FINAL REPORT
MARCH 2009

EVALUATION REPORT ON THE

2008-2009 BICYCLE AMBULANCE PILOT PROJECT IMPLEMENTED IN THREE DISTRICTS OF EASTERN PROVINCE, ZAMBIA

FUNDED BY
CANADIAN FUNDS FOR LOCAL INITIATIVE (CFLI-CIDA)

Picture 1.0-A patient being transported to a health facility in Chipata at Chiwoko on a bicycle ambulance by Mr. Banda

By Victor Simfukwe (Project Manager and Lead Author), Caroline Barber and Gary Forster
Contents

Acronyms ........................................................................................................... 3

1. Executive Summary ......................................................................................... 6

2. Introduction ......................................................................................................... 6

3. Background ......................................................................................................... 7
   3.1. Project Purpose ............................................................................................ 7
   3.2. The need for the project ............................................................................. 8
   3.3. Building local capacity .............................................................................. 9
   3.4. Transaid’s previous IMT projects ................................................................. 9
   3.5. Working with existing structures and partners in Zambia ......................... 9

4. Methodology ....................................................................................................... 10
   4.1. Implementation plan .................................................................................... 10
   4.2. Partners Involved and their roles in this project ......................................... 12
   4.3. Sensitisation ................................................................................................ 14

5. Design and Construction of the Bicycle Ambulance ....................................... 15
   5.1. Construction phases .................................................................................... 15
   5.2. Designs .......................................................................................................... 15
   5.3. Training of the field mechanics .................................................................... 18

6. Distribution .......................................................................................................... 18
   6.1. Chipata (Makungwa Area Development Programme): ............................... 18
   6.2. Katete ........................................................................................................... 19
   6.3. Petauke (Nyampande ADP) ......................................................................... 19

7. Operational Management of the Bicycle Ambulances ..................................... 19
   7.1. Accessing the bicycle ambulance ................................................................ 19
   7.2. Management of information ....................................................................... 20
   7.3. Governance .................................................................................................. 20

8. Monitoring and Evaluation Model and Process ................................................. 20

9. Monitoring and Evaluation Results .................................................................... 21
   9.1. Baseline ........................................................................................................ 21
   9.2. Monitoring and Evaluation Phase 1 .............................................................. 23
   9.3. Monitoring and Evaluation Phase 2 .............................................................. 25
   9.4. M&E Key Findings Based on M&E Phases 1 and 2 ...................................... 25
9.5. Lessons Learned

9.5.1. Importance of allocation sufficient time for meaningful M&E

9.5.2. Challenges of distributing at beginning of rainy season and importance of M&E over 12 month period

9.5.3. Having a stronger presence of the ground - beyond reliance on partners

9.5.4. Kgoroo - notes relating to Kgoroo - 13 villages in one zone. Point about sensitisation and involving the traditional village headmen.

9.5.5. Position on the bicycle ambulance

9.5.6. Feedback on the different models and the merits of each design

10. Conclusions and Recommendations

Appendices
1. Bicycle ambulance contract
2. List of custodians
3. Log sheet template
4. Maintenance sheet template
5. M&E data:
   5.1 M&E Model
   5.2 Baseline and M&E questionnaires
   5.3 Completed baseline data
   5.4 Completed M&E phase 1 Caregivers interviews
   5.5 Completed M&E phase 2 Caregivers interviews
   5.6 Completed M&E phase 1 Beneficiaries interviews
   5.7 Completed M&E phase 2 Beneficiaries interviews
   5.8 Completed log books
6. Budget summary

Acronyms
AIDS Acquired Immune Deficiency Syndrome
ADP Area Development Programme
ART Anti Retroviral Therapy
BA Bicycle Ambulance
CIDA Canadian International Development Agency
CFLI Canadian Funds for Local Initiatives
HIV Human Immunodeficiency Virus
IMT Intermediate Modes of Transport
MDG Millennium Development Goals
MIT Massachusetts Institute of Technology
NGO Non Governmental Organisation
OVC Orphans and Vulnerable Children
RAPIDs Reaching HIVs/AIDS affected People with Integrated Development and support
WBR World Bicycle Relief
1. Executive Summary

Transport costs, including the transport of emergency cases, put a strain on often already limited district health budgets, making emergency ambulance services difficult to sustain. Where free ambulance services are not available the cost of emergency transportation to a referral hospital is often a barrier to accessing health services for people living in remote rural areas. Research has indicated that a large percentage of the three mortality rates (infant, child and maternal) could be reduced by providing or supporting some intermediate modes of transport. More than 60% of people in developing countries live more than 8km from a healthcare facility and the need for timely and highly responsive health care services is made more urgent by the HIV/AIDS crisis in many countries.

In 2008 Transaid, a British NGO, implemented a bicycle ambulance project to respond to rural communities’ urgent need to access health facilities in the eastern province of Zambia. The project saw the production and distribution of forty ambulances in eastern province. The project was funded by the Canadian International Development Agency (CIDA) through the Canadian Funds for Local Initiatives (CFLI). The project was implemented in collaboration with a number of Zambian and International partners. Key to the implementation was the role of World Bicycle Relief (WBR) the lead partner, an International NGO with an office in Zambia.

