INTERNATIONAL JOURNAL OF ADVANCED MULTIDISCIPLINARY STUDIES
Volume VI, Issue 3 March 2026, eISSN: 2799-0664

# Traffic Congestions in Abatan, Buguias, Benguet: Its Causes and Effects

**RILDA G. PUGONG**
CCJE Faculty
Cordillera Career Development College

*Abstract* — Traffic congestion is one major concern in Abatan, Bugias as it is the meeting path to several places. Research has shown that traffic congestion is the effect of rising population and poverty, increasing economic activities and opportunities in the cities. The study aimed to determine the factors that affects traffic congestion and the effects of it in Abatan, Buguias. Using purposive sampling, the data were collected through in-depth interview to particular individual road users of Abatan. Analysis of the responses showed that factors causing traffic congestion are violations of traffic regulations, road incapacity, and vehicular accidents. While effects of it includes environmental, economic, and psychological effects.

***Keywords — Traffic Management System, Congestion, Mobility***

## I. Introduction

In modern society, quick mobility is one of the most basic needs wherein people are able to use different transportation facilities such as automotive vehicles, subways, and bicycles. However, among all these transportation facilities, automotive vehicles are still the most adopted due to its comfort and practicality. In this way, assuming a continuous population growth, the number of vehicles in large cities will increase as well, but much faster than transportation infrastructure; consequently, traffic congestion will become a pressing issue. It creates several negative concerns for the environment and society such as increasing in number of traffic accidents, economic impacts, and high levels of greenhouse emissions (Souza et.al.,2017). In the study conducted by United States (US) Department of Transportation (2015), they found that traffic congestion may have three key sources. The first one is related to traffic-influencing events, such as incidents, working zones, and bad weather conditions. The second one is related to traffic demand, which means fluctuations in normal traffic and special events. The last source is the transportation infrastructure, which represents the traffic control devices and physical bottlenecks. The same is through to developing countries like Philippines which are burdened by rising population and poverty, increasing economic activities and opportunities in the cities resulting in rapid increase in urban population, intolerable levels of traffic congestion, and consequent need for transportation facilities (Khalif, 2008).

Thus, the country's traffic management systems (TMSs) should focus on preventing traffic congestion and improving the overall traffic efficiency to reduce the congestion and its related problems. Underwood (1990) define traffic management as the organization,

arrangement, guidance and control of both stationary and moving traffic, including pedestrians, bicyclists and all types of vehicles. Its aim is to provide for the safe, orderly and efficient movement of persons and goods, and to protect and, where possible, enhance the quality of the local environment on and adjacent to traffic facilities.

Additionally, study in USA conducted by Wallace and Speier (2015) define Traffic Management System as the combination of measures that serve to the preserve traffic capacity and improve the security, the safety and reliability of the overall road transport system. They figure out that extensive traffic management measures are deployed to address the high incidence of bottleneck points to issues of network management and infrastructures inadequacies, since traffic congestion is the case particularly at road intersections and junctions, and can be seen across the world. This is what actually happens in Abatan, Buguias, Benguet wherein the road intersection is located, (going to Loo, Buguias; to Mountain province; to Mankayan, Benguet; and, to Baguio City) that is why traffic jam has been the number one issue.

To this regard, this study concentrates in dealing with the traffic congestion origin and in suggesting possible solutions in addressing its related problems, several TMSs have been proposed focusing on adjusting the speed of the vehicles in order to reduce the time spent in traffic lights, detect and prevent traffic congestion, and suggest alternative routes to the vehicles. Succinctly, as traffic congestion is a daily concern, researchers from different areas have been attracted to develop TMS to deal with it (Donato et. al., 2016). In Metro Manila, a study about the traffic management system was conducted by Espada et.al (2009), they've mention that Manila is severely wanting in basic infrastructure, specifically in the transport sector. Poor and ineffective performance of the public sector in responding to the challenges of the urbanization has brought abought traffic congestion, air pollution, and traffic accidents. Their study is somehow related in the case of Abatan traffic congestion, wherein migration is one factor of congestion. Observably, the other lane of the road has become a parking area for other vehicles which contributes to traffic congestions.

Although the problem of traffic jams is researched widely, the majority of the studies conducted in the Philippines concentrate on the most urbanized regions including Metro Manila (Espada et al., 2009). Little concern exists regarding congestion in minor cities and small commercial areas. Numerous works focus on the analysis of traffic and infrastructure but do not consider the community-based views of drivers, residents, and local authorities that have to endure congestion every day (Souza et al., 2017; U.S. Department of Transportation, 2015). Therefore, the empirical studies of the local factors and community problems of traffic congestion within the provincial transportation sites like Abatan, Buguias, Benguet remain deficient. This study aims at bridging that gap by finding the factors that have led to congestion and its impact on the local community based on the views of the residents, drivers and traffic enforcers. It also suggests a potential solution, as not many studies have covered this subject in that region.

This study would be beneficial to the traffic enforcers assigned in that area as it provides data regarding the traffic congestion, this can help them identify which factors can contribute to the problem and to help them look for possible actions to be taken in order to ease or seek for alternative traffic management techniques to lessen the traffic congestion which sometimes leads to road accidents. This will also help the residents in that area for them to be informed about the problem in their community and the precautions that they should take in order to be safe most specially when walking across or beside the road. Additionally, this will also be beneficial to our local government for them to help the traffic enforcers plan programs and find solution regarding the problem through assessing the data or assessment provided by the participants.

