Socio-Economic Impacts of Farm-To-Market Roads in Selected Barangays in Surigao

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Socio-Economic Impacts of Farm-To-Market Roads in Selected Barangays in Surigao Del Norte, Philippines

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Abstract: *This study investigates the social and economic impacts of farm-to-market roads (FMRs) in Surigao del Norte, Philippines, focusing on transportation, economic activity, and access to essential services. Findings reveal that FMRs reduce travel time by about 50%, improve the transport of agricultural goods, and enhance access to markets, healthcare, education, and government services. These benefits contribute to increased household income and employment. However, the degree of impact varies by location and population density. The study also identifies infrastructure issues, including poor road shoulders, drainage, and a lack of safety features and signage. The absence of post-harvest facilities limits the full utility of FMRs. Continuous road maintenance and additional infrastructure are essential to sustain these benefits. Overall, the study highlights the transformative role of FMRs in fostering inclusive and sustainable rural development while emphasizing the need for ongoing support and improvement.*

Keywords: Farm-to-Market Roads; Socio-economic; Impact assessment; Social Services; and Household income

1. INTRODUCTION

Developing a nation's road infrastructure, including farm-to-market roads, is crucial for economic progress. Road systems play a significant role in facilitating the movement of goods and people, particularly in developing countries where these are essential for agricultural activities [1,2].

Agriculture is a key economic driver in many African nations, with a large percentage of the population relying on farming for their livelihoods. In Sub-Saharan Africa, approximately 70% of the working population is engaged in agricultural activities [3]. In rural Africa, 70% of the population depends on income from farming for monetary sustenance, while 30%-40% supplement their livelihood through other rural non-farm activities [4].

Additionally, the Philippine economy is based primarily on agriculture, which provides raw materials for even the manufacturing sector. Additionally, the Philippine economy is based primarily on agriculture, which provides raw materials for even the manufacturing sector. However, the agricultural sector's performance remains poor, which observably hinders national economic growth. Consequently, the government acknowledges the necessity of enhancing the agriculture sector to boost productivity and profitability by investing in infrastructure, particularly farm-to-market roads, for rural development. The scarcity of proper infrastructure in the Philippines, especially rural roads, represents a significant obstacle for many impoverished farmers striving to enhance their productivity and profitability [5]. Under the administration of the current President Ferdinand Marcos, Jr., approximately 67,328.92 kilometers of farm-to-market roads were developed by the Philippine government [6]. Notably, in Surigao del Norte, the successful completion of seven locally funded farm-to-market road projects has been utilized in transporting goods and services by the local communities in the area [7].

Although impact assessments of farm-to-market roads (FMRs) have been undertaken in various regions, a comprehensive understanding of their localized effects remains limited. This study aimed to assess the socio-economic impact of the farm-to-market road in the selected barangays in Surigao del Norte, Philippines. Specifically, a comparative analysis on social services accessibility and economic household income were conducted. Results of this study are useful to policymakers and planners, implementers of future infrastructure development.

2. METHODOLOGY

This study employed mixed-method integrating quantitative and qualitative approaches to assess the socio-economic impact of the farm-to-market road projects in the selected barangays in Surigao del Norte, Philippines. The general process flow of the study is shown in Fig. 1, which includes: (1) identification of completed FMR projects; (2) identification of site selection for survey; (3) formulation of survey questionnaires and pilot testing; (4) data gathering through survey and measurements; and (5) assessment and analysis. This mixed approach allowed analysis combining measurable data with contextual and experiential insights, aligning with established mixed-method frameworks [8,9,10].

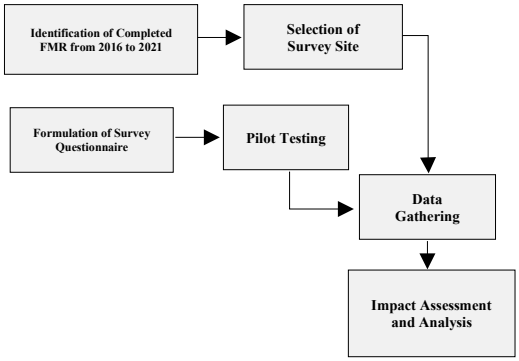

Fig. 1. General process flow of the study.