The purpose of this project was three fold;
1. Improve access to healthcare for community inhabitants in Zambia’s eastern province
2. Build capacity within Zambia’s eastern province for the construction/maintenance of bicycle ambulances
3. Develop a report which offers solutions to issues of rural access, highlights elements of best practice and recommendations to be endorsed by international organisations

This project, whilst having been monitored and evaluated over just a four month period can be seen to have achieved the three core objectives. The bicycle ambulance project aimed to enable improved access to health facilities. Against this objective the Bicycle ambulance project has been successful, with 96% of Caregivers stating that the provision of a bicycle ambulance helped them to do their work in the community more effectively. Over the four month period according to data from the logbooks the bicycle ambulances we used 82 times by the caregivers in the community to transport clients to receive healthcare. Moreover, 86% of the trips undertaken were lifesaving according to the Caregivers. This means, according to the data collected during the project monitoring and evaluation the project has saved approximately 70 lives in 6 months.

From the data collected using the logbooks it was found that of the 71 trips with reasons provided, 28 or 40% were for the purposes of clients seeking ART. Malaria and pregnancy accounted for 20% and 17% of journeys respectively.

As a result of the bicycle ambulances communities have access to a free bicycle ambulance service. The clients are now able to receive medical attention in less time, whereas it used to take between two to three hours to take a patient to a rural health centre that was 2.5 km away using an ox-cart. It now takes an average of 30 minutes using a bicycle ambulance for the same distance journey. Whereas patients used to sit on bicycles en route to a rural health centre, now clients can lie flat on a bicycle ambulance which is much safer and more comfortable.

The full canopy of the ambulance now provides privacy, especially important for the expectant mothers. The canopy also shelters the clients from the heat of the sun and the rain.
The ambulance is readily available when it is needed unlike the cart whose oxen have to be fetched from the fields, often far away from the villages. The convenience of a stretcher has also made it much easier to cross rivers or take routes on foot that a bicycle or ox-cart could take.

These 40 bicycle ambulances covered an average distance of 10.2 km over the four months they were monitored and they have been used in challenging road conditions, at night and in all weathers. By trialling three different designs of bicycle ambulance valuable feedback has been obtained to help identify the most appropriate design for future projects. Of the three different designs trialled one bicycle ambulance with a full canopy and a non-flexible hinge has stood out as the superior model with the riders and beneficiaries both stating a preference for this model.

The project has also seen capacity built within Zambia's eastern province for the construction and maintenance of these bicycle ambulances. Ten field mechanics were trained in the construction and maintenance of the bicycle ambulances and indeed played a key role in the construction of these forty which are showing a positive impact in their communities of eastern province.

The total cost of the project was $43,000 USD which included the production, distribution and monitoring and evaluation of the project. $43,000 USD is approximately half of the cost of a motorised 4 x 4 ambulance and yet this amount has provided these communities with forty bicycle ambulances which have virtually zero running costs and have provided numerous life saving journeys.

Whilst the results are encouraging this remains a pilot project. The project’s development must be tracked for the remainder of the year to gather a 12 month perspective. With the monitoring and evaluation showing the positive impact and the future potential of IMTs placed within clear reporting structures on the ground it is hoped that this report will support in taking future bicycle ambulance projects to scale.
2. Introduction

Transport costs, including the transport of emergency cases, put a strain on often already limited district health budgets, making emergency ambulance services difficult to sustain. Where free ambulance services are not available the cost of emergency transportation to a referral hospital is often a barrier to accessing health services for people living in remote rural areas. Research has indicated that a large percentage of the three mortality rates (infant, child and maternal) could be reduced by providing or supporting some intermediate modes of transport.

More than 60% of people in developing countries live more than 8km from a healthcare facility. A case study from Cebu in the Philippines found that a 10% increase in distance from a hospital was associated with a 2% increase in infant, child and maternal mortality rates. A study in Addis Ababa found that on average, it takes women in labor 11 hours to reach a health care facility capable of addressing their needs and that both access to and the inhibitive cost (due to poverty) of transport were the two most important factors contributing to the occurrence of fistula.

The need for timely and highly responsive health care services is made more urgent by the HIV/AIDS crisis in many countries. Home-based care services are increasingly becoming an important way of responding to the pandemic. A well-managed mobility system is an important element in the provision of effective home-based care services. Various options are being implemented in developing countries to improve rural transport and communication systems and the distribution of 40 bicycle ambulances in 2008 is a Transaid initiative which aims to improve access to healthcare in the communities of eastern province, Zambia.

In 2005 Transaid, a British NGO, conducted a project in Malawi (Mchinji) and Zambia (Mwami) which indicated that the distribution of 5 bicycle ambulances were having a positive impact in the community. Consequently, Transaid saw the importance and value of replicating the successful elements of this project on a larger scale. In 2008 Transaid implemented a bicycle ambulance project to respond to rural communities’ urgent need to access health facilities in the eastern province of Zambia. This report focuses on this particular project. This 2008 project was implemented in collaboration with a number of Zambian and International partners. Key to the implementation was the role of World Bicycle Relief (WBR) the lead partners, an International NGO with an office in Zambia.
3. Background

3.1. Project Purpose

Transaid is a British NGO which believes that provision of safe and cost effective transport is a vital ingredient in accomplishing the Millennium Development Goals. In order to promote economic growth, you must improve people’s access to trade and markets. In order to curb the growing rate of road-related deaths, you must improve driver training standards and road safety awareness. Finally and most significantly for this project, in order to improve health, you must improve people’s access to health facilities.

