceed with caution. (Alam ko na paliit ang daan, at kailangang bawasan ko ang aking takbo o magpapatuloy nang may pag-iingat.) 	2.82	A	1.094	1.196	4
3.	I understand that there will be a steep descent ahead, and I will need to use my brakes carefully to keep the vehicle's speed under control. (Nauunawaan ko na may matarik na daan pababa at kailangang maingat ang paggamit ko ng preno upang mapanatili ang kontrol sa sasakyan.) 	2.96	A	1.161	1.348	3

Descriptive Statistics						
	Indicator	**X**	**VI**	**SD**	**V**	**RANK**
4.	I am aware that I am approaching an accident-prone area and will proceed with caution and slow down. (Alam kong papalapit na ako sa bahagi ng daan na laging nagkakaroon ng aksidente at kailangan kong magpapatuloy nang may pag-iingat.) 	3.45	G	1.196	1.431	1
5.	I'm aware that the bridge ahead is narrow. (Alam ko na ang paparating na tulay ay makitid.) 	2.81	A	1.197	1.433	5
	TOTAL	**3.10**	**A**	**1.140**	**1.303**	

VI – Verbal Interpretation: 4.21-5.00 Excellent (E); 3.41-4.20 Good (G); 2.61-3.40 Average (A); 1.81-2.60 Poor (P); 1.00-1.80 Very Poor (VP)

Regulatory Signs. Table 4 shows the comprehension levels of regulatory traffic signs among respondents. The overall mean score of 3.36 indicates an "Average" comprehension, suggesting that while most respondents understand the general idea of these signs, further education is necessary to ensure complete understanding. The "Stop" and "Pedestrian Crossing" signs received the highest mean score of 3.60 ("Good"), effectively combining verbal messages with symbols, enhancing understanding. The indicator “I understand that there is a weight restriction in place and that I must comply with it” received the lowest mean score of 2.68 ("Average"), suggesting that Aeta motorists may not fully comprehend this sign, potentially leading to misunderstandings and unintentional violations.

Table 4. Level of Comprehension of Respondents to Regulatory Sign (Test 1, Part 4)

Descriptive Statistics						
	Indicators	**X**	**VI**	**SD**	**V**	**RANK**
1.	I understand that I must come to a complete stop at the stop sign before continuing to drive. (Naiintindihan ko na dapat akong huminto sa stop signs bago magpatuloy sa pagmamaneho.) 	3.60	G	1.167	1.361	1
2.	Overtaking is prohibited in this area. (Bawal lumusot sa lugar na ito.) 	3.45	G	1.154	1.332	2

Descriptive Statistics						
	Indicators	**X**	**VI**	**SD**	**V**	**RANK**
3.	I understand that there is a weight restriction in place and that I must comply with it. (Naiintindihan ko na ang senyas ay nagpapaalam na mayroong limitasyon sa bigat ng mga sasakyang maaaring dumaan sa lugar na ito.) 	2.68	A	1.154	1.332	3
4.	I understand that this is a no-parking zone. (Naiintindihan ko na bawal iparada ang sasakyan sa lugar na ito.) 	3.45	G	1.135	1.289	2
5.	I am aware that there is a pedestrian crossing ahead, and I must proceed with caution. (Alam kong tawiran ang lugar na ito at dapat akong magpatuloy ng may pag-iingat.) 	3.60	G	1.124	1.263	1
	TOTAL	**3.36**	**A**	**1.147**	**1.315**	

VI – Verbal Interpretation: 4.21-5.00 Excellent (E); 3.41-4.20 Good (G); 2.61-3.40 Average (A); 1.81-2.60 Poor (P); 1.00-1.80 Very Poor (VP)

Road Markings. Table 5 shows the comprehension level of respondents regarding road markings. The overall mean score of 3.24 ("Good") indicates that Aeta motorists generally understand and follow the instructions of road markings well. The indicator "I understand that a broken white center line allows changing lanes provided that it is safe to do so and will not result in obstruction" received the highest mean score of 3.48 ("Good"), indicating good understanding of lane lines and their associated rules. Conversely, the indicator "Overtaking is prohibited in both directions when there is a single solid yellow line" received the lowest mean score of 3.37 ("Average"), suggesting a need for further education on this rule.

