

An Impact Case Study of Improved Road Infrastructure on Urban Communities in Samoa

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Abstract

This study explores the social-economic impacts of the upgraded Vaitele Street on a selected number of households residing along a two-hundred-meter stretch of the Vaitele Street. Studies conducted elsewhere in the developed and developing world, report a significant positive impact of infrastructure on economic growth, income and productivity. Massive donor funded infrastructure investment particularly in major road and drainage construction have been implemented in Samoa for the last fifteen years to support development efforts to achieve the Millennium Development Goals, now replaced by Sustainable Development Goals. However, there has been a dearth of impact studies both at the national and local levels to gauge how road upgrades among other infrastructure developments are impacting the lives of the general population. This study intends to fill this knowledge gap, by documenting the social –economic experiences of twelve households with road frontage properties and how they are making the most of the opportunities presented by the upgraded Vaitele Street.

Keywords: income; infrastructure; knowledge gap; Samoa; social-economic impacts

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Introduction

The paper explores the social-economic impacts of improved road infrastructure on one particular urban community in Samoa. Infrastructure is an important sector driving development in Samoa and it is understood to include physical structures to enable the production of goods and services. Gramlich (1994) defines infrastructure as long lasting capital intensive systems and facilities such as roads, highways, bridges, communications, water and sewer lines. Massive investment in road upgrade across the country commenced half way through the Millennium Development Goals period in 2006 in preparation for the 2007 South Pacific Games hosted by Samoa. These road upgrade works continue today under the Sustainable Development Goals flagship, particularly Goal 9, building resilient infrastructure that promotes inclusive and sustainable industrialization. Challenges and opportunities to infrastructure development in the Pacific Islands have been well documented in the literature (see ADB, 2009; AusAID, 2013; ESCAP, 2015, 2017; World Bank, 2006), however, there is a scarcity of studies on the impact of infrastructure, such as road networks, on the social-economic well-being of road users, particularly in Samoa. The study addresses this significant knowledge gap, by looking at the impacts of the newly upgraded Vaitele Street on a selected number of households residing along one section of the upgraded street (see Figures 1 and 2) It will investigate the economic and social impact of the upgraded Vaitele Street, a major transportation route connecting the Apia Central Business District to Faleolo International Airport and the densely populated North West Upolu region. North West Upolu is most densely populated region on the main island of Upolu, the second largest island that make up the Samoa group of islands. The 2016 Census survey enumerated 66358 persons or 34% of the total population reside in North West Upolu. The upgraded road provides a practical tool to view and explain the socioeconomic trends as experienced and related by the study participants in their narratives. Key questions underpinning the study are related to the effects of the upgraded road on family life variables such as their health, general well-being and economic benefits derived from the road upgrade.

Infrastructure: Issues, Challenges and Conceptualizing the Study

Regional Context

Service Infrastructure is a generic term used to encompass physical structures used by industries in the production of goods and services such as schools, hospitals, and network utilities such as energy, transport, water and information communication technology. Infrastructure development are critical in the initial stages of development affecting aggregate output from the islands. Additionally, since

independence, Pacific Island countries have demonstrated extensive social-economic progress despite numerous challenges posed by their small size, isolation and increasing vulnerability to natural disasters. Smallness, isolation and vulnerability to natural disasters suggest a need for sustainable infrastructure a perpetual challenge for the region. Fortunately for the region, the Asian Development Bank among other donors are stepping up efforts to promote sustainable infrastructure development through a number of loans, investments and technical assistance through public-private partnerships.

Maintenance of infrastructure is critical if they are to be used for long periods of time. Also, many of these structures built since independence have deteriorated due to neglect and poor maintenance. Lack of funding, poor planning, shifting priorities, and competing expenditures between social infrastructure such as schools and health as opposed to economic infrastructure like water and transport demonstrate some of the problems linked to infrastructure maintenance. A 'build-neglect-rebuild paradigm' describes the attitude of Pacific Island governments towards infrastructure development (ESCAP, 2015). Samoa is currently undergoing major road upgrading projects in preparation for the 2019 Pacific Games. Similar road upgrades were carried out in 2006 before the 2007 Pacific games and in 2014 for the Small Island Developing States (SIDS) meeting.

Growing Pacific economies demand new transport and utilities infrastructure to move people, products and connect the urban centers to their hinterlands. Increasing populations will generate the need for schools and healthcare facilities. Fast and cheaper access to broadband networks will bridge the region's isolation from major markets in Europe, Asia and the Americas. And the increasing urbanization of many Pacific states will continue to put pressure on existing infrastructures such as water, transport networks and waste management. Poor management and poorly structured infrastructure projects have been identified as one of many constraints to growth in the region (AusAID, 2006, p. 3; Pacific Economic Monitor, 2017). Lack of capacity to deal with large and complex projects that require experience in technical, legal and financial skills exacerbates the challenges to infrastructure development particularly in the smaller islands.

Providing efficient infrastructure is critical to achieving the 2030 Sustainable Development Goals. This requires resources for investment, operation and maintenance. Transport infrastructure is unlike other key services such as health and education because large scale transport services demand higher capital intensity, carry high risk and long pay back periods but enjoy sustainable economies of scale (Calderon, Cesar, & Serven, 2004).

Infrastructure can also be quite 'lumpy' in the sense that huge pipe lines and cables

need to be laid underground in the form of networks such as broadband cables and water treatment plants with extensive water distribution systems. Once constructed, these assets need constant repair, upgrade and maintenance. By the same token, they also define where and how people live and work. Infrastructure mistakes can return to haunt government and tax payers in the long term. As such, long term vision and planning is crucial. Hence, the role of the Pacific Regional Infrastructure Facility (PRIF) is to coordinate infrastructure financing and provide advice on policy, planning and regulations among other things.