The purpose of this project was three fold;

4. Improve access to healthcare for community inhabitants in Zambia’s eastern province
5. Build capacity within Zambia’s eastern province for the construction/maintenance of bicycle ambulances
6. Develop a report which offers solutions to issues of rural access, highlights elements of best practice and recommendations to be endorsed by international organisations

The map below (Figure 1.0) illustrates the three districts in Eastern Province where the project was implemented:

![Figure 1.0 Map of Zambia indicating Zambia’s Eastern Province](image)
The principal objective of this project is to enable rural inhabitants of Zambia’s Eastern Province to access health services via the use of intermediate modes of transport, in this case via bicycle ambulance.

3.2. The need for the project

The need for timely and highly responsive health care services is made more urgent by the HIV/AIDS crisis in Zambia and high levels of maternal, infant and child mortality.

The statistics in Table 1.0 were taken from the World Vision website - www.worldvision.org:

<table>
<thead>
<tr>
<th>Zambia HIV/AIDS Facts 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.6% Percentage of adults living with HIV/AIDS</td>
</tr>
<tr>
<td>13.4% Know their HIV status</td>
</tr>
<tr>
<td>801,000 Estimated number of AIDS orphans</td>
</tr>
<tr>
<td>96,000 Estimated number of deaths due to AIDS</td>
</tr>
<tr>
<td>98,000 HIV positive people on anti-retroviral drugs</td>
</tr>
</tbody>
</table>

Table 1.0 indicates HIV/AIDS statistics for Zambia recorded in 2007

The ‘three delays’ model, developed by Thaddeus and Maine (1994)iii, is useful in isolating the factors that come into play between the onset of an ailment and the receipt of medical care.

The model specifies three main causes of delay in receiving health care during which delay to get medical help can occur. Phase one is the delay in deciding to seek medical care on the part of the individual or family; phase two is the delay in reaching a health care facility, which is mainly related to transport and mobility issues and phase three delay relates to quality of health care received when a facility is reached. Although the three delays model is used by many agencies to plan interventions to address maternal and neonatal mortality in low-income countries, very little research actually focuses on the transport and mobility aspects of these delays. It is this second delay that this project principally addresses although the first delay is also a factor as some people may not seek help if they believe that transport is too expensive or simply not available.

The quote below comes from a caregiver in Katete and was taken during sensitisation in August 2008;

‘My brother had a heart problem for so many years and he was going for medical review every Monday. One Monday morning when I returned from the health centre, I was in the bathroom when I heard a sound of something. When I came out I found my brother was on the floor with his face on the ground. This has happened to him about three times, at the hospital we were told to rush him to the health centre. I was just alone at that time every one had gone to school others to the field. I rushed to the next family which was about 200 metres, we were told they will send someone to assemble an ox cart as that was our usual mode of transport. But this time all the animals (cattle, donkey) had gone to feed in the bush. To assemble the all transport mode took about an hour and at that time my brother was weak, sadly he died on the way to the rural health centre. The nurse told us that, had we arrived on time they would have tried their best to save his life....You can imagine all my life I imagine how a slightly better mode of transport would have saved my brother’s live, the pain of losing my only brother will take many years to heal. If this bicycle ambulance were there in my brother’s time he would have survived. Please, you have to start implementing this program before another person loses their loved ones and goes through the same pain I’m going through.’
The need for immediate modes of transport in rural areas is very clear. Every minute lost in accessing medical care can mean life or death, hence good, reliable, affordable and fast transport is paramount to survival of emergency health cases.

3.3. Building local capacity

A secondary purpose to this project was to build capacity and expertise within the 3 major centres (Petauke, Katete and Chipata) in eastern province. This capacity was developed through the provision of 10 scholarships for individuals identified by the 2 NGO’s (World Vision and Care International) in Eastern Province to travel to Lusaka to learn how to construct and maintain the ambulances and to help in the construction of the 40 ambulances planned.

This project was aimed to support existing work being completed by RAPIDs, a USAID-funded, World Vision-led coalition of relief organisations working to address the HIV/AIDS crisis in Zambia.

3.4. Transaid’s previous IMT projects

Transaid has implemented two previous IMT projects; a bicycle ambulance in Malawi and Zambia and a motor cycle ambulance in Nigeria. The motorcycle was tailored for emergency and maternal cases whereas the bicycle ambulance/trailer had two objectives; to provide access to health services and also to offer access to markets. The bicycle trailer was built to offer these entrepreneurship opportunities for local people in the community to start running a bicycle taxi, where as the bicycle ambulance was tailored to bridge the gap in terms of accessing health facilities. They were monitored by community leaders (village headman, chairperson etc.) but there was no formal structure on the ground with proper guidelines to offer equal access to the transport facility for all members of the community. Evaluation of this project highlighted this as a weakness in the implementation to be noted when scaling up an IMT project.

The motorcycle ambulance proved efficient for its operations concerning emergency and maternal operations; however the running cost and maintenance cost was seen to be a barrier for both the communities and the rural health centres. In that effect this was seen to be more of a strain on the budget and sustainability was an issue. The bicycle ambulance however was seen to be very accessible and had minimal running costs that could be maintained if there were strong structures on the ground to monitor and support daily operation of the bicycle ambulance.

Having analysed the findings of these intermediate modes of transport, the option which stood out as the most effective in terms of use and easy access by the community as well being cost effective was the bicycle ambulance. Low cost, accessible and ‘ownership’ from the community are key factors to the implementation in order to achieve successful results in relation to the above points. It was clear that with the right structures in place a bicycle ambulance could be very effective and mean that many members of a community would benefit in terms of access to health facilities.

