

ROAD INFRASTRUCTURE AND ROAD TRAFFIC IN RURAL ETHIOPIA: THE CASE OF SOUTH OMO ZONE

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1. Introduction

This is a research report produced in the context of the Ethio-Japan SATREPS-MNGD project, which was launched by four universities in Japan (Kyoto University, University of Miyazaki, Nagoya Institute of Technology, and Ehime University) and three partners in Ethiopia (Jinka University, Addis Ababa Science and Technology University—AASTU, and the Ethiopian Roads Administration—ERA).⁽¹⁾ The social science research component of the project was carried out in Baytsimal and Kaysa Kebeles (the lowest administrative tiers) of the Baka Dawla Ari Woreda (district) in South Omo Zone, which is found in Southern Nations, Nationalities, and People's Region (SNNPR), Ethiopia. The study was conducted in three phases: from July to September 2021, October 2021 to January 2022, and February to June 2022. This particular paper is based on the third phase, which examined the road infrastructure and road traffic, defined as the mobility of people, animals, and vehicles.

The SATREPS-MNGD project in Ethiopia focuses on addressing the problems of rural road construction and maintenance on expansive soil. Depending on the moisture content, expansive soil changes its volume: it swells when it absorbs water during the rainy season and shrinks when it loses moisture during the dry season. While the swelling pressure causes roads to heave, lift, and/or become muddy, the shrinkage pressure causes cracks and produces subsidence on the roads. From this, it is apparent that expansive soil causes severe and regular road disasters and makes road construction and maintenance rather difficult. The conventional solution to road disasters involves mixing cement with the expansive soil or replacing the soil with other weightier soils. However, this approach is expensive, making it an unrealistic solution for developing countries.

Therefore, the SATREPS-MNGD project intends to develop mechanisms to improve the stability of unpaved roads by applying soil additives from local

plants. The goal of the project is to find simple and convenient methods to construct and maintain roads without relying on expensive machinery or materials and to develop an operational model in collaboration with researchers from Japan and Ethiopia. Hence, the overall aim of the project is to contribute to the mission of the Universal Rural Road Access Program (URRAP), which connects all kebeles by all-weather roads. The URRAP requires the participation of local communities in the construction of rural roads.

The first phase of the SATREPS-MNGD research project in Baytsimal and Kaysa Kebeles of Baka Dawla Woreda explored the history and current state of road construction, disasters, and maintenance; the history, frequency, and purpose of road use; and knowledge about and interest of local people in the SATREPS-MNGD project. The second phase of the study focused on road construction and maintenance and the nature and extent of community participation. To understand individual experiences, informants were asked to provide details on specific roads constructed or maintained, the time of participation in the roadwork, the organizers of the work, the number of participants, and whether incentives were involved, as well as on other factors.

The third phase of the study, the focus of this paper, examined the road infrastructure in South Omo Zone and explored road usage based on the results of a road traffic survey. Regarding the review of roads in South Omo Zone, attempts were made to shed light on the roads constructed and maintained by the Ethiopian Universal Rural Road Access Program and the Road Authority of the SNNPR. The review explored the actors who participated in the road projects, the budget allocation and utilization, the completion of projects on schedule, community participation, achievements, and challenges. The road traffic survey, the second issue presented in this paper, was undertaken in two rounds during two seasons: during the agricultural off-season (December 2021 and January 2022) and during the agricultural season (May and June 2022).

The research approach employed two methods of data collection. Data on the road infrastructure in South Omo Zone were collected through a review of official project documents. During the document review, the relevant experts and officers were asked to clarify certain issues that required additional explanation. The road traffic survey involved recording the movement of people, animals, and vehicles on four roads (two unpaved roads and two footpaths) selected for the survey. Data collectors recruited from the local community recorded the traffic movements between 8:00 and 18:00 local time. The main purpose of this paper is to identify the various challenges associated with road development and

the intensity of road use in rural areas.

2. Road Infrastructure in South Omo Zone

2.1 The contexts

Road networks are reported to have expanded worldwide during the first decades of the 21st century (Mouratidis, 2020). According to the International Trade Administration (2022), the Government of Ethiopia has recently been vigorously engaged in new road construction and expansion of the existing road network. Other studies have also reported that Ethiopia has experienced rapid expansion in road infrastructure since 1997 as the result of the Road Sector Development Program (Emmenegger, 2012; Ethiopian Roads Authority, 2011; 2012; Gebre et al., 2022; Terefe, 2012). Despite the remarkable expansion of Ethiopia's road network, the implementation of RSPD has faced multiple challenges that have affected the construction and maintenance of the infrastructure works (Gebre et al., 2022; Takele, 2020).

According to Mouratidis (2020), the main challenges that road authorities and operators worldwide have experienced relate to seven factors, namely: (1) financing new projects, (2) alternative energy resources, especially renewable energy, (3) serviceability, including maintenance of road infrastructure, traffic congestion, and quality of the network, (4) climate change hazards due to increasing greenhouse gas emissions, (5) environmental impacts, (6) safety on roads, streets, and motorways, and (7) the economy and cost effectiveness. The author further noted that the particular challenges and concerns may vary across countries and networks, authorities engaged in road development must deal with most of these issues. The present review of roads in South Omo Zone provides insight into some of these challenges in the Ethiopian context.

In Ethiopia, three government organs are primarily responsible for public-financed road construction and maintenance: the URRAP, the regional road authorities, and the Ethiopian Roads Administration (ERA). In addition to these three, communities are responsible for the construction and maintenance of rural footpaths. The Ethiopian government launched the URRAP as a subprogram of the fourth Road Sector Development Program to connect rural kebeles, thereby addressing road accessibility and connectivity in rural areas.

The URRAP funds from the federal government are channeled through the

regional transport and road development bureaus to the local zone transport and road development departments. Upon the completion of the URRAP roads, the appropriate woreda transport and road development office would be responsible for administration and maintenance. SNNPR's Transport and Road Development Bureau receives funds from the federal government and channels them to the South Omo Zone Transport and Road Development Department, which works in collaboration with the relevant Woreda Transport and Road Development Offices.

Each region has a road authority responsible for the construction and maintenance of roads that connect kebeles and woredas, different woredas, and woredas and zones. Each regional authority is divided into district offices and structures that do not correspond with the regular zonal or woreda structures. For instance, the Road Authority of SNNPR (RA-SNNPR) has the Jinka District Office, which operates in South Omo Zone and the Basketo Special Woreda. At the federal level, the Ethiopian Roads Administration, formerly the Ethiopian Roads Authority, is mandated to construct and maintain road networks that connect different regions as well as regions and zones. The ERA also constructs roads that connect kebeles, kebeles and woredas, and different woredas depending on cost factors and technical capacity requirements.

Against this backdrop, the present review of roads seeks to provide basic information on the different roads in South Omo Zone constructed by URRAP and RA-SNNPR using machinery. Roads that are constructed and maintained by the ERA using heavy machinery and the numerous footpaths constructed and maintained by hand by local communities are not covered in this paper.

2.2 Completed URRAP roads

In South Omo Zone, a total of 15 roads have been completed by the URRAP project in eight of the woredas (Table 1). The total length of the 15 roads is 193.77 km, and the total financial expenditure for these roads was Birr 137,688,869, representing 73.37% of the total budget (Birr 187,661,608) originally earmarked for the 15 projects. Evidently, there were no budget constraints as the construction of all 15 roads required less money than initially budgeted. However, the construction of the roads took much longer than expected. Although the original plan was to construct most roads in four months, the actual project duration ranged between two and five years. The most common reason for the delays was the slow release of funds or cash flow from the regional government. Other reasons include design changes, frequent flooding, and increasing prices of construction materials.

Table 1. Completed URRAP Roads in South Omo Zone by Woreda, Length, and Budget

Woreda	Name of the Road	KM	Budget*		Duration	
			Allocated	Utilized	Start	End
1 North Ari	Shamabulket–Arfaro	10.04	12,429,748	4,390,734	2012	2017
	Ayka Selmi–Zifti	8.46	5,677,534	3,829,314	2019	2021
2 Woba Ari	Gomir–Aydamer	18.84	29,723,603	26,215,588	2012	2017
3 South Ari	Tolta–Chalegod	12.70	11,076,903	9,367,909	2012	2017
	Shishir–Maytol	11.58	8,449,444	7,804,035	2013	2017
	Woset–Arki	12.00	18,713,862	5,907,341	2018	2021
4 Baka Dawla Ari	Alga–Goyd	10.76	12,427,261	8,361,298	2019	2021
5 Maale	Tikiboko–Melasagatsa	19.04	16,632,626	14,172,101	2012	2017
	Koybe–Ajo-Balla	24.04	22,054,055	16,973,224	2013	2018
6 Bena-Tsemay	Main road–Goldia	11.00	8,361,091	7,379,673	2012	2017
	Luka Asphalt–Aron	15.00	15,413,284	12,063,194	2013	2018
	Alduba–Gurdo	7.20	1,704,550	1,705,359	2019	2020
7 Hamer	Ere Kaysa–Ere Umbule	10.74	8,604,321	6,953,897	2012	2017
	Simbale–Olgen	10.30	4,896,528	3,262,043	2020	2022
8 Dassanech	-	-	-	-	-	-
9 Nyangatom	-	-	-	-	-	-
10 Salamago	Main road–Garfa	12.07	11,496,798	9,303,159	2014	2017
Total		15 roads	193.77	187,661,608	137,688,869	

(Source: Adapted from South Omo Zone Transport & Road Development Department, 2022)

* The average exchange rate increased from 1USD = 17.7874 Birr in 2012 to 1USD = 23.9673 Birr in 2017.

2.2.1 Shamabulket–Arfaro Road (North Ari Woreda)

The Shamabulket–Arfaro, 10.04 km in length, was constructed with a budget of Birr 4,390,734 from the Transport and Road Development Bureau of SNNPR. An original allocation of Birr 12,429,748 was designated for the road construction. The road construction project was launched in 2012 and completed in 2017. The South Omo Zone’s Transport and Road Development Department was responsible for the supervision of the road construction. Although the road was originally scheduled to be finished in four months, completion of the project took five years. The delay was due to the failure of the first contractor to meet the deadline because of an alleged ongoing landslide. Once completed, the North Ari Woreda Road and Transport Office assumed responsibility for administering and maintaining the road.

