



Mobility=Relief

PROJECT TSUNAMI REPORT CONFIRMS THE POWER OF BICYCLES

*Conducted and reported by TANGO International, in conjunction with
the University of Sri Lanka and World Vision*

September 2007



Impact of Bicycle Distribution on Tsunami Recovery in Sri Lanka



Final Report
September, 2007



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I. Introduction

The catastrophic damage wrought by the December 2005 tsunami severely impacted the lives and livelihoods of many households in South and Southeast Asia. Many households lost family member, some of them prime wage earners. Most lost some or all of their productive assets, making it difficult for them to recover economically and regain their livelihoods.

One of the key elements of recovery after the tsunami was assisting people to recover their assets. One of the most empowering assets owned by the poorest households is their bicycle. In response to tsunami victims in Sri Lanka, the World Bicycle Relief, in partnership with World Vision, distributed 24,376 bicycles in tsunami affected areas in an attempt to rehabilitate peoples' lives and livelihoods. These preliminary findings represent the results of a quantitative and qualitative study implemented by World Vision and TANGO International on behalf of the World Bicycle Relief.

The objective of World Bicycle Relief's bicycle distribution program was to assist in returning adult survivors of the tsunami to independence and in reestablishing their livelihood. Beneficiaries of bicycles included school children, adult male and female workers (e.g., fish vendors, small-scale traders, government servants), and handicapped individuals (Table 1). For adults, providing bicycles would mean greater access to jobs, commerce, food and medicine, and would also provide a greater sense of independence. Bikes were also provided to children to facilitate their ability to stay in school, to help with supporting the family (in terms of being able to perform errands and get to school), and to provide recreation and entertainment in a time of healing. All bicycles were sourced locally to ensure correct specification and that recipients were familiar with their bikes. This also ensured better access to mechanics and spare parts, eliminated any supply chain problems, reduced shipping costs and import duties, eased logistics, and supported the local economy. The project also trained and equipped selected individuals in bicycle maintenance.

Table 1: Distribution of bicycle recipients by District.

District	Adult Males	Adult Females	School Children	Disabled Persons	Total
Ampara	562	150	2,540		3,252
Batticaloa	1,250	1,250			2,500
Galle	715				715
Hambantota	3,400		1,100		4,500
Jaffna	2,000	1,500	750		4,250
Kalutara	544				544
Matara	302	15	1,541		1,858
Mullaitivu	1,300	597	500		2,397
Trincomalee	2,425	700	1,210	25	4,360
Total	12,498	4,212	7,641	25	24,376

The data from the qualitative and quantitative studies provides significant evidence supporting the positive impact of bicycles on livelihoods and income generating opportunities. With a bicycle, hauling capacity is greatly increased, a significant benefit for beneficiaries in the South whose livelihoods greatly depend upon being able to haul goods. Increased ease of mobility is also tremendously important for all beneficiaries, but particularly those in the East whose average daily commute is over 13 km/day. Another benefit of bicycles that must be mentioned

but is not easily quantified is the empowering nature of bicycle ownership. The freedom of sustainable independent movement and sense of autonomy is of incalculable significance.

II. The Power of Bicycles

It is well known that bicycles constitute a primary mode of transport in the developing world. Less well known are the ways in which bicycles empower individuals, are used for income generation, shape the dynamics of gender differences, and impact on the social lives, notably of students. Within Sri Lanka, there is significant regional variation with regards to bicycle use for livelihoods. Dependency upon bicycles also appears to vary by region. Bicycles have great potential to impact the lives of women through enabling them to explore more income generating opportunities.

When the only other choice is walking, bicycles are a tool of development, improving access to farms, market, jobs, schools, and health care. Bicycles are also integral to the personal and domestic lives of the beneficiaries. Students utilize their bicycles to visit family and friends as well as running errands for their families. The two most commonly visited places amongst the beneficiaries were places of religion and service providers, highlighting the social importance of bicycles as well as indicating an increase in accessibility of healthcare and other services.

III. Study Methods

III.a. Quantitative Survey

The quantitative study included in-depth and interviews with 1,092 randomly selected individuals, including 221 “livelihoods” bicycle owners, 801 students, and 70 government workers. The questionnaire included a brief section on household demographics, detailed questions on livelihood activities (for livelihood and government worker individuals, questions on bicycle use for students, a section on the social aspects of bicycle ownership, and a final section on maintenance. The questionnaire is provided in Annex II. Two teams of enumerators (one for the South and one for the East) were trained on the particulars of the questionnaire and the use of Personal Digital Assistants (PDAs), which were used for all quantitative data collection. Interviews were conducted from May 14-24, 2007 in both the South and East zones.

III.b. Qualitative Survey

The qualitative survey was based on a focus group discussion (FGD) guide. The FGD guide was divided into four sub-topics that would be triangulated with the quantitative survey to measure program impact. The four sub-topics explored were: patterns of transportation in the community; household bicycle use; LTRT bicycle distribution project; and obstacles to widespread use of bicycles. Trained research teams¹ conducted semi-structured interviews with community members using pre-determined topics stated above. Two teams of 6 members—one team dedicated to each zone—collected, analyzed and consolidated data. Each research team was comprised of a team leader, one translator, a facilitator, one observer, and two note-takers. The Team Leaders provided field supervision, and were in turn supervised by the



¹ Research teams completed a 5-day training on focus group methods and data analysis techniques.

Qualitative Supervisor, who ensured consistency in methods. Focus group participants reflected on the bicycle distribution target groups. These were government employees, livelihood groups, school children and ordinary community members. Where possible, male and female participants participated in separate focus group discussions. Data collection and analysis took place from May 7 – June 2, 2007 in two zones: East Zone (Ampara, Batticaloa and Trincomalee;) and South Zone (Galle, Hambantota, Kalutara and Matara).

IV. Results

IV.a Demographics

As shown in Figure 1 mean household size was 5.4 household members. Most households (72%) did not have any children under five in the household. Almost 40 percent of respondents have one male child (6-18 years old) and 41 percent reported having one female child. Just over 65 percent of households had one male adult and 72 percent of households have one female adult present. The vast majority (roughly 90%) reported not having any males or females over the age of 60 in the household.

Figure 1: Household Size

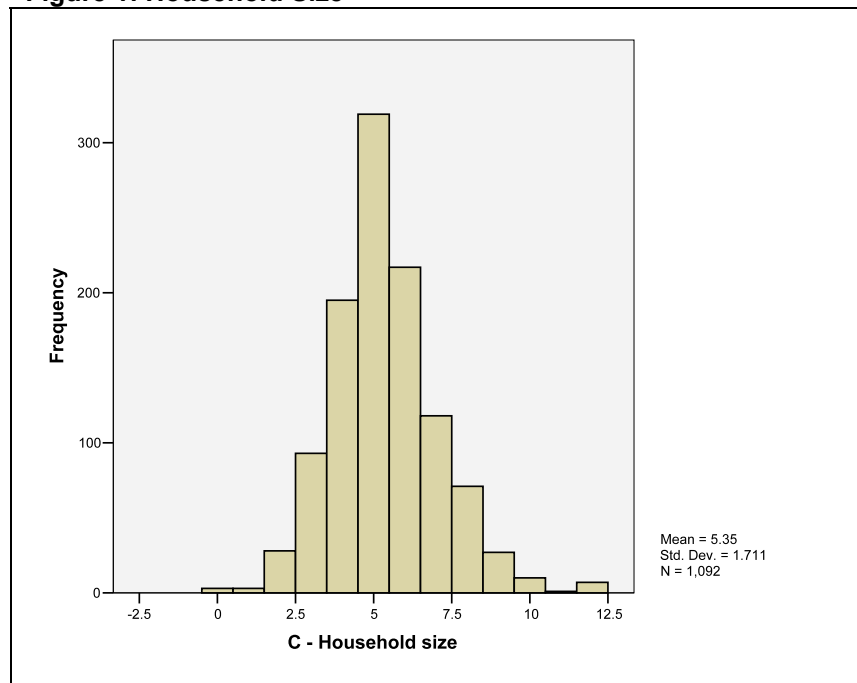
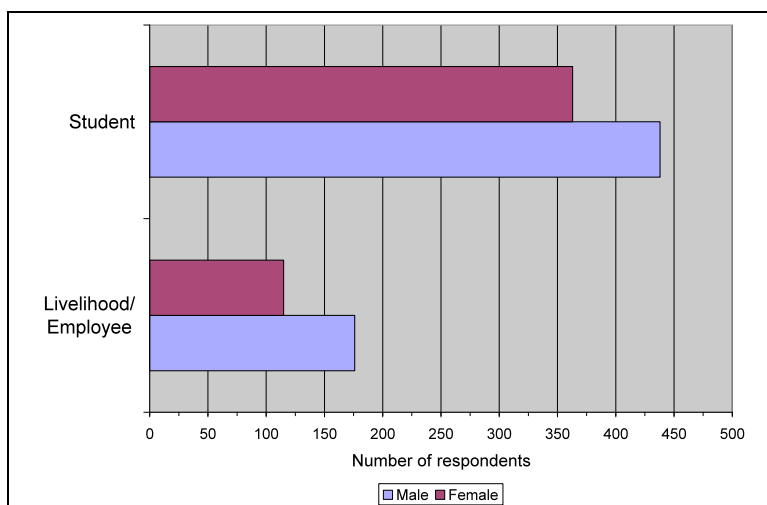


Figure 2: Gender by Module



Of the 1092 respondents, 614 were male (56%) and 478 were female (44%). Amongst student respondents, 438 were male (55%) and 363 were female (45%). This leaves 176 males (61%) and 115 females (39%) responding to the Livelihood/Government Employee module (see *Figure 2*).