Table 5. Level of Comprehension of Respondents to Road Markings (Test 1, Part 5)

Descriptive Statistics						
	Indicators	**X**	**VI**	**SD**	**V**	**RANK**
1.	I understand that a broken white lane line allows changing lanes provided that it is safe to do so and will not result in obstruction. (Maaaring lumipat ng daan ang mga sasakyan kapag mayroong puting linyang pasudlong sa gitna ng kalsada.) 	3.48	G	1.100	1.210	1

Descriptive Statistics					
Indicators	**X**	**VI**	**SD**	**V**	**RANK**
2. I am aware that a barrier line with double solid yellow lines does not allow vehicle crossing or passing and is usually found around blind curves.  (Alam ko na ang dobleng solidong dilaw na linya ay hindi pinapayagan ang pagtawid o pagdaan ng sasakyan at karaniwang matatagpuan ito sa mga kalsada na may blind curve.)	3.45	G	1.032	1.065	2
3. I am aware that double solid yellow lines indicate a barrier lane and that I am not permitted to cross them. (Alam ko na ang dobleng diretsong dilaw na linya ay nagpapahiwatig ng isang barrier lane at hindi ako maaaring tumawid sa mga ito.) 	3.44	G	1.064	1.132	3
4. I understand that passing is allowed on a broken yellow line. (Naiintindihan ko na maaari ang pagdaan sa magkabilang daan kapag mayroong paudlong na dilaw na linya kalsada.) 	3.38	A	1.035	1.071	4
5. Overtaking is prohibited in both directions when there is a single solid yellow line. (Ipinagbabawal ang pag-overtake sa magkabilang direksyon kapag mayroon isang diretsong dilaw na linya sa gitna ng kalsada.) 	3.37	A	1.106	1.224	5
TOTAL	**3.42**	**G**	**1.067**	**1.141**	

VI – Verbal Interpretation: 4.21-5.00 Excellent (E); 3.41-4.20 Good (G); 2.61-3.40 Average (A); 1.81-2.60 Poor (P); 1.00-1.80 Very Poor (VP)

The quantitative findings highlight that Aeta motorists have an overall "Average" comprehension level of traffic signs, indicating room for improvement. The higher comprehension scores for commonly seen signs like "Stop" and "Pedestrian Crossing" align with findings from Charlton (2006) and suggest the importance of frequent exposure and clear verbal-symbolic combinations in understanding. However, the lower scores for less familiar or solely symbolic signs emphasize the need for targeted educational initiatives.

Percentage of Correct Answers by Respondents in Matching Traffic Signs

Informative Signs. This study assessed respondents' knowledge of informative signs through a matching test. As shown in Table 6, the sign with the most correct answers was "Slow Vehicles Use Right Lane," with 160 correct responses (49.4%), and the fewest incorrect answers (164, 50.6%). This suggests frequent exposure leads to better recognition. Conversely, the sign "No Right Turn on Red Signal" had the fewest correct answers (103, 31.8%) and the highest incorrect answers (221, 68.2%), indicating that less frequently seen signs are less recognizable, highlighting a lack of familiarity among respondents.