In 2014, Siket General Road Construction Association, a private firm with four personnel (a manager, a material engineer, a surveyor, and a foreman), signed an agreement to take over and complete the construction. The road was constructed

according to the original design and URRAP standards: Design Class 2 (DC-2), 6 m wide and 15 cm thick of the sub-base material. The North Ari Woreda Road and Transport Office took responsibility for mobilizing the community to cover the 25% share of the work that corresponded to the community, including clearing grasses, de-stumping, and earthwork. However, the community did not participate as expected due to an awareness gap.

The construction of this road is reported to have economic and social advantages. The availability of motorbikes and vehicles made it much easier to transport people and goods. Farmers can access markets to sell agricultural products, and medical centers have become accessible for people to receive health services. Additionally, the road facilitated the social interaction between people and communities.

2.2.2 Ayka Selmi–Zifti Road (North Ari Woreda)

The Ayka Selmi–Zifti Road, 8.46 km in length, was constructed between September 2019 and September 2021. A total of Birr 3,829,314 was utilized for the construction of the road compared with the initial budget allocation of Birr 5,677,534. SNNPR’s Transport and Road Development Bureau allocated funds for the construction of the road, and the South Omo Zone Transport and Road Development Department in collaboration with the North Ari Woreda Transport and Road Development Department Office supervised the construction of the road. This office is also responsible for the administration and maintenance to sustain the widely needed road maintenance.

The Siket Road Construction Association, a private contractor, built the Ayka Selmi–Zifti Road after signing a contract agreement. During the construction work, the contractor had four personnel assigned to the project, including the manager. The construction of the road was completed according to the standards of the URRAP road (i.e., DC-2, 6 m wide, and 15 cm thick of the sub-base material). The local community participated in clearing bushes, although data are lacking on whether the community fulfilled its 25% contribution.

The Ayka Semi and Zifti areas have a great potential for producing crops (grain and cash crops) and raising small ruminants, especially sheep. Therefore, the road has enabled farmers to transport their agricultural products to the woreda center market, reducing transportation costs for agricultural inputs.

2.2.3 Gomir–Aydamer Road (Woba Ari Woreda)

The construction of the Gomir–Aydamer Road, 18.84 km in length, was launched in 2012 and completed in 2017. A total of Birr 26,215,588 was spent on

the construction of this road, compared with the SNNPR's Transport and Road Development Bureau original budget of Birr 29,723,603. Although the road was scheduled to be completed in four months beginning in September 2012, there was a long delay mainly due to frequent landslides on the steep hills. South Omo Zone's Transport and Road Development Department was responsible for overseeing the implementation of the road project, and the Woba Ari Woreda Transport and Road Development Office took over the administration and maintenance of the road upon completion.

The Arsoniya General Road Construction Association, a private firm, signed the contract to construct this road, and the firm had four key personnel (material engineer, surveyor, foreman and manager) dedicated to the project. Clearing, earthwork, cutting, ditch work, and culvert construction were to be shared by the community (responsible for 25%) and the contractor. However, the community made only limited contributions in terms of clearing grass, destumping, and earthwork due to limited awareness of its responsibilities. The road was constructed according to the URRAP standards previously indicated.

The benefits of the road are attributed to the use of vehicles and motorbikes that have enabled people to access markets for agricultural products and medical centers for health services, in addition to enhancing community interactions. The road connects many kebeles widely known for their production of coffee, cardamom, and grain. Beyond the villagers, urban residents and the country at large are expected to benefit by promoting the production of cash and food crops.

2.2.4 Tolta–Chalegod Road (South Ari Woreda)

The Tolta–Chalegod Road, 12.7 km in length, was launched in 2012 and completed in 2017 with a total budget of Birr 9,367,909. The Transport and Road Development Bureau of SNNPR initially allocated Birr 11,076,903 for the construction of this road. It appears that there was also a delay in its construction, although the experts were not in a position to explain the delay. South Omo Zone Transport and Road Development Department in collaboration with the South Ari Woreda Transport and Road Development Office oversaw the road construction project.

A private contractor, the Arsoniya General Road Construction Association, signed a binding contract agreement and implemented the construction of the road. The association dedicated four individuals to the construction project, including the manager. The construction of the road was completed according to the URRAP standards as specified in the bill of quantity, including ditch work, camber, 6 m wide, and 15 cm of sub-base material spreading. The level of the

Tolta–Chalegod Road is described as DC-2 with a width of 6 m and thickness of 15 cm. The community and the woreda shouldered the responsibility of clearing grasses and bushes. Although the labor contribution of the community was expected to cover 25% of the construction, the required level of participation was not reached due to a lack of awareness.

The Chalegod Kebele and the neighboring areas are known for the production of maize and coffee. Hence, the road significantly enhanced access to agricultural products to Tolta and other markets (e.g., Metser, Gazer, and Jinka). Moreover, the road now allows people to easily reach medical centers.

2.2.5 Shishir–Maytol Road (South Ari Woreda)

The Shishir–Maytol Road, 11.58 km in length, was constructed between 2013 and 2017. The cost of completing the road was Birr 7,804,035.60 compared with an initial allocation by the Transport and Road Development of the Bureau of SNNPR of Birr 8,449,444.29. Information is lacking on the causes of the failure to complete the road construction in four months. The South Omo Zone Transport and Road Development Department in collaboration with the South Ari Woreda Transport and Road Development Office oversaw road construction. The office continues to be responsible for the road’s administration and maintenance.

The Arisoniya General Road Construction Association, a private contractor, had four personnel, including the manager dedicated to constructing the road after signing a binding contract agreement. The local community and the woreda covered 25% of the work and the contractor completed 75% of the tasks, in strict compliance with the common standards of the URRAP.

The road has paramount economic and social benefits. The Shihir–Maytol Road connects different kebeles that produce staple and cash crops. Hence, the road created access to Metser, Gazer, and Jinka towns to sell agricultural products. It may have increased farm gate prices of agricultural products for the farmers. In addition to improving the social interaction of people in the areas, the road also enhanced access to health offices and hospitals as well as educational services in these towns.

2.2.6 Woset–Arki Road (South Ari Woreda)

The Woset–Arki Road, 12 km in length, connects three kebeles (Woset, Billi, and Arki) and is divided into two parts: the URRAP part and the RA-SNNPR part. The URRAP part, 10.5 km in length, was started in 2018 and completed in 2021. The total budget allocated for this road was Birr 18,713,862, and at the time of writing this report (June 2022), Birr 5,907,341 had been utilized. The remaining

1.5 km has been transferred to the Road Authority SNNPR (RA-SNNPR) due to the difficult terrain and the need for heavy machinery. This is one of the situations in which the URRAP and RA-SNNPR have joined hands in the construction of one road in two phases. Hence, the first phase is completed, and the second phase, the construction of the Billi–Arki Road has not yet started. The zonal Transport and Road Development Department and the Woreda Transport and Road Development Office have been supervising the construction of the road, and the latter is also responsible for maintenance activities.

The Hamer Nasa Road Construction Association, which had four staff members, including the manager, constructed the 10.5 km long road based on the contract agreement that specifies the URRAP standards listed elsewhere in this report. After further deals and explanations, the remaining work is to be undertaken by RA-SNNPR. The local communities participated in clearing bushes during road construction. However, their contributions were not converted to monetary values to express whether they met the 25% share of the community contribution.

The construction of the road in these kebeles is expected to have significant economic, social, and administrative benefits. Economically, the Shengama area (Woset, Billi, and Arki) is known for its production of wheat, barley, enset, and vegetables. The road would create easy access to the markets in Gazer and Jinka. Because of the mountainous terrain in the region, these kebeles lacked adequate access to services such as health, education, agricultural inputs, water, and electricity, among others. The road is expected to solve this problem.

2.2.7 Alga–Goyd Road (Baka Dawla Ari Woreda)

The Alga–Goyd Road, 10.76 km in length, was launched in 2019 and completed in 2021. Of the total budget (Birr 12,427,261) allocated for the construction of this road, Birr 8,361,298 has been spent. While the SNNPR’s Transport and Road Development Bureau provided the budget, the South Omo Zone Transport and Road Development Department and the Baka Dawla Ari Woreda Transport and Road Development Office were entrusted with supervision of the project. The same woreda office has assumed responsibility for the ongoing administration and maintenance to sustain the road service.

The Soliyana Road Construction Association, a private contractor with four staff members, constructed the road after signing a contract agreement that included detailed activity plans and specifications of quality standards, all of which were met. Although the construction of the road was completed according to the agreement, the road has not been given services at the required level due

to a lack of structural work, which was omitted from the initial design. Thus, a design amendment was made and modification orders were allowed for the contractor to undertake the supplementary structural work. Nearly 9,820,168.71 Birr were allocated for this additional structural work, of which Birr 5,882,058.37 was spent. During the construction, the local community participated in clearing the bush. However, this participation was not measured in terms of its monetary value.

The road has vital economic and social benefits. The kebeles in this area are known for the production of food staples and cash crops that are supplied to Jinka town as well as to the central market in Addis Ababa. Farmers no longer have to walk long distances carrying heavy loads of farm products on their backs, shoulders, or heads. Socially, the road has enhanced access to medical and educational centers in Jinka town, not to mention the community interaction it has fostered.

2.2.8 Tikiboko–Melasagatsa Road (Maale Woreda)

The Tikiboko–Melasagatsa Road, 19.04 km in length, was planned and launched in September 2012 and was scheduled to be completed in four months. However, it was not completed until June 2017, six years later. However, information is lacking on the reason for the delay. The total cost of the road construction was Birr 14,172,101. This amount was less than what the SNNPR’s Transport and Road Development Bureau had initially allocated—Birr 16,632,626. The South Omo Zone Road and Transport office oversaw the implementation of the Tikiboko–Melasagatsa road construction. After the completion of the construction work, the Maale Woreda Transport and Road Development Office took over the responsibility of administering and maintaining the road.

The Hama General Road Construction Association, a private company, was responsible for the actual construction of the road in accordance with the URRAP standards and specifications. The contractor, which signed a binding contract agreement, had four personnel assigned to the task: material engineer, surveyor, foreman, and manager. The SNNPR State, the South Omo Zone Transport and Road Development Department, and the Maale Woreda Transport and Road Development Office were responsible for following up on the implementation of the road. The Transport and Road Development Office was also responsible for the mobilization of the community to participate in the road construction. However, the community contributed less than expected due to an awareness gap regarding their support.