To support this research on traffic management specifically the causes and effects of traffic congestion in Abatan, Buguias, Benguet, the traffic theory known as three phase theories by Kerner (2004) and the car-following theory by Gazis (1961) is connected and helpful in guiding the researchers in conducting the study. Traffic theory was born to address automobile traffic and other problems associated with it. In the book of Denos C. Gazis (2002) about the theory, he mentioned the term "range of good" which was coined to describe the maximal distance a person can and is willing to go in order to do something useful or buy something. He explained that traffic congestion is caused by the intersection of a multitude of such "ranges of good" of many people exercising their range utilization at the same time and one factor that contributes to it are the urban structures. In addition, Park (2012) stated that deceleration of vehicle, lane changing, any random behavior of drivers can cause traffic congestion too. traffic theory was born to address automobile traffic and other problems associated with it. One of this is “Three phase traffic theory” developed by Russian physicist Boris Kerner which explains the congestion by the phase transition in traffic system. The three phases are consisting of free flow and two congestion phases: synchronized flow and wide moving jam. It only needs three parameters for understanding the empirical features of three phases: Velocity (v), density (p) and flow rate of vehicles (q). Obviously, these are not independent each other. They are related by simple intuitive expression. Park (2012) explained the three phases and stated that in free flow since there is no significant speed drop, the flow rate is nearly proportional to the density (its slope tends to decrease as the density increases). However, when the density reaches the maximum density for the free flow, the transition to the congestion must occur. After the congestion transition occur, free flow change to synchronized flow. In the synchronized flow, the speed of vehicles drops significantly, but there is no noticeable change in the flow rate is observed. This is due to the increase in the density of vehicle so that the product of the speed and the density remains nearly the same. the term synchronized reflects the synchronization of speed of the vehicles in different lanes. The wide moving jam can only spontaneously occur through synchronized flow. At this stage, both flow rate and velocity drop significantly, and they become relatively uniform than synchronized flow.

While the car-following theory tested by Gazis et.al (1961), he explained the flow of traffic stating that the acceleration of the following car was proportional to the relative speed between the lead and following cars, with a time-lag between these two quantities. In other words, it was

assumed that drivers were trying to catch up with a car pulling away, or slowing down while closing in on a car, but they did it after a certain time-lag which depended on their own reaction time-lag and the physical characteristics of their car. The gain factor was proportional to the speed of the following vehicle raised to some power, m, and inversely proportional to the relative distance raised to some power, l, resulting in what some people started calling the "L&M model." In his book he mentioned about the "Boltzmann-like model" that filled a lot of gaps in traffic flow modeling. It was based on the assumptions that the ensemble (group) of cars is associated with a distribution of "desired speeds" of the drivers, who drive at those desired speeds as long as they are not impeded by other cars. But when a fast car reaches a slow car and is prevented from passing it immediately because of the presence of other cars in the vicinity, it slows down for a while until it finds a passing clearance, when it passes and resumes its desired speed. Herman and Prigogine proposed a differential equation for the speed distribution as a function of space and time, with terms accounting for the effect of interference between slow and fast cars chosen for mathematical convenience and plausibility. True to his tradition as a leading expert in statistical mechanics, Prigogine referred to this interference term as a "collision" term, a rather ominous term when used in conjunction with traffic.

Gazis, D. (1964) developed the first theory of optimal control of such an intersection with the objective of optimizing the aggregate waiting time of the users of the intersection. The key to the solution of the problem was the observation that, in such a system, the best one could do was to maximize output from the system as soon as possible. This led to the somewhat unexpected result that the best control strategy was to give the maximum possible green light to the stream associated with the maximum "saturation flow" across the intersection, e.g., the stream with the greater number of lanes, and switch the strategy near the end of the rush period. An appropriate timing of this switching could serve out the queues, at the same time minimizing the aggregate delay.

With the above underpinnings, this study focuses on the common factors that causes traffic congestion and determine its effect most especially to where the intersection road is located in Abatan, Buguias, Benguet. The selection of respondents is limited to randomly selected residents, drivers, and employees working in the area since the study determines the common factors that affect the traffic management. This research is designed to acquire more knowledge about the problems of the respondents regarding traffic congestion and to suggest possible solutions, precautions and management technique to improve the mobility of vehicle. This paper aims to answer the following questions:

1. What are factors that affect traffic congestion in Abatan, Buguias, Benguet?
2. What are effects of traffic congestions to the community of Abatan, Buguias, Benguet?

## II. Methodology

This section presents the research methods and procedures used in collecting and analyzing the data for the study.

### Research Design

This research is based on the qualitative, phenomenological research design to investigate the causes and consequences of traffic congestion in Abatan, Buguias, Benguet. Qualitative research involves investigations that are exploratory and geared towards establishing the causes, views and motives behind the participants (Wyse, 2011). It enables researchers to discuss complicated societal problems using the voice of the ones who get directly impacted by them.