Table 6. Percentage of Correct Answers of Informative Signs of 324 Aeta Motorists

Informative Signs										
Indicators	Item 1 		Item 2 		Item 3 		Item 4 		Item 5 	
Responses	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect
Frequency	118	206	160	164	141	183	118	206	103	221
Percentage	36.4	63.6	49.4	50.6	43.5	56.5	36.4	63.6	31.8	68.2

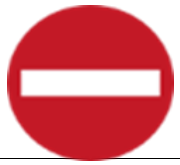
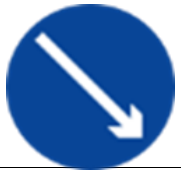
Warning Signs. Participants in this study matched pictures of five warning signs to their corresponding names. As shown in Table 7, the sign "Slippery When Wet" received the most correct answers, with a frequency of 155 (47.8%), and the fewest incorrect answers, with 169 (52.2%). This suggests frequent encounters by Aeta motorists lead to better recognition and recall. Conversely, the sign "Curve Left" had the fewest correct answers, with a frequency of 109 (33.6%), and the highest incorrect answers, with 215 (66.4%).

Table 7. Percentage of Correct Answers of Warning Signs of 324 Aeta Motorists

Warning Signs										
Indicators	Item 1 – Sharp turn right 		Item 2 – Falling debris left 		Item 3 - Steep climb left 		Item 4 – Curve left 		Item 5 - Slippery when wet 	
Responses	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect
Frequency	110	214	139	185	135	189	109	215	155	169
Percentage	34.0	66.0	42.9	57.1	41.7	58.3	33.6	66.4	47.8	52.2

Regulatory Signs. Participants identified names of five regulatory signs from images. Table 8 shows the "Stop Sign" had the highest correct answers (214, 66.0%) and the fewest incorrect answers (110, 34.0%), indicating familiarity due to frequent encounters. The "Give Way" sign had the fewest correct answers (109, 33.6%) and the highest incorrect answers (187, 57.7%), suggesting difficulty in identification, likely due to infrequent exposure.

Table 8. Percentage of Correct Answers of Warning Signs of 324 Aeta Motorists

Regulatory Signs										
Indicators	Item 1 – Stop Sign 		Item 2 – Keep Right 		Item 3 – No Entry for Motorcycles 		Item 4 – Give Way Sign 		Item 5 – No U-turn Sign 	
Responses	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect
Frequency	214	110	153	171	153	171	137	187	151	173
Percentage	66.0	34.00	47.2	52.8	47.2	52.8	42.3	57.7	46.6	53.4

Road Markings. Participants matched pictures of five road markings to their corresponding names. Table 9 shows that the road marking with the most correct answers was "Single Solid Yellow Line," with 151 correct responses (46.6%), and the fewest incorrect answers, with 192 (59.3%). Conversely, the road marking with the fewest correct answers was "Centerline or Separation Line," with 70 correct responses (21.6%), and the most incorrect answers, with 254 (78.4%).

Road Markings										
Indicators	Item 1 – Broken & Solid Yellow Line 		Item 2 – Single Solid Yellow Line 		Item 3 – Barrier Line Double Solid Yellow line 		Item 4 – Centerline (or Separation Line) 		Item 5 – Cat's Eye/Road Studs 	
Responses	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect
Frequency	71	253	151	173	132	192	70	254	137	187
Percentage	21.9	78.1	46.6	53.4	40.7	59.3	21.6	78.4	42.3	57.7

The findings indicate that Aeta motorists generally have a higher recognition of more frequently encountered signs. Informative signs like "Slow Vehicles Use Right Lane" and warning signs like "Slippery When Wet" show better comprehension due to their common occurrence. This aligns with previous research by Berrio et al. (2022), who found that familiarity significantly enhances traffic sign comprehension.

Conversely, less frequently seen signs, such as "No Right Turn on Red Signal" and "Give Way," exhibit lower recognition levels, suggesting limited exposure impacts comprehension. This is consistent with findings by Dyah Utari et al., 2024, emphasizing the role of frequent exposure in traffic sign recognition.

Qualitative Findings

This study gathered qualitative data from five open-ended interview questions. The qualitative content analysis identified five major themes, each of which highlighted the difficulties that Aeta motorists have when comprehending traffic signs.