IV.b. Livelihoods

Both the quantitative and qualitative surveys explored the impact of bicycle ownership in the livelihoods of male and female adults. Results suggest that bicycle ownership enhances livelihood capabilities² and that bicycle ownership can have both short and long-term impacts on household livelihood security.

Livelihood Impact

Bicycles have a number of direct and indirect impacts on livelihoods. Annex I provides a common livelihoods framework. As a livelihood asset, bicycles can control influence and access, thus either contributing to or becoming an integral component of a livelihood strategy. For example, one who sells fish from door-to-door and uses a bicycle for both transporting the fish and reaching more “doors” (especially in rural areas where houses may be widely dispersed) has integrated his/her bicycle into a livelihood strategy. The efficiency of a livelihood strategy has a direct bearing on livelihood outcomes. If this person had to walk, the livelihood outcomes may be quite different than if this same person used a bicycle. The livelihood outcomes may also be different if this same person had a motorcycle (or a small pick-up) instead of a bicycle.

For very poor households, small changes in *capitals* (see Annex I), be they natural, physical, social, etc., can have profound changes in livelihood outcomes. For tsunami victims, loss of physical capital had a devastating impact on livelihood outcomes, and on their ability to regain what had been lost. Bicycle ownership can also directly affect other livelihood outcomes, such

² Since no formal baseline survey, or longitudinal study, was conducted on bicycle ownership and livelihoods, many of the conclusions extrapolate on evidence related to efficiencies of bicycle use.

as health care and education, by providing a means of transportation to and from service providers.

Prior to the tsunami, most respondents (26%) were engaged in some type of formal wage/salaried employment. Petty trade (19%), selling fish (14%), and fish processing (11%) were also common income sources. A large majority of respondents (82%) stated that they used a bicycle in some way for their livelihood prior to the tsunami (Table 2). Almost three-quarters of respondents used their bicycles for transport to and from work and half used their bicycles as transport *during* work. Almost 40 percent of respondents reported using their bicycles to haul goods/materials for generating income. Especially for those individuals who used their bicycles during work and those who hauled goods and materials, the bicycle was an important component of their livelihood strategy.

Table 2: Livelihood before and after the Tsunami and by Region

Livelihood	Before Tsunami	After Tsunami	Current Livelihood	
			East	South
	(%)			
Producing/selling crops	2.1	2.1	***	2.6
Selling crops produced by others	0.7	1.4	1.7	1.3
Casual labor – ag.	2.4	1.7	6.7	0.4
Casual labor - non-ag.	2.1	3.1	5.0	2.6
Producing/selling livestock	2.1	1.4	***	1.7
Selling fish	14.0	15.8	20.0	14.7
Processing fish	11.3	9.2	21.7	6.0
Skilled trade/artisan	1.0	0.7	***	0.9
Small business/shop	4.5	5.1	1.7	6.0
Petty trade	19.2	18.8	13.3	20.3
Brewing	3.8	2.1	***	2.6
Government employee	0.3	0.3	***	0.4
Other formal salary	26.4	26.7	13.3	30.2
Vegetable production/sales	3.1	2.4	3.3	2.2
No source of income	0.7	0.7	1.7	0.4
Student/unemployed	3.1	5.1	3.3	5.6
Other	3.4	3.4	8.3	2.2
Total	100.0	100.0	100.0	100.0

After the tsunami, most respondents (27%) remained engaged in formal wage/salaried livelihoods. The amount of people engaged in petty trade and fish sales stayed roughly the same (19% and 16% respectively), but the amount of people engaged in processing fish dropped to 9 percent.³ Currently 88 percent of respondents depend upon a bicycle to engage in

³ One cause of this significant decline in fish selling could be a supply chain phenomenon. While much work was done after the tsunami to restore fishing assets, less was done on the transportation side of the fish supply chain.

their livelihood activities.⁴ Now more people (86%) utilize their bicycles as transport to and from work and 62 percent of respondents use their bicycles as transport during work. Forty-five percent of respondents also use their bicycles to haul goods/materials for their livelihood. It is clearly evident that bicycles are indispensable for people to undertake their livelihood activities.

Mobility

In Sri Lanka, for the majority of the people roads are extremely important. According to the World Bank (2005), roads are often the only way most rural people reach essential services such as hospitals, schools, markets and banks, which are mostly situated far from their villages.⁵ However, the conditions and standards of the roads are poor and many are seriously congested. A study conducted by Rural Travel and Transport Program in 2001 reported that in Sri Lanka the bicycle is the predominant form of transport vehicle for most people and it satisfies nearly all their needs. The study stated that bicycle use included travel to markets, friends, employment, grinding mills and fields.⁶

One of the primary benefits of bicycle ownership is increased mobility along the existing road networks and small paths. The overall average commute for all livelihoods recipients to/from work was 9.9 km and the average distance traveled during work was 2.5 kms. The total average distance traveled throughout the entire day was 12.4 km (see Table 3 and Figure 3). Calculating speed according to the commute time to work given by the respondents yields an average speed of 9 km/hr. A rough estimate (that does not take into account cargo, road conditions, weather etc.) is that people spend approximately 1.4 hours/day on their bicycles. Without bicycles, assuming that people can walk roughly 4 km/hr,⁷ it would take respondents over 3.1 hours to walk the distances they travel daily.

Table 3: Estimated travel distances, use times, and time saved for bicycle users in the East and South of Sri Lanka.

	Distance to/from work (kms)	Distance traveled during work (kms)	Total distance used per day (kms)	Average Speed (kms/hr)	Hours of bicycle use per day	Equivalent hours of walking per day	Time saved (hours per day)
All Users	9.86	2.51	12.37	9.0	1.4	3.1	1.7
East – All	13.84	3.34	17.18	9.3	1.8	4.3	2.5
East – Extended Users⁸	14.06	9.19	23.25	9.3	2.5	5.8	3.3
South - All	8.51	2.23	10.74	8.8	1.2	2.7	1.5
South - Extended Users	8.21	3.90	12.11	8.8	1.4	3.0	1.6

In the East, respondents that use their bike during the day travel an average of 13.8 km to/from work and 17.2 km over the entire work day. In the South, respondents that use their bike during

⁴ Note that respondents are bicycle recipients in the program, and therefore this does not represent the proportion of individuals in the general population who rely on a bicycle.

⁵ Rural roads in Sub-Saharan Africa: lessons from World Bank experience. Technical Paper 141. The World Bank. Washington, D.C. 2005.