2.1 Identification of Completed FMR, Site Selection, and Sampling

Data from the Department of Agriculture's Caraga Region for the fiscal years 2016–2021 served as the basis for choosing the survey locations. The researchers analyzed first the available data to identify, and rank completed Farm-to-Market Roads (FMRs) based on the scale of the project in terms of their length, with small-scale ranging from 0.5 km to 0.9 km. Following this ranking, the researchers used a stratified sampling in selecting the three representative FMR projects, one large-scale, one medium-scale, and one small-scale to ensure a comprehensive assessment of the impact across different project sizes. By adopting this approach, the study aims to provide valuable insights into the effectiveness and benefits of FMR projects of varying magnitudes.

To choose household respondents within these sites, a mixed stratified convenience sampling design was used, selecting three people per FMR from regions close to the beginning, middle, and end points of each FMR segment. This was further extended to include residents living within a two-kilometer radius to better capture the wider community impact [11]. Purposive and convenience sampling were employed to select key informants such as barangay officials, officers from the Farmers' Association, farmers, and even representatives from the Irrigators' Association who actively engaged in agricultural activities along the FMR traverse, ensuring the relevance and accessibility of qualitative data [12].

2.2 Data Collection Instruments

To evaluate the effects of Farm-to-Market Roads (FMRs) in Surigao del Norte, four specialized tools were created: (1) the FMR Field Assessment Survey for road condition; (2) the Household Survey Questionnaire for social and economic impacts; and (3) the Focus Group Discussion (FGD) Guide for stakeholder and farmer perspectives.

These tools captured both pre- and post-FMR conditions. Since the respondents of this research are solely from the provinces situated in the Mindanao Islands, the questionnaires were translated into two languages: English and Visayan, to ensure clarity and ease of understanding. These approaches provide relevance to the study conducted within Surigao del Norte, supporting comprehensive impact assessment and practical recommendations.

2.3 Data Gathering

The researchers gathered the primary data through face-to-face self-made questionnaires in a survey to obtain information from the selected number of participants on their experiences before and after the construction of the farm-to-market road. The researchers prepared a consent form and asked the respondents' permission before letting them sign the form. Coordinating with the city and municipal government offices to request help in identifying possible respondents was the first step in the interview process. The researchers engaged in active collaboration with barangay officials who played a crucial role in facilitating community entry and supporting the recruitment of study participants. To ensure meaningful dialogue and preserve group dynamics, Focus Group Discussions (FGDs) were conducted with purposively selected participants, organized into groups comprising 4 to 10 members. This group size was strategically maintained to foster cohesive interaction and enhance the depth and quality of discourse [9].

2.4 Impact Assessment and Analysis

With an emphasis on the socioeconomic and physical effects of FMRs in Surigao del Norte, this assessment used a mixed research design that included both quantitative and qualitative methods. This approach helped identify outlier data points that deviate significantly from the rest of the data, which can indicate errors in data collection or unusual cases that require further investigation. For statistical analysis, this study utilized JASP (Jeffrey's Amazing Statistics Program), an open-source software designed for easy-to-use and advanced statistical analysis [13].

2.5 Ethical Considerations

The rights of participants and the privacy of their data were protected because the study closely followed ethical guidelines. Anonymity and confidentiality were maintained by excluding any identifying information from all reports and publications. In compliance with the Philippine Data Privacy Act of 2012 and standard social science research protocols, informed consent was obtained, and participation was entirely voluntary, with the option to withdraw at any time without penalty. To maintain confidentiality and the integrity of the research, all data were handled ethically and stored securely.