Theme 1: Riding My Courage: The Filipino Spirit of "Lakas ng Loob"

This theme captures how Aeta motorists learned to drive, with many participants

summoning the courage to teach themselves to ride motorcycles, embodying the Filipino concept of "Lakas ng Loob." This concept has been deeply ingrained in Filipino culture, allowing countless Filipinos to overcome life's challenges.

- Self-Taught Driving:
  - "Ano sakin, bali... basta nakyalam lang ako ganyan, tapos yung, tas may ano din... nag ano din... Na ganito ganito tas ang gagawin para ano ka yung maipatakbo mo siya." (Basta nangialam lang ako, atsaka meron din nagturo sakin kung paano patakbuhin iyong motor.) (I just stepped in, and someone also taught me how to do this and that to run the motorcycle.)"
  - "Wala po, ako lang po mag isa..." (Ako lang po mag-isa nagturo sa sarili ko.) (I just taught myself.)"
- Motivation and Resilience:
  - "Kabud nakumu ateng kayi ehh...migsikan lub pu ate king sarili ku eh... numpung...bang potang mekisawa ku aku keng sarili ku ate...aku...bang eku magkasakit keng kapanintunan ate… (Bigla na lang po akong nag lakas ng loob ate. Upang hindi ako mahirapan kapag sa pagtatrabaho kapag nag asawa na ako, ate.) (I suddenly mustered up my courage. so that I won't have a hard time working when I get married, sister.)

To summarize, Filipino values, notably "Lakas ng loob," can be applied broadly. The majority of participants' "Lakas ng Loob" was motivated by a desire to aid their family and overcome life's hardships. Thus, Filipinos are not easily beaten and constantly try to improve themselves in the spirit of "Lakas ng loob."

Theme 2: Signs Lost in Translation and Their Consequences (Learning the Hard Way)

Several individuals' descriptions of specific traffic signs were ambiguous. They noticed the presence of these signs but were unsure of their purpose and significance.

- Misinterpretation of Traffic Signs:
  - "Yung... for sign daw na anu yun, sabi nila sakin ano daw yung... Ano daw para magising... pero hindi naman yata." (Sabi nila iyong palatandaan na iyon ay pampagising ngunit hindi naman yata.) (They said that sign is a wake-up call, but it doesn't seem like it.)
  - Minsan pu ate itang "dumurut ka pu ate," mali ya pala itang minsan amakanyan..." (Iyong tanda na kailangan mo umikot sa daan na iyon, ate. Minsan mali pala iyong ginagawa ko.) (The sign indicating that you need to rotate on that road, sister. It turns out I've been doing it wrong.)
- Impact of Misunderstanding:
  - "Itang "first to stop, first to go." Kasi pag minsan maliliit yung sign, kaya minsan sa crossing, hindi mo napapansin may sign dun na "first to stop, first to go." Kaya misan nahuhuli kami ng pulis, ganon. (Iyong "First stop, first to go." Maliit kasi iyong palatandaan na nakalagay sa tawiran, hindi namin kaagad napapansin kaya minsan nahuhuli kami ng mga pulis.) (The sign "First stop, first to go" on the bridge is minute, so we don't notice it immediately, which is why sometimes we get caught by the police.)
  - "Kayi me impound motor. Kasi..... No license, ku eh. (Pagkatapos kinumpiska nila yung motor ko, kasi wala akong lisensya sa pagmamaneho, eh.) (Then they confiscated my motorcycle because I didn't have a driver's license.)

The participants' experiences highlighted the challenges and uncertainties faced by Aeta motorists in understanding traffic signs. These findings underscore the crucial importance of improved education and familiarity with traffic signs to promote safe and efficient road use. The findings emphasize the necessity of continued efforts to improve Aeta motorists' understanding of traffic signs, reducing misinterpretations and encouraging safer driving.