According to Denzin and Lincoln (2005), qualitative research is interpretive in nature, naturalistic and examines phenomena in their natural environment and determines the meanings people put on them. The phenomenological approach will assist us in the study to get the lived experiences and perceptions of the locals, drivers, business owners, and law enforcement officers concerning the traffic jams in the area.

A case study design is also included in the research, as it includes studying a certain community or phenomenon in its contexts of a real-life situation (Gustafsson, 2017). The selection of Abatan, Buguias, Benguet was selected as it is a strategic crossroad that links number of municipalities and provinces thus a good place to study the issue of traffic congestion in a rural commercial centre.

The given qualitative design corresponds to the aims of the study: to define what causes traffic jams and to comprehend the impact of traffic jam on the community.

### Population and Locale of the Study

The research was conducted in the town of Abatan, Buguias, Benguet in the second semester of the Academic Year 2021- 2022 between January and May 2022. Abatan is a commercial and transportation hub that links roads leading to Mountain Province, Mankayan, Buguias, and Baguio City forming a crossroad of various types of vehicles and travelers.

Purposive sampling was used to sample the participants with firsthand information and experience of the traffic conditions in the region. The respondents involved in the study were seven:

1. A local government official, or traffic controller;

2. Two drivers of the public utility vehicles (PUV) that pass regularly through the area;

3. Owners of businesses that run on the roadside or in commercial places;

4. A lone police officer of the Buguias Municipal Police Station (BMPS).

Inclusion Criteria**:**

Participants were selected based on the following criteria:

1. Must be 18 years old or above.
2. Must be working, residing, or regularly traveling in Abatan, Buguias.
3. Must have direct experience or involvement with traffic conditions in the area.
4. Must be willing to participate voluntarily in the interview process.

**Data Gathering Tools**

The major instrument was the semi structured interview guide. The guide allowed the researchers to gather detailed qualitative data concerning the experiences and perceptions of the participants regarding traffic congestion in the region. The guide contained well-constructed open-ended questions that were aimed at understanding core issues with the main reference being the causes and impacts of congestion. Semi-structured interviews give the respondents the freedom to express their ideas yet give a uniform structure that is associated with the research objectives.

The guide was prepared using a literature review on the related literature, past research on traffic congestion, and observation of the researchers in the locality. Besides the guide, the responses were also recorded using audio recording devices at the consent of the participants. These were recorded and then transcribed so as to be reliable and comprehensive. Interviews are also recorded on field notes to assist the researcher in analysis, observations, and non-verbal cues as well as contextual information. A combination of these tools guaranteed the full and valid qualitative data.

**Data Gathering Procedure**

The researcher got the required permission of authorities before doing the study. The researcher drafted a research proposal and formal request letters and delivered the letters to the research director, the barangay captain of Abatan and the Chief of Police of the Buguias Municipal Police Station in January 2022. The letters were aimed at seeking the permission to carry out the study in the area and question the chosen participants familiar with the problem of traffic congestion.

With the consent of the research participants in February 2022, the researcher completed and tested the semi-structured interview guide. The guide has been well formulated with regard to the research goals and to investigate the causes and impacts of congestion in Abatan. Potential participants were identified using purposive sampling by the researchers, and the respondents fit the inclusion criteria (participated in or affected by traffic conditions).

The data collection period was in the months of March to April 2022. The researcher used this time to call the chosen respondents and to make arrangements on their preferred time and mode of interview. It was made to be flexible in scheduling the interviews taking into consideration that some of the participants were government employees and business operators, whose availability was limited. The interviews were done in person or online using digital communication applications like Facebook Messenger, depending in the convenience and accessibility of the respondents. The interviews took about 20-40 minutes and the respondents were requested to narrate their experience, observations, and views about traffic jam in Abatan. The interviews were also audio recorded with the permission of the participants to make sure that the responses were accurate. Field notes were to be made as well to be able to make important observations and contextual information of the interviews. After the interviews had been conducted in April 2022, the researcher categorized the data gathered with the view of preparing the data to undergo transcription and analysis.

**Treatment of Data**

When the data collection phase was done, the researchers moved on to the data organization and analysis phase between April and May 2022. The transcribed interviews were then transcribed word-to-mouth to make sure that all the statements by the respondents were captured correctly. This has enabled the researchers to revise the responses of the participants in detail and become well acquainted with these responses. Thematic analysis was the qualitative method of analysis of data used in the study. Thematic analysis is an approach used to identify, analyze, and report on the patterns or themes in qualitative data (Braun and Clarke, 2006). The reason why this technique was chosen is that it will allow the researcher to approach the interpretation of the experiences and views of the participants about traffic congestion in a systematic manner.

The analysis commenced with the familiarization stage which saw the researchers repeatedly reading the interview transcript in order to get a very clear picture of the responses. This step enabled the researchers to come up with meaningful statements and recurrent ideas that were based on the research questions.

The researchers then used open coding in which the significant parts of the responses were coded with initial codes which translated into significant concepts. Pattern identification and thematic clustering was then used to organize these codes into more general categories. The similar codes were clustered to create major themes that represented the most important issues discussed by the participants.

With such a coding process, the themes that were highlighted and analyzed included violations of traffic rules, road capacity limits, road accidents, environmental consequences, economic implications, and psychological implications of traffic jams.