3. RESULTS AND DISCUSSION

3.1 Study Site

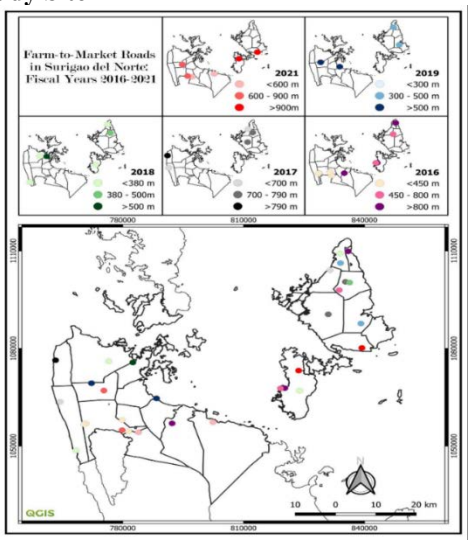

Fig. 2. The FMRs in Surigao del Norte (2016-2021).

Fig. 2 shows the completed Farm-to-market roads in Surigao del Norte from fiscal years 2016-2021, funded by the Department of Agriculture- Philippine Rural Development Project (DA-PRDP). The FMR was classified based on length into small, medium, and large scales. It was found out as shown in Fig. 3 that FMR in Brgy. Mapawa, completed in 2018, was a small-scale measured up to approximately 364 meters, the medium-scale FMR in Brgy. Ima, constructed in 2019, covers a length of about 841 meters, and the large-scale FMR in Brgy. Don Paulino, established in 2021, spans a total of 1,780 meters.

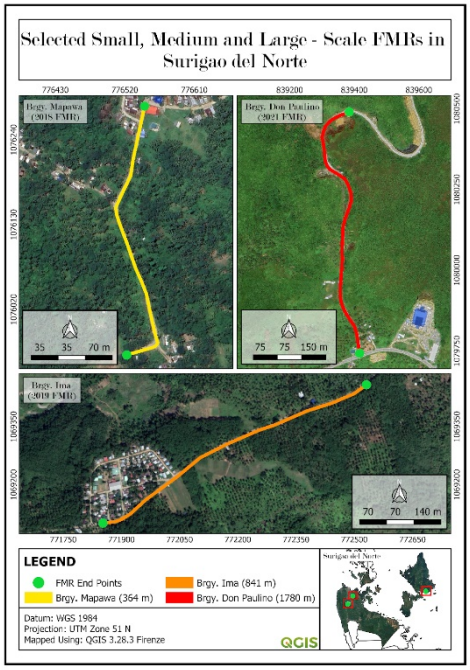

Fig.3. The three farm-to-market roads representative of the study.

These FMRs supported large areas of coconut farming along with the residential communities, which played a significant role in the utilization of these road networks through improved accessibility to social services.

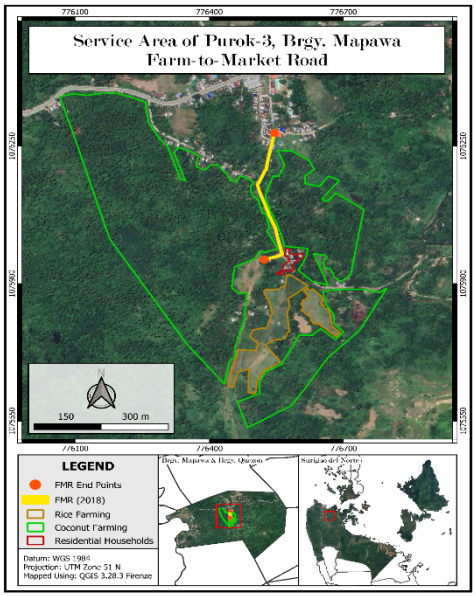

Fig.4. FMR in Brgy. Mapawa and Its Service Area.

Fig. 4 shows the FMR in Brgy. Mapawa with 364 meters in length. This FMR supports agricultural transport from remote farms to city markets, aiding rural development. Survey data indicate that while the barangay hall is located along the FMR, essential services such as healthcare are accessed in Surigao City proper, about 5.6 km away. Key facilities include Caraga Regional Hospital (904 m), Surigao City Public Market (1.6 km), and Caraga Wet Market (388 m) from a common reference point. Thus, making FMR a viable project for safe travels and efficient access to essential services.