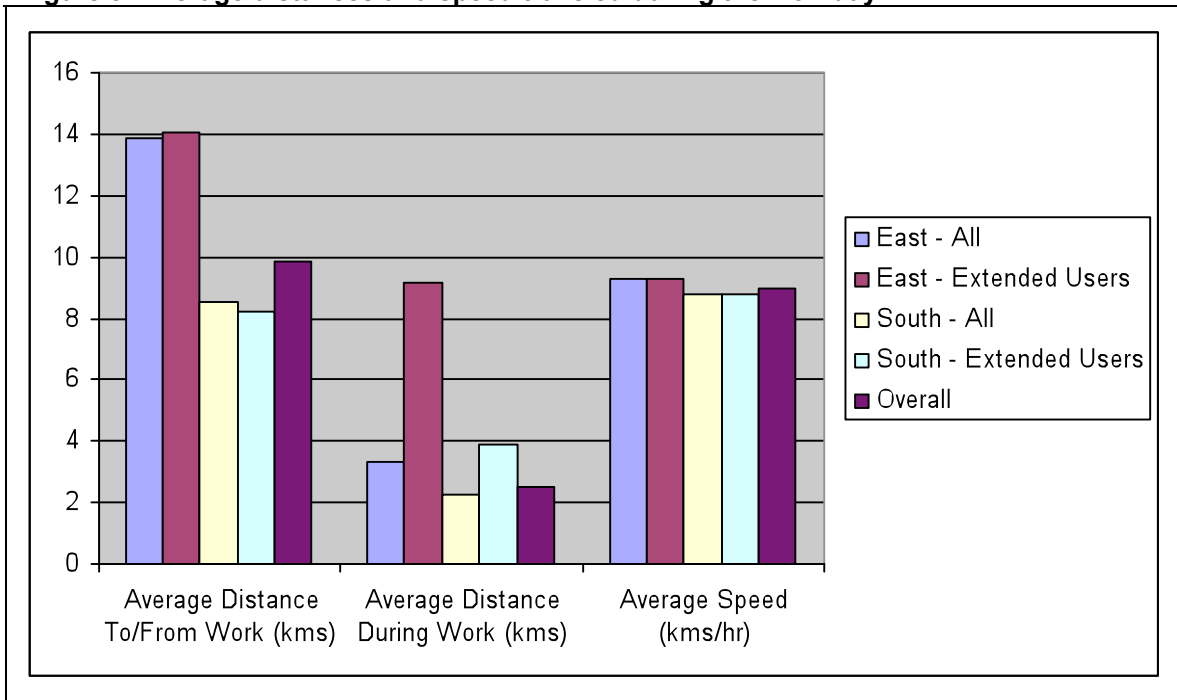
⁶ Rural Travel and Transport Program. Promoting the Use of IMT's Case Study. TRL Limited. Report prepared by S.D. Ellis. 2001.

⁷ Information obtained from www.worldbicyclerelief.org

⁸ *Extended Users* are those users who report using their bicycle to get to/from work and using their bicycle during work hours, either transporting goods or visiting clients.

the day travel an average of 8.5 km to work and roughly 10.7 km over the entire work day. The average speed in the East is 9.3 km/hr and 8.8 km/hr in the South. People spend roughly 1.8 hours on their bikes in the East and 1.2 hours on their bikes in the South. It is interesting to note that, despite traveling significantly different distances over the course of the workday, people in the East and South spend remarkably similar amounts of time on their bicycles. This finding could be related to the fact that Southerners are more likely to use their bikes to haul goods and are likely to face more traffic.

Figure 3: Average distances and speed traveled during the workday.



Without bicycles, assuming that people can walk roughly 4 km/hr, it would take respondents in the East three and one half hours to walk their daily commute and two hours and twenty minutes for people in the South. Thus in the East, bicyclists are saving over 2.5 per day by using their bicycles instead of walking, and in the South they are saving 1.5 hours per day.

A large percentage of Livelihood bicycle owners use their bicycles for more than simply commuting – they also use it for transporting goods during the day or for visiting clients or getting to other work-related points during the day. In Table 3, these are referred to as Extended Users. For these users, the bicycle represents an even more important livelihood asset, and the time savings are even greater (Table 3).

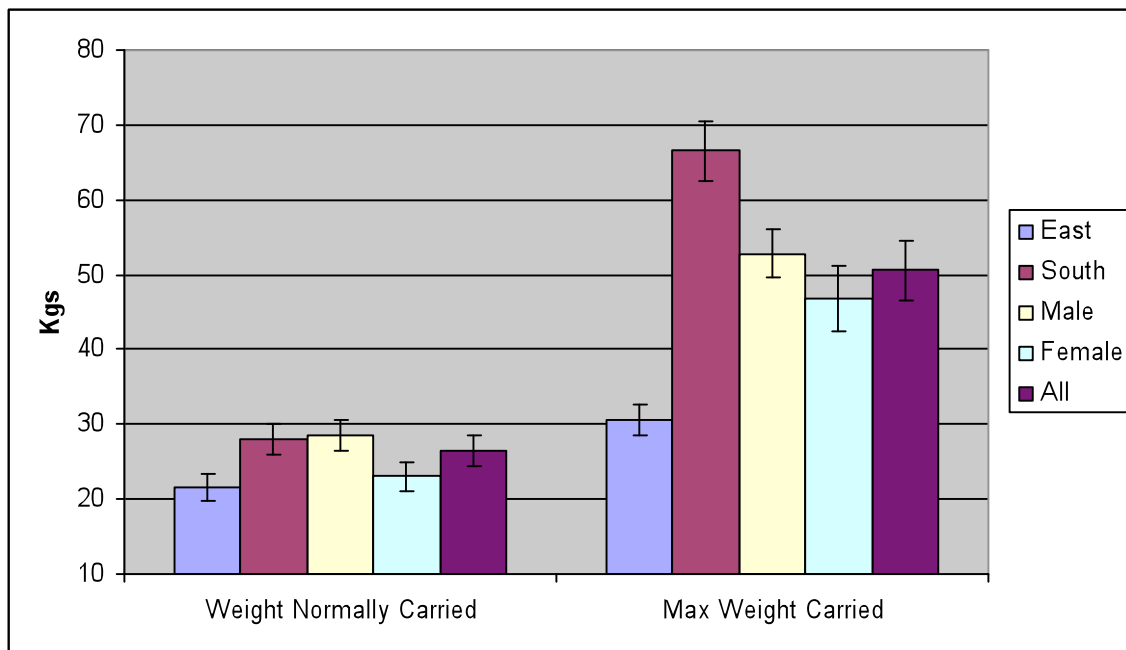
The above data is for all livelihoods bicycle users. However, if those who use their bicycle for purposes other than simply getting to and from work the savings per day are even greater. In the East, those who use bicycles for more than just getting to/from work save 5.8 hours per day compared to walking.



According to World Bicycle Relief, bicycles increase one’s carrying capacity by five times. This is particularly important in the East where 86 percent of livelihood respondents utilize their bicycles for hauling goods and/or other people. Without a bicycle, the ability to generate income would be severely curtailed. In the South, just over 75 percent of respondents utilize their bikes to haul goods. The difference between the two zones may be reflected in the fact that there are more transport options in the South for people to take.

Figure 5 shows mean weights normally carried by respondents, as well as maximum reported weights, by zone and by gender. There is a large discrepancy in the weight of goods hauled. In the East, normal weights are reported to be significantly less than in the South, and women carry significantly less weight than men. The mean weight of goods carried in the South is 25.6 kg compared to 19.4 kg in the East. In the South, the average for most weight carried, 54.5 kg, was double the most weight carried in the East. The quality of roads is generally better in the South, and bear in mind that the distances traveled are greater in the East. Typical goods carried include firewood, water, fish products, and agricultural products.

Figure 5: Normal and maximum weights carried by livelihood respondents by zone and gender.



In the East, respondents were more likely than their Southern counterparts to engage in fish processing and sales both before and after the tsunami (*Refer to Table 2 above*). In the South, almost one-third of the respondents (31%) received a formal salary compared to only 8 percent in the East prior to the tsunami. After the tsunami the number of respondents earning formal salaries remained the same in the South but increased to 13 percent in the East. Petty trade and fish sales were also frequently mentioned as income sources (20% and 15% respectively).

While it is readily apparent that bicycles are critical for people to engage in their livelihood activities, they also play other important roles for households. Over three-quarters (77%) of

respondents stated that they carried food items for their households. Seventy percent of respondents carry people/passengers and 21 percent of respondents carry water.