The construction of this road has resulted in economic and social benefits. The local community was able to market its agricultural products and it allowed them to have easy access to the medical center in Lemo Gento, the capital of Maale Woreda. The opening of this road also facilitated the flow of motorbikes and vehicles that enhanced the transportation of people and goods. Socially, the road enhanced the interactions with people residing in distant locations.

2.2.9 Koybe–Ajo-Balla Road (Maale Woreda)

The Koybe–Ajo-Balla Road, 24.04 km in length, was launched in 2013 and completed in 2018 at a total cost of 16,973,224. SNNPR's Transport and Road Development Bureau initially allocated Birr 22,054,055 for the construction of this road. The South Omo Zone Transport and Road Development Department and Maale Woreda Transport and Road Development Office were responsible for providing technical support and supervision during construction. Upon completion of the road, the Transport and Road Development Office assumed responsibility for maintenance activities to sustain the road's services.

The construction work was implemented by a private contractor, the Hamer Nasa General Road Construction Association, which had signed the contract agreement and constructed the road in accordance with the standards of the URRAP as established in the contract. During the construction, the community participated in clearing, grubbing, and roadbed preparation. Although it was expected that community participation would be approximately 25%, their actual involvement was below expectations due to a lack of awareness.

The Maale Woreda is known for livestock and maize production. Hence, the road enabled the residents of Maale along the road to transport animals, butter, and maize to the market. They are also reported to be using the road to take their animals to grazing areas and water points.

2.2.10 Main Road–Goldia Road (Bena-Tsemay Woreda)

The Goldia Road that runs from the main asphalt road between Kako and Jinka towns is 11 km long. It was constructed between 2012 and 2017 with a total expenditure of Birr 7,379,673 from the Transport and Road Development of SNNPR, which had originally earmarked Birr 8,361,091 for its construction. Although the original plan was that the construction of this road would take place in four months, it took a total of six years to complete the project; the reason for the delay has not yet been evaluated. The South Omo Zone Transport and Road Development Department supervised the construction of the road. The Bena-Tsemay Woreda Transport and Road Development Office is charged with the

responsibility of administration and maintenance.

Tsinat General Road Construction Association, a private firm, was responsible for the actual construction of the road. The project plan included clearing, earthwork, cutting, ditch work, and culvert construction. Of the listed tasks, clearing grasses, stumping roots, and earthwork (25% of the project work) were to be implemented by the community and the rest by the contractor. The contractor reportedly accomplished its duties per the terms of the contract agreement and the URRAP standards. The Bena-Tsemay Woreda Transport and Road Development Office mobilized the community to make labor contributions, although the actual participation was less than expected due to a lack of awareness.

The Goldia Road provides market access to the residents of the area, who were able to transport agricultural products, especially maize and sorghum, to Kako, Kaysa, and Jinka markets. It is equally important to note that the availability of motorbikes facilitated the movement of people and social interactions between people increased because of the transportation.

2.2.11 Luka Asphalt–Aron Road (Bena-Tsemay Woreda)

The Luka Asphalt–Aron Road, 15 km in length, was constructed between 2013 and 2018 with a total budget of Birr 12,063,194.57. Initially, the regional government's budget allocation was Birr 15,413,284. It appears that there was a delay in completing the construction of the road, although information is lacking on the possible reason(s) for the delay. This road connects two kebeles: Luka (located along the Woito–Keyafer asphalt road) and Aron (located far from the road). The South Omo Zone Transport and Road Development Department supervised the construction of the road in collaboration with the Bena-Tsemay Woreda Transport and Road Development Office. Upon completion of the road construction, the latter assumed responsibility for administration and maintenance to sustain the service of the road for the community.

The contractor that signed the contract agreement to construct the road was Roha General Road Construction Association, which had four staff members, including the manager. The road was constructed according to the URRAP standards specified in the contract. During construction, the local community participated in clearing bushes. However, the labor contribution of the local people was estimated and converted into monetary values to verify if the 25% requirement was met. The road connected the people to Aron Kebele, agropastoralists residing in remote villages, to market and other services in Luka, Woito, and Keyafer.

2.2.12 Alduba–Gurdo Road (Bena-Tsemay Woreda)

The Aluduba–Gurdo Road, 7.2 km in length, was constructed between 2019 and 2020 at a total cost of 1,704,550. This figure is close to the original budget allocated by the Transport and Road Development Bureau of SNNPR of Birr 1,705,359. Due to the lack of structural design, the structural work was not performed. The South Omo Zone Transport and Road Development Department in collaboration with the Bena-Tsemay Woreda Transport and Road Development Office supervised the project and provided technical support. The office is also charged with administering and maintaining the road.

The private firm Tsinat General Road Construction Association, which has four personnel, including the manager, performed the actual construction work. The association signed a contract agreement that contains details about planned activities, standards, and timetable. However, data are lacking about whether the construction of the road was completed according to schedule. During construction, the community reportedly participated in clearing bushes. However, data are lacking on the monetary values of community participation.

The Aluduba–Gurdo Road connects agro-pastoral communities to Alduba town and other towns (Keyafer, Dimeka, and Turmi) in the area. The communities in the area produce food crops such as sorghum and maize and raise cattle and goats in large numbers. Therefore, the road significantly enhances access to markets. The residents are reported to be using the road to move their animals to grazing areas and water points. Moreover, the people use the road for fairly easy access to medical centers and other services in urban areas.

2.2.13 Ere Kaysa–Ere Umbule Road (Hamer Woreda)

The Ere Kaysa–Ere Umbule Road, 10.74 km long, was constructed between November 2012 and November 2017. The cost of the construction of the road was Birr 6,953,897, less than the initial budget (Birr 8,604,321) allocated by the SNNPR's Transport and Road Development Bureau. The South Omo Zone Transport and Road Development Department in collaboration with the Hamer Woreda Transport and Road Development Office provided technical support and supervised the project. Since the road construction project was completed, the office has been responsible for the administration and maintenance activities to sustain the road's service.

The BDS General Road Construction Association, a private contractor with a manager and three more staff members, constructed the Ere Kaysa–Ere Umbule Road. It was built in accordance with the terms of the contract agreement, which included the URRAP standards, namely, DC-2, 6 m wide, and 15 cm of sub-base

material. During the construction, the community participated in clearing and grubbing. Data are lacking on the extent of community participation in terms of meeting the 25% share of the project cost.

The Hamer people are agro-pastoralists. Therefore, the road enabled the residents of the two kebeles to move their livestock to grazing areas, water points, and the market. It also facilitated interaction between the people of the Ere area.

2.2.14 Simbale–Olgen Road (Hamer Woreda)

The Simbale–Olgen Road, 10.3 km in length, was started in 2020 and was completed in May 2022. The Transport and Road Development Bureau of SNNPR allocated Birr 4,896,528 for this road, and the actual cost of the road construction was Birr 3,262,043. This road, as the name signifies, connects Simbale and Olgen Kebeles in Hamer. The South Omo Zone Transport and Road Development Department did technical support and supervision in collaboration with the Hamer Woreda Transport and Road Development Office. The office has responsibility for maintenance activities to ensure road sustainability.

The Hamer Nasa Road Construction Association, a private firm with four experts, constructed the road after signing a contract agreement. The contract includes requirements, contractor expectations related to the design, standards, timetable, and activity details. For example, the level of the road is described as DC-2 with a 6 m width and 15 cm thickness of sub-base material. The Simbale–Olgen Road connected agro-pastoral communities in the two kebeles, significantly improving people’s access to market, health services, and social interactions.

2.2.15 Main Road–Garfa Road (Salamago Woreda)

The 12.065 km Garfa Road that runs from the main road connecting Jinka town and Hana town (the capital of Salamago Woreda) was constructed between September 2014 and June 2017. Although the construction of the road was scheduled to take four months, it ended up taking four years to construct. The cost of the construction was Birr 9,303,159, which was less than the original budgeted amount (Birr 11,496,798) by SNNPR’s Bureau of Transport and Road Development Department. Information and data are lacking on the reasons for the four-year delay. The South Omo Zone’s Transport and Road Development Department oversaw the implementation of the Garfa Road construction, and the Transport and Road Development Office of Salamago Woreda is charged with its administration and maintenance.

The Soliyana General Road Construction Association, a private firm with four staff members (manager, material engineer, surveyor, and foreman), constructed

the road after signing a contract agreement. The URRAP standards (namely, DC-2, 6 m wide, and 15 cm thick) specified in the contract were strictly followed. Clearing, earthwork, cutting, ditch work, and culvert construction were among the planned activities. Of these, grass clearing, stump removal, and earthwork (estimated to cover 25% of the total project) were to be performed by the community, and Salamago Woreda was responsible for mobilizing the community.

The Garfa area is inhabited by the ethnic Dime agriculturalists. The benefits of the road to the Dime people are represented in relation to improved access to markets for agricultural products and to medical facilities for health services, thanks to the relative availability of motorbikes and vehicles. The social interaction of the communities in the area has also reportedly improved because of the construction of the road.

2.3 URAAP roads under construction

During the research period, seven URRAP roads of a total length of 79.48 km were constructed in six woredas. The total budget earmarked for the seven roads is Birr 147,327,663, of which Birr 29,307,818 has been executed. Although four roads were launched in 2017 and 2018, they have not been completed as planned due to reasons such as the delayed release of funds from the region, design changes for different reasons, and the unexpected rise in the price of construction materials. The ongoing URRAP roads in South Omo Zone are listed in Table 2, and some details on each road are provided in the discussions that follow.

2.3.1 Arfaro–Lelo Road (North Ari Woreda)

The Arfaro–Lelo Road is 8.23 km long, and 67% of its construction has been completed. The total allocated budget for the project was Birr 24,723,080, of which Birr 9,988,532 has been used. Launched in September 2017, the Arfaro–Lelo Road remains under construction. The continuous increase in prices for structural works has been a challenge. The project budget was allocated by SNNPR's state Transport and Road Development Bureau, and the South Omo Zone Transport and Road Development Department oversees the implementation of the construction. The North Ari Woreda Transport and Road Development Office have four experts responsible for the supervision and administration.