Climate change poses considerable challenges to existing and future infrastructure projects intended for the region. The bulk of critical infrastructures such as water, energy, roads, and information communication technologies are concentrated in coastal areas, which makes them vulnerable to coastal erosion from rising sea level. Considerable efforts to climate proof many of these infrastructures are being trialed across fourteen Pacific Island countries (UNDP, 2015). Climate proofing projects such as beach nourishment, sea and river dike construction and port upgrade are some of the more common activities undertaken in Samoa, Vanuatu and Kiribati.

Samoa is one of the better performing Pacific Islands to meet its Millennium Development Goals targets, particularly MDGs 1,4, and 5 (UNDP, 2014). But a review of Samoa's progress towards achieving the Millennium Development Goals by the Commonwealth Foundation (2013) shows a different picture. The country remains vulnerable to global economic shocks and natural disasters such as the 2009 tsunami, 2012 Tropical Cyclone Evan and 2018 Cyclone Gita caused widespread damage to a number of key infrastructures, particularly roads, power and water supply. Samoa's integration into the fast pace of international competition for capital and resource markets may have spurred the many changes introduced in the last five years such as the road switch, time change and massive expansion in infrastructure – roads, electricity and information communication networks (Samoa Bureau of Statistics, 2011, p. 136). Having said all that, the challenge for Samoa rests in assessing how these infrastructural developments, particularly roads, are impacting on users, in this case, the urban road users.

Sustainable road development is a priority development goal to meet land transport demands for Samoa. It supports inclusive economic development and sharing the benefits of economic growth to reduce poverty. Access road projects initially were intended to encourage and promote village agriculture (Strategy for the Development of Samoa, 2008-2012). At the same time, the need to meet Samoa's obligation towards achieving the Millennium Development Goals meant that road transport infrastructure was also part of the government priority area of investment (Government of Samoa MDGs Progress Report, 2010). The most immediate

poverty-alleviating effect of investing in a road is the local employment created in its improvement and subsequent maintenance. If suitably targeted, the poor can benefit most directly through earnings. Studies elsewhere in Bangladesh and Sub-Saharan Africa show labour intensive road works to be 25 to 30 percent cheaper than comparable capital intensive methods and employ five times more labour which can be wage targeted on the poorest group (Howe & Richards, 1984; Keddeman, 1997). Similar data cannot be found anywhere in the Pacific, but anecdotal evidence suggests parallel experiences in Samoa. The sub-contraction of road construction and maintenance work to local private contractors in Samoa began in the 1990s in response to public sector reforms and restructuring of government ministries where the former Public Works Department became the Ministry of Works, Transport and Infrastructure (MWTI). The current practice in relation to road construction and maintenance is carried out by local contractors, under the watchful eye of the MWTI through its monitoring and evaluation section.

Benefits to road users such as farmers, school children, public servants, village communities for example, need to be quantified to determine whether people are better off as stipulated in the planning and implementation stages of road construction and rehabilitation. There is a scarcity of impact studies of this nature in Samoa. Hence, this study intends to provide some primary data of benefits accruing to selected urban dwellers residing along part of Vaitele Street. Vaitele Street is a section of the main west road connecting Apia Central Business District to the Faleolo International Airport and the Mulifanua Wharf.

Concepts

Transport geography has received renewed interest among geographers since the 1990s in response to the rapid and increased globalization of trade, international division of labour and multinational corporation activities that demand the movement of goods and services, resources and people between different locations (Rodrique, Comtois, & Slack, 2009). Transport infrastructures such as roads, terminals, equipment and networks take up a critical chunk of space which is the basis of a complex spatial system (De Blij, 2007, p. 409). Given that geography seeks to explain spatial relationships, transport infrastructures and networks are therefore important because they facilitate and have impact on these interactions.

Accessibility is an important concept of transport geography that is useful to frame this study. Hansen (1959) defines accessibility as the potential of opportunities for interaction, particularly in relation to the ease with which any land-use activity can be reached from a location using a particular transport system (Geurs & Van Wee, 2004). Accessibility determines the locational advantage of an area (a town, region,

corridor) relative to all areas including itself. In this study, the road upgrade from a two-lane to a four-lane, including paved walk ways and foot paths for pedestrians has impacted strongly on small family owned businesses situated along the Vaitele Street corridor. Evidence from the study indicated improved earnings accruing to small family owned businesses located along the upgraded Vaitele Street, that correlates with improved accessibility to customers both vehicular and foot traffic.

Equally important is the concept of connectivity defined as the degree of interconnection between roadways (Brinckerhoff, 2009, p. 16). Vaitele Street is a 23 kilometer road stretch connecting Apia with the Faleolo International Airport and the Mulifanua Wharf. Perpendicular to Vaitele Street in the study area (see Figure 1) are a couple of roads (Vaimea Road and Moamoa Road) and Fugalei Street. These roads combined with Vaitele Street serve the purpose of improving the efficiency of movement using the roadway system as explored in this study and similar studies (see Taua'a, 2015). Mobility (ease of movement) and accessibility are important aspects of efficiency. Furthermore, connectivity extends beyond improved mobility and accessibility to include better pedestrian connections and shorter, more direct routes and less congestion (Brinckerhoff, 2009). These are obvious benefits of connectivity to consider in future road upgrade projects elsewhere in the country. But for this work, it is sufficient to say that the Vaitele Street upgrade has enhanced the connectivity of the study households to the greater Apia urban area. The Vaimoso household that operates a road stall (see Figure 1 and Table 2) is strategically located at the intersection of Fugalei Street and Vaimea Road (see Figure 1). One can assume the clear benefit of enhanced connectivity between this household and its suppliers from rural areas.

Methods and Location of Research

A range of research instruments (questionnaires, focus groups, household visits, observations, face to face interviews, talanoa) were utilized to collect the information needed to answer the study questions.

Questionnaires were designed to collect the respondent's personal and household profiles such as age, gender, occupational status and how long they have been living in the area. Other information about the actual and perceived impacts of the improved road were contained in the second section of the questionnaire. Questions asked in this section include changes in life style and habits, benefits derived from the upgraded road, and hazards related to the widening of the road. Prior to implementing the actual study, the processes in relation to submission of study proposal and ethical approval had to be obtained from the sponsoring institution.