Alternate Modes of Transport

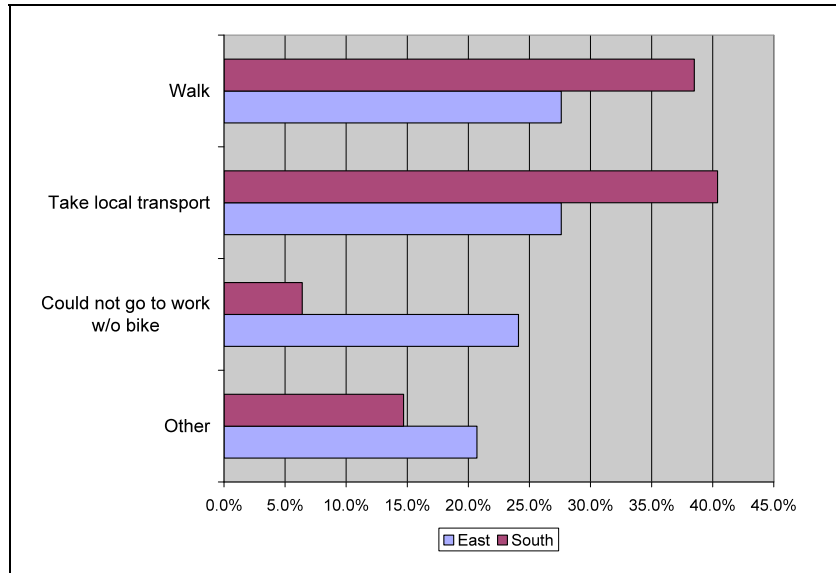
Project beneficiaries reported a wide range of transport options available in their respective communities. Modes of transportation included, bicycles, motorcycles, buses, trishaws, vans, lorries, small cars, tractors and trains. Walking was also mentioned as an alternative form of transportation. The bicycle was easily the most common mode of transportation mentioned. Transporting or carrying goods, going to work or to school was the main use of transport. Other uses of transport include going to the hospital, visiting friends or relations. Bicycles are mostly used for short distances. Trishaws and motorbikes were utilized for medium distances. Bicycles and buses offered the cheapest mode of transportation. Trishaws/local taxis were considered out of reach for most people and were rarely used Private transportation in personal cars was even less common.

Factors affecting preference of transportation mode

- ❖ *Cost of transport*
- ❖ *Safety and comfort*
- ❖ *Security*
- ❖ *Availability*
- ❖ *Time taken to reach destination*
- ❖ *Distance to be traveled*

Walking and local transport were both stated to be viable alternative modes of transportation by 28 percent of respondents. This is in stark contrast to 40 percent of respondents in the South stating local transport and 39 percent of Southerners having the ability to walk to work (Figure 6). A significant finding highlighting the importance of bicycles for peoples' livelihood and mobility is the fact that almost one-quarter (24%) of respondents in the East stated that they could *not* get to work without their bicycle. People in the South are not as dependent upon bicycles, probably due mainly to the presence of local transportation and geographical proximity.

Figure 6: Alternative modes of transportation by Region



The long-term conflict in the East has also had an impact on transport alternatives. Clearly there are fewer options available in the East. In the East there were reports that buses were not regular hence they were unreliable. In addition, some communities had to walk a long distance to catch a bus. In contrast, in the South transport was reported to be always available particularly for those staying in urban areas. However, some bus operators did not want to cater for short distance travelers (short distances are considered less profitable).

These findings show that bicycles have a significant positive impact on beneficiaries by drastically reducing their commute times, thus enabling them to spend more time restoring and improving their livelihoods. For those that use their bicycles during the course of their work, bicycles reduce travel times and greatly increase the amount and weight of goods that can be transported compared to foot travel.

Other Factors

Prior to the tsunami 77 percent of women reported utilizing a bicycle for income generating activities. Currently that percentage has increased to 82 percent. There are only slight gender differences in the commute distance and time to and from work. Distance traveled *during* work, however, does appear to be less for women ($p = .007$). This result implies that women are more likely to use bicycles exclusively for transport to and from work rather than having a livelihood that requires hauling goods or other travel needs. When asked how they would commute without a bicycle, women were more likely than men to take local transport than walk. As mentioned above, the distances traveled to work were relatively the same for men and women, therefore this gender differential could be due to safety concerns. Of note among women, those working in factories reported more bicycle use. For government employees, beyond transportation to their workstations, bicycles were also used for work related activities like field visits (e.g. midwives visiting clients in households).

Beneficiaries also used bicycles to access various services including going to the hospital, going to the post office, markets/shops, going to the main road to catch a long distance bus. In the domestic sphere bicycles were useful in carrying heavy loads like water and firewood. Socially, bicycles were used to go to the church/temple, visiting friends or relations, attending weddings. Children also rode bicycles for recreational purposes.



Economic Impact of Bicycles

Bicycles can have a direct and positive impact on household disposable income, especially for poor households. Bicycles can provide a cheap form of alternative transport. The average cost of getting to/from work without a bicycle was reported to be 50 and 70 rupees/day in the East and South, respectively. Assuming a six day workweek, bicycles can save individuals an average of 300-450 rupiah/week, or 1,200-1,800 per month⁹ in direct transport costs (this is equivalent to US\$10.90-16.40 per week). The average household income of poor households in Eastern Sri Lanka is about 5,850 rupees per month, and in the South it is about 8,000 rupees per month. Thus in the South, transport alone can account for 20-30 percent of disposable household income, and in the South for 10-20 percent of disposable household income, assuming there is only one individual paying for transport. The poorer households, if they have the choice, would opt for walking to save this income for other essential needs such as food, health care and education (although not all have this choice).

While walking instead of taking an alternative form of transport can save money, it requires time. As reported earlier, those with bicycles save considerable time in getting to and from work compared to those walking. They also save time during work, plus have the ability to haul up to 50 kilograms of goods with their bicycle. The average worker in the lower income households of the East makes about 330 rupees per day, or US\$3.00. In the South, the average worker makes about 400 rupees per day, or US\$3.60. Assuming a ten-hour workday, this means that every hour could be worth approximately 33 rupees (30 cents) in the East and 40 rupees (36 cents) in the South. As reported earlier, bicycle users in the East saved on average 2.5 hours per day by using a bicycle, and those in the South saved 1.5 hours. Assuming every hour saved could be put into other productive activities (such as weeding a field, selling fish, visiting clients), bicycle owners in the South are saving 82 rupees per day, or US\$.75. Those in the South are saving 60 rupees or about US\$.55 per day. Again assuming a 6-day workweek, those in the East could be saving 1,440 rupees per month and those in the South 2,000 rupees per month, similar to the savings in equivalent alternative transport.

Bicycles may also help poorer households to access cheaper goods and services. Often prices in regional markets will be lower than those in local markets. While the bicycle survey did not collect information on local market prices, a parallel survey conducted by World Vision did collect asset prices in local markets and found significant differences based on market location. Factors such as volume of sales and transport costs of goods have an impact on selling price, and the more rural markets tend to be more expensive for non-locally produced goods and services.

⁹ Income data comes from a parallel survey conducted by World Vision for its tsunami program. Income data was available for low, middle and upper income households. The data reported here is for low income households.

Any savings in disposable income for poor households contributes to increasing household livelihood security (and in areas where food and nutrition problems exist, these savings can contribute to household food security). Households can redirect income they would spend on transportation, or income they would have made by spending more time working and less time commuting, into alternative needs such as paying school fees, improving their diet, or seeking medical care. They can also put more money into savings, purchase assets, or spend it on social functions.

IV.c. Students

Students rely heavily on bicycles for transport to and from school. The overall average distance to school is 2.3 km, with most (92%), less than 5 km. Distance to school varies regionally, with students in East having to travel further than students in the South ($p = .003$).

A paired t-test indicated that commute time on a bicycle is significantly less than commute time without a bicycle ($p < .001$). The overall average time spent commuting to school on a bicycle was 17.5 minutes compared to an average commute of 25.6 minutes without a bicycle. In both the East and the South it was found that commuting by bicycle was significantly faster than commuting without a bicycle.

Table 4: Proportion of children carrying others to school, who is carried, and how books are carried by zone and gender.

		<i>East</i>	<i>South</i>	<i>Males</i>	<i>Females</i>	<i>All</i>
Carry somebody? (n=801)	Yes	56.8	61.5	62.7	51.6	58.3
	Who carried? (n=571)					
	Family Member	72.1	56.0	59.8	79.3	66.6
	Friend	27.9	44.0	40.2	20.7	33.4
How books are carried	Backpack	60.9	95.7	69.7	76.4	72.3
	On a rack	28.9	3.2	22.0	18.2	20.5
	In hands	10.2	1.1	8.4	5.3	7.2

Table 6 above shows some interesting differences between males and females, and between East and South in terms of who is taken to school on ones bicycle. Females are much more likely to carry another family member whiles males are more likely to carry a friend. In the East, where transport is more problematic, over 70 percent of children also carry another family member. In the East, bike racks are much more important for carrying books, probably because it is a cheaper alternative to a backpack.

It is clear that students have multiple uses for their bicycles (*see Figure 7 below*). Only three percent of respondents stated they used their bicycle exclusively for transport to and from school. Three-quarters responded that they run errands for their family, while over half (56%) ride their bicycles to visit friends. Forty-one percent of respondents stated that they use their bikes to go to the market. These findings illustrate that bicycles are integral to young people's lives not only as primary modes of transport to and from school, but also for domestic and social needs.