The Soliana General Road Construction Association, a private firm, is responsible for the actual construction work. The association, which has four experts, signed a contract to build the road according to the terms specified. These include, among others, earthwork, cutting, ditch work, culvert construction, and

Table 2. Ongoing URRAP Roads in South Omo Zone by Woreda, Length, Budget, and Year

Woreda	Name of the Road	KM	Budget*		Launch Year
			Allocated	Utilized	
1 North Ari	Arfaro–Lelo	8.23	24,723,080	9,988,532	2017
2 Woba Ari	-	-	-	-	-
3 South Ari	Senselet–Pelpa	9.20	7,590,763	1,222,513	2017
4 Baka Dawla Ari	Arksha–Baytsimal	11.14	21,738,246	2,301,928	2018
5 Maale	Boshkoro–Gento	5.70	5,888,644	2,312,117	2017
	Eronius–Gongode	7.93	47,588,600	2,020,582	2018
6 Bena-Tsemay	Luka Asphalt–Ansonda	26.83	30,589,323	4,590,044	2018
7 Hamer	-	-	-	-	-
8 Dassanech	-	-	-	-	-
9 Nyangatom	-	-	-	-	-
10 Salamago	Main road–Tsitsma Erqa	10.45	9,209,007	6,872,102	2017
Total		7 roads	79.48	147,327,663	29,307,818

(Source: Adapted from South Omo Zone Transport & Road Development Department, 2022)

* The average exchange rates for 2017 and 2018 were 1USD = 23.9673 Birr and 1USD = 27.6677 Birr respectively.

maintaining the URRAP (namely, DC-2, which is 6 m wide and 15 cm thick). A total of 50% of the cost of construction is to be borne by the community⁽²⁾ and the North Ari Woreda Transport and Road Development Office is responsible for organizing the community participation.

Regarding the use of the road, the local people are expected to be able to access markets for their agricultural products and medical centers for health services. The road is also expected to make social interaction between the Arfaro and other communities much easier than before. The opening of this road has already facilitated motorbike transportations.

2.3.2 Senselet–Pelpa Road (South Ari Woreda)

The Senselet–Pelpa Road, 9.2 km in length, was initiated in September 2017 and is currently still under construction. The total budget allocated by SNNPR's Transport and Road Development Bureau for the project was Birr 7,590,763, of which Birr 1,222,513 has been executed. In addition to the regional bureau, the South Omo Zone Transport and Road Development Department and South Ari Woreda Transport and Road Development Office are responsible for overseeing the implementation of the construction of the Senselet–Pelpa Road.

The Arsoniya General Road Construction Association, a private firm with four employees, initially signed a contract agreement and completed the work on the

ditch, camber, and the pipe and ford structure, as agreed. However, the contract was terminated because the Association disappeared and failed to deliver the rest of the construction tasks due to a lack of capacity. The community is responsible for covering 50% of the construction cost through labor contribution, and the South Ari Woreda Transport and Road Development Office is responsible for mobilizing the community.

This road, which departs at Senselet from the Gazer–Metser Road and connects Dordora and Pelpa Kebeles, which are known for the production of highland crops (barley, wheat, beans, peas) and raising large numbers of sheep. Dordora has many tourist attractions, such as caves, a natural bridge, and beautiful topography. Therefore, the benefit of this road is explained in terms of enhancing access to markets and health centers, tourist attractions, and community interaction.

2.3.3 Arksha–Baytsimal Road (Baka Dawla Ari Woreda)

The Arksha–Baytsimal Road, 11.14 km in length, was launched in September 2018 and is still under construction. Of the total allocated budget for the project (Birr 21,738,246), Birr 2,301,928 has been spent at the time of the research (June 2022). Thus far, ditch work, camber, and 7 km fill work have been completed, reportedly representing 39% of the overall construction tasks. As is the case with the URRAP roads, the regional, zonal and woreda-level transport and road development actors have been playing their respective roles. Before the inclusion of parts of Baytsimal Kebele (namely, the Gomsha area) into Jinka town, the Arksha–Kaysa Road used to be administered by the then South Ari Woreda. Now, part of the road located within Jinka town has been reassigned from URAAP.

The Siket General Road Construction Association, a private firm that has four staff members, signed a contract assigning responsibility for the actual construction of the road. The road is being built according to the detailed list of activities and specifications in the contract. Clearing grease and removing stamps were carried out by the community, fulfilling its 50% share of the construction cost. However, concrete data are lacking on the estimates of the monetary value of the community contributions.

The road is extremely important for the people of Baytsimal to travel to Jinka town to buy and sell goods and services in the market. Baytsimal is known for the production of grain, especially maize, raising animals, and keeping honey bees. The clinics, hospital, high schools, university, and other facilities and services located in Jinka town can now be easily accessed by the Baytsimal people. The interaction between the Baytsimal and Arksha communities has increased since the construction of this road.

2.3.4 Boshkoro–Gento Road (Maale Woreda)

The Boshkoro–Gento Road, 5.7 km in length, was launched in September 2017 and was expected to be completed by December 2017. The total budget allocated by SNNPR’s Transport and Road Development Department to the project was Birr 5,888,644 and, thus far, Birr 2,312,117 has been spent, and 97% of the construction has been completed. The delay in the construction of the road is explained by delays in the cash flow from the regional government and the increases in the cost of construction materials for structural works. There is another complication worth noting: of the total 5.7 km, 4.7 km of the URRAP design reportedly overlaps with the RA-SNNPR design.

The private contractor, the Roha General Road Construction Association, with four personnel, signed a contract agreement to construct 4.7 km, which was to be constructed by RA-SNNPR. Roha agreed to undertake such activities as clearing, cutting, earthwork, ditch work, and culvert construction, and the road grade is DC-2, 6 m wide and 15 cm thick. Worried about loss and bankruptcy, the contractor is reported to have lost interest in completing the remaining work until the confusion is cleared up. The Maale Woreda Transport and Road Development Office is responsible for the mobilization of the community to cover 50% of the construction cost through labor contributions.

The Boshkoro–Gento Road connects, Lemo Gento, the capital of Maale, to Jinka. The opening of this road has facilitated motorbike and car transportation. The road provides access to markets for agricultural products (grain, animals, and animal products). Furthermore, communities located along the road have better access to medical centers and other neighboring communities.

2.3.5 Eronius–Gongode Road (Maale Woreda)

The Eronius–Gongode Road, 7.93 km in length, was launched in September 2018 and is still under construction. With soil fills, ditch and camber works completed, it is estimated that 67% of the construction work has been completed. The total allocated budget for the project was Birr 47,588,600, of which Birr 2,020,582 has been executed. The delay is caused by a major challenge that led to a design change and the rising cost of materials for the structural works. The original design was developed in such a way that the road passes through a high flood-prone area. The Maale Woreda Transport and Road Development Office requested a design change to protect the road from the floods. The stakeholders responsible for transport and road development at the regional, zonal, and woreda levels have been playing their respective individual and joint roles.

The BDS General Road Construction Association, a private firm with four

staff members, started the actual construction after signing a contract agreement that specified the activity details, timetable, and standards. The contractor has been accomplishing its tasks according to the terms of the agreement. The Maale Woreda Transport and Road Development Office mobilized the community to shoulder its 50% share requirement.

This road connects people residing in remote locations, and is expected to create new access to markets, health services, and other neighboring communities. The Maale is generally known for the production of maize and pumpkin seeds, raising cattle and goats, and the availability of butter. The supply of these products from remote locations may be expected to lower the corresponding price in towns for these products.

2.3.6 Luka Asphalt–Ansonda Road (Bena-Tsemay Woreda)

The Luka–Ansonda Road, 26.83 km in length, was launched in September 2018 and remains under construction. The total budget allocated by SNNPR’s Transport and Road Development Bureau for the project was Birr 30,589,323, of which Birr 4,590,044 has been spent by June 2022. With 10 km soil fills finished and the full ditch and camber works completed, the overall construction is reported to have reached 23%. Three explanations are given for the construction delays of the Luka Asphalt–Ansonda Road: a late response to requests for cash transfers, flooding, and the continuous increment of the cost of construction materials. The relevant regional, zonal, and woreda-level government entities have been fulfilling their roles.

The Roha General Road Construction Association, a private organization that has a manager and three experts, has been responsible for the actual implementation of the road. The association signed a contract agreement to carry out the construction tasks according to the design and detailed work specifications. Due to frequent flooding in the area, the original design of the road was changed to reduce flood exposure. The Bena-Tsemay Woreda mobilized the community to participate in grass and stump clearing.

The Luka Asphalt–Ansonda Road has multiple advantages: it provides access to markets to buy and sell goods, provides access to medical facilities for health services, and facilitates enhanced community interactions. The Luka and Ansonda areas are known for raising livestock and production of crops such as sorghum. This road facilitated the introduction of motorbike transportation in the remote villages.

2.3.7 Main Road–Tsitsma Erqa Road (Salamago Woreda)

The main road–Tsitsma Erqa Road, 10.45 km in length, was launched in September 2017 and the task was more or less completed in September 2021, except for one pipe structure construction, which was still underway at the time of conducting this research. The total budget allocated for the project was Birr 9,209,007, of which Birr 6,872,102 has been spent. Although the plan was to construct the road in four months, it took five years. The delay was due to the delayed response of the relevant regional bureau to cash requests by the contractor. As with the other URRAP roads, the relevant transport and road development organs at different government levels fulfilled their roles.

The Hama General Road Construction Association, a private firm, constructed the road after signing a contract agreement with the Salamago Woreda Transport and Road Development Office in representation of the government. A manager and four employees worked for Hama. The contract agreement specified the road standards (DC-2, 6 m wide, and 15 cm thick) and activity details (e.g., clearing, earthwork, cutting, and ditch and pipeline construction). The surrounding community participated in the project by clearing grasses and trees, although the monetary value of the labor contribution has not been calculated.

The Tsitsma Erqa area is known for its production of maize and sesame by the Konso resettlers. The surrounding agro-pastoral communities of the Bodi people raise large numbers of cattle. Therefore, the road provides easy access to markets in Hanna town and further away. It should be noted that prior to the construction of this road, people had to walk long distances for hours carrying heavy loads of goods on their backs. The opening of this road has also provided an opportunity for easy social interaction among people and communities.

2.4 RA-SNNPR roads in South Omo Zone

As stated above, the Road Authority of SNNPR (RA-SNNPR), through its district offices, is responsible for the construction and maintenance of certain roads in the region. The authority, which has 64 staff members (experts and non-experts) at the head office and in the four district offices, works in collaboration with the ERA. The ERA, as a federal organization, supports RA-SNNPR in procurement and maintenance of machinery through a special Road Fund. Upon completion of the roads, RA-SNNPR is designated as responsible for maintenance.