Lastly, the researchers made an interpretation of the themes and have linked them to the study objectives. These results were subsequently tabulated and tabulated in the research

manuscript results and discussion section. The research report was finally written and completed in May 2022 and, in that case, the analysis and interpretations were recorded systematically.

**Ethical Consideration and Feasibility**

Among the key commitments of the researcher is to maintain the profile of the respondent confidential this is the reason why social researchers should work to ensure that their participation in research will not cause them any unnecessary harm. In this way, the researchers requested voluntary involvement of respondents whereby they are free to non-participate by not answering or dropping out any time he chooses. Besides that, researchers also requested permission to record interviews which were to be followed after the participants had signed the informed consent form prior to the onset of an interview. The researchers ensured that all information collected was highly confidential; the discussion was done using pseudo names. Destructions and recording were done by destroying and subsequently deleting the note-taking and recordings or were destroyed at the end of the research when it was ready to be submitted.

Several logistical factors were involved in the successful execution of this study especially the access to the appropriate information, coordination with the local authorities and access to the participants who have first-hand experience with the congestion in traffic in Abatan, Buguias, Benguet. Because the study aimed to determine the perception and experiences of the people who were directly impacted by the traffic congestions, the interviews conducted to the sampled stakeholders formed the main source of information, as opposed to using the official traffic databases as the sole source of data. The participants and the surrounding traffic-related data were made accessible through the cooperation with the local government and the barangay heads of Abatan and the Buguias Municipal Police Station. These institutions granted the researchers the right to carry out the interviews in the locality and to reach out to people who are frequent victims of traffic congestion and who include drivers, owners of businesses as well as municipal officials. The coordination with local governments was very critical in making the study feasible. The researchers were in a position to safely carry out field interviews and earn credibility when approaching participants due to their approval. Also, the collaboration of the community members played a role in the effective accomplishment of the qualitative data collection process during the assigned period.

Even with these arrangements, a number of possible stumbling blocks to implementation were outlined. The unavailability of respondents especially business owners and employees in government is one of the greatest challenges since these individuals are busy in their schedules. To alleviate this problem, the researchers chose to be flexible on the interview arrangements, which means, the participants were given the chance to choose an appropriate schedule, which included a type of an interview, i.e. face-to-face interview as well as online communication platforms like Facebook Messenger. The second possible weakness was that access to formal data of traffic monitoring was limited because the locality does not have significant databases of automated traffic. To overcome this weakness, the authors concentrated on gathering empirical and

observational evidence of the main stakeholders, which offered meaningful information about the trends and effects of traffic congestion in the region.

In addition, time constraints and transportation access were also handled by the wise scheduling and prior coordination with respondents. These measures were used to make sure that the research process would be carried out in a manner that would not compromise the quality and reliability of the data gathered in the process. In general, the cooperation with local authorities, the possibility to use flexible data collection strategies, and the use of stakeholder experiences led to the general feasibility of the research.

## III. Results and Discussion

This section presents the analysis and interpretation of the study about the causes and effect of traffic in Abatan, Buguias, Benguet. The content is based on the responses of the respondents gathered through interview method and researchers were able to answer the statement of the problem of the study.

### Results

The clustered themes for the factors causing traffic congestion are the following: violation of traffic regulations, road incapacity, and vehicular accidents. As to the effects of traffic congestion, the researchers also came up with the three following themes which are the environmental effect, economic effect, and psychological effect.

### Causes of traffic congestion in Abatan, Buguias, Benguet

**Lack of Discipline among Drivers and Business owners.** When asked about the causes of traffic congestion in their area, respondents answered various reasons and one of these is due to the lack of discipline among drivers and business owners. Most problem in the area are illegal parking, the loading/unloading zones and violation of municipal ordinance. Participant 1 said that illegal parking and extension of business establishment occupying the sidewalk affects traffic congestion stating that, " *Essa pay ay rason din illegal parking. Pati sidewalk panparadaan da sunga manbalin et ay one-way di kalsada. Pati din loding ya unloading area, pinanbalin da si parking space, sunga di jeep ya van yan kapilitan ay mansardeng sin kalsada, siya et di gapu ay traffic. No maminsan abe din (colorum vehicles) siya et di gapo ta maparadad igid di kalsada sunga lumipit et di matraffican di lugan".* Participant 2 also stated the same reason as the previous participant saying, "*din mostly ay problema et no man park da amey si essay oras, taynan dan lugan… Din essay mangtraffic et din double parking tan syempre naparadaan yan mabayag ay kumaan, yan wan essay lugan abe ay manmarket et mapilitan et ay man double park.*" He even added that loading and unloading of passengers is additional violation affecting the congestion*"…Maysa nga gapu ket day loading ken unloading, pati metlang nu ag U-turn ti lugan,*

*dagijay ugali met ti drivers, uray nu binagaan ti pulis, nu awan en ti traffic enforcers, agsubli da manen, natangken ulo da."* Moreover, participant 6 supports the previous statements reasoning that drivers don't know how to settle their cars when loading/unloading their passengers *"Illegal parking or double parking, basta kasardeng da ket ijay ladtan, haan da nga iigid. Dagijay tricycles nu agpababa da, uray kasardeng da ladtan uray adda ijay tenga ti kalsada."* Further, participant 4 said that it's not just the driver's misbehavior but also the business owners who are extending their business establishment into the sidewalks, *"examples ngay ket matake-over dagijay sidewalks. Uray paik-ikat da they return over and over again. Disregard of traffic rules ladta, uray no 'no parking', ada ldta agpark same as other developing municipalities."*

**Road Incapacity.** Road incapacity describes the limit of the road as to its measurement to accommodate the number of cars.