Figure 7: Student bike use (Multiple response)

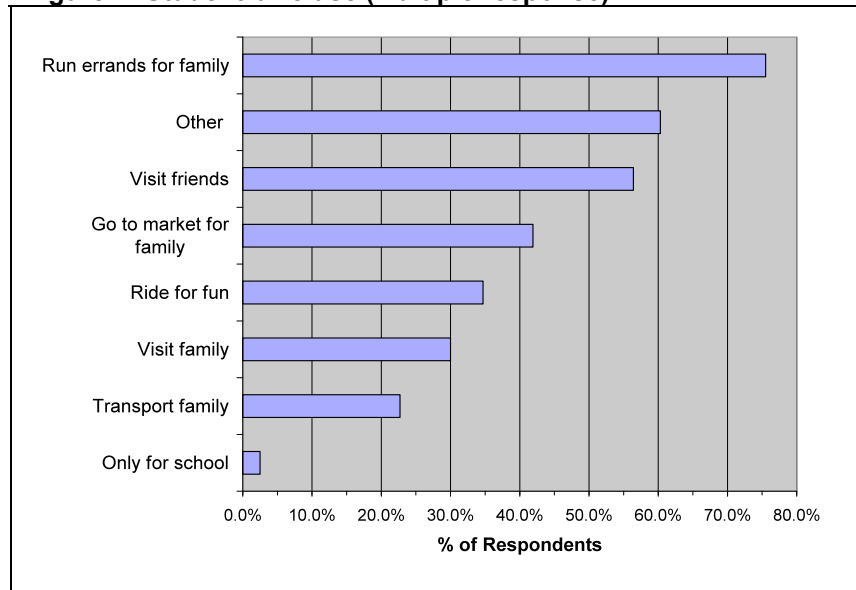


Table 5 shows some important differences in bike use between the East and South. In the South, about 70 percent of students also use their bike to make trips to the market for the family, whereas in the East this is more difficult due largely to the conflict. Also in the East, riding a bicycle for pure fun is not nearly as common as it is in the South, again likely due to the risks associated with the conflict.

Table 5: Student bike use outside of school by zone.

Zone		Responses		Percent of Cases
		N	Percent	
East	Go to market for family	128	8.9%	25.3%
	Do errands for family	376	26.2%	74.3%
	Visit friends	265	18.5%	52.4%
	Ride with friends for fun	102	7.1%	20.2%
	Take family members elsewhere	31	2.2%	6.1%
	Visit other family members	135	9.4%	26.7%
	Only use for school	14	1.0%	2.8%
	Other	382	26.7%	75.5%
	Total	1433	100.0%	283.2%
South	Go to market for family	208	17.9%	70.5%
	Do errands for family	229	19.7%	77.6%
	Visit friends	187	16.1%	63.4%
	Ride with friends for fun	176	15.1%	59.7%
	Take family members elsewhere	151	13.0%	51.2%
	Visit other family members	105	9.0%	35.6%
	Only use for school	6	5%	2.0%
	Other	101	8.7%	34.2%
	Total	1163	100.0%	394.2%

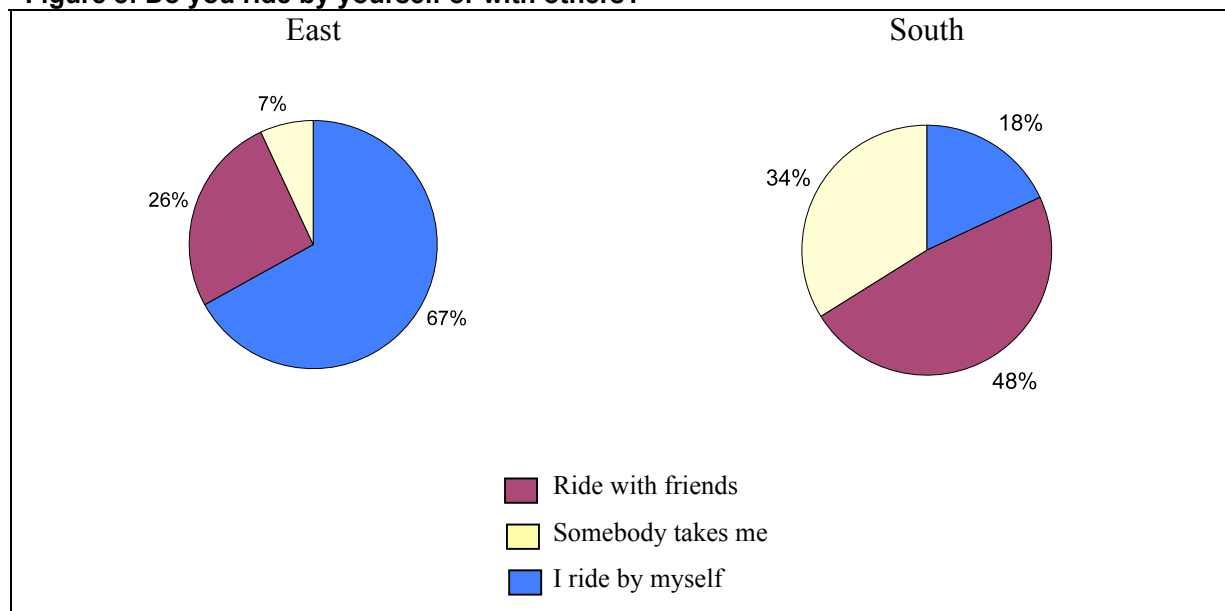
As shown in the livelihoods section above, people in the East are particularly dependent upon bicycles as primary modes of transportation. This is reflected again amongst students. As Table 6 illustrates below, students in the East are less likely to have access to public transportation than students in the South.

Table 6: Alternative modes of transportation available to students

Without a bicycle, how would you get to school?	East (%)	South (%)
Father/Mother would take me	8.3	2.7
Public transportation	9.7	31.9
Walk by myself	61.3	47.1
Walk with friends	15.4	12.5
Could not go to school	.2	***
Other	5.1	5.8

There are some other interesting regional differences amongst students and bike use. In the East over three-quarters of student respondents used their bicycles to get to school whereas in the South 63 percent of students use their bikes as transport to school. Sixty-seven percent of students in the East ride by themselves to schools compared to just 18 percent in the South (See Figure 8). In the South, 34 percent of the students are accompanied to school by somebody compared to 7 percent in the East.

Figure 8: Do you ride by yourself or with others?



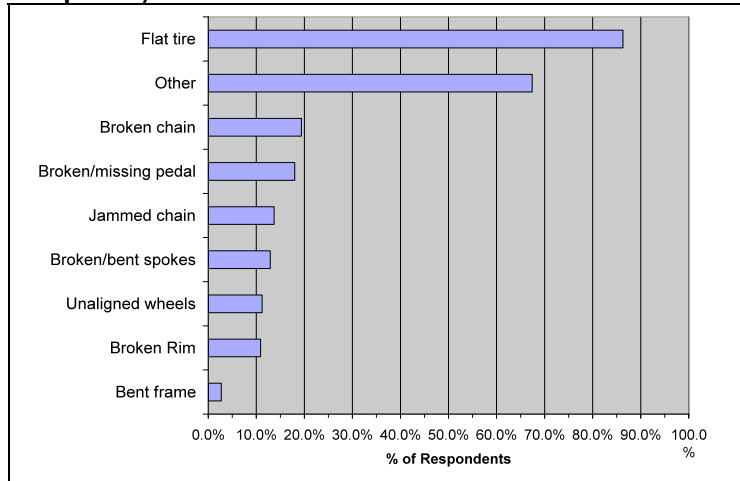
There is a gender dimension to bike use in Sri Lanka. Eighty percent of males responded that they ride their bicycle to school while only 62 percent of females ride their bicycles to school. Females are also more likely to ride in groups; 56 percent of females do not ride alone versus 44 percent for male students.

V. Maintenance

Not surprisingly, the most commonly reported problem stated by 86 percent of respondents was flat tires (see Figure 9). The next two most common problems were broken chains (19%) and broken/missing pedals (18%).