There is evidence through recommendations from the past Transaid and other IMT projects to show the value of implementation in order to deal with the bottleneck that exists when accessing health facilities. The demand for this transport facility (bicycle ambulance) is significant and requires a coherent strategy to address the needs of the communities.

3.5. Working with existing structures and partners in Zambia

RAPIDS is a consortium of partners led by World Vision International in partnership with Africare, Catholic Relief Services (CRS), Expanded Church Response (ECR), Salvation Army, World Vision Zambia, and the Care International. This is a six-year (2004-2010), $57,481,437 Program.
RAPIDS covers 52 districts throughout Zambia to provide home and community-based care for people living with AIDS, care and support for orphans and vulnerable children (OVCs), youth livelihood and promotion of abstinence among youth, and household resilience and improved food security for those affected by HIV/AIDS. In addition, RAPIDS provides policy and programmatic support at the National Level for OVCs.

RAPIDS is working in collaboration with World Bicycle Relief to distribute 23,000 bicycles to Community Based Home Care Volunteers. Much work has been done by World Bicycle Relief and engineers within its supporting companies to make a bicycle which is culturally appropriate to the region. The structure which overlooks the daily operation of the bicycle ambulance exists within the strong structures built by the partners on the ground such as the World Vision and Care International. The districts are divided into zones in which caregivers operate on a voluntary basis which are lead by a Chair Person for each zone. The Chair Person submits a progress report to the RAPIDS District Coordinator at the end of the month and then all the information is send to the national level for administration purposes. By working with multiple partners on the ground who have an extremely well organised structure and links up to national level, with training specific to the bicycle ambulance Transaid were able to place the bicycle ambulances into a community managed system.

There are more than 18,000 Caregivers in 52 districts of Zambia operating under the RAPIDS. By a way of supporting the vital work they do, caregivers have been provided with a bicycle (WBR design) and a first aid medical kit to help in quality health provision. The caregivers have been trained on basic health care and how to handle emergency cases before they are attended to by qualified health personnel. Each zone also has well trained field mechanics who it was recognised could be trained with relative ease (given their existing skills) to attend to any mechanical failures on the bicycle ambulance.

Research has shown the positive impact of the work carried out by the caregivers in their communities and consequently many organisations are searching for options to allow the faithful care givers to have even more impact. A study from Kenya on the challenges of the home based care giver showed that: ‘Many families within Ugunjia Division live below poverty line and hence have inadequate resources to facilitate the community Home Based Care process’.iv A bicycle ambulance is just such a concept which seeks to empower the caregivers further and support the concerted efforts and prove remarkable results in Zambia’s communities.

4. Methodology

4.1. Implementation plan

Table 1.2 below shows the key milestones for the project implementation. It should be noted however that Transaid plan to continue monitoring the project up to two years from the time of distribution.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Aug-08</th>
<th>Sept-08</th>
<th>Oct-08</th>
<th>Nov-08</th>
<th>Dec-08</th>
<th>Mar-09</th>
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<tbody>
<tr>
<td>Baseline/ sensitisation</td>
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<tr>
<td>Training of the Field Mechanics</td>
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<tr>
<td>Final deadline for production (40-Bicycle Ambulance)</td>
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<tr>
<td>Distribution of 40 Bicycle Ambulances in Eastern Province</td>
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<tr>
<td>1st Monitoring and Evaluation</td>
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<tr>
<td>2nd Monitoring and Evaluation</td>
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EVALUATION REPORT ON THE 2008-2009 BICYCLE AMBULANCE PILOT PROJECT IMPLEMENTED IN THREE DISTRICTS OF EASTERN PROVINCE, ZAMBIA
Table 1.2 - Key project Milestones

Formation of the project teams on the ground and selection of the distribution sites was carried out by the partners on the ground, however the process also focused on using the lessons learned and the recommendations from the Transaid 2005 bicycle ambulance project.

The number of partners included in this project, was much wider than in the case of the previous 2005 project, which added to the complexity of the undertaking but aimed to ensure that the result was a system that was embedded within the local communities and with transport which all could access. This was further enhanced by the decentralisation of the structures on the ground. In the 2008 project the methodology aimed to provide clear processes around access to transport, understanding of usage and operational management at a community level. The districts were selected because they were believed to have solid and effective structures in those communities and already had a record of being pro-active in terms of their health care provision and support with other community projects.

Although all of the Caregivers had some theoretical knowledge about this transport facility (bicycle ambulance), practical experience of a project of this nature was scarce and as result clear guidelines were established in order to ensure equal access of the transport facility. In previous projects there had been feedback that the means of transport were not accessible to all and not fairly shared amongst the community.

As a result the implementation teams for the 2008 project were composed of the diverse members below in order to ensure broad representation:

- District Coordinators (RAPIDS)
- Community Chair Person
- Zonal leader
- Caregiver
- Health personnel (Rural Health Centre)

The process to access a bicycle ambulance was clearly outlined and communicated during sensitisation. Caregivers were advised to submit a request to the Zonal Chair Person (who is the custodian of the bicycle ambulance) if there is need to use the transport facility.