Respondents said that there are a lot of cars yet the road is narrow. Participant 3 explained as to why volume of cars increased which affects congestion in the area "*during the time of lockdown, inparit da si manlugan sin public cars. Amom iti inaramid ti kakadwa nga Igorot? Ginmatang da iti luglugan da isunga inmado ketdin. Idi adda ti service (PUVs), awanen, ta private lang ti mabalin nga agtravel during the lockdown. Sunga nu mapansin mo ket nan increase ya din volume di lugan. Mapanpansin mo, bumakbaknang di Igorot, maup-upgrade ti standard da, nu malpas di be-ey, sumaruno nga gatangen din lugan abe. Maminsan pay nu bumaba ti nateng, han unay agbyahe dagiti farmers. Nu ngumina met adu dagiti agbyahe. Isu nga ipaay yu na sin nemnem yo, our economy is getting better and better*" – (during the time of lockdown, government restricted riding the public cars. That's why residents bought their own cars to travel and this leads to increase in volume of cars. If you observe, the Igorots are getting rich, they also upgrade their standards, once they finish building their houses, the next target is to buy their own cars. Sometime when the prices of vegetables get low, the numbers of cars travelling decreases but when the prices get high, it will also increase. Always remember this, our economy is getting better and better). Along with that, participant 1 added same reason proving that number of private cars increased during the pandemic "*Amin ay ipugaw yan waday saril-sarili ay lugan na karkaro sin nanrugi di pandemic, tan bawal ay bumala no magay pass ay kailangan ay manlugan. Sunga gapu si egyat da ay masita ya macovid, nanlako das sarili da ay lugan".* More to that, the municipal officer further explained that Abatan is a business center so when private and public cars converge, it results to traffic congestion most especially during market days. "*rason na ket umad-adu lugan ngem haan lumawlawa djay dalan. Naturally gamin ket business center daytoi ket adu ti vendors ken entrepreneurs, aglaklako ti kumkumpormi… agconverge amin nga buyers, vendors karo nu market days".* Traffic enforcers in the area also reasoned out that the geographic location and road structure affects the congestion *"it is only the main road that connects the 4 provinces (going to Ifugao, Cervantes, Mt. province, and Mankayan), it is the meeting path sunga Abatan. Ken ad-adu ti balay ditoy. It is the business area for all the residences, it is where they put businesses and they buy their goods… Nalipit nga talaga ti kalsada ditoi ngay ket adu ti lugan."*

**Vehicular accidents.** This pertains to temporary traffic disruption and minor accidents causing traffic congestions. Police officer explained that *"as vehicles forced to get closer and closer together, abrupt speed changes can cause shock waves to form in the traffic stream, rippling backward and causing even more vehicles to slowdown. About half of the traffic slowdowns are caused by temporary traffic disruption. These are the unwelcome surprises that take over part of the roadway, such an accident blocking a lane, a construction zone causing a bottleneck…"* Additionally, the traffic enforcer said "*Nu maminsan ket minor accidents, nu maminsan ada masagid nga ubbing kasjay"* as one reason that leads to congestion.

**Effects of Traffic Congestion in the Area**

Apart from this, researchers were also able to know the effect of traffic congestion which is themed into three (3) namely: environmental and public health; economic, and psychological and mental effect.

**Environmental effect and public health** . It pertains to the effect of diesel combustion or pollution affecting the environment. The municipal officer stated the environmental effects of traffic is mainly the air pollution produced by diesel combustion that also affects our health, saying "*it's unhealthy ta nu agstop ka, daily combustion jay diesel ket malanglanghap ti tao*". Same reason as that, traffic enforcer also said *"increasing air pollution and carbon dioxide emission''* which occur when the vehicle got stuck in the road during congestion.

**Economic effect**. This pertains to the travel time and the effect to work or job of the residences in the area. Most of the respondents answered that traffic congestion causes delay to their work and it leads to low productivity and low income most especially to PUV drivers and entrepreneurs. The driver answered the question about the effects of congestion saying: "*nu matraffic, sat man an-andar di lugan isunga isu pay et si consume di gasoline, nu aben manrurush yan isu pay di tumaktak. Imbes ta paspas koma di byahe, matumal et sunga bassit di diskitar*". (if traffic occurs while the engine is on, it will consume more gasoline. It will also lead to delay. And leads to low income, because it will reduce number of trip/ rounds that we should take). In the other hand, the business owner concerned is that cars covered their business establishment " *gapu sin traffic , masalsalinan din business gapu abe din nakapark ay lugan sin sango mi. narigat nga agpababa ti PWD. Nu maminsan madelay ijay pagtatrabahoan*." Where as in the case of traffic enforcers, traffic congestion required "*Police visibility, imbes ta nga adda koma matrabaho nga daduma ket isu ketdi maas-asikaso. Makadelay ti amin nga tattao, it can cause low economic mobility*." Another driver also added that *" Dyay 3 mins. Nga byahe agbalin ktdi nga 30 mins."*