The Jinka District Office of RA-SNNPR is mandated with the construction and maintenance of roads in South Omo Zone and the neighboring Basketo

Special Woreda, answerable to SNNPR. The responsibilities of the regional authority include: initiating projects; allocating budgets; assigning machinery and manpower; and supervising, monitoring, and evaluating the implementation of road projects. The level of the roads constructed is reported to be DC-3, 6 m wide and 25 cm thick sub-base material. As in the case of other government agencies, the fiscal year starts in July and ends in June.

The RA-SNNPR often initiates new road construction projects from scratch. However, roads that have been started or completed by the URRAP can be transferred to RA-SNNPR. Likewise, roads that have been started or completed by RA-SNNPR can be transferred to ERA. For example, the number of URRAP roads decreased from 28 in 2021 to 22 in 2022, and the number of RA-SNNPR roads decreased from 14 in 2021 to 10 in 2022. Therefore, data on the number of roads constructed and maintained by the URRAP, RA-SNNPR, and ERA change frequently due to the inter-agency transfer of roads.

Leaders and experts of the Roads Authority Office conduct monitoring and evaluation of road construction and maintenance works quarterly at the district level using a checklist. In addition to observing project performance, monitoring allows responding to challenges such as requests for machinery, vehicles, manpower, and transportation services.

In June 2022, the Jinka District Office of the RA-SNNPR was reported to have 10 road projects in South Omo Zone, excluding its projects in the neighboring Basketo Special Woreda. Most of these roads were transferred from URRAP. Since the design standards of URAAP and RA-SNNPR are different, the activities performed on transferred roads are not seen as pure maintenance or as new construction. As stated above, construction firms and communities are involved in the construction of URAAP roads. In contrast, RA-SNNPR constructs roads by mobilizing its own machinery and by deploying its own workers. Unlike projects of the RA-SNNPR, communities are not expected to provide unpaid labor.

The Jinka District Office of the RA-SNNPR plans to maintain the existing roads and/or construct new ones annually and requests the required budget for the required tasks from the regional road authority. In 2021, for example, there was a plan to construct and maintain 10 roads with a total length of 97 km and a required budget of Birr 81,864,783 (Table 3). However, RA-SNNPR only assigned Birr 14,387,202—just 17.6% of the total amount needed for the planned tasks. A look at the cash flow for the individual roads reveals that all 10 road projects received far less money than required, in amounts ranging from 9.6% to 44.4%. This mismatch between the budget requested for the task in a given year

Table 3. RA-SNNPR in South Omo Zone by Woreda, Year, Length, and Budget 2021–2022⁽¹⁾

No	Road Name	Woreda	Launch Year	Length (KM)	Planned for 2021–2022 (KM)	Assigned Budget	Required Budget*	Percent of Assigned	
Existing road maintenance projects									
1	Jinka–Lemo Gento	Male	2013/14	21.7	8	1,272,470	7,257,472	17.5	
2	Omorate–Agulech–Aware	Dassanech	2018/19	25.9	10	1,590,587	16,597,698	9.6	
3	Mandir–Emanuel Investments	South Ari	2018/19	30.0	17	2,703,998	11,224,628	24.0	
Roads transferred from the URRAP currently under construction/maintenance									
4	Shishir–Aydamer	Woba Ari	2016/17	19.8	15	1,819,168	7,297,229	24.9	
5	Gazer–Woset	South Ari	2016/17	19.0	9	2,100,000	4,729,903	44.4	
6	Yeinebersh–Berka–Tolta	South Ari	2016/17	24.0	4	636,235	2,344,125	27.1	
7	Gelila–Goza	North Ari	2017/18	10.8	6	992,274	5,644,427	17.6	
8	Kangaten–Shenkora	Nyangatom	2017/18	15.6	8	1,272,470	9,724,790	13.1	
New planned projects									
9	Kaysa–Ally–Senegal	Baka Dawla Ari	2021/22	22.0	10	1,000,000	8,218,552	12.2	
10	Koybe–Bezo	Male	2021/22	39.0	10	1,000,000	8,825,959	12.2	
				Total	227.8	97	14,387,202	81,864,783	17.6

(1) The figures indicated in this column refer to the length of road planned for maintenance and construction, not the distance between two locations. For example, the distance between Jinka and Lemo Gento is 37 km, while the 21.7 km indicated in the table is the length of road planned for maintenance/construction.

(Source: Jinka District Office, Road Authority of Southern Nations, Nationalities and Peoples Region, 2022)

* The average exchange rate increased from 1USD = 18.7144 Birr in 2013 to 1USD = 51.9425 Birr in 2022.

and the actual amount transferred from the region caused project delays.

The Jinka District Office actually listed multiple problems related to the construction and maintenance of roads, some of which cause project delays. These include: (1) the allocation and approval of budgets without considering the detailed fiscal and financial plans of individual projects, (2) the late approval of budgets and the late arrival of cash that affect the performance of planned tasks or prevent the office from implementing projects on time, (3) the frequent failure of machinery and vehicles such as loaders, rollers, dozers, and graders due to age or long years of service that also hinder timely project implementation, (4) a shortage of mechanical parts for substitution cause damage to the machines, (5) frequent or continuous heavy rains that delay works and damage the newly maintained and constructed roads, and (6) road design problems that require revision.

3. Road Traffic Survey

3.1 Contexts

As part of the SATREPS-MNGD project, road traffic data have been collected in two rounds with the intention of analyzing the movement of humans, animals and vehicles (two- and three-wheel vehicles) in the study area. The survey was conducted on two types of roads (unpaved roads and rural footpaths) each for a period of 16 days in Baytsimal and Kaysa Kebeles (local administrative units) of Baka Dawla Woreda (District), South Omo Zone, SNNPR (Table 4). The first round survey was conducted during the dry and slack months of January and February 2022, while the second round took place during the agricultural season in the months of May and June of the same year. The data collected through the two road traffic surveys reveal the frequency and intensity of road use by different categories of people, types of animals, and vehicles on different days of the week. The purpose of this report is to describe, compare, and contrast the road traffic data of the agricultural off season and the agricultural season.⁽³⁾ The different roads/paths selected for the study in the two kebeles are indicated in the following table.

Table 4. Roads and Paths on Which Road Traffic Data Were Collected by Kebele

	Kebele	Unpaved Roads	Footpaths
1	Baytsimal	Baytsimal–Jinka Road	Maylak (Baytsimal)–Manchri Path
2	Kaysa	Kaysa–Ally Road	Kaysa–Goldia Path

Apart from the Jinka–Keyafer asphalt road that crosses Kaysa Kebele, Baytsimal and Kaysa Kebeles have only one unpaved road each (Table 4), and the road traffic surveys were carried out on both roads: Baytsimal–Jinka and Kaysa–Ally. That is, the Baytsimal–Jinka unpaved road qualified for the traffic data analysis because it is the only road used for vehicle transportation. This is also the case for the Kaysa–Ally Road, which is the only one of its type. However, as stated below, the two walking paths (Table 4) were selected from many similar roads that exist in the study areas.

In Baytsimal Kebele, in addition to the networks of footpaths that connect the different villages within the kebele, four major footpaths lead to farms, grazing areas, and other destinations such as the neighboring kebeles. These include the Baytsimal–Manchri Road, the Baytsimal–Balma Road, the Baytsimal–Gista Road, and the Baytsimal–Bitamal Road. While the first two roads lead to farms and grazing areas, the other two connect Baytsimal to the neighboring kebeles. The Baytsimal–Manchri Path was selected for the survey due to the large flow of people and animals that the road accommodates. Manchri is an area where the residents of the Baytsimal Kebele grow crops and raise animals.

In Kaysa, the study also reveals that four major walking paths connect Kaysa Kebele to other kebeles, farms, and grazing areas. These include the Kaysa–Senegal, the Kaysa–Yirga, the Kaysa–Goldia, and the Kaysa–Gista roads. It needs to be noted that there are networks of paths that connect the different villages within the Kaysa Kebele. The Kaysa–Goldia Road has been chosen for the survey because this road, compared with others, is being used by many people and animals from the two kebeles of Kaysa and Yirga.

It should be noted upfront that the unpaved roads have been constructed and maintained by the joint government-community efforts, while the walking paths have been constructed and maintained by members of the community members. In terms of usage, the roads are used for the movement of people and animals and for the transportation of goods and services. The functional difference between the unpaved roads and the walking paths is that cars cannot be driven on the

latter. However, motorbikes and donkey carts are used wherever the ground is flat. During each survey, traffic data were recorded for a total of 16 days over a period of one month: seven days in the first week, four days in the second week, three days in the third week, and two days in the fourth week. Data were collected almost every Saturday, the major market day in Jinka town, which is located close to both kebeles.

In this section of the report, the road traffic data from the two surveys are compared and contrasted, with a focus on the movement of people disaggregated by sex and age; the movement of domestic animals differentiated by type; and the flow by means of transportation also differentiated by type. Accordingly, the findings of the survey are discussed under three major subsections: road use by people, animals on the road, and the flow of vehicles and donkey carts.

3.2 Road use by people

The purpose, intensity, and frequency of road use by people vary from one road to another depending on various factors. In this section, the utilization of the four roads covered in the two rounds of road traffic surveys are discussed. The analysis shows variations in road use by men, women, and children on market days and nonmarket days as well as during the slack season (agricultural off-season) and the agricultural season.

3.2.1 The Baytsimal–Jinka Road

The people of Baytsimal rely heavily on Jinka town for multiple reasons: market opportunity, schooling, medical services, business activities, and family visitation, among others. Data collected on the Baytsimal–Jinka Road (Figures 1–1, 1–2, 1–3, and 1–4) during the two rounds of surveys (Table 5) reveal that the total number of people on the road increased by 17%, from 7,634 in the slack season to 9,205 during the agricultural season. While the number of men on the road substantially increased (from 3,247 to 4,220), the number of women on the road has also shown a significant increase (from 3,183 to 3,757). On the contrary, the number of children on this road did not show any significant increment.