A focus group session was conducted to stimulate debate and generate a forum for respondents to interact to remind and or validate information that would have been overlooked by the researcher in the data collection and verification process. The focus group members comprised five respondents; a taxi operator, BBQ vendor, sewing shop owner, a road stall vendor and a furniture maker (see Table 2). They were selected to ensure a fair representation of the formal and non-formal economic activities explored in the study. Additional face-to-face interviews with ten of the respondents were conducted to clarify some of the responses in the questionnaire. The idea was to interview all the seventeen participants, but given time constraints and the difficulties of organizing interview times that do not interfere with the participants' work schedule, ten were selected for face-to-face interviews, five from each village.

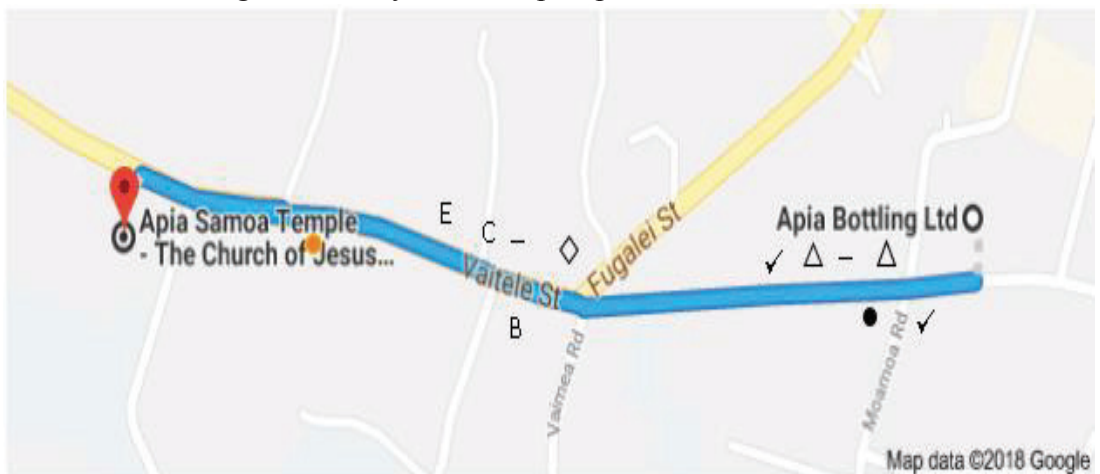
The case study tool is significant in examining the real life experiences (Yin, 2003) of a selected group such as the family unit whose livelihoods have been impacted for better or worse by state funded road improvements. An instrumental case study of one household who have been living in the study area for more than fifty years was conducted to find out how the initial road that was built before independence in 1962 has evolved into what it is today, and more importantly, how these changes have impacted on the family over the years. The instrumental case study seeks an insight into the road-widening project, and how its existence and improved state impacts on a particular group or family. It is expected that the experiences and or lessons learnt from this case can be generalized to similar studies elsewhere in the country. The case study information was collected through a structured questionnaire, face to face interviews and several informal talanoa sessions with the head of the household. The case study family was selected based on the fact that it was one of the first families to settle in the area before Samoa became independent in 1962 and has been there for more than fifty years. Other families followed after Independence along with many other new comers to the area, but occupying inland areas.

Talanoa (conversing) in the Samoan language was the medium of communication, given the respondents are Samoans and conversing in the vernacular allows for the free flow of information between researcher and participants (Vaiotele, 2006, p. 21). Talanoa was used in explaining the questionnaires to the respondents. In the same vein, talanoa, as a constructivist paradigm allows both the researcher and participant to contribute to the discussion, where both can learn from the experience (Prescott, 2008, p. 131).

Sorting and interpreting the data and information to answer the study questions was an important element of the study. Coding commenced after the questionnaires were completed and sorted. Coding closed questions were dealt with first, as they were

simple and direct. Open questions demanded more attention in terms of reading, familiarizing and translating the responses before they were grouped into meaningful themes. The focus group data were analyzed based on a selection of qualitative data analysis tools set out by Leech and Onwuegbuzie (2007). These were discourse analysis and key words in context. Discourse analysis probed the words and phrases as spoken by the respondents to determine how they relate to and describe their experiences and events in their daily lives that shape their lived experiences in and around the study area (Leech & Onwuegbuzie, 2007). Key words in context showed how respondents used words in context by comparing words that appear before and after 'key words'. A variant of this tool as applied in this study was identifying key words from the verbal responses of the participants to the questions being asked in the focus group session. Key words in the context of this study were identified from a word count of the most commonly used or spoken word(s) by the respondents in the focus group. For example, the word '*tupe maua*' translated as 'money received' was spoken nineteen times in the informal talanoa session during the focus group discussion. The key word '*tupe maua* or money received' was spoken or used in the context of *ala manuia* or livelihood and *lumana'i'o le aiga* and translated as 'the future wellbeing of the family'.

Figure 1. Study Area: Map of part of Vaitele Street.



Key: ✓ Sewing shops; • Case Study; E for Elei Printing; C for Charcoal Making; – Taxi Stand; B for BBQ; ◇ Road Stall; 🏠 Shop; 🪑 furniture shop.

Source: Google Maps 2018

Figure 1 above shows the part of Vaitele Street where the study households are located and the type of economic activities they are engaged in. The section of Vaitele Street covered in this study was one of the first to undergo road improvement in 2006 before the 2007 South Pacific Games hosted by Samoa. This survey was conducted in October 2014. Figure 2 shows Vaitele Street in relation to other places

surrounding the study area to enable a complete view of the context in which the study area is situated. The study population of twelve households and seventeen household members were selected from people whose lands front on to the main road in the urban villages of Taufusi and Vaimoso. As such, there is a diverse mix of land use, that range from formal businesses (super markets, hardware stores, furniture shops), informal businesses (road side stalls selling cooked food, charcoal, wood), as well as residential areas. Many of the prime lands that front on to Vaitele Street are a mixture of freehold, church, government and customary lands. The study is limited to households and how they have been affected by the road upgrade, hence the sample of twelve households and seventeen people.