It was evident from prior experience that a defined management structure, clear and defined roles and accountability is a key success factor for IMT projects.
4.2. Partners Involved and their roles in this project

In order to ensure the high service provision, sustainability and be able to measure the impact of the project, the role of the partners was critical from the outset as a way to link the partners. Below is the list of the partners involved:

- World Bicycle Relief
- World Vision
- Care International
- Disacare
- Ministry of Health (PHO/DHMT)

**World Bicycle Relief**

- The role of WBR was very key as they were the lead partner.
• Manage the finances of the bicycle ambulance project (based on the fact that Transaid did not have a local bank account as required by the donor).
• Link the project with the field mechanics who should be trained on how to assemble and maintain a bicycle ambulance.
• Manage distribution of 40-bicycle ambulance in three districts.

World Vision

World Vision’s role was key and they supported the implementation of the project in the following ways:

• To link the project (bicycle ambulance) into the Home Based Caregiver structure’s in the two ADP’s namely Nyampane [Ptauke] and Makungwa [Chipata] in eastern province respectively.
• To provide Transaid with direct linkages to the people on the ground in order to monitor the project progress closely.
• To report back to Transaid, any case of misuse of the bicycle ambulance on the ground.
• To facilitate the selection of the zones that will receive bicycle ambulance’s and provides a team of field mechanics to be trained on how to build and assemble a bicycle ambulance.
• To ensure that all the bicycle ambulance are serviced on time, and ensure that the field mechanics were trained to undertake this service were available.

Care International

Care International have a strong presence in Katete and the home based care structure used was different to that of the World Vision structure in the community in terms of supporting health care provision. Most of their activities where facilitated directly with the Ministry of Health, (all their community facilitators were seconded to Health centres), as a result all of the bicycle ambulances were placed at the Health Centres.

As this system differed from the World Vision structure it was seen as a system which can be used for “comparison” in order to see which structure recorded high utilisation and positive impact in terms of the transport facility.

Another component to this project was to monitor comparisons in maintenance and sustainability on the facility as the Rural Health Centres have monthly allocation funds for maintenance compared with the zone allocation which entirely depends on contributions from the members of that zone.

Care International also provided other support to the project which included the following:

• Linkages to the Caregivers on the ground.
• Monitoring daily operation of the bicycle ambulance and reporting to Transaid any issues affecting the operation on the bicycle ambulance.
• Linking the project into the rural health centres.
• Participated in supporting facilitation monitoring and evaluations.
• Facilitated the selection of the field mechanics to be trained on how to undertake basic maintenance on the bicycle ambulance.

Disacare

Disacare is a Zambian NGO that is operated by person’s with disabilities in producing local wheel chairs and recently embarked on a new program with students from Massachusetts Institute of Technology (MIT)
on how to manufacture bicycle ambulance. With the help from a student from MIT who was seconded to the same institution they managed to come up with a new prototype called Zambulance.

Disacare had a contract to produce 40 bicycle ambulance in a period of one month and train the field mechanics on how to build and assemble a bicycle ambulance.

The two weeks training program was able to see the field mechanics acquire general skills on mental fabrication, which include pipe bending, welding, spray painting, just to mention a few.

4.3. Sensitisation

A series of meetings and discussions were held on the ground in Eastern Province to sensitise the key stakeholders about the project concepts and its implementation strategy. All the key partners were involved in planning these stakeholder meetings. Sensitisation took place in August 2008 and the main target for these meetings were traditional leaders, political leaders, members of staff from the rural health centres and members of the communities.

A meeting was held in each district, bringing the stakeholders together for one meeting in each district where all details of the projects were addressed with questions from those present. There was one additional meeting with the Ministry of Health to obtain clearance and support for the project. It was in
these meetings that our facilitators introduced with confidence all the merits of this new transport facility and the positive impact they may have on the communities.

These meetings also enabled the community to express a preference for placing the bicycle ambulance in either a zone or directly at a health centre. Some members of the community expressed a preference for allocation to a zone as they thought the community could benefit from ownership within the zone. For example Chipata and Petauke expressed a preference for this option. However, Katete felt it would be better in their instance to place the bicycle ambulance at the health centres in case resources for maintenance were required the health centre would be responsible. The key difference is that in the community the caregivers will take full responsibility of the bicycle ambulance in terms of maintenance of the facility, were as for the rural health centre they depend on the funding from the ministry.

The major findings on the ground during sensitisation were that people were using WBR bicycle’s to transport patients to the health facilities. This has posed a huge challenge on the work that the caregivers are doing as many patients were too weak to sit on the parcel rack of the bicycle and this requires more people to support in transporting the patient. As a result many people would be transported to health facilities by sitting on a WBR bicycle and being pushed along.

The other mode of transport to health services being used was an oxcart, which in most cases is not practical as it is too slow to organise. Each time it needs to be used it needs to be assembled (an ox needs to be located to draw the cart) and in this time taken to prepare the transport the patient may lose their life.

It was very clear from these gatherings that the bicycle ambulance could offer a transport mode which had the potential to transform the communities of eastern province in the way they access health facilities and could contribute greatly in reducing mortality rates in the province. Baseline data was also collected during sensitisation in order to establish a clear picture of the current situation. Please refer to section 7 for more details concerning monitoring and evaluation.

5. Design and Construction of the Bicycle Ambulance

5.1. Construction phases

Production of the bicycle ambulance was completed by Disacare in two distinct phases;

1. Production during training of the field mechanics (two weeks) which took place in Lusaka and intended to build the skills of the field mechanics. Twenty five bicycle ambulances were produced during this phase

2. Final production phase by Disacare, which was another two weeks saw the production of a further fifteen bicycle ambulances. The balloon tyre was used (a larger type of tyre). A 26 inch tyre was chosen on the trailers compared to 28 inch tyres on bicycles to balance the trailer. Through trials with a 24inch tyre and a 28 inch tyre this was found to be the optimum size.