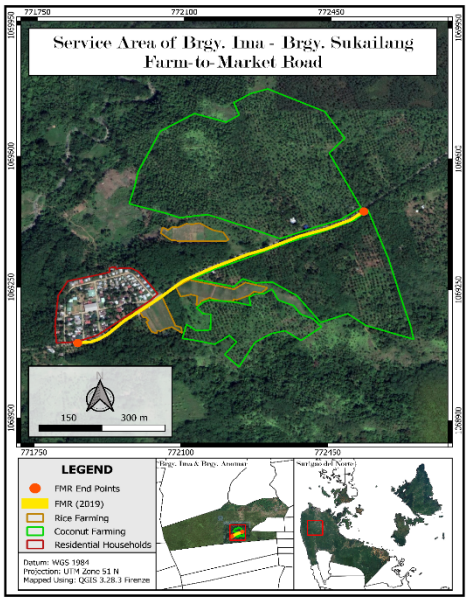

Fig. 5. FMR in Brgy. Ima-Sukailang and relative access to nearest social services.

While the FMR in Brgy. Ima effectively connects residents to nearby facilities like the elementary school, gymnasium, and barangay hall, and access to more specialized services still requires significant travel as displayed in Figure 5. The nearest healthcare facility, located in Surigao City proper, is about 18.3 kilometers away, creating a substantial barrier to immediate medical care. Similarly, key economic and administrative centers such as the Sison Public Market (6.6 km) and Surigao City Public Market (26.3 km) are situated far from the barangay. This spatial separation underscores the critical importance of the FMR as a vital link that reduces isolation by improving connectivity between rural and urban areas. By facilitating smoother and faster transportation, the road not only enhances access to essential health and government services but also supports economic activities by linking farmers and local producers to broader markets. Ultimately, the FMR plays a pivotal role in promoting individual well-being and fostering sustainable rural development.

Spatial analysis shown in Fig. 6 reveals that although the FMR in Sitio Lobo does not directly pass through major social service facilities, it substantially enhances connectivity to nearby essential services. Don Paulino Elementary School and the barangay hall are situated approximately 1.2 km and 1.3 km, respectively, from the road's starting point, it facilitates improved access to basic education and community governance. Moreover, the FMR establishes a strategic link to larger commercial hubs, notably Puregold along the Dapa–General Luna Road (approximately 3.9 km away). This improved access underscores the FMR's role as a catalyst for local economic activity and infrastructure-driven community development.

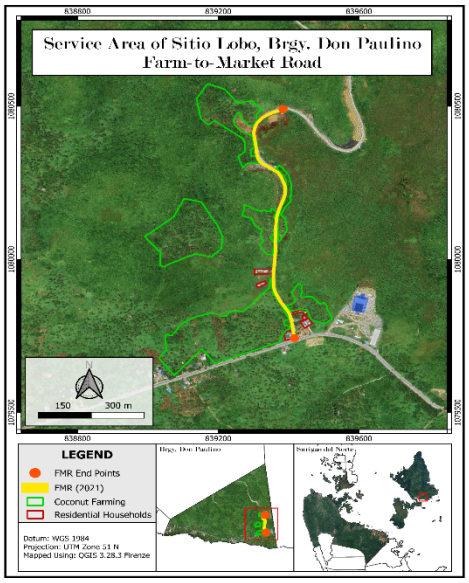

Fig. 6. FMR in Sitio Lobo, Brgy. Don Paulino and its service area.

3.2 Socio-Economic Impact

Farm-to-Market Roads (FMRs) are widely linked to improved rural economic conditions by enhancing market access, reducing transportation costs, and enabling livelihood opportunities. However, their impact varies by location and project scale. In Brgy. Ima Sukailang (medium scale) and Purok 3, Mapawa (small-scale), 100% and 75% of respondents, respectively, reported new employment or business ventures attributed to better accessibility and higher population density, which spurred migration and economic activity. Conversely, in Sitio Lobo, Brgy. Don Paulino (large-scale), only 33.3% noted such gains, as isolation and low population density limited immediate economic growth despite significant infrastructure investment. Rural roads like farm-to-market roads often lead to the development of key infrastructure, such as schools, clinics, and markets, along their routes, creating growth hubs and reshaping service distribution. Improved connectivity also influences rural-urban migration, as easier access to cities encourages movement, alters settlement patterns, and supports suburban expansion [14].