Theme 3: Deep Rooted Prejudice: Curls Shouldn't Dictate How You're Treated

This theme addresses the experiences of discrimination faced by Aeta motorists,

particularly those with kinky hair. Many participants described how they were treated unfairly by residents and authorities due to their appearance, often being perceived as uneducated. This discrimination led to feelings of isolation, alienation, and discomfort.

- Unfair Treatment by Authorities:
  - "Pero...hindi po ako nagkamali po ate doon... Kahit "kulut" pu ako ate, hindi ako nagkamali pero ako na lang ang nagkumbaba pu ate, kase wala akong lisensiya kahit kulut kami pu ate. Di pwede yung ateng magtaas ka ng boses... Makiusap ka lang. (Kahit katutubong kulot po ako ate, hindi ako nagkamali doon ngunit ako nalang ang nagpakumbaba dahil wala akong lisensya.) (Even though I'm just a kinky-haired native, I wasn't wrong there, but I backed down because I didn't have a license.)
  - "Kitang da pu, linawe da pa pin pu ing bwak ku ehhh... kulut." (Tinanong po nila pagkatapos tinignan din po nila ang buhok ko—kulot.) (They asked afterwards, and they also looked at my hair—it's kinky.)
- Discriminatory Comments and Actions:
  - "Malambat na murin. Oneng ding pulis naman, kasi. Deng mandakap kanaku, taga nokarin ku, syempre munang muna kutnan daka "taga nokarin ka? "(Matagal-tagal na din ng nahuli ako, ngunit ang mga pulis na nanghuhuli sa akin tinanong nila kung taga saan ako.) (It has been quite a while since I was last caught, but the policemen who caught me asked where I was from.)
  - "Sabyan da (Kulut ka). "Osyempre pakit munemu ing bwak ku... "Kulut ku'' aku... "Itatanong nila kung katutubong kulot ba ako, syempre ang gagawin ko na lang ipapakita ko ang buhok ko at sabay sasabihing katutubong kulot ako. pagkatapos noon, papa alisin na nila ako.) (They'll ask if I'm a kinky-haired native; of course I'll just show my hair and say I'm a kinky-haired native. After that, they will let us be.)

These personal accounts illustrate the emotional and mental toll of discrimination on kinky-haired natives, emphasizing the importance of addressing and acknowledging its negative impact in order to promote an inclusive and prosperous society.

Theme 4: A Hungry Mind and a Yearning for a Driver's License

Participants repeatedly expressed an eagerness to learn about traffic signs and laws. They recognized that holding a driver's license would provide legal protection and enable them to confidently interact with traffic authorities. However, several challenges, including poverty, lack of resources, insufficient education, insufficient documents, and limited government assistance, hinder their ability to obtain a driver's license.

- Desire for Education and Training:
  - "Mag ano sa kwan... May training center, mga ganyan, para may ano mag-a. Tawag ba dun... mag turu para hindi ano. Ehh…ahhh…para…para makatuto sa mga sign. (Sana magkaroon ng sentro ng pagsasanay kung saan matuturuan nila kami tungkol sa mga palatandaan.) (I hope there will be a training center where they can teach us about the signs.)
  - "Syempre seminar ya pu kanita..." (Syempre, magkaroon po sana ng pantasaral.) (Of course, there should be a seminar.)
- Socioeconomic Challenges:
  - "Lisensiya mu ing buri ku sana eh bang...anti kekami baluga kami rugu ala kaming pagkayi keng...pantubus king kayi...mas... "(Kahit katutubong kulot ako. gusto ko rin magkaroon ng lisensya ngunit wala nga lang akong pera na pantubos ng lisensya.) (Even though I'm a kinky-haired native, I also want to have a license, but I don't have the money to pay for a license.)
  - "Ahh. bat di ako pupunta kung libreng seminar naman, mas... gusto ko nga yun, eh? mas gusto ko talaga yung ganon, yung magbibigay sila ng pang lisensya sa katutubo, kaparehas kong katutubo…" (Syempre pupunta ako kung

magbibigay sila ng libreng pantas-aral. Higit kong magugustuhan iyon, lalo na kung nagbibigay sila ng lisensya sa mga katulad kong katutubo.) (Of course, I will go if they provide free seminars. I would like it even more, especially if they give licenses to natives like me.)