5.2. Designs

The other core objective of this project was to establish a suitable design that could withstand rough terrains throughout all the seasons and as a result a number of designs were to be trialled in order to monitor their effectiveness and sustainability.

Having considered all the above points a number of key experts in IMT were involved in order to identify a number of designs (maximum three) to see which one would result in high utilisation.
Prototypes were submitted from:

- Design for Development (Niki Dunn)
- World Bicycle Relief
- Bicycle Empowerment Network Namibia (Michael Linke)
- Jessica Vechakul, a student from Massachusetts Institute of Technology MIT and engineer for the Zambulance Project (see also www.cadlab6.mit.edu/bike.ambulance).

A list of designs were shortlisted and the following designs were identified for this project. The designs selected were:

- Namibian Design from BEN Namibia
- Zambulance/Disacare from both Jessica Vechakul (MIT) and Disacare with two different hingees; being a rubber and a metal hinge.

Also note that on all the designs the stretcher can be removed from the bicycle ambulance in a case of transporting the patient off the bicycle ambulance eg taking some one inside the house or take a patient off the BA into the clinic, while at the same time the BA can be adjusted to a sitting position or can be in a position of laying down to suite the comfort of the patient on the bicycle ambulance.

*Picture 1.1 shows the Disacare Model with a quarter canopy. Ten of these were made.* 

*Picture 1.3 below shows Mr. Alumakino Nikisi Phiri of vulamkoko (Katete) on a Disacare Model with a full canopy. Ten of these were made.*
Picture 1.4 below shows a Caregiver from Petauke (Chipungu zone) taking a Namibian design after distribution. 20 of these were made with the half canopy and a metal hinge which attached to the seatpost:
5.3. Training of the field mechanics

Training of the field mechanics commenced on the 22nd September 2008. The training provider was Disacare. The main objective of the training was to build capacity on the ground by training the existing WBR field mechanics with general skills on how to assemble, service and maintain a bicycle ambulance. This was seen as a paramount part of the project as the life span of this project entirely depends on the structures on the ground and to which extent the individuals involved understand the details of the project.

The team of ten field mechanics were selected by the partners in the districts. As well as building capacity for these field mechanics their support in providing labour also make Disacare’s task of constructing 40 bicycle ambulances in 4 weeks easier and ensuring the deadline was met.

Twenty five bicycle ambulances were made during this two week training period. The team of field mechanics was lead by a team leader who was selected from the group and was supervised by the programme officer from Transaid. The skills learned from the training included general knowledge on metal fabrication which include spray painting, welding and pipe bending.

The country director from WBR officially closed the training on the 3rd October 2008 and the director for the Disacare board presented certificates to the field mechanics in recognition of the training they had undertaken.

6. Distribution

Distribution of the bicycle ambulance in three districts of Eastern Province took place between the 17th and 19th Nov 2008. At the three handover ceremonies all of the caregivers were shown how to fill in the log book and maintenance form to allow accurate data collection. The ceremonies put on by the communities showed that they had fully embraced the project and they saw the potential value of the bicycle ambulances and this was expressed in the enthusiasm of their reception.

The following districts received the bicycle ambulances:

6.1. Chipata (Makungwa Area Development Programme):

On Monday 17th of November 2008 World Vision Makungwa received 15 bicycle ambulances which where placed in seven zones. Makungwa ADP has seven zones, six zones were allocated two ambulances each and one zone was allocated three as they have larger area to service.

The World Vision representatives on the ground arranged the handover ceremony. Among the people who attended a very colourful ceremony were Traditional Leaders, Senior Civil Servants, managers from the National AIDS Council, World Vision, Canadian High Commissioner and World Bicycle Relief representatives.

In his introductory remarks the moderator announced; ‘today is a big day in the history such that even our children’s children will be told of what has happened today’. He explained that this transport facility being distributed in the community was a new opportunity. The moderator explained that for many years they have been having problems carrying patients to the health facilities and advised; ‘what our friends have brought is beyond our imagination, we never thought a bicycle ambulance could be like this’. The Traditional Leaders dressed in the Ngoni warrior’s outfit led a ceremonial dance as a way of expressing their happiness for the help brought to their areas. This represented a great honour bestowed upon the people distributing the IMTs.
The speech from the Ministry of Health was delivered by the Provincial Aids Coordinator Mr Chama. He advised that through the work the NGO’s are doing, the HIV prevalence rate in eastern province has reduced from 14% in 2006 to 10% this year. Mr. Chama explained; ‘this was as a result of the efforts the caregivers are making by providing health care to the communities. With the provision of the bicycle ambulance we are sure that our communities will have very high referrals to the health facilities and this will save so many lives including those who are suffering from HIV/AIDS.’

He advised that this is a huge step towards accomplishing the Millennium Development Goals (MDG’s) by 2015. He also challenged the community to take care of the ambulance describing it as a ‘window of hope’ and urged them to; ‘..put it to good use as there is no way such a facility will fail to perform wonders…If you look at that thing [pointing at the bicycle ambulance] there is no provision to carry charcoal or maize, please, that is only meant for sick person’s, look after it and it will look after you that day when you will be sick’.

Having an influential individual in the community stresses the importance of only using the bicycle ambulance for legitimate purposes was powerful.