All respondents (100%) believed the FMR increased their household income, with 60% reporting gains below ₱1,000 a month and 40% between ₱1,000–₱5,000. This confirms that rural roads boost income by improving market access, pricing, and reducing transport costs [15]. Post-harvest facilities such as copra dryers and coconut processing equipment, though not located along the FMR, are now more accessible due to improved road connectivity. This has reduced post-harvest losses, enhanced product quality, and eased transport burdens. Traditional carabao transport has largely been replaced by vehicles like trucks, jeeps, and motorcycles, enabling faster and more efficient delivery. Importantly, traders can now collect produce directly from farms, strengthening market linkages and reducing intermediary costs.

Despite the advantages brought by FMRs, persistent economic challenges such as inflation and rising operational costs covering labor, inputs, and transportation continue to hinder smallholders and micro-enterprises in fully benefiting from the improved infrastructure [16]. Additionally, increased commodity prices and intensified market competition may limit access for low-income consumers, potentially exacerbating existing inequalities [17]. These issues highlight the importance of implementing complementary policies and support mechanisms to ensure that infrastructure investments lead to inclusive and sustainable rural economic growth.

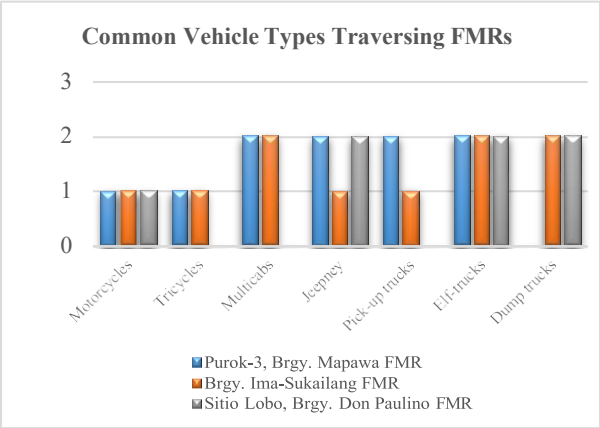

Fig.8. Types of vehicles and their frequency of passage.

The types of vehicles utilizing the farm-to-market roads (FMRs), the observed transport of agricultural produce, and the road obstructions affecting traffic flow across three selected project locations, Brgy. Ima to Sukailang FMR, Purok 3, Brgy. Mapawa FMR, and Sitio Lobo, Brgy. Don Paulino FMR are all presented in Fig.8. Motorcycles, tricycles, multicabs, pick-up trucks, and dump trucks are among the most frequently seen vehicle types on the roads, though these vary amongst the three locations. Notably, all three sites show evidence of the transport of agricultural produce, which confirms the role of these FMRs in facilitating agricultural logistics in the area. All three FMR sites support agricultural transport, confirming their role in local logistics. However, traffic flow is hindered by obstructions, mainly parked vehicles and debris, due to the absence of designated parking areas and road shoulders. This lack of infrastructure forces vehicles to stop along the roadway, reducing space for moving traffic and delaying goods transport. Addressing this design gap is essential to improve FMR efficiency and support rural economic activity [18].

3.4 Data Analysis

In this section, the socioeconomic effects of the three chosen Farm-to-Market Roads (FMRs) in Surigao del Norte are compared. Key differences and similarities across the FMRs in terms of accessibility, community benefits, and economic contributions are highlighted. The comparison aims to identify which areas have benefited most and to draw insights that can guide future infrastructure planning and improvements.