The narratives show that participants clearly recognize the benefits of acquiring a driver's license. They regard it as a road to social inclusion and legal protection. However, socioeconomic hurdles such as poverty, a scarcity of resources, and insufficient government assistance inhibit their progress. Addressing these challenges would necessitate a multifaceted approach that includes educational programs, the construction of training centers, and increased access to identification documents.

Theme 5: Beyond the Textbook: Understanding Traffic Signs by Experience

Some participants indicated that there were no educational tools available to help them learn traffic signs. Instead, they depended on their own experiences and the help of others like local officials, residents, and other motorists. Their narratives reflect the reliance on personal and communal learning to navigate road signs.

- Reliance on Personal Experience:
  - "Ala pa pu ate makanita eh, pero yaku pu ate...aintindiyanan ku na pu kase ate eh. king kayi.... adyang nokarin ku pu ate mirasnan pu ate aintindiyanan ku na eh...uling ken mung tiru da pu ate about dalan pu ate...balu kune pu ate eh." (Wala pa naman ganyan ngunit naiintindihan ko na ate. Kaya kahit saan ako magpunta naiintindihan ko dahil sa mga tinuro nila sa akin tungkol sa daan, alam ko na.) (There isn't anything like that yet, but I can already understand, sister. So wherever I go, I understand because of what they taught me about the way, I already know.)
- Lack of Formal Educational Tools:
  - "Alapu. Ala pu talaga." (Wala po. Wala man po talaga.) (No. There really isn't.)
  - "Maganda sana yung mga marunong... Ituro din po nila sa mga hindi nag-aral." (Mabuti kung turuan kami ng mga nakapag aral para matuto din kami.) (It would be nice if those who are educated could teach us so that we can learn.)

The findings reveal a major gap in the availability of teaching materials for Aeta motorists. The participants' dependence on personal experiences and community support underscores the importance of specialized educational initiatives.

Conclusion

This study concludes that most Aeta motorists began driving at a young age without formal training, relying on observation and guidance from family and relatives. This informal learning method often leads to misunderstandings about the meaning of traffic signs. The research revealed significant challenges, such as difficulties in understanding text-based signs, particularly those in English, and issues with non-verbal traffic signs. Additionally, the majority of Aeta motorists lack driver's licenses or vehicle registrations due to financial difficulties, insufficient resources, and illiteracy, which hinder their ability to obtain suitable training and licensing. The study also highlights that Aeta motorists face prejudice and discrimination, often being stereotyped as illiterate and unfairly blamed for accidents, even when they are not at fault.

To support and enhance the traffic sign comprehension of Aeta motorists, it is crucial to develop targeted educational initiatives and create an enabling support system to improve traffic sign comprehension and driving compliance among Aeta motorists. The following recommendations are proposed:

1. Create simple and engaging materials in local languages that explain driving rules, road safety, and traffic signs. Ensure these materials are easily accessible and distributed through community centers, local events, and public announcements.
2. Conduct regular seminars and workshops focused on traffic sign education for Aeta motorists. Hold these events in accessible locations and tailor them to the specific needs of the community.

3. Provide sensitivity training for traffic authorities and residents to reduce discriminatory practices against Aeta motorists. Emphasize the importance of treating all motorists with respect and understanding.
4. Offer subsidies and financial aid to help Aeta motorists cover the costs associated with obtaining a driver's license.
5. Establish mobile training centers in Aeta communities to provide convenient access to driver's education and testing services. Equip these centers with necessary resources and staff them with trained instructors.

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