Results

Sociodemographic profiles of respondents

The study was conducted over a period of five weeks in October 2014. There were two ways engaged to select the respondents. First, the households were identified from the list of parishioners in the Taufusi and Vaimoso Catholic Parishes. A foot survey of the area was then conducted to appraise the study area and to confirm the names, location and economic activities of the selected households. This required walking the length of Vaitele Street that was included in the study area (from Apia Bottling Taufusi to the bridge (Vaimoso) before the Samoa Temple, see Figure 1). This exercise required physically counting the number of residential households in the study area as opposed to other forms of land use, such as churches, schools, and commercial operations (hardware & electrical goods wholesalers, car rental operations, supermarkets, food and beverage manufacturing). The foot survey provided the opportunity to informally engage with potential respondents, who volunteered information such as their church affiliations, and land ownership that were very supportive towards the study. The foot survey covered two urban villages of Taufusi and Vaimoso marked by the Vaea and Vaitele Streets' intersection and the Latter Day Saints Temple (see Figure 2).

Table 1 presents a summary of key variables pertaining to the respondents in the study. Seventeen persons from twelve urban households residing along the Vaitele Street completed the questionnaires. Each household was requested to nominate two persons to participate in the study, and one of the participants would have to be the head of the household. In the absence of the head of the household, another senior member of the household was requested to participate. There is a slight majority of males (53%) over females (47%) in the study sample. The distribution of population by sex and place of residence in the 2016 Census, shows similar trends, with a total of 18,740 males and 18,612 females residing in the Apia Urban Area (Samoa Bureau

of Statistics, 2017, p. 13).

Figure 2: Vaitele Street in Relation to Vaea Street and Part of Apia



Source: Ministry of Natural Resources and Environment, Map Division.

The extended family is the dominant family type (89%), an expected trend among many urban households that play host to members of the larger extended family from the village. The extended family consists of first or second generations of cousins, nieces, nephews and in-laws from the village, who work and attend school in Apia. In one particular household, a distant relative was living with the family to serve out his banishment from their village in Savaii. The host family found him very useful in operating their BBQ food stall (Table 2).

The question on employment status yielded some interesting responses. Eighteen percent, were at school, thus, they worked to help out in the household business during weekends and school holidays. Those who responded as self-employed (41%) described the owners of the family business, whereas those who were permanently employed (41%) were other members of the household who worked or helped out in

the family business (see Table 2). Three respondents who were permanently employed at the time disclosed in our informal talanoa session, that they occasionally received their wages in cash, otherwise, it was mostly in kind. Payment in kind was usually in the form of grocery shopping for the family in the village over the weekend, or on special occasions (Children's White Sunday), or contribution to the village or church obligation (*fa'alavelave*). This practice is not unusual among Samoan households that tend to 'informally' employ family members.

Table 1: Demographics of respondents in the study

Variables	No.	Percentage
Gender:		
Male	9	53
Female	8	47
Age Group:		
18-25	4	24
26-40	4	24
41-60	7	41
60+	2	11
Family Type:		
Nuclear	2	11
Extended	15	89
Years of living in the area:		
1-15	2	11
16-40	10	59
41 +	5	30
Employment Status:		
Permanent	7	41
Self-employed	7	41
Temporary	3	18

Source: Questionnaire Survey

Economic impacts

A major objective of the study was to examine the economic impact of the Vaitele Street upgrade on the people living alongside the street. Table 2 displays five study variables. First, the study households were numbered from 1 to 12, second, the urban villages of Taufusi and Vaimoso where the households are located. Third was the number of respondents from each of the twelve households. Fourth were the types of economic activities they operated and finally, was the frequency in which the road is used for access to and from these economic activities in the study area. Economic activities ranged from small formal enterprises (66%) to informal operations (34%). Direct access to the main road was the common variable to all the economic activities

of the households. The households selected for this study already had road frontage advantages, considering the majority (59%) have been living in the area for more than twenty years. Some (30%) have lived in the area for over forty years, while one family have lived there for more than fifty years. They are considered the 'old' families of the area (Table 1). Essentially, road access is already an established element. Road widening and resealing works have significantly enhanced the accessibility of the family businesses to vehicular and pedestrian customers alike. By the same token, the advantage of a road frontage location, enhances access to other services and products required for the small family businesses to grow.

Table 2. Type of Economic Activity

Household Number	Urban village	Number of Participants Per H/hold	Type of Activity	Frequency of road usage-access
1	Taufusi (FG)	1	Taxi Stand	Daily
2	Taufusi	2	Small Shop (grocery)	Daily, except Sundays
3	Vaimoso (FG)	1	Road stall (vegetables, brooms, printed Lavalavas, coconuts)	Daily
4	Taufusi (FG)	1	Furniture Shop	Daily
5	Taufusi	2	Furniture & Tire Shop	Daily
6	Vaimoso	2	Shop (grocery)	Daily
7	Vaimoso (FG)	2	BBQ stall	3 days per week
8	Taufusi	1	Sewing shop (home)	Daily
9	Vaimoso	1	Taxi stand	Daily
10	Vaimoso	1	Elei fabric printing	Daily
11	Taufusi (FG)	2	Sewing shop	Daily
12	Vaimoso	1	Charcoal Making & firewood	Daily

Source: Focus Group (FG); Questionnaire Survey

For every economic activity, a certain number of customers and sufficient traffic movement is a necessity to allow maximum income for the household. In the case of Household Number 2 (Table 2), their economic activity is a small shop that was

opened in 2004, with a stock value of \$28,000. The owner was very excited to report how they started with humble beginnings, unsure of whether the venture would succeed, but, in less than ten years, he has extended his business and paid off the loan for the shop. According to the shop owner, there were many contributing factors to the profitability of his venture, and a significant part of the success was attributed to the upgraded road. When he started his business, the road, was a narrow one-lane stretch, with no parking space and patchy footpaths, but after the first phase of road improvement in 2006, he observed a marked improvement in the number of vehicular customers that stop at his shop. The increase in his customer base correlates with increased cash sales particularly on the weekends. Before the road upgrade, the shop sales on Thursdays and Fridays amounted to \$500.00 and \$700.00 respectively, but since after the road improvement, sales increased to \$900.00 and \$1,500 on these particular days. Improved parking space is another critical factor that allowed for easy access particularly with vehicle travelling customers.