**Psychological and Mental effect**. This is the effect of traffic towards cognitive and physical level of road users. Loud honking, road rage and over speeding can affect the person themselves and other commuters as well. And one of the biggest consequences of this is stress. It is a very broad term with multiple dimensions. Municipal officer mentioned that traffic causes *"Stress, or sakit ti ulo, no han nga agflow ti traffic, dagijay drivers pumudpudot"*, and the driver

agreed saying traffic gives them "*Sakit ti ulo*" and the police officer also said "*frustration"* when they got stocked in a traffic.

## DISCUSSION

### Causes of traffic congestion in Abatan, Buguias, Benguet

The result shows that leading cause of traffic congestion in Abatan, Buguias is due to lack of discipline among drivers and business owners wherein they violate existing traffic rules and regulation including violation to municipal ordinance. Most violated traffic rules and regulation by the drivers, either private or public vehicles, is the illegal parking and the loading/unloading zone and these things occurs when the supposed to be parking space for them, especially for private cars, was taken over by the business owners who are displaying their goods/stocks in it. This implies that traffic congestion happens due to undisciplined attitude of drivers in parking their vehicles along the road especially occupying the one lane of the road. However, violation regarding the parking is affected by the vendor's misbehavior as explained earlier. Another thing is that driver's unspecific U-turn area which affects the mobility of the vehicles happens because of lack in traffic signs/ road markings wherein there's no designated area for the vehicles. A study of Saad Yousif and Purnawan (1999) supports this, showing the result of their study that illegal parking is caused by absence of fixed spot on the road. Drivers normally park at a slight angle to the curb, either in an empty space or in front of/at the back of another illegally parked vehicle which affects the flow of vehicle passing the road. These describes the same situation happening in Abatan, Buguias, Benguet.

In relation to this, the next theme which is road incapacity as described, indicates that the physical transportation infrastructure in Abatan—such as the conditions of roads, and highways—is one of the inherent causes of traffic congestion where the travel demand exceeds road capacity. Rao and Rao (2012) explains the micro and macro level as factor of congestion relating to the road infrastructure and demand of travel. In their statement, there are broadly two factors which effect congestion: micro-level factors and macro-level factors that relate to overall demand for road use. Congestion is triggered at the micro level like many people wanting to move at the same time, or too many vehicles for limited road space, and driven at the macro level which pertains to land-use patterns, car ownership trends, and regional economic dynamics. The road infrastructure in Abatan, Buguias is insufficient to handle the increase in volume of cars since it is just 2 lanes / two-way road. It is already beyond the road capacity leading the vehicles to flock in the road most especially in the intersection. Congestion occur when the demand exceeds the capacity of a road as explained further by Afrin and Yodo (2020). In their study, they explained that insufficient infrastructure is one of the most significant reasons for congestion, especially in highly populated areas. Because of the higher population rate, the number of vehicles also increases with it. When the existing number of infrastructures fails to occupy this increasing number of cars, congestion occurs.

Proceeding to the final theme which is vehicular accidents, this implies that because of temporary disruption happening and vehicular accidents it leads to traffic congestion. A study conducted by the US-DoT (2020), categorized this factor as "Traffic-influencing events" wherein it is described as events that disrupt the normal flow of traffic, usually by physical impedance in the travel lanes. Events such as vehicular crashes, breakdowns, and debris in travel lanes are the most common form of incidents. Even incidents off of the roadway (a fire in a building next to a highway) can be considered traffic incidents if they affect travel in the travel lanes. This is somehow related to the first theme, stating the justifiable circumstances that leads to violation of the ordinances. Events that occur on the shoulder or roadside can also influence traffic flow by distracting drivers, leading to changes in driver behavior and ultimately degrading the quality of traffic flow.

Thus, these three themes are inter-connected with each other. The violation of traffic congestion and vehicular accidents arises because of insufficient road construction which may both lead to traffic congestion. As stated by Boquet (2013) a significant component of the quality of traffic is the availability of road space. That being said, the possible way to address the traffic congestion in Abatan, Buguias is to consider road widening. However, if not possible because of other circumstances, it would be better to follow and obey strictly the existing laws on traffic. So that the negative impacts of traffic congestion in different aspects can be avoided.