6.2. Katete

The handover ceremony in Katete was held at the office of the District Director of health. In the speech read by his assistant he mentioned that he was very positive that this will help the communities with the biggest challenge that they were facing which was accessing health facilities. He promised continuing support from the district for such initiatives. The District Commissioner was represented at the same event and gave his assurance any misuse of these ambulances would not be tolerated.

6.3. Petauke (Nyampande ADP)

The ceremony in Petauke took place at Chipungu health centre which is approximately 30kms from the ‘boma’ or central point of the district. It was a very colourful event attended by people from 13 Zones who came to witness the handover ceremony of the bicycle ambulances. The people present included Senior Government Officials, Health Personnel and Managers from other NGO’s. The Canadian high Commission was represented at the same event as were WBR representatives.

It was evident that the people of Petauke understood the potential value of this project to their community, and this was clearly exhibited in the sketches and poems which where performed by the local theatre group on the same event. The meeting was officially closed by the representative from District Aids Council (DACA) after all the Zonal Leaders had signed a contract form with Transaid.

7. Operational Management of the Bicycle Ambulances

7.1. Accessing the bicycle ambulance

As it has been outlined, the bicycle ambulances were placed in each of the zones and the caregivers would submit a request to the Zonal Chair Person who is the custodian of the bicycle ambulance, if there is need to use the transport facility. Please refer to appendix 2 for a full list of the custodians, the district where they are based, the organisation they are working within - e.g. Care International or World Vision as well as the Zone and the type of bicycle ambulance they received.

If a patient needs emergency transport they or their family will request support from the caregivers. The care givers will then request for the bicycle ambulance from the custodians if they need to transport a client to the health centre. It should be noted that the bicycle ambulance is held at a specific location
in each area and that it can be hinged to any bicycle that needs it. This is a very different approach to some other bicycle ambulance projects where the bicycle ambulance is a permanently connected piece of equipment.

Through sensitisation and further communication at distribution the community have been informed how they can access these bicycle ambulances.

7.2. Management of information

Each Bicycle Ambulance has a folder with a log book where all the information in each case is recorded every time it is used. This information in the log book is recorded by the rider. This information recorded covers:

- Date of journey
- Name of the rider
- Distance covered and the route
- The illness of the patient

This folder also includes a maintenance sheet where all details of any breakdowns are recorded including the amount of time the bicycle ambulance is unavailable for use. An example maintenance form is attached in appendix 4.

The caregivers were trained on how to fill in this information during distribution, as that will be a proof of utilisation on the facility. The importance of their role in doing this was stressed.

7.3. Governance

Monitoring of daily operations was to be carried out by the zone Chair Person who would act as the custodian of the bicycle ambulance who at the end of the month would issue a progress report to the District Coordinator for RAPIDS. This was applicable in the two ADP’s under World Vision, as for Katete under Care International this was done by the Development Officer. A custodian signed a contract during distribution so their role and accountability is clear from the outset. Please refer to appendix 1 for a copy of the Custodian’s contract.

Each zone has well trained field mechanics who attend to any mechanical failures on both the bicycle and the ambulance. The field mechanics trained to undertake maintenance on the bicycle ambulance were those who were already trained by WBR.

8. Monitoring and Evaluation Model and Process

The monitoring and evaluation model used in this project is primarily based on the content and recommendations of 2 World Bank publications; “Monitoring and Evaluation: Some Tools, Methods & Approaches” and “Monitoring and Evaluation System for Rural Travel and Transport Programs in Africa” (SSATP Working Paper No. 55) published in 2004 and 2001 respectively. Specific content has also been derived with permission from the M&E tools developed by Bicycle Empowerment Network Namibia and Jessica Vechakul of the Zambulance Project.

The aims of the M&E model were to contribute to effective project implementation in the following ways:

- Develop a model of the project implementation process and identify key inputs, expected outputs and intended program impacts
- Monitor the use of project inputs
- Monitor the production of project outputs and the impacts they have on the pilot communities
- Monitor and assess the effectiveness of the project implementation process
• Monitoring the effectiveness with which transport project outputs resulted in the intended short- 
term and long-term impacts and evaluating the extent to which these impacts can be attributed 
to the effects of the project
• Evaluate the sustainability and replicability of the project

In addition, the M&E model contributes to the following learning and development objectives:

• Extracting lessons learned and best practices for design of future projects
• Adapting the program design to changing circumstances
• Providing adequate data for evaluation of program impact

This M&E model is designed specifically to monitor the following 6 project areas:

• project design and inputs
• project implementation process
• project outputs
• project impacts
• project sustainability
• project replicability

The monitoring and evaluation system incorporated the use of interviews for clients and caregivers, log 
books to record utilisation of the bicycle ambulance, and during the 2nd M&E visit a community feedback 
session was executed. The monitoring and Evaluation was split into 3 distinct phases:

1. Collection of Baseline Data
2. M&E Phase 1 (Caregiver and Client Interviews, analysis of logbooks, informal discussions with rural 
   health workers)
3. M&E Phase 2 (Caregiver and Client Interviews, analysis of logbooks, community feedback sessions, 
   informal discussions with rural health workers)

The tool used for monitoring and evaluation can be found in the Appendices.

9. Monitoring and Evaluation Results

9.1. Baseline

Baseline data was collected at the same as sensitisation of the bicycle ambulances in August 2008. 
The information collected was intended to allow a clear and accurate picture of the current situation in 
the communities with regard to transport for health care provision. As baseline took at place at the same 
time as sensitisation there were time pressures and as a result it was decided that only five questions 
would be asked but designed in a way to allow a useful set of data.