Roadside operations were new small scale informal ventures set up after the road upgrade in 2006. According to the charcoal makers and firewood vendors the opportunity to maximize their income by eliminating the costs of transporting their charcoal to the Fugalei market unfolded as the newly upgraded road began to take shape. The family observed that the travelling public would stop and buy these items if they were provided based on the assumptions and observations they have made over the years since they occupied the area (30 years). Furthermore, from their observations, the travelling public tend to avoid going into the congested Fugalei fresh produce market if they could buy the same produce elsewhere. Hence, the idea was conceived to utilize their property's road frontage advantage. Between the period of the road upgrade and this survey, the household business has expanded on the range of products sold from their road side stall. Other informal operations sprouted along the same section of the road. The opportunity to earn a good income was too great to pass up. A cluster of economic activities that interact and complement each other is an idea that emerged to take full advantage of the newly upgraded four-lane Vaitele Street.

Similarly, other small ventures that existed before the road upgrade in 2006 (Table 2, Household 1,4,5,8,9) reported some major improvements in line with the increased volume of traffic flow and potential customer base the upgraded road would generate. The second hand tire shop (Household 5) operator reported investing in expanding parking and workshop floor space in anticipation of the demand for tire services given the projected increase in the number of vehicles as a result of the road change in 2009. The upgraded road (2006) and the road change (2009) stimulated an increase in the number of taxi service operations in the study area (and elsewhere in the country). The two taxi operations included in this study existed before the road

upgrade, another four (not included in the study) emerged in response to the road change and the affordability of second hand vehicles imported from Japan. In this particular case, the road switch other than the road upgrade was a critical factor in the household’s decision to set up a taxi operation.

An enquiry into the households’ cash earnings from their business activities was a sensitive but important question that had to be asked of the respondents. Hence, this was the significance of having the head of household or other senior members of the household as a participant in the study. Table 3 summarizes household income from six households who consented to disclose the status of their income before and after the road upgrade.

Table 3. Income earned before and after the road upgrade.

Household	Type of activity	Income before the road upgrade	Income after the road upgrade
1	Taxi Stand	\$200-\$280 weekly (fluctuates), or \$900-\$1000 per month.	\$700 weekly (more or less), \$2800 per month from 2 taxis.
2	Small shop	\$500-\$700 (2 days of the week)	\$900-\$1500 (2 days only)
5	Furniture & Tire shop	\$1500-\$2000 (furniture sales per week); \$300+ per day from tire shop	More of the same income from the furniture shop. Tire shop collects between \$600-\$700 per day.
6	Shop	\$600-\$800 sales on daily basis, except Fridays and Saturdays with recorded sales of \$1300 - \$2000.	\$1300 - \$2000 daily, except Fridays & Saturdays (\$3000-\$5000)
10	Elei fabric printing	Weekly income between (\$400-\$600), some weeks are better than other weeks.	Income recorded at \$1,500 to \$2,800 per week.
11	Sewing shop	Weekly income of around \$800 - \$1000.	Weekly income increased to \$1,500 to \$2,000.

Source: Face to face interviews; questionnaires.

Economic As indicated in Table 3, there are marked contrasts in income earned before and after the road upgrade. The head of households tasked with the exercise of income calculation and disclosure were specifically asked to work from the period

before April 2007 (phase 1 of the road upgrade) and 12 months after the road upgrade³. There are other factors that may have a bearing on the level of income earned. For example, the taxi operation by Household 1, recorded a reasonable improvement in the earnings from the taxi operation. He also managed to buy another taxi with the savings from the first taxi. During the time of the study he had two taxis in operation. However, he also emphasized that there are times when the taxis do not earn as much as expected, primarily due to the increase in the number of taxi businesses along this stretch of Vaitele Street as a result of the road upgrade and road switch. His sentiments were reiterated by another taxi operator from Household 9 (Table 2).

The time of day in which the economic activity takes place is another factor that impacts on household earnings. The elei fabric printing business (Household 10), started off as an informal home based enterprise but is now a fully registered business entity. Operating a formal business from home has many advantages, such as flexible hours of operation, where her customers have the advantage of collecting their fabric any time after working hours when traffic is lighter. According to the owner's assessment of her earnings, flexible working hours and the road upgrade that allowed adequate public parking spaces for her customers is an added advantage to her operation.

Four households in the study (see Table 2: Households 3,7,8,12) are new informal ventures that commenced operations after the first phase of the road upgrade in 2006. The operators are rural migrants living with family in the area (see Table 1 category on Family type). The informal ventures were intended to utilize the opportunity to earn a living while awaiting formal employment in Apia. In this respect, the road upgrade produced an opportunity to earn income for some of the study respondents. The idea of spillover effects of road improvement describes the spike of informal road side stalls along 23 kilometers of the entire Vaitele Street.