**Effects of Traffic Congestion in Abatan, Buguias, Benguet**

The first theme under the effects of traffic congestion is the Environmental and Public Health effect. Traffic jam is a major contributor to environmental degradation, and the main effect of this aspect is increased air pollution caused by automobile emissions. The study participants noted that the intermittent motion of vehicles in congestion due to constant stops and go results in the constant emission of diesel exhaust and other pollutants in the immediate environment. One of the municipal officers laid stress on the fact that burning of diesel fuel produces emissions that are routinely inhaled by people in the vicinity hence creating possible danger to the health of people. In the same light, traffic enforcers have pointed out that traffic congestion leads to carbon dioxide and air pollution in general, especially when the cars are stuck at a traffic junction, yet engines keep on running. These findings resonate with epidemiological studies that report that traffic-related air pollution is made up of dangerous pollutants like particulate matter (PM 2.5), nitrogen dioxide (NO 2 ), and carbon monoxide that have been well linked to respiratory and cardiovascular illnesses. Available literature has already proven that exposure to fine particulate matter (PM2.5) causes a substantial increase in the risk of morbidity and mortality, especially due to cardiovascular diseases (Brook et al., 2010). In addition, epidemiological evidence indicates that 10 µg/m 3 long-term exposure to PM2.5 is linked to about 11 per cent cardiovascular mortality (Rajagopalan et al., 2018). These results suggest that the places with continuous traffic congestion can be subjected to higher levels of the dangerous pollutants hence the tendencies of health hazards to the residents, commuters and traffic enforcers who often spend most of the time in the high-traffic locations.

Moreover, there is also traffic noise related to traffic jams that influence the human health. Prolonged exposure to the noise produced by road-traffic is observed to promote the occurrence of cardiovascular diseases such as ischemic heart disease and stroke, or stress-related disorders (Vienneau et al., 2023). Such results indicate that the population health can be indirectly affected by traffic congestion via environmental exposures.

Secondly is the Economic Effects. Traffic jam also impacts on the economic activities of people in the society where majorities of the respondents indicated that the congestion increases delays in transportation, which results in low productivity and income, particularly to the public utility vehicle (PUV) drivers and business owners. One of the drivers mentioned that it is due to the fact that when cars are stuck in traffic consuming fuel is higher than the number of journeys and this reduces their daily income. On the same note, entrepreneurs complained that the parked cars tend to obstruct the entrance of their organizations and customers find it hard to use their services or goods. These economic effects are in line with the results of transportation research that traffic congestion lowers efficiency and productivity of mobility. Delays and fuel use may make congestion to raise transportation costs, labor productivity, and economic competitiveness (Sweet, 2011; Rodrigue et al., 2013). Moreover, the environmental-health studies have revealed air pollution caused by traffic congestion can have a strong economic cost by increasing the cost of healthcare and decreasing the productivity of the workforce caused by pollution-related diseases.

Final theme refers to Psychological and Mental Health Impact. The other significant impact as realized by the respondents is the psychological consequence of the traffic congestion. According to the participants, the long exposure to congestion causes stress, frustration, and annoyance among commuters and drivers. The behaviors by loud honking, slow traffic flow, and aggressive driving tend to cause emotional reactions like anger and road rage. One of the municipal officers claimed that traffic jam stresses and gives people headaches when the traffic is slowed down. Equally, drivers and police officers complained about frustrations that they experience when they are stuck in the traffic. The results of these observations align with the psychological studies of the mental-health consequences of road congestion. The researchers note that long-term stress, anxiety, and poor emotional health may be caused by exposure to congestion and traffic noise (Ganesh, 2019). Moreover, epidemiological research has also discovered how road-traffic noise and congestion can lead to predisposition to stress-related health problems like high blood pressure and cardiovascular diseases. In a systematic review of over 8 million individuals, it was reported that road-traffic noise posed significant risk to the development of ischemic heart disease, myocardial infarction and stroke when experienced over a long time (Vienneau et al., 2023). The psychological effect of congestion can also be creating physiological reactions that increase the blood pressure and heart rate thus leading to cardiovascular risk.

## IV. Conclusion

This research aimed to gain more knowledge about the traffic congestion in Abatan, Buguias, Benguet and that is to determine its causes and effect to road users. Based on the in-depth interview conducted, it can be concluded that lack of discipline of drivers greatly affects the traffic flow. That loss of gross income of the community and inhabitable pollution are major effect of this traffic congestion. Thus, local government unit may consider road constructions or rather road widening in Abatan including the strict implementations of existing ordinances and traffic laws.

## V. Recommendations

Base on the findings and conclusion, practitioners should consider the following are recommendation:

First, the Traffic enforcers need to strictly implement the traffic rules and regulations to discipline the drivers and business sectors. If possible, coordination to barangay officials or even municipal officials is needed to conduct a symposium or seminar. This is also for the residences in the area to follow and abide to the existing municipal ordinances to help ease the congestion in the area.

Second, is the application of advanced information and communication technologies on transportation on the basis of the intelligent transportation systems. The installation of traffic lights and CCTV to monitor the flow of traffic, and bringing back the traffic signs in the area since these constitutes a broad range of different technologies that are applied to transportation to make systems safer, reliable, more effective, and environmentally friendly.

Third, allotment and creation of parking areas for designated vehicles like for customers and vendors, for tricycles, and van/jeep. This is to lessen the hassle when loading and unloading passenger most especially when it comes to PWDs.

Fourth, creation of pedestrian lane for safer crossing the road and also designated U-turn area since it is observed that some drivers are doing U-turn everywhere.

Eventually, further studies should take into account the additional numbers of respondents and consider to study the problem and effective solution of traffic congestion.