Why did the number of men and women increase on the road during the agricultural season? It is important to note that Jinka is not the only destination for people walking on the Baytsimal–Jinka Road. During the rainy season, the difficulty of crossing the swampy area between Baytsimal and the nearby Bitemal area forces people to take a long detour via Jinka town. The agricultural season requires the movement of people in different directions. The residents of



1-1



1-2

1-3



1-4



Figure 1-1, 1-2, 1-3, and 1-4. People, Animals, and Vehicles on Baytsimal–Jinka Road

Table 5. Number of People on the Road by Gender and Age

Road/Path	Description	People																
		Men				Women				Children				Total				
		Slack	Agricultural	Season	Total	Slack	Agricultural	Season	Total	Slack	Agricultural	Season	Total	Slack	Agricultural	Season	Total	
Baytsimal-Jinka	Total number of people in 16 days	3,247	4,220	3,183	3,757	1,204	1,228	7,634	9,205									
	Average of market days	278	353	302	354	85	76											
	Average of nonmarket days	178	243	164	289	72	77											
Baytsimal-Manchri	Total number of people in 16 days	10,635	11,780	10,480	11,845	10,150	11,765	31,265	35,390									
	Average of market days	768	662	753	667	760	663											
	Average of nonmarket days	650	753	641	757	616	752											
Kaysa-Ally	Total number of people in 16 days	5,306	6,853	6,212	7,359	8,526	9,142	20,044	23,354									
	Average of market days	658	893	847	1,098	817	1,013											
	Average of nonmarket days	223	321	235	312	376	469											

(Source: Generated from the Road Traffic Survey Data)

other kebeles may have taken this road to access their farm fields in the vicinity of Baytsimal. In contrast, the number of children traveling on the road, mostly students, did not show a significant variation, as school activities are not affected by agricultural seasons.

The daily averages of people show significant variations for market days (Saturdays) and nonmarket days. More men and women were seen on the road on Saturdays than on the other days of the week. This was the case for both the first and second rounds of surveys. For example, in the slack season, on average, there were 278 men on the road on market days and only 178 on nonmarket days. The pattern was the same for both men and women during both slack and agricultural seasons.

During the slack season, on average, more women (302 per day) than men (278 per day) were seen on the Baytsimal–Jinka Road on market days. The explanation of why more women than men went to the Saturday markets of Jinka town is that women bear responsibility for selling items (e.g., farm products) and buying materials needed for household use. However, during the agricultural season, the average number of men (353 per day) and women (354 per day) showed no significant difference, which may be explained in relation to two factors. First, women were highly needed in the agricultural fields such as Manchri, Balma, and other farm areas. Traveling to Jinka or in the direction of Jinka was not the priority of either men or women. Second, the violent incident that broke out in April 2022 in Jinka town reportedly created a sense of insecurity on the part of market-goers from the surrounding areas.⁽⁴⁾

3.2.2 The Baytsimal–Manchri Path

For the people of Baytsimal, the road that heads to the Manchri area is considered their lifeline (Figures 2–1, 2–2, 2–3, and 2–4). Because they grow crops and raise animals in the Manchri area, the road is busy every day. The number of people seen on the Baytsimal–Manchri Path increased from 31,265 in the slack season to 35,390 in the agricultural season (11.65% increment) (Table 5). During the two surveys, a total of 66,655 people were seen traveling on the road. This figure is far greater than the 16,839 people seen on the Baytsimal–Jinka Road during the same period. Based on this finding, it can be concluded that the overwhelming majority of the residents of Baytsimal use the road that takes them to the farms in Manchri rather than the one that heads directly to Jinka town. In terms of use, for the people of Baytsimal, the Manchri Road is more important than all other roads in the area. The government is expected to construct the Baytsimal–Gista Road to connect the villages of Baytsimal and Gista, although



2-1



2-2

2-3



2-4



Figure 2-1, 2-2, 2-3, and 2-4. People and Animals on Baytsimal–Manchri Road

the number of users is extremely low. When it comes to the selection of roads for construction, the priority of the people (widely used roads) and the priority of the government (connecting kebeles) do not necessarily align.

On the Baytsimal–Jinka Road, in both surveys, more people (men, women and children) were seen on the road on market days than on nonmarket days. The Baytsimal–Manchri Path, however, exhibited a different pattern. During the slack season, on average, the number of men, women, and children on the road on market days was greater than on nonmarket days. This is consistent with what is observed on the Baytsimal–Jinka and Kaysa–Ally roads in both surveys. However, this pattern is reversed in the agricultural season; that is, the average number of men, women, and children on the road on nonmarket days exceeds the corresponding averages on market days. This can be explained in terms of the demand for human labor on the farms during the weekdays. The data suggest that the demand for transportation services would have been high throughout the week had such a service been offered.

Both surveys on the Baytsimal–Manchri Road reveal a worrisome finding. A large number of children (10,150 during the first survey and 11,765 during the second survey) were seen going to and coming from the Manchri area. During the agricultural season, on average, 752 children were on the road on nonmarket days (weekdays). Since there is no school between the areas of Baytsimal and Manchri, these children were not heading to or returning from a school. Some of them could possibly be newly married young men and women. However, it appears that many school-aged children in Baytsimal Kebele have not enrolled in school or have dropped out of school, perhaps to help their families with the crops and rearing of animals. This worrisome situation requires further investigation to determine why young boys and girls have not enrolled in school and what measures can be taken to address the problem.

3.2.3 The Kaysa–Ally Road

The Kaysa–Ally unpaved road (Figures 3–1, 3–2, 3–3, and 3–4) is extremely important for villagers of Kaysa Kebele living in the hills, for the residents of Ally Kebele further in the mountains, and some residents of the neighboring Yirga Kebele. Some of fars residing in the mountains and hillsides have farms on the low-lying plains, which also have abundant pasture lands. Moreover, the health and education services in Kaysa town and along the road keep the Kaysa–Ally Road busy every day.

Data recorded on this road (Table 5) reveal that the total number of people walking on the road increased by 14%, from 20,044 in the slack season to 23,354



3-1



3-2

3-3



3-4



Figure 3-1, 3-2, 3-3, and 3-4. People, Animals, and Vehicles on Kaysa–Ally Road

in the agricultural season. The surveys indicate that more men, more women, and more children were seen on the road during the agricultural season compared with the agricultural off-season. Thus, it can be concluded that people are more on the move during the agricultural season than the agricultural off-season.

On the Kaysa–Ally Road, there were more people on market days than on nonmarket days, and this pattern is consistent for men, women, and children. The average value of weekdays was far less than the average on market days. During the slack season, on average, 658 men per day were seen on the road on market days as opposed to the 223 men per day on nonmarket days. Likewise, during the agricultural season, the average for market days was 893 men per day versus 321 men per day on nonmarket days. The pattern remained the same for women and children in that there were many more women and children on the road on market days than on nonmarket days during both seasons. The explanation for this significant difference is that on market days people from the neighboring Ally and Yirga Kebeles come in large numbers, while on nonmarket days the road was used largely by the residents of Kaysa.

As indicated earlier, on the Baytsimal–Jinka Road and the Baytsimal–Manchri Road, there were fewer children on the road than men or women during the survey period. This is understandable, as large numbers of children are not expected to go to market or to the farm, unlike the adults. On the Kaysa–Ally Road, during both surveys, more children than men or women were seen on the road. The figures for men, women, and children on the road during the agricultural season were 6,853, 7,359, and 9,142 respectively. The survey result of the slack season showed the same pattern. A primary school located along the Kaysa–Ally explains why more children than adults were seen on the road.

3.2.4 The Kaysa–Goldia Path

The Kaysa–Goldia Path (Figures 4–1, 4–2, 4–3, and 4–4) is used by people from Kaysa and Yirga Kebeles to travel to farmlands and grazing areas in the direction of Goldia Kebele. Some people use this road to visit relatives and, on rare occasions, to engage in certain business activities. During the slack season survey, the following were observed. The path was busy daily with many people on the road, although the numbers varied between market days (Saturdays) and nonmarket days. More women than men were seen on the road on Saturdays. The number of travelers on market days was high because the residents of Goldia Kebele came to the Kaysa market in large numbers, which was not the case on nonmarket days.

The number of cattle on the move also slightly increased on Saturdays,



4-1



4-2

4-3



4-4



Figure 4-1, 4-2, 4-3, and 4-4. People and Animals on Kaysa-Goldia New and Old Roads

probably because some of the animals were taken to the market for sale. The most striking observation on this road is that the means of transportation are worse than the three roads covered in the road traffic surveys. This path is not suitable for vehicles, motorbikes, or even donkey carts as evidenced by the absence and/or very low number recorded of these types of transportation. This is mainly because of poor road conditions, including waterlogging and muddiness.

Data collected on the Kaysa–Goldia Road during the agricultural season could not be incorporated into this report for comparative analysis as in the case of the first three roads discussed above. The second survey was conducted on the very same spot as the first round. During the analysis stage, however, the principal investigator noticed that the number of people and animals seen on the road was significantly reduced compared with the figures of the first round. This drastic reduction signaled inconsistency with the survey data from the other three roads. Further exploration of the reasons for the decline revealed that another new road had been opened by the Kaysa Kebele to reduce the movement of people and animals after some farmers complained that animals damaged their crops along the Kaysa–Goldia Road. The local data collector, who was unaware of the implication of the new development on the ground for the planned data comparison, carried out the survey of the original Kayasa–Goldia Road without informing the principal investigator about the new alternative road.

3.3 Animals on the road

Domestic animals (namely, cattle, donkeys, goats, and sheep) were seen daily on the roads covered in the two road traffic surveys. While most animals were led to grazing areas and farms, others were taken to the market for sale. The total number of animals on the road on market day and nonmarket days, during both the slack season and the agricultural season, varied for different reasons. This subsection discusses the reasons for the variations in the number of animals on different days of the week and in different seasons of the year.

3.3.1 Animals on Baytsimal–Jinka Road

On the Baytsimal–Jinka Road, the number of cattle, donkeys, and sheep on the road decreased during the second survey period (May–June), while the number of goats slightly increased (Table 6). For example, the number of cattle on the road decreased from 2,477 in the slack season to 2,314 in the agricultural season. Likewise, the number of sheep decreased from 164 to 62 during the same periods. Some of the animals seen on this road are taken to the Jinka market for sale. From

Table 6. Number of Animals on the Road by Type

Road/Path	Description	Type of Animals													
		Cattle				Donkey				Goats				Sheep	
		Slack	Agricultural	Season	Slack	Agricultural	Season	Slack	Agricultural	Season	Slack	Agricultural	Season	Slack	Agricultural
Bayisimal-Jinka	Number of animals on the road in 16 days	2,477	2,314	631	625	422	497	164	62						
	Average per day on market days	235	192	58	26	37	41	13	7						
	Average per day on nonmarket days	128	134	33	42	23	29	9	3						
Bayisimal-Manchri	Number of animals on the road in 16 days	10,260	9,965	10,065	9,875	10,215	9,965	9,905	9,925						
	Average per day on market days	7,378	633	733	632	763	640	725	632						
	Average per day on nonmarket days	628	620	719	612	621	619	604	618						
Kaysa-Ally	Number of animals on the road in 16 days	4,670	4,248	897	1,410	1,859	1,842	916	1,116						
	Average per day on market days	323	490	199	380	131	158	63	98						
	Average per day on nonmarket days	282	214	8	21	111	105	55	63						

(Source: Generated from the Road Traffic Survey Data)

the gross data, therefore, it appears that the total supply of animals to the Jinka market decreased in the months of May and June 2022.