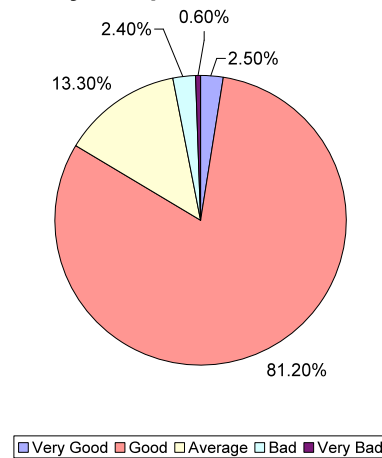
Most respondents (92%) are unable to fix these problems themselves and are dependent primarily upon local repair stalls for assistance. Distance to repair shops is significantly greater in the East than it is in the South ($p < .001$). Chi-square tests also show that part availability varies by region as well. The most commonly unavailable parts were tires and tubes. Given the high prevalence of flat tires and subsequent demand for tires/tubes, any future bicycle distribution should ensure the availability of these critical spare parts.

Figure 9: Commonly reported problems (multiple response)



Overall, the quality of the repairs was satisfactory (Figure 10). Eighty-four percent of respondents felt the repairs were good or very good and when expanded to include the average category, the percentages jumps to 97 percent. Ninety-one percent of respondents felt the pricing for the repairs was fair to very fair.

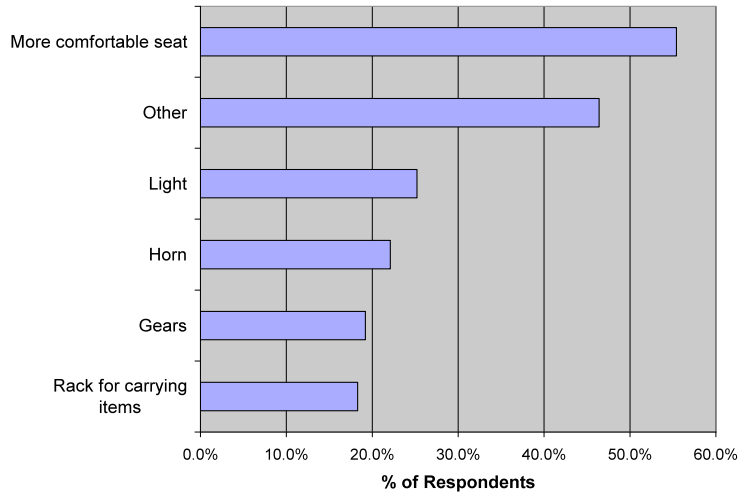
Figure 10: Quality of repairs



The bicycles distributed generally fit people well. Overall, 79 percent of respondents stated the bike fit “about right”. However, unusually high percentages (21%) of respondents in the East stated that the bike was too small for them. This is especially important as it has been shown that people in the East are largely dependent upon their bikes and future distributions should put more emphasis on bike fit.

The most common modifications made to the bicycles were adding decorations (52%) and adding a basket (51%). It is interesting to note the emphasis on personalizing the bicycle. Over half (55%) of respondents noted that the most important improvement that could be made to the bicycle would be a more comfortable seat (see Figure 11). This is not unexpected, given the amount of time and distance people ride their bikes. One-quarter of respondents stated they would like a light and 22 percent stated they wanted a horn, indicating a prioritization of safety features.

Figure 11: Improvements desired for bicycle (multiple response)

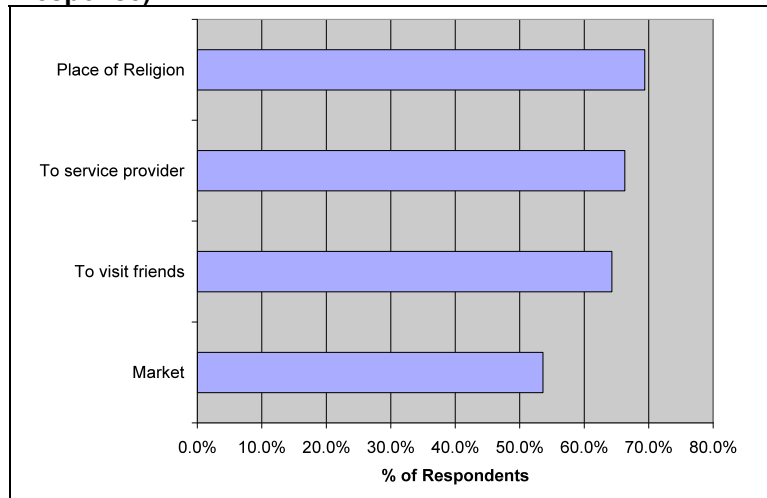


VI. Bike Ownership, Use, and Safety

Regional variation was highlighted again in bike ownership. Households in the East tend to own and desire more bikes ($p < .001$). This is not surprising given the already discussed dependency on bikes in the East. Almost 70 percent of respondents in the South loan their bikes out (mostly to a neighbor or friend) compared to 61 percent in the East. This differential could be related to the higher levels of bike ownership in the East.

Overall, most (80%) respondents transport family members on their bikes. The most common destinations are to places of religion and service providers (see Figure 12). It should be noted that while these are the most common responses, visiting friends and markets are also frequent and important destinations stated by respondents.

Figure 12: Most common destinations (multiple response).



These findings highlight the fact that the benefits of bicycle ownership are not exclusively related to livelihoods or income-generation. Bicycles are integral to people’s personal lives as shown by the high rates of people going to places of religion and visiting friends. Bicycles also enable people to access healthcare and other services, as evidenced by the high prevalence of respondents that utilize their bicycles to visit service providers.

A disproportionate amount of serious accidents were experienced in the East. Over one quarter (26%) of respondents have experienced a serious accident compared to 16 percent of respondents in the South. Reasons for this could include the presence of more bikes in general or poor roads. Surprisingly, the discrepancy in accidents is not reflected in presence of injuries, in the East injuries were experienced by 11 percent of the respondents versus 13 percent in the South.

VII. Obstacles to Widespread Use

Obstacles to more widespread use of bicycles

- ❖ *Lack of financial resources*
- ❖ *For those who wish to purchase bicycles by getting loans find interest rates prohibitive*
- ❖ *Some households are still paying off debts they incurred as a result of the tsunami*

While most project beneficiaries said they had the desire to get new bicycles, lack of financial resources was the most cited reason why they could not do so. Most of them could not even get a loan to buy a bicycle because they did not have a steady income to repay the loan or the interest rates were prohibitive. The situation was worsened by the tsunami that saw a lot of household taking loans that a lot of them were still repaying at the time of the evaluation. Some people however pool financial resources

together to buy a new or used bicycle but this was not common. Another option was to buy cheaper brands available though these were of inferior quality. Some shops also offer installment plans for people to buy bicycles.

In addition to financial resources, the focus group discussions revealed some gender related obstacles regarding bicycle use in Sri Lanka. Women and girls state they have not benefited from the bicycle distribution program as much as boys and men, even though they also received bicycles. The primary factors affecting additional use of bicycles for girls and women are cultural – however this does not seem to be a complete barrier for access, as some women and girls currently use bicycles. In all zones girls state they use bikes to get to school, some girls in the south report that their parents discourage them from riding bicycles, and they are restricted to riding their bikes in their gardens. Girls also report that boys yell insults at them when they are riding bicycles, and sometimes remove their bike seats or otherwise damage their bikes. The most common reason that women do not use bikes is that they do not know how to ride bicycles. In some places it is culturally inappropriate for women to ride bicycles, and women face negative comments from other community members when they are riding bikes.

VIII. Conclusions

In Sri Lanka it is clear that bicycles play a critical role in the lives and livelihoods of students, men and women. The findings of this report provide empirical evidence of the value of bicycles to people's lives and livelihoods, and the timeliness of the distribution program in building household assets and providing a needed benefit. Particularly after the tragedy of the 2004 tsunami, bicycles have enabled beneficiaries to restore and improve their livelihoods, as well as providing a critical sense of autonomy and independence in the wake of the disaster. Not only are bicycles integral to people's livelihoods, they also provide crucial modes of transportation for health care and other services.

Bicycles proved to be very flexible and versatile for the target communities hence the heavy reliance on them as the primary transport mode. Almost all household members make use of bicycles for different purposes. Increased mobility by people involved in small-scale trade/door-to-door vending was an important outcome of the bicycle distribution project. Sri Lanka is facing rising fuel costs and this is affecting fishing communities' operational costs. Using bicycles instead of motorized vehicles could assist in cutting fuel costs. School children also benefited immensely from the project, as bicycles were clearly the most preferred choice of transport to go to school. At home, bicycles reduced the time taken in completing tasks like carrying water, goods from the market, harvest from the fields or firewood. This lessened the burden on women and children (who mostly do these tasks) and provided them with time to do other activities.