The implementation of FMRs in various barangays across Surigao del Norte has led to marked improvements in several dimensions of community well-being. As shown in Table 1, the overall quality of life significantly improved post-FMR implementation, with 100% of respondents from Sitio Lobo, Brgy. Don Paulino, Brgy. Ima, and Brgy. Mapawa reported that their lives have become “much better” following the completion of the road projects as projected in Table 1. This finding

substantiates the transformative role of rural infrastructure in enhancing day-to-day living standards by improving mobility, economic opportunities, and access to essential services.

In terms of social connectivity, the responses were similarly unanimous, with all participants across the three municipalities indicating a significant improvement in their social connections. This enhanced interaction can be attributed to the easier mobility between households and communities that the FMRs now facilitate, allowing residents to engage more actively in social, civic, and economic activities. This finding aligns with literature emphasizing that improved rural infrastructure not only promotes economic growth but also fortifies social cohesion within and between communities.

Table 1. Comparative Analysis on Social Services Accessibility

Variable	Category	Sitio Lobo, Brgy. Don Paulino FMR (n=3)		Brgy. Ima-Sukailang FMR (n=3)		P-3, Brgy. Mapawa FMR (n=4)	
		F	%	F	%	F	%
Overall Quality of Life After the FMR	Much better	3	100	3	100	4	100
	Slightly better	0	-	0	-	0	-
	No change	0	-	0	-	0	-
	slightly worse	0	-	0	-	0	-
	Significantly worse	0	-	0	-	0	-
Impact on social connections	Significant improvement	3	100	3	100	4	100
	Slight improvement	0	-	0	-	0	-
	No change	0	-	0	-	0	-
	Slight worse	0	-	0	-	0	-
	Significant worse	0	-	0	-	0	-
Easier access to education for children	Yes	3	100	3	100	4	100
	No	0	-	0	-	0	-
	Not applicable	0	-	0	-	0	-
Improved access to public services (e.g., free check-ups, assistance)	Yes	3	100	3	100	4	100
	No	0	-	0	-	0	-
	Not applicable	0	-	0	-	0	-
Safety and security while using the FMR	Very safe	2	66.7	1	33.3	2	50
	Somewhat safe	1	33.3	2	66.7	1	25
	Unsafe	0	-	0	-	1	25

Regarding access to education, all respondents across the three barangays confirmed that the FMR has enabled easier access to educational institutions for children. This is particularly crucial in rural areas, where the lack of reliable roads has historically hindered regular school attendance, especially during the rainy season. Enhanced access contributes to better educational outcomes and is a direct reflection of the long-term developmental potential of the FMR projects. Another critical dimension highlighted by the study is the improvement in access to public services, such as free medical check-ups and government programs. Once again, a full 100% of respondents from Dapa, Sison, and Mapawa acknowledged this improvement. The ease of reaching health centers, barangay halls, and other government facilities underscores the enabling effect of road infrastructure on public service delivery and inclusive governance.

However, the findings on safety and security while using the FMR present a more nuanced picture. While 66.7% of respondents from Dapa rated their FMR as "very safe," only 33.3% of those from Sison shared the same sentiment, with the remaining 66.7% indicating it was only "somewhat safe." In Mapawa, responses were more varied: 50% reported feeling very safe, while 25% felt somewhat safe, and a notable 25% even considered the road "unsafe." These responses are driven by causes from physical vulnerabilities such as the absence of barricades, incomplete or clogged drainage systems, debris from typhoons (e.g., Typhoon Odette), and the overgrowth of vegetation along road shoulders, all of which were recorded during field observations. The data suggests that while the FMRs are beneficial in many socio-economic aspects, further attention must be given to physical safety and infrastructure maintenance to ensure their full utility.