Social Implications of Road Improvement

The study sample, described mixed experiences with the improved road. While the new 4-laned street inspired positive economic behavior as demonstrated in the expansion of existing small business ventures and emerging informal economic activities, other undesirable impacts were also reported. For example, a 19-year-old female, commented on how their house has become so exposed to the road, she can hear the conversations of pedestrians on the foot path. Others felt vulnerable to the prying eyes of their customers. Increased noise pollution and traffic congestion became a daily experience for residents in the area. The spike in the number of vehicles as a result of the 2009 road switch aggravated the problem. In 2011, 40 percent of 26,205 households surveyed owned a motor vehicle (Samoa Bureau of

Statistics, 2011, p.89). Data from the 2016 Census survey, reported 44 percent of 28,862 households own a motor vehicle (Samoa Bureau of Statistics, 2017, p.10). The lack of privacy from the prying eyes of other road users particularly foot traffic along the walkways and footpaths is a disturbing factor that the residents somehow have managed to adapt to. A negative spillover effect of the lack of privacy and increased noise pollution, is the infrequent and sometimes complete cessation of family evening prayers. The oldest respondent in the study, attributed escalating crime, violence and youth unemployment particularly in Apia area, to the erosion of family time in the evenings, as a result of the major disruptions caused by the upgraded road. It is important to point out that the problems identified by some of the respondents in the study are emerging elsewhere in places outside Apia and in rural areas as improved road, transport and communication infrastructure enhance access and connectivity between Apia and its hinterland. Similar experiences and problems of road accidents due to driving while under the influence of alcohol, under age driving, speeding, using cell phones while driving as reported in the media almost on a daily basis are associated with improved roads and other forms of development that Samoa has undertaken in the last twenty years.

Connecting people to their jobs and students to school plus significantly reduced travel time between Apia and its hinterlands are obvious benefits of improved roads. The study area was one of the first areas targeted by the government of Samoa infrastructure developments because of the high potential for economic development and its strategic location in connecting Apia Central Business District with the international airport and Mulifanua Wharf on the west coast of Upolu Island.

The taking of land for road widening had a significant impact on the residents whose lands were affected. Seventy-five percent of the households (9 out of 12) in the study survey had portions of their lands taken up by the project. Some households (33%), received compensation, others are still fighting for compensation. According to the Ministry of Natural Resources and Environment which is responsible for surveying and maintaining land records, many of the families owning freehold property adjacent to the government main roads, are illegally encroaching and extending their developments such as concrete fences, hibiscus hedges and flower gardens onto 'government reserve' lands for development purposes such as road extensions and upgrade. It was not possible to engage the households concerned in a detailed talanoa about the issue of land and compensation, considering it is a private matter and families involved do not wish to disclose any information other than the fact that some families are still waiting for compensation.

Recent (June-July 2018) boy racing activities and V8 car shows by young and not so young men may be attributed to the improved conditions of the roads particularly the

4-laned Vaitele Street that is ideal for car racing particularly in the early hours of Saturday morning. A handful of accidents in the last three years have been responsible for damages to the traffic lights at the intersection of Vaea Street and Vaitele Street in Taufusi (see Figure 2). This is a growing problem with improved roads, increased number of cars on the road and growing number of young and inexperienced drivers. The Land and Transport Authority (LTA) and Police conduct weekly road blocks on the weekends to deter inebriate drivers from driving, but it takes more than road blocks and road safety awareness programmes to address many of the undesirable aspects of improved roads as emerged from this study. For example, the lack of privacy, noise pollution from road users and infrequent family prayers in the evenings arguably are part of the broader societal changes, but at the same time a broader sense of collective social responsibility beginning with the household and older members of the group should prevail.

Insights from the Family Case Study

The case study family has been living in the area for more than fifty years, and is considered as one of the original families to settle in the area where the current road passes through was only beginning to develop. The head of the household is a grandchild of the land owner. As original occupants of the area, their story provides an oral history of the road in its early beginnings. Very few people are aware of the history of the area and the reasons for naming the street as Vaitele street, when Vaitele is a designated industrial zone that lies 3 kilometers outside of Apia urban area. Table 4 details the outcome of the case study *talanoa* session.

Table 4. Report from case study household.

Case study question	Head of Household Response
1. How long have you lived in the area?	My grandparents moved here from inland Vaimoso village in 1948. Their children (my father was the eldest) all grew up here. So, we have been living here even before Samoa gained independence.
2. What was the road like in those days?	I was a young boy then, but I can remember it was a narrow road, unsealed, except for ma'ama'a (crushed rocks), because, the entire area was a taufusi (swamp). But in those days there weren't that many cars and people! Hardly any accidents! Quiet,
3. How long have you been operating your shop?	The shop belonged to my grandparents. It was closed for some time before my father reopened it in 1964. I took over from him in the early 1980s and rebuilt the entire place. The old shop was very small about 150 square feet. As you can see, I have put in a second floor upstairs where we live and I have extended the ground floor for space, it is almost four times the original shop.

	<p>The shop improvements parallel the developments to the road and the times we are living in...</p>
<p>4. What do you mean by your statement, that the improvements to the shop parallel the road developments?</p>	<p>Is it not obvious? We need to keep up with the times? The road is tar sealed and wider, so many cars and people on the road. I have a business, and I need to capture the people passing through to buy from my shop. How can I repay the capital I borrowed from the bank to extend and improve my business, if people do not stop by? I invested in a 10 vehicle capacity car park, to complement the government road upgrade. Very easy for customers to turn in and shop.</p>
<p>5. Any challenges, or adverse effects of the improved road?</p>	<p>As you can see, we live upstairs, so we are above the road level, so we have some privacy, but that does not stop the noise from below (and air pollution). Too much noise, fumes from cars! I feel sorry for some of the elderly people of our Parish.</p> <p>Sound proofing the house is not an option. The biggest noise hazard comes from container trucks, but that is expected with Samoa becoming very modernized. There is also the problem with speeding vehicles and booming music late at night and the early hours of the morning, especially on the weekends. There is the potential danger of a speeding car, veering off the main road and crashing into our house. I have also noticed the lack of pedestrian crossings, other than the designated crossings where schools and churches are located. So, for many people, particularly my customers living on the other side of the road, crossing to the shop, is a challenge.</p> <p>Another challenge, I think arising from the road upgrade, is the increased vulnerability of all this area to flooding. Compared to previous years, flooding was not as bad as today. This whole area, extending to the main Apia township is the flood plain. I think the contractors should look at properly fixing the drains...</p> <p>Since the road upgrade in 2007 to 2011, I have witnessed and aided the victims of twelve separate traffic accidents, two fatal ones. It is very tempting for drivers to speed. What is lacking are regular road safety awareness programmes for the public by the Police and Land Transport Authority that should go hand in hand with major road upgrades. I also notice, that the foot paths are used by pedestrians and cyclists...there should be some designated lanes for cyclists like overseas, particularly along this road (Vaitele Street), because this is the main road to Faleolo Airport.</p>
<p>6. What else can you recall about this area, history? The people</p>	<p>The land belongs to Vaimoso village, but this area was all swamp. There was no road, it was during the German administration, they reclaimed the swamp, and started road</p>