Bicycles can have a direct and positive impact on household disposable income, especially for poor households. In the South, transport alone can account for 20-30 percent of disposable household income, and in the South for 10-20 percent of disposable household income, assuming there is only one individual paying for transport. The poorer households, if they have the choice, will opt for walking to save this income for other essential needs such as food, health care and education, although not all have this choice). Assuming every hour saved could be put into other productive activities (such as weeding a field, selling fish, visiting clients), bicycle owners in the South are saving 82 rupees per day, or US\$.75. Those in the South are saving 60 rupees or about US\$.55 per day. Again assuming a 6-day workweek, those in the East could be saving 1,440 rupees per month and those in the South 2,000 rupees per month, similar to the savings in equivalent alternative transport. Bicycles may also help poorer households to access cheaper goods and services.

Any savings in disposable income for poor households contributes to increasing household livelihood security (and in areas where food and nutrition problems exist, these savings can contribute to household food security). Households can also redirect saved income into other livelihood capital – such as productive assets such as tools and fishing equipment, or into non-productive assets such as televisions. They can invest in human capital by providing more education for their children or acquire additional skills for themselves. With the money bicycles save, households can improve their diet and their health.

Bicycle distribution has also effectively mobilized and empowered women as is evidenced by the increasing number of women using bicycles to engage in livelihood activities. School girls were less likely than boys to ride bicycles to school and when they did, they were more likely to ride in groups, most likely for safety reasons.

In the event of mechanical problems, most respondents were satisfied with both the quality and price of repairs. In general parts are usually available, although data indicates that there is some regional variation; the South is more likely to carry spare parts than the East.

Households in the East are likely to own and desire more bicycles. This again highlights the importance of bicycles in the East. Most respondents transport family members on their bicycles and frequent places of worship and services providers the most often. Accidents are more common in the East than the South, but injury is relatively rare in both regions.

IX. Future Considerations

The World Bicycle Relief and World Vision implemented a novel asset program for tsunami victims. Few agencies have acknowledged the *Power of Bicycles* and their potential positive impact in post-disaster economic and social recovery. With every new and innovative program comes a series of valuable insights and lessons that can be applied to future programs. The following insights come from discussions with bicycle recipients, aid workers, and World Bicycle Relief representatives.

1. *Credit Programs.* In the work described herein, all bicycles were provided to recipients at no cost. This was justified on the basis that every recipient had lost a bicycle as a result of the tsunami (along with other assets), and individuals would not be able to purchase another bicycle in the foreseeable future. In the meantime, bicycles could contribute to economic recovery. However, providing free bicycles, and bicycles only to former bike owners, limited the program in its reach. Future efforts to promote bicycle ownership should consider a wider range of options for individuals to acquire a bicycle. At least three options should be considered: distributing bicycles at no cost; providing bicycles at a subsidized cost, and providing bicycles on credit. The latter two options can also be combined in various ways,

Numerous studies have shown that providing assets for free, under certain scenarios, can result in some disincentives for the owner of the asset. Generally, people value an asset more if they had to contribute to acquiring it. This holds true for even the poorest households. Nevertheless there are circumstances where free distribution is justified, and the post-tsunami environment was one of these circumstances. Time was limited, households lost substantial resources, and the asset itself could positively influence recovery. When distribution is free it should be targeted as well as possible to ensure that those who are poorest, or most in need, are first-line recipients.

In cases where the cost of a bicycle is subsidized, the amount of the subsidy should be carefully studied to reflect the means of the target group(s). Different levels of subsidies can be applied to different classes of individuals or households. There are also options for how the difference in the actual cost and the subsidized cost is paid – in cash or in kind.

The third option to consider is some type of micro-credit arrangement. The challenge is to mainstream good practice in microfinance operations and increase the outreach to the poor. Realize that any credit programme will require more administration, as poorer individuals will likely have to repay the loan over an extended time period.

Finally, carefully consider who should receive bicycles at no cost (there are times and circumstances where this is important) and who should have access to other options (subsidize, credit, earned credit). For school children, receipt of a bicycle could be linked to other goals and objectives, such as participation in environmental programs, community work, etc.

2. *Advocacy.* There are often some important advocacy messages that need to be promoted along with bicycle provisioning. This could include such things as bicycle safety, gender stigma/discrimination, urban planning for bicycle use, promotion of bicycle paths, and changes in policies (such as import duties) related to bicycles. With any

bicycle programme there should be thought in combining advocacy with bicycle promotion at the local level.

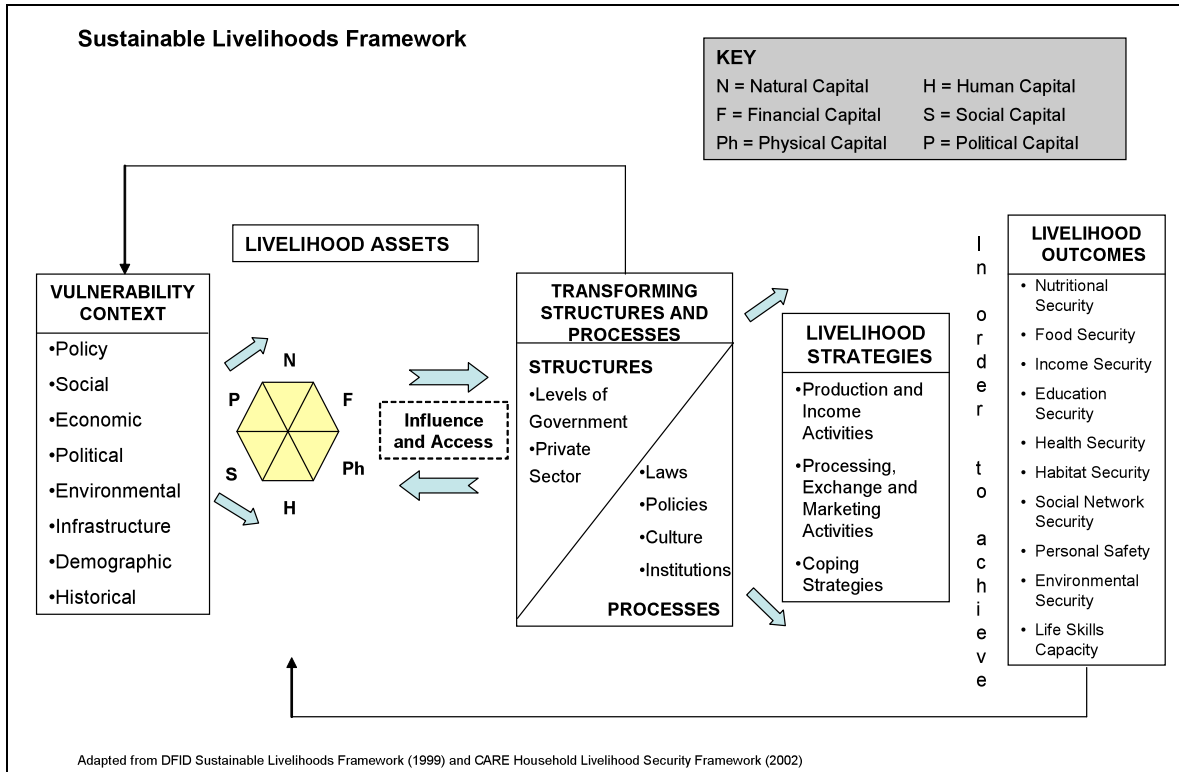
3. *Programme Design.* Bicycle programmes should be designed using causal analysis, systems thinking, and goal/objective formulation. Focus groups can be used in the assessment stage to explore key issues and gain insight on various aspects of the plan.

4. *Workshops.* Several bicycle programmes have reported success with providing one or more workshops for bicycle recipients. The common topics are on bicycle repair, bicycle safety, and enhancing components (such as how to build a bicycle ambulance). Aspects of life skills, such as making a household budget, can also be incorporated.

5. *Targeting.* Be explicit in targeting, justifying who receives bicycles and why (intimately linked to point 3. For example, target specifically for (or bias towards) those who use their bicycles for livelihood activities (as opposed to just getting to/from work) – when resources are limited.