## REFERENCES

[1] Afrin, T., & Yodo, N. (2020). A survey of road traffic congestion measures toward a sustainable and resilient transportation system. Sustainability, 12(11), 4660. https://doi.org/10.3390/su12114660
[2] Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77–101. https://doi.org/10.1191/1478088706qp063oa
[3] Brook, R. D., Rajagopalan, S., Pope, C. A., Brook, J. R., Bhatnagar, A., Diez-Roux, A. V., Holguin, F., Hong, Y., Luepker, R. V., Mittleman, M. A., Peters, A., Siscovick, D., Smith, S. C., Whitsel, L., & Kaufman, J. D. (2010). Particulate matter air pollution and cardiovascular disease. Circulation, 121(21), 2331–2378.
[4] De Souza, A. M., & Villas, L. A. (2017). A fully distributed traffic management system to improve overall traffic efficiency. Retrieved from http://www.creativecommons.org/licenses/by/4.0/
[5] Denzin, N. K., & Lincoln, Y. S. (2005). The Sage handbook of qualitative research (3rd ed.). Sage Publications.
[6] Donato, E., Yokoyama, R. S., Maia, G., et al. (2016). Real-time path planning to prevent traffic jams through an intelligent transportation system. International Journal of Distributed Sensor Networks, 726–731. https://doi.org/10.1177/1550147716683612
[7] Espada, I., Lidasan, H., De Leon, M., et al. (2009). A needs assessment of transport planning and traffic management of local cities: The case of the Philippines. Retrieved from https://www.researchgate.net/publication/228465340
[8] Gan, W. Q., Davies, H. W., Koehoorn, M., & Brauer, M. (2010). Long-term exposure to traffic-related air pollution and the risk of coronary heart disease hospitalization and mortality. Environmental Health Perspectives, 119(4), 501–507.
[9] Ganesh, K. (2019). Psychological effects of traffic congestion on commuters. International Journal of Community Medicine and Public Health, 6(4), 1520–1524.
[10] Gazis, D. C. (1964). Optimum control of a system of oversaturated intersections. Operations Research, 12, 815–831.
[11] Gazis, D. C. (2002). The origins of traffic theory. Operations Research, 50(1), 69–77. https://doi.org/10.1287/opre.50.1.69.1777
[12] Gazis, D., Herman, R., & Rothery, R. W. (1961). Nonlinear follow-the-leader models of traffic flow. Operations Research, 9, 545–567. https://doi.org/10.1287/opre.9.4.545
[13] Gustafsson, J. (2017). Single case studies vs. multiple case studies: A comparative study. Halmstad University.
[14] Khalif, I. (2017). Traffic management systems: A classification, review, challenges, and future perspectives. https://doi.org/10.1177/1550147716683612
[15] Kerner, B. S., & Demir, C. (2005). Traffic state detection with floating car data in road networks. Proceedings of the 8th International IEEE Conference on Intelligent Transportation Systems. Vienna, Austria.
[16] Nitsche, P., Olstam, J., Taylor, N., Reinthaler, M., Ponweiser, W., Bernhardsson, V., Mocanu, I., Uittenbogaard, J., & van Dam, E. (2016). Pro-active management of traffic incidents using novel technologies. Transportation Research Procedia, 14, 3360–3369.
[17] Park, M. J. (2012). Three-phase traffic theory. Retrieved from https://guava.physics.uiuc.edu
[18] Rajagopalan, S., Al-Kindi, S. G., & Brook, R. D. (2018). Air pollution and cardiovascular disease. Journal of the American College of Cardiology, 72(17), 2054–2070.

[19] Rodrigue, J. P., Comtois, C., & Slack, B. (2013). The geography of transport systems (3rd ed.). Routledge.
[20] Rodriguez, R. L., Villamaria, J. B., & Noroña, M. I. (2020). Analysis of factors affecting road traffic accidents in the city of Makati, Philippines. Retrieved from http://www.ieomsociety.org/brazil2020/papers/602.pdf
[21] Swanson, R. A., & Holton, E. F. (2005). Research in organizations: Foundations and methods of inquiry. Berrett-Koehler Publishers.
[22] Sweet, M. (2011). Transportation and economic competitiveness. Transport Policy, 18(1), 153–159.
[23] Tenny, S., Brannan, G. D., & Brannan, J. M. (2022). Qualitative study. In StatPearls. StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK470395/
[24] U.S. Department of Transportation. (2021). Traffic congestion and reliability: Trends and advanced strategies for congestion mitigation. Retrieved from http://www.ops.fhwa.dot.gov/congestion_report/chapter2.html
[25] Underwood, R. T. (1990). Traffic management: An introduction. Retrieved from https://books.google.com.ph
[26] Vienneau, D., et al. (2023). Road traffic noise and cardiovascular disease: A systematic review and meta-analysis. Environmental Epidemiology, 7(2), e240.
[27] Wallace, C., & Speier, G. (2015). Urban congestion trends. Retrieved from http://www.fhwa.dot.gov/congestion
[28] Wyse, S. E. (2011). What is the difference between qualitative research and quantitative research? Snap Surveys.
[29] Yousif, S., & Purnawan. (1999). Evaluation of illegal parking behavior and its impact on urban traffic congestion. Transportation Research Record.
[30] Zhang, K., & Batterman, S. (2013). Air pollution and health risks due to vehicle traffic. Science of the Total Environment, 450–451, 307–316. https://doi.org/10.1016/j.scitotenv.2013.01.074