who own these prime lands?	works to transport copra and cocoa to the Matautu wharf. Many of the families that moved close to the road are Vaimoso families, the land was sub divided among them, before it was registered as freehold, during the Germans and later under the New Zealand administration. On the eastern side, heading towards main Apia town, that was all Catholic land, leased to Catholics, some have bought land from the church, I suppose they had a vision of the future as in now, with the value of land in this area selling at \$700,000 for a ¼ acre! This road was named Vaitele, because it connects Apia town to the Vaitele industrial zone set up in the 1970s, that started with the Vailima Breweries and the British American Tobacco Company.
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Source: Talanoa Case study.

The upgraded road has a direct bearing on the increase in the numbers of private cars if considered together with the 2009 road switch. While there have been some positive impacts since phase 1 in 2007, as demonstrated with the spike in formal and informal economic activities as well as major improvement and extension work to pre-existing businesses, some negative effects have also occurred. Traffic congestion never seen before on Samoa's roads is becoming the norm, even outside the morning and after work peak hours. Increased availability and ownership of cheap Japanese second hand vehicles only exacerbate the problem of congestion.

While the upgraded road is designed to keep traffic and people moving, safety and protection of all road users must also feature in the planning and design of road systems. The lack of pedestrian crossings was pointed out as a critical shortfall of the improved road. The simple act of crossing the road has become a challenge for many. According to the case study respondent, crossing the road is a problem for his customers living across the road from his shop. He believes a proper crossing will not only improve pedestrian mobility, but more importantly reduce the incidence of traffic accidents. The head of household reported 12 separate traffic accidents he personally witnessed in the area since 2007 to 2011. Also, pedestrians were involved in all but one incident. The latest incident occurred in 2017, when a young man waiting to cross from in front of the shop, was run over by a speeding vehicle.

The case study respondent also touched on the increased use of non-motorized means of transport such as bicycles, very popular with young men. Footpaths are being used by pedestrians and cyclists alike. The absence of designated lanes for cyclists as in many overseas road structures is a contributing factor to many road accidents, and there has been a modest increase in reported accidents involving cyclists around the country.

Noise pollution is a constant problem reported by the case study household. Fortunately, for them, building a two-storey structure provided a small relief from the noise. But, for other families in the area, building upwards is an option, but a very costly one. Poor air quality was also a problem identified by the case study respondent, related more to the increase in the number of cars on the road as opposed to the road upgrade. Vulnerability to flooding during the wet season was another problem identified, particularly considering the entire study area is a low lying flood plain for the Loimata to Apaula stream. Food risk, noise pollution and poor air quality are not a conducive environment, particularly for the young and elderly residents in the area.

For a business-oriented household, the opportunity to expand and grow its business was stimulated by the road upgrade project. The owner expanded his shop floor space and put in a second floor as a living area for the family. In addition, he invested in a 10 vehicles capacity car park to complement the government road upgrade. To attract customers and tap into the potential benefits derived from the upgraded road, he needed to play his part in bridging the gap between the government initiative and what citizens (business community) can do to help themselves to ensure a win-win situation.

The case study household is important for three reasons. First, it represented probable scenarios further along the 23 kilometers stretch of Vaitele Street that is not included in the study. Vaitele Street runs through the Vaitele industrial zone and many other villages on North West Upolu where similar businesses to the case study are emerging to make use of the improved road. Second, it suggests what families can do to help them cope with the stresses of living along a busy road. However, factors such as access to funds, willingness to mortgage the land and the ability to make loan repayments prevented some of the study respondents from doing so. Third, the case study documents the histories of land ownership and land transfer that are useful when conducting future road impact assessment studies, particularly issues related to land acquisition for public developments.

Generalized Impacts of Road Improvement

Infrastructure in this case, major road upgrade in Apia township, is critical to growth and development prospects for the country. A multiplicity of studies including this household-based investigation, provides anecdotal and scientific evidence that better quality roads enhance the productivity and social capital of communities. Improved roads provide better access to services or markets in the case of farmers and informal sector operators. Equally important, roads are necessary to reduce differences across regions. The current government under the Human Rights Protection Party, has

always maintained its mantra of what is good for Apia is also good for the rest of the country, hence road improvement projects are a nationwide undertaking. The same applies to other services such as education, health, water, energy and information communication technology.

Highly connected road networks and high density transport infrastructure are linked to high levels of development. In countries with efficient transport systems, they provide social and economic benefits and opportunities that culminate in positive multiplier effects such as better accessibility to employment and added investments. On the other hand, poor and undeveloped roads can result in missed opportunities and lower quality of life.

Congestion is an unintended outcome of providing efficient low cost transport infrastructure to users. But, congestion is also a manifestation of a vibrant and growing economy where the capacity of the infrastructure is stretched to meet the mobility demands of users. In actual fact, congestion was one obvious effect of the improved section of road in the study area.