This is supported by a comparison of the averages of animals seen on the road on market days and nonmarket days. The average number of cattle on market days decreased from 235 per day in the agricultural off-season to 192 per day in the agricultural season, while the averages of these animals on nonmarket days increased during the same period. This pattern holds true for sheep and donkeys as well. In contrast, the total number of goats and the average of goats on the road on market days slightly increased during the agricultural season.

The total and average decline of animals on the Baytsimal–Jinka Road in May and June may be explained by two factors: the prioritization of agricultural activities over the market and the security concerns in Jinka town after the violence on April 9th, 2022 during which market-goers lost animals and other belongings to looters in town. Since cattle are viewed as precious animals, owners tend to avoid situations that pose risks of losing them. In Jinka area, the number of sheep are generally few, and they do not fetch as high a price as goats. Given these factors, the decline of sheep on market days was hardly surprising. The slight increases in the number of goats on the road and on market days may be explained in relation to the growing demand for goat meat in Jinka town and the need to generate cash income by taking calculated risks.

3.3.2 Animals on Baytsimal–Manchri Road

The Baytsimal–Manchri Road, which originates in Maylak village, was busy every day with thousands of people walking back and forth on foot, some with and others without animals. It is important to note that this path leads to a dead end at the Manchri farm fields. Therefore, men, women and children go to this destination primarily to engage in agricultural activities.

On the Baytsimal–Manchri Road, more cattle, donkeys, and goats were seen during the agricultural off-season than the agricultural season. As indicated in Table 6, the number of cattle decreased from 10,260 in the slack season to 9,965 in the agricultural season; the number of donkeys decreased from 10,065 to 9,875; and the number of goats decreased from 10,215 to 9,965. While the average number of donkeys and goats exhibited a slight decline on market days, the average number of cattle showed a sharp decline: from 7,378 per day in the slack season to 633 per day in the agricultural season. The average number of all animals (cattle, donkeys, goats, and sheep) counted on market days was moderately or slightly greater than the corresponding average values for nonmarket days. Based on this observation, which seems to be the case on other

roads covered in the survey, it can be argued that some of these animals were taken to the market for sale.

The reduction in the number of animals on the Baytsimal–Manchri Road has to do with the following factors. First, when the rain starts, grasses and water become available everywhere, reducing the need to move animals around regularly. Second, the rain also allows farmers to grow crops and, thus, it becomes necessary to keep the animals at bay from the crops by taking alternative routes or by keeping some animals in the bush. Third, the veterinary service program that brought a large number of cattle during the first survey did not occur during the second survey. Finally, the avoidance of the market due to security concerns may have contributed to the decline in the number of animals on the road, especially on market days.

3.3.3 Animals on Kaysa–Ally Road

On the Kaysa–Ally Road, the total number of animals (namely cattle and goats) recorded on the road decreased during the agricultural season, while the number of other animals (namely, donkeys and sheep) increased during the same period (Table 6). As in the case of the Baytsimal–Manchri, the availability of grass and water and the need to keep animals away from crops have reportedly reduced the number of cattle and goats. The increase in the number of donkeys may be explained by the dire transportation needs of the people of Ally, who experienced a road disaster that made the area no longer accessible by vehicles. The reason for the increment of sheep on the road in the agricultural season requires further exploration. It is possible that an increasing number of people started raising sheep.

The survey reveals that in both seasons, on average, more animals (cattle, donkeys, goats and sheep) were seen on the road on market days rather than on nonmarket days. During the slack season, on average, 323 cattle per day were seen on market days versus 282 per day on nonmarket days. This was the case for all animals in both seasons, and it is apparent that some of the animals seen on the road on Saturdays were taken to the market. Second, on market days, the average number of all animals increased during the agricultural season compared with the agricultural off-season. For example, the average number of cattle on the road increased from 323 per day in the slack season to 490 per day in the agricultural season. On nonmarket days, on the other hand, the average numbers of all animals were lower in the agricultural season than in the slack season. The average number of cattle, for instance, decreased from 282 per day in the slack to season to 214 per day in the agricultural season. It appears that people residing

far away from Jinka town, in the mountains, brought more animals to the market, perhaps to fill the supply gaps.

3.4 Flow of vehicles and donkey carts

It should be noted upfront that the majority of people in Baytsimal and Kaysa Kebeles walk on foot and goods are transported from place to place on the backs, shoulders, or heads of people. There are some means of transportation that people use when they are available, including vehicles, motorbikes, pack animals, donkey carts, and sometimes three-wheel motor vehicles (called Bajaj). On the Baytsimal–Jinka Road, potentially, all three means of transportation can be accessed. Practically, however, until recent months, there was no public transportation service and private motor vehicle services were unaffordable.

During the first survey (the slack season), some 372 vehicles were seen on the road, and this figure decreased to 198 during the agricultural season (Table 7). Likewise, motorbikes decreased from 6,562 during the first survey to 5,562 during the second, and donkey carts decreased from 1,004 to 937 during the same period. The decline in the means of transportation is explained by the security concerns after the April 2022 incident. It is important to clarify that the total number of vehicles, motorbikes, and donkey carts noted above are far greater than the actual figures on the ground due to multiple countings. That is, the same lorry or motorbike, or donkey cart might have been counted multiple times in one day as the data collectors could not differentiate them for different reasons: speed, absence of plate numbers, and the changing drivers and riders.

On the Baytsimal–Manchri Road, the only means of transportation is the donkey cart, the use of which is on the rise (Table 7). The total of number of donkey carts seen on the road increased from 3,368 during the 16 days in the slack season to 3,483 in the second set of 16 days in the agricultural season. This increment points to the growing demand for transportation of agricultural products from the Manchri farms. On average, there were more donkey carts on nonmarket days than on market days (Saturdays). This is because on Saturdays people do not go to Manchri in large numbers. Some people who used the Kaysa–Ally Road heavily relied on motorbikes, the use of which declined from 7,460 in the slack season to 6,486 in the agricultural season due to road disasters (Table 7). Although on a limited scale, donkey carts have also been used on part of the Kaysa–Ally Road suitable for such transportation services, the number of donkey carts decreased from 370 in the agricultural off season to 319 in the agricultural season due to the poor road conditions.

Table 7. Number of Vehicles and Donkey Carts on the Road

Road/Path	Description	Means of Transportation											
		Car				Motorbike				Donkey Cart			
		Slack	Agricultural	Season	Season	Slack	Agricultural	Season	Season	Slack	Agricultural	Season	Season
Baytsimal-Jinka	Vehicles and carts on the road in 16 days	372	198	6,562	5,562	1,004	937						
	Average per day on market days	36	27	672	418	165	164						
	Average per day on nonmarket days	19	9	323	331	29	34						
Baytsimal-Manchri	Vehicles and carts on the road in 16 days	0	0	0	0	3,368	3,483						
	Average per day on market days	0	0	0	0	149	69						
	Average per day on nonmarket days	0	0	0	0	198	252						
Kaysa-Ally	Vehicles and carts on the road in 16 days	8	14	7,460	6,486	370	319						
	Average per day on market days	1	0	861	900	73	63						
	Average per day on nonmarket days	0.33	0	335	291	6	10						

(Source: Generated from the Road Traffic Survey Data)

4. Summary and Concluding Remarks

4.1 Summary of road infrastructure

In South Omo Zone, roads have been constructed by the URRAP, the Road Authority of SNNPR, ERA, and local communities. The URRAP has constructed a total of 15 roads and seven more roads are currently under construction. The operational roads reportedly have enhanced local people's access to markets to sell their agricultural products, medical centers to receive health services, and other important destinations.

In terms of responsibility, the URRAP roads are handled by three government organs: the SNNPR's Transport and Road Development Bureau allocates budgets, approves contracts, and releases cash; the South Omo Zone's Transport and Road Development Department signs contracts, provides technical assistance, and oversees the implementation of road constructions; and the woreda-level transport and road development offices participate in the supervision of road project implementation, mobilize communities to provide free labor contribution; and shoulder the responsibility for administering and maintaining roads.

The URRAP roads were constructed by certain road construction associations, private firms often with four staff members (a manager, a material engineer, a surveyor, and a foreman), organized initially with government support. These associations signed contract agreements with South Omo Zone Transport and Road Development Department and the SNNPR's Transport and Road Development Bureau approved the contracts. The contracts contained details on the planned activities (clearing, earthwork, cutting, cambers, ditches, and culverts), the URRAP standards (DC-2, 6 m wide, and 15 cm thick), and timetables, among others. The contractors were provided with road designs and maps.

The 15 operational roads were constructed with 73.77% of the budget. The experts who provided the documents were not in a position to explain the discrepancies between the planned budget and the actual expenditures. It appears that there was no budget restriction on completing the road construction projects. However, although the URRAP roads were planned to be completed in four months, it took contractors two to five years to accomplish their tasks. One of the major factors that caused and continued to cause delays in road construction is the slow response on the part of SNNPR's Bureau of Transport and Road Development to release the funding requests of contractors. Further inquiry would

be necessary to understand this paradox—the reason why the allocated money could not be released timely to avoid unnecessary project delays. The other causes of delays include design change, landslides, and flooding, and the rise in the cost of construction materials, among others.

Community participation is an important component of the URRAP. When the project started in 2012, the community share was 25% of the construction cost, and the share has now increased to 50%. The transport and road development offices are responsible for mobilizing communities to engage in activities such as clearing grasses/bushes and stump removal free of charge. In some projects, the community contributions were favorably reported, although in most they were assessed as being inadequate. It seems that there is no sufficient mechanism to convert the labor contributions of people into monetary values.