Annex I

Sustainable Livelihoods Conceptual Framework



**Annex II
Bicycle Questionnaire**

Bicycle Questionnaire	
WORLD BICYCLE RELIEF AND WORLD VISION IMPACT OF BICYCLES IN TSUNAMI RECOVERY	
District code:	_ _ _ _
Village Code	_ _ _ _
Module: 1. livelihood	2. student 3. government worker _

A. INDIVIDUAL DATA			
1.	Sex:	1 = Male 2 = Female	
2.	Age (years):	_ _ Years	
3.	Household Size – how many people are CURRENTLY resident in the household	_ _ Members	
4.	Number of children 5 years of age and under:	_ _	
5.	Number of children 6-18 years of age:	Males _ _	Females _ _
6.	Number of adults 19-59	Males _ _	Females _ _
7.	Number of adults 60 or older	Males _ _	Females _ _

B. LIVELIHOOD		
1.	What was your primary way of earning money before the tsunami? (Choose one only)	1 = Producing and selling crops 2 = Selling crops produced by others 3 = Casual labor - agriculture 4 = Casual labor – non-agriculture 5 = Producing and selling livestock 6 = Selling fish 7 = Processing fish 8 = Skilled trade/artisan/laborer 9 = Small business/shop 10 = Petty trade (firewood sales, etc.) 11 = Brewing 12 = Government employee 13 = Other Formal salary/wages 14 = Vegetable production/sales 15 = No source of livelihood 16 = No employment (student, unemployed, etc.) 17 = Other
2.	Did you use a bicycle in any way for earning this money?	1 = Yes 2 = No
3.	How did you use your bicycle in earning money? (Multiple Response)	1 = As transportation to/from work 2 = As transportation during work 3 = To haul goods/materials/equipment/produce/fish 4 = To pick up supplies 5 = To visit clients/households 6 = Other
4.	What is your primary way of earning money now? (Choose one only)	1 = Producing and selling crops 2 = Selling crops produced by others 3 = Casual labor - agriculture 4 = Casual labor – non-agriculture 5 = Producing and selling livestock 6 = Selling fish 7 = Processing fish 8 = Skilled trade/artisan/laborer 9 = Small business/shop 10 = Petty trade (firewood sales, etc.) 11 = Brewing 12 = Government employee 13 = Other Formal salary/wages 14 = Vegetable production/sales 15 = No source of livelihood 16 = No employment (student, unemployed, etc.) 17 = Other
5.	Do you use a bicycle in any way for earning this money?	1 = Yes 2 = No
6.	How do you use your bicycle in earning money? (multiple answers)	1 = As transportation to/from work 2 = As transportation during work 3 = To haul goods/materials/equipment/produce/fish 4 = To pick up supplies 5 = To visit clients/households 6 = Other

7.	Please estimate the number of kilometers you ride on your bicycle during an average work day for the following: (if < 1, write 0)	To work: _ _ During work: _ _ From work: _ _
8.	How long does it take you to get to work on your bicycle?	Hours: _ _ Minutes: _ _
9.	If you did not have a bicycle, how would you get to your destination?	1 = Walk 2 = Take local transport 3 = Could not work in this job w/o my bicycle 4 = Other
10.	How long would it take you to get to work using this other form of transportation?	Hours: _ _ Minutes: _ _
11.	How much would it cost you each day:	_ _ _ _
12.	What types of items do you typically carry on your bicycle: (multiple answers)	1 = People/passengers 2 = Small animals/livestock 3 = Chicken/poultry 4 = HH food items 5 = Fish/seafood products 6 = Firewood 7 = Water 8 = Fuel (cooking, petrol) 9 = HH goods and supplies 10 = Other
13.	How much do you normally carry on your bicycle (kilos) per trip?	_ _ _ Kilos
14.	What is the most you have ever carried?	_ _ _ Kilos
15.	What is the furthest distance you have traveled in a single day?	_ _ _ Kilometers
16.	How much money do you earn each month?	_ _ _ _ _ _ _ _
17.	What impact does your bicycle have on your ability to make this money?	1 = Can make a lot more money with my bike 2 = Can make a little more money with my bike 3 = No impact (would make the same w/o my bike) 4 = Could make more money with other transportation

E. SCHOOL CHILDREN		
1.	Do you use your bicycle to go to and from school?	1 = Yes 2 = No
1a.	Do you ride yourself to school, or does somebody take you on your bicycle?	1 = Ride myself Skip to 2 = Somebody takes me
1b.	Who usually takes you to school?	1 = Mother 2 = Father 3 = A brother 4 = A sister 5 = Other Skip to E5
2.	Do you ride by yourself, or with friends?	1 = By myself 2 = With friends 3 = Depends
3.	Do you carry anyone on your bicycle when going to school?	1 = Yes 2 = No
4.	Who do you take with you?	1 = Another family member 2 = A friend
5.	How do you carry your school books and other things?	1 = In a backpack 2 = On a rack 3 = In my hands
6.	How far is it to school from your home? (If < 1 kilometer, write 0)	_ _ _ Kilometers
7.	How long does it take you to get to school on your bicycle?	Hours: _ _ Minutes: _ _
8.	If you did not have your bicycle, how would you get to and from school?	1 = Father or mother would take me 2 = I would take public transportation 3 = I would walk by myself 4 = I would walk with friends 5 = I could not go to school without a bicycle 6 = Other
9.	How long would it take you to get to school this way?	Hours: _ _ Minutes: _ _
10.	How far is it to school from your home? (If < 1 kilometer, write 0)	_ _ _ Kilometers
11.	What do you use your bike for, other than going to school? Multiple response	1 = To go to the market for my family 2 = To do other errands for my family 3 = To go to my friends houses 4 = To ride with my friends for fun 5 = To take other family members places 6 = To visit other family members 7 = I only use it for school 8 = Other
12.	Do any other people ever use your bicycle?	1 = Yes 2 = No If no, skip to End
13.	Who uses your bicycle? (Multiple answers)	1 = Family members 2 = Other school children 3 = Neighbors/friends 4 = Other

C. MAINTENANCE

1.	What types of mechanical problems, if any, have you had with your new bicycle since you received it? (Multiple answers)	1 = Flat tire 2 = Broken chain 3 = Jammed chain 4 = Broken/bent spokes 5 = Bent frame 6 = Unaligned wheels 7 = Broken rim 8 = Broken/missing pedal 9 = Other
2.	Are you able to make all of the repairs yourself?	1 = Yes 2 = No
3.	If no, where do you take your bicycle for repairs?	1 = Local repair stall 2 = Friend/acquaintance 3 = Anywhere convenient
4.	How far away is this? (If < 1 kilometer, write 0)	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> Kilometers
5.	Are spare parts normally available?	1 = Yes 2 = No
6.	If no, which parts are usually not available	List to be generated
7.	How do you find the quality of repairs?	1 = Very good quality 2 = Good quality 3 = Average quality 4 = Bad quality 5 = Very bad quality
8.	How do you view the prices that are charged for repairs?	1 = Very fair 2 = Fair 3 = Unfair 4 = Very Unfair
9.	How does your bicycle fit you?	1 = Too big 2 = About right 3 = Too small
10.	What modifications, if any, have you made to your bicycle	1 = Added a rack for carrying items 2 = Added a horn 3 = Painted the frame 4 = Added decals 5 = Added decorations 6 = Other
11.	What modifications would make your bicycle better?	1 = A rack for carrying items 2 = A horn 3 = More comfortable seat 4 = Gears for hills 5 = A light for riding at night 6 = Other

D. SOCIAL/OTHER		
1.	How many bicycles are in your household?	□□□
2.	How many additional bicycles would you like your household to own?	□□□
3.	How would you most likely purchase an additional bicycle?	1 = Purchase with cash 2 = Purchase using formal credit 3 = Purchase using informal credit (NGO, savings group, etc.) 4 = Purchase using loan from moneylender 5 = Purchase with money borrowed from friends/relatives 6 = Purchase with savings 7 = Other
4.	Have you ever used credit to purchase an item (i.e., borrowed money)?	1 = Yes 2 = No
5.	Would you consider obtaining additional bicycles using credit?	1 = Yes 2 = No
7.	Do any other people ever use your bicycle?	1 = Yes 2 = No
8.	Who uses your bicycle? (Multiple answers)	1 = Spouse 2 = Children 3 = Neighbor/friend 4 = Other people at work 5 = Other
9.	How much compensation do you receive for lending your bicycle?	1 = None (0) □□□□□
10.	Do you ever transport other members of your household on your bicycle?	1 = Yes 2 = No
11.	How many trips to the following locations have you taken a member of your family to in the last two weeks? (multiple answers)	Local Market □□□ Regional Market □□□ Place of religion □□□ Visit friends □□□ Local clinic/hospital □□□ Take children to school □□□
12.	Have you had any accidents on your bicycle?	1 = Yes 2 = No
13.	Have you had any injuries?	1 = Yes 2 = No
14.	What types of injuries?	To be generated
15.	Do you think bicycles are equally as useful for men as for women?	1 = No, they should be used only by men 2 = No, they should only be used by women 3 = Yes, they are equally useful