Upgrading roads (and other forms of transport development) was used in the past as a tool for territorial control. The German administration laid the foundations for the development of road infrastructure in Samoa to support the export of copra and cocoa. A similar approach is observed with the governing Human Rights Protection Party. Anecdotal evidence suggests that road rehabilitation projects in many of the villages tend to be implemented in the last 6 to 8 months leading up to the general elections. Donor funded road projects, among other things, are tangible evidence used by sitting members of Parliament and potential members to drive their campaigns. In the study area, this was not so evident, considering the study area is part of the Apia urban area and one of the first areas to experience major developments beginning with the early years of European contact.

Future Action

Better quality roads have profound social, economic, and health effects on communities and individuals. Samoa being a small island nation should endeavor to promote and develop good quality public transport systems such as mini-buses and taxi vans with the capacity to move large numbers of people. The use of public transport hopefully will reduce the number of private vehicles on the road. Providing bus-only lanes is a good start to promoting the use of public transport. The active promotion of non-motorized transport such as cycling accompanied by relevant infrastructure, proper policies and education-awareness programmes for users (young adults, school children) provides health benefits and improved air quality.

Children observed riding their bicycles for leisure on the footpaths in the study area and young males cycling to the shops is a good start to initiate a campaign for non-motorized transport.

Introducing a vehicle quota system to limit the number of cars imported into the country is one way of managing the demand for further road expansion considering the limited land space to build new roads or extend existing ones. This may not go down well with many people who have had a taste of the good life through the charity of families overseas and the benefits of remittances again from the expatriate Samoan community. But, with appropriate legislation and political willingness, this can be an option in the future. The four-lane road in the study area cannot be extended further unless all the free hold land owners in the area sell their lands to government and relocate elsewhere for the purpose of further road extension work, which is highly unlikely in the near future.

Advocating for better management of the population's demand for travel is just one way of curbing traffic congestion and demands for new roads. Providing options that encourage more people travelling in fewer vehicles such as carpooling and ridesharing, increasing fuel prices and imposing car-parking fees to deter private vehicle use during traffic peak hours are a handful of measures to address some of the adverse impacts of road infrastructure on small urban communities. The lack of bus stops along the study area and the prevalence of taxi operations only encourage private car usage.

Conclusion

The upgraded Vaitele Street serves the purpose of improving connectivity and accessibility as espoused in transport geography concepts. Evidence from the study demonstrated an increase in vehicular and foot traffic along the improved section of the road. This translates into improved mobility of road users and increased connectivity between urban Apia and the western part of the island, including the Faleolo International Airport and Mulifanua Wharf. The improved road facilitated better access and opened up economic opportunities for people residing within the vicinity of Vaitele Street as documented in the study.

The study explored the social-economic impacts of the upgraded Vaitele Street on twelve households living along 400 meters of the street. The households were strategically selected based on their existing economic operations, how long they have been living in the area, and the advantage of having a road frontage property.

The respondents reported earning reasonable income prior to the first phase of the

road upgrade in 2006. During the first phase of the road upgrade, income reportedly dipped due to a lot of interruptions, which was expected with detours for pedestrians and vehicles put in place before road construction works started. But after the completion of phase 1 and 2, the households reported doubling of earnings from their various small enterprises. It is important to note, that there were other factors (road switch) identified by the respondents that complemented the road upgrade which may have indirect impact on their earnings. Nonetheless, fifty percent of the households were happy and inspired by their achievements. This was reflected in the efforts of some households to expand and improve on their selected businesses to take advantage of the prospects and opportunities presented by the upgraded road infrastructure. Others were inspired to engage in informal ventures to provide a service that was deemed necessary as well as earning a livelihood at the same time. Providing employment in the informal venture was a spillover effect of the upgraded road for a couple of households in the study.

Other undesirable impacts (noise and air pollution, absence of privacy) of the upgraded road were identified, but gauging from the respondents' responses, these are only a small price to pay for the improved living standards demanded by many households in Samoa. Additionally, there are possible solutions flagged in the talanoa sessions, such as building upward or selling their prime lands and buying property out in the suburbs of Apia.

Overall, the upgraded Vaitele Street fulfills an important role in effecting access to services and markets as well as moving people and products between places particularly along the Apia to Faleolo International Airport corridor, impacting directly on the country's gross domestic production. Raising the productivity of households as demonstrated in this study is a small but significant evidence to demonstrate that properly planned and managed infrastructure investment can work to deliver opportunities and benefits to the livelihoods of communities dependent on it.

One of the important reasons for impact studies is to lend support to policy formulation. Therefore, a number of policy directions can be gauged from this study. First, there is a need for comprehensive road impact assessment that entail extensive consultation with a wide cross section of the community to understand their needs. Government agencies responsible for road planning and development need to ensure that all groups of road users from manufacturers, farmers, local government, parishioners, landowners, other service providers and motorists are consulted to ensure that road infrastructure planning and investment is well coordinated to reasonably anticipate future needs and problems.

Second, there should be some principles to guide the development and use of main road infrastructures. The focus of main road development is on safety and efficiency of the road system. Some of the main road impacts identified may require mitigation measures such as transport modal choice and traffic management. This raises an important issue related to the lack of mitigating strategies in government's approach to managing the undesirable effects of improved roads. The case study household provided an example of how they coped with the noise pollution and lack of privacy at the family unit, but there is room for the state to develop national road strategies and policies to address unfavorable impacts of road improvement.

On the other hand, a significant number of economic activities that emerged in response to the improved road are small and owner/family operated. There is no government evidence to indicate that these forms of economic developments are consistent with the main road plans as set down in the road upgrade phase that started in 2006 to 2016. Developments that are consistent with main road upgrades should not cause significant impacts to the road system. At the same time, inconsistent development activities may cause significant impacts that may compromise the safety and efficiency of the road system. This situation calls for considerable transparency in monitoring and setting conditions for such developments. These can be achieved with proper road policies in place to guide the work of the relevant authority such as the Land Transport Authority.

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