Sometimes roads started by the URRAP are transferred to the SNNPR's Road Authority. This is done when the road demands are significant, due to the nature of the terrain and/or the necessity to build bridges, the mobilization of machinery, advanced technical expertise, and a significant budget. Moreover, the need to upgrade roads also requires transfer from the URRAP to RA-SNNPR or ERA. During research, careful scrutiny is warranted to avoid double counting.

The Road Authority of SNNPR (RA-SNNPR) is responsible for the construction and maintenance of certain roads in collaboration with the ERA, which supports the former in the procurement and maintenance of machinery. Upon completion of the roads, the district offices of RA-SNNPR (e.g., Jinka District Office) are charged with the ongoing maintenance works. The Jinka District Office of RA-SNNPR is mandated to construct and maintain roads in South Omo Zone and the neighboring Basketo Special Woreda. The responsibilities of the regional authority include initiating projects, allocating the budget, assigning machinery and manpower, and supervision, monitoring, and evaluating the implementation of road projects. The level of the roads constructed is reported to be DC-3, 6 m wide and 25 cm thick with sub-base material.

Unlike the URRAP projects that rely on construction firms and community labor, RA-SNNPR accomplishes the road projects by mobilizing its own machinery, deploying its own experts, and hiring paid laborers. In 2021, there was a plan to construct/maintain 10 roads with the total length of 227.8 km in South Omo Zone. Of the total length, the Jinka District Office planned to maintain and construct 97 km in 2021 and requested the required budget for the tasks. However, RA-SNNPR assigned only 17.6% of the total amount needed for the planned tasks. This mismatch between the required budget and the assigned

budget reportedly contributed to project delays.

There are many problems associated with the RA-SNNPR road projects. These include the allocation and approval of the budget without considering the detailed fiscal and financial plans of individual projects; the late approval of budgets and the late arrival of cash that affected the performance of planned tasks or prevented the office from implementing projects on time; the frequent failure of machinery and vehicles such as loaders, rollers, dozers, and graders due to age or long years of services that also hinder timely project implementation; the shortage of mechanical parts to replace damaged machinery; the continuous heavy rains that delayed works and damaged the newly maintained and constructed roads; and the road design problems that required revision.

4.2 Summary on road traffic survey

The road traffic data were collected in two rounds with the intention of analyzing the frequency and intensity of road use by different categories of people, animals, and vehicles. As discussed above, there are significant variations in the pattern of road use based on certain factors: slack season versus agricultural season, market days versus nonmarket days, and men versus women. There were more people on the road during the agricultural season than during the slack season. Gender disaggregation further reveals that there were many more men on the road than women during the agricultural season. The reason for more movement of more people and more men may have to do with the high demand for labor by farms. It appears that during the slack season, people stayed in villages relatively idle, apart from engaging in light work around homes, visiting friends, and going to the market. The number of children on the road did not show seasonal variation, as school activities are less affected by the seasons.

During the slack season, on all three roads, the average number of people on the road on market days (Saturdays) was greater than the average number of people on nonmarket days. From this it is apparent that access to the weekly market is important for rural people to buy and sell goods and services. The survey data also reveal that on market days more women than men were seen on the roads, and this is has to do with the domestic responsibility of women for household management such as cooking that requires selling farm products and buying goods from the market. Therefore, opening or improving road access to markets obviously helps rural people, especially women.

During the agricultural season, on Baytsimal–Manchri Road (which connects Baytsimal Kebele and Manchri farms), the average number of men, women, and

children on nonmarket days exceeds the corresponding averages on market days. This can be explained by the high demand for human labor by the farms. Even during the slack season, large numbers of people and animals traveled to the farms daily. Based on the traffic flow of people and animals, it was determined that there is a need to construct roads that connect settlements and farms. However, this is not expected to happen since the URRAP is not mandated to connect kebeles and farms despite the local people's priorities and demands. The SATREPS-MNGD project may be able to fill such critical road infrastructure gaps.

During both surveys, a large number of school-aged children were seen on the Manchri Road Monday through Friday. It appears that many children in Baytsimal Kebele have not enrolled in school or have dropped out of school perhaps to help their families on the farms, or at least to take care of domestic animals. Further study is needed to understand why some of the young children in Baytsimal were not enrolled in school. On the Baytsimal–Jinka Road and the Baytsimal–Manchri Road, the number of children on the road was less than the number of men or women. This is normal, as children are not expected to go to the market or to the farm in as large numbers as adults. On the Kaysa–Ally Road, however, more children than men or women were seen on the road because a primary school is located along the Kaysa–Ally Road.

Domestic animals (cattle, donkeys, goats, and sheep) were seen on all roads on a daily basis. While most animals were led to grazing areas, water points, and farms, others were taken to the market for sale. The number of different animals seen on the road has varied based on the seasons of the year (slack versus agricultural) and days of the week (market days versus nonmarket days). On the three roads surveyed, there were more animals on the road during the slack season than during the agricultural season. This was the case for most animals. Data collected from the three roads point to a clear decline of cattle in the agricultural season consistently. The number of other animals (donkeys, goats, and sheep) has shown deviations, in that their numbers increased on some roads and decreased on others. Some of reasons for the decline or increase are evident, while others need further investigation.

The decline of cattle on the road during the agricultural season compared with the slack season can be explained by various factors: the availability of grass and water everywhere that reduced the need to move animals around; the need to keep animals at bay (e.g., use of alternative routes) from damaging crops along roads; and the avoidance of the market due to security concerns in Jinka town after the violence on April 9th, 2022 during which market-goers lost animals and other

belongings to looters in the town. The number of pack animals on the Kaysa–Ally Road increased perhaps due to the road disaster that prevented the movement of vehicles between Kaysa and Ally. It is not clear why the number of goats and sheep increased on some roads and decreased on others.

The averages of all animals (cattle, donkeys, goats and sheep) in both seasons reveal that there were more animals on all three roads on market days than on nonmarket days. This shows that some of the animals were taken to the Jinka or the Kaysa markets for sale. However, on the Baytsimal–Jinka and the Baytsimal–Manchri Roads, on market days, there were fewer animals during the agricultural season than the slack season. This reduction can be explained by the security concern in Jinka town mentioned above. On Kaysa–Ally, however, there were many more animals during the agricultural season market days, as the Saturday market in Kaysa had no security concern.

The majority of people in Baytsimal and Kaysa Kebeles walk on foot carrying goods on their backs, shoulders, or heads. There are limited and unreliable means of transportation that some people use. These include vehicles, motorbikes, pack animals, donkey carts, and sometimes three-wheel motor vehicles. However, the number seen on the road have shown a decline in the agricultural season due to prioritization of agricultural work and the security concern after the April 2022 incident. On the Baytsimal–Manchri Road, mainly donkey carts were seen, and their use has increased during the agricultural season. On the Kaysa–Ally Road, motorbikes and donkey carts were seen, and their numbers decreased during the agricultural season due to road conditions.

4.3 Concluding remarks

The road infrastructure review reveals that many roads have been constructed through the URRAP. Although there was no budget constraint (as the roads were constructed with less money than initially budgeted), all URRAP roads scheduled to be completed in four months took two to five years to complete. The reasons for the delays include the problems with the release of requested funds, design problems that required changes, heavy rain that caused flooding and landslide, and the high cost of construction materials. Although the URRAP roads started in 2012, the problems derived from road project delays have persisted until today. As Mouratidis (2020) argued, there are a number of challenges associated with road development projects. In South Omo Zone, the major problems related to the URRAP include, the feasibility of plans, the terrain characteristics, the availability of funds, the weather conditions, bureaucratic bottlenecks, and the technical

capacity of the contractors, among others. Government actors should scrutinize these factors carefully, and foreign partners such as Japanese institutions could also provide advice and technical assistance.

One of the most important initiatives in the URRAP road development projects is the participation of communities through free labor contributions. Although the level of involvement of communities varied from one road project to another and the monetary values of the labor contributions have rarely been computed, by tapping into the tradition of voluntary services, the local residents were mobilized without any difficulty. The RA-SNNPR roads are rarely constructed or maintained on time due to a shortage of funds. Unlike the URRAP roads, communities are not required or expected to take part in the RA-SNNPR roads. Apart from securing sufficient funds at the right time, the involvement of communities in such road projects could make a difference in the timely completion of road projects. The SATREPS-MNGD project can count on the existing institutions and practices of voluntary community labor mobilization.

The road traffic surveys in the study areas reveal that some footpaths heading to agricultural fields are widely and regularly used by humans and animals. Since these walking paths are constructed using human labor and simple agricultural tools, such as hoes and shovels, they lack the structural strength to withstand erosion, landslides, and waterlogging. Consequently, the frequent road disasters required frequent maintenance works, which failed to address the endless underlying challenges. Although these paths are quite widely used by humans and animals, they are beyond the scope of the three government agencies (URRAP, RA-SNNPR, and ERA) responsible for road construction and maintenance. Therefore, there is a need to find other means to fill the gap, and the SATREPS-MNGD project could play an important role in supporting the construction and maintenance of roads leading to common farms and other destinations of great importance to local communities.

According to the surveys, on average, the number of people on the road on market days was greater than on nonmarket days. Likewise, on average, there were more animals (cattle, donkeys, goats, and sheep) on market days than on nonmarket days. Access to the weekly market is important for rural people to sell their animals and agricultural products, which most people carried on their heads, shoulders, or backs. The surveys also reveal that on market days, more women than men were seen on the roads, which was due to the multiple responsibilities of women. Motorbikes, pack animals, and donkey carts represent the limited means of transportation in the study areas. During the agricultural season, when

transportation is needed most, road disasters restricted the efficacy of the existing limited means of transportation. Therefore, the construction and maintenance of roads leading to markets should be seen as having direct effects on rural development and gender empowerment. By the same token, urban residents would benefit from an increased supply of agricultural products.

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Notes

- (1) SATREPS (Science and Technology Research Partnership for Sustainable Development) is the Japanese government's program for international joint research into global issues by researchers in Japan and developing countries. MNGD stands for Making Network for Global Development.
- (2) It is to be recalled that in the past, the community share was only 25%.
- (3) The period between May and August was expected to be a rainy season, although it did not rain much this year perhaps due to climate change.
- (4) On April 9th, 2022, market-goers from Baytsimal and other neighboring kebeles were attacked and looted by gangsters from town following tension between the Ari youth and the migrant youth in Jinka. Hence, the months of April, May, and June remained unsafe for people to move around.

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