Table 2. Comparative analysis on economic household income

Variable	Category	Sitio Lobo, Brgy. Don Paulino FMR (n=3)		Brgy. Ima-Sukailang FMR (n=3)		P-3, Brgy. Mapawa FMR (n=4)	
		F	%	F	%	F	%
FMR helped increase HH income	Yes	3	100	3	100	4	100
	No	0	-	0	-	0	-
Estimated Additional Income per Month	Less than 1,000 PHP	3	100	2	66.7	1	25
	1,000–5,000 PHP	0	-	1	33.3	3	75
	More than 5,000 PHP	0	-	0	-	0	-
	No change	0	-	0	-	0	-
New Job or Business Opportunities	Yes	0	0.0	3	100	3	75
	No	3	100.0	0	-	1	25
Access to Market for Selling Products	Significant improvement	3	100	3	100	3	75
	Slight improvement	0	-	0	-	1	25
	No change	0	-	0	-	0	-
	Slight worse	0	-	0	-	0	-
	Significant worse	0	-	0	-	0	-
FMR helped in saving money due to reduced costs	Yes	3	100	3	100	4	100
	No	0	-	0	-	0	
Estimated saved money	Less than 1,000 PHP	3	100	3	100	4	100
	1,000–5,000 PHP	0	-	0	-	0	-
	More than 5,000 PHP	0	-	0	-	0	-
	No change	0	-	0	-	0	-
Access to credit loans improved	Yes	3	100	2	66.7	4	100
	No	0	-	1	33.3	0	-

The respondents' perceptions on the economic impact of the farm-to-market road (FMR) on their household income, business opportunities, market access, cost savings, and access to financial services have been presented in Table 2. The data reflect a generally positive outcome, underscoring the importance of rural infrastructure development in improving local livelihoods.

All respondents (100%) perceived that the FMR helped increase their household income. Among them, 60% had an estimated additional monthly income of less than

₱1,000.00, while 40% reported an estimated increase between ₱1,000.00 to ₱5,000.00.

Although the additional income may appear modest in absolute terms, it represents a significant improvement for smallholder farmers in rural settings, where income volatility is high, and margins are typically low. The increase in income can be attributed to reduced transportation losses, improved market access, and lower travel expenses, which allow farmers to retain more of their earnings and potentially reinvest in their farm operations.

In terms of livelihood diversification, 70% of respondents perceived new opportunities for employment or business following the FMR construction. These were particularly notable in Barangay Mapawa, Surigao City, and Barangay Ima, Sison. Respondents from these areas reported an increase in microenterprises such as sari-sari stores and medium-scale piggery operations.

The FMR also had a major effect on market access. Ninety percent of those surveyed said their ability to sell things had significantly improved. Farmers stressed that improved road conditions facilitated quicker and easier access to markets. Travel used to be costly and time-consuming due to bad roads and insufficient transit options. Farmers can now carry goods effectively and on schedule thanks to an increase in the number of vehicles and better road access. They have also been able to investigate new markets and interact with customers more actively as a result.

One other noteworthy advantage of the FMR was cost reductions. Every respondent estimated that they saved less than ₱1,000.00 per month as a result of the upgraded road infrastructure. The farmers claim that the decrease in transportation expenses is the primary cause of these savings. Due to challenging terrain, lengthy journey durations, and the requirement for numerous transit transfers, such as riding from the farm to the highway and then to the market. They had to pay more before the FMR. Since cars can now get to their barangays immediately, there is no longer a need for "double rides," which results in immediate savings and more convenience.

Additionally, 90% of respondents noted improved access to credit and financial services. Better road connectivity has made it easier for microfinance institutions, such as ASA Philippines Foundation (Alalay sa Kaunlaran) and Surigao Economic Development and Microfinance Foundation Incorporated, to reach remote communities. Respondents noted that representatives of lending institutions now visit their areas more frequently to offer small loans and other financial services. With easier travel and increased income, farmers are now better positioned to engage with lending institutions, which may further support agricultural productivity and household investment.

Therefore, FMRs are key in improving rural livelihoods by enhancing access to markets, healthcare, education, and government services, thereby contributing to overall economic growth and social well-being. The results show that FMRs facilitate the efficient transportation of agricultural products, which reduces time and costs associated with market access, boosting income and fostering economic stability in rural communities. It improves access to essential services, enhancing community connectivity and integration.

However, the study also reveals that regardless of the scale of the FMR projects, whether small, medium, or large, the benefits of improved roads were broadly distributed across the three selected FMRs where it was implemented.

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