Twenty-two Home Based Caregivers were interviewed, eight from Petauke, eight from Chipata and six 
from Katete. These 22 Caregivers have a number of clients who are assigned to them under the RAPIDS 
umbrella. These clients are OVCs as well as those on ART.

Baseline interviews found that each Caregiver transported an average of 9.3 clients to health facilities 
every month. In response to the question: ‘How do you transport patients to health facilities?’ all 22 Care 
Givers answered a WBR bicycle was their usual method of transport. This was not unsurprising as 
Caregivers who had been provided with a WBR bicycle were the main target group for this project.

The group interviewed have provided care for 1889 clients which equates to transporting an average of 86 
clients each since they became caregivers (which could be anywhere between 1 month and 4 years).
In response to the question; ‘How many patients do not seek health care as a result of no transport being available?’ 21 of the Caregivers replied none and one Caregiver replied two. This was an interesting finding as it seems that a lack of transport in the communities largely does not discourage people from accessing health care, they just have to resort to time consuming, slow or expensive methods.

The tables below (Tables 1.3 - 1.6) show the modes of transport used to transport clients to health facilities prior to the distribution of the bicycle ambulances in eastern province.

Table 1.3 - Modes of transport used in Petauke to access health care facilities:

<table>
<thead>
<tr>
<th>Petauke Baseline - Average use of IMTs (prior to BA distribution)</th>
<th>Oxcart</th>
<th>Bicycle</th>
<th>Motor vehicle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modes available</td>
<td>How often is each option used as a %?</td>
<td>25%</td>
<td>65%</td>
</tr>
<tr>
<td></td>
<td>How long in minutes would the option take on a journey of the same distance?</td>
<td>143</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>What would each option cost (Kwacha)</td>
<td>55,000</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 1.4 - Modes of transport used in Katete to access health care facilities:

<table>
<thead>
<tr>
<th>Katete Baseline - Average use of IMTs (prior to BA distribution)</th>
<th>Oxcart</th>
<th>Bicycle</th>
<th>Motor vehicle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modes available</td>
<td>How often is each option used as a %?</td>
<td>29%</td>
<td>65%</td>
</tr>
<tr>
<td></td>
<td>How long in minutes would the option take on a journey of the same distance?</td>
<td>92</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>What would each option cost (Kwacha)</td>
<td>41,667</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 1.5 - Modes of transport used in Chipata to access health care facilities:

<table>
<thead>
<tr>
<th>Chipata Baseline - Average use of IMTs (prior to BA distribution)</th>
<th>Oxcart</th>
<th>Bicycle</th>
<th>Motor vehicle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modes available</td>
<td>How often is each option used as a %?</td>
<td>37%</td>
<td>57%</td>
</tr>
<tr>
<td></td>
<td>How long in minutes would the option take on a journey of the same distance?</td>
<td>135</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>What would each option cost (Kwacha)</td>
<td>73,750</td>
<td>0</td>
</tr>
</tbody>
</table>
From this data we can see that prior to the distribution of the bicycle ambulances by far the most highly utilised option to transport a patient to a health facility was the WBR bicycle, followed by an ox cart and use of a motor vehicle representing less than 10% of the sample. The motor vehicle was the overall fastest option as we might expect being twice as fast as the second quickest, the bicycle. An ox cart was the slowest option taking an average journey of two hours compared to 35 minutes in a car or 70 minutes on a bike. The bicycle has no associated cost, the ox cart was the second cheapest option at an average cost per trip of 56,806 and the most costly option was the motor vehicle at an average cost of 118,472, more than twice the cost of the ox cart.

The bicycle option is the most available option in the event of an emergency as it is readily available. The communities interviewed advised that the ox cart can be time consuming to assemble and almost impossible at night. The option to use a motor vehicle was often not actually an option for those living far from a main road.

The severity of the case would also determine the mode to be used. The weakest patients could not be transported on the back on the bicycle and an ox cart would remain the only option. In the comments gathered at baseline it also became clear that sometimes owners of other transport options could exploit the situation and demand a very high price. Sometimes families would have not enough money to pay this and would resort to trading, for example with a chicken or a goat, in exchange for transport provision when it was critically needed.

Please refer to Appendix 5.3 for full copies of the baseline data.

9.2. Monitoring and Evaluation Phase 1

The first monitoring and evaluation took place 28 days after distribution and was carried out by the Transaid Bicycle Ambulance Project Manager and the WBR Head of Operations Zambia.

The methods employed to monitor and evaluate the project were:

- Through Caregiver and beneficiary interviews
- Analyse utilisation and distance covered through the records in the logbooks and any maintenance recorded
- Informal meetings with health workers at rural setup levels

A few challenges were identified within this period and are highlighted in the narrative below. Interventions to address these challenges were put in place where possible.
Please see Appendices 5.4 and 5.6 for details of these interviews. The key findings from M&E 1 are also detailed in section 9.4 of this report and in the lessons learned.

Chipata Makungwa ADP

From all the seven zones that received a bicycle ambulance it was only possible to visit six of them during our first monitoring and evaluation, due to time constraints. The period from distribution and the first M&E was one month and during that time 14 Caregivers had used the bicycle and 11 were interviewed with 1 beneficiary being interviewed.

The M&E team had a real challenge to get to all of the zones at the designated times due to the wide coverage of the ADP (Makungwa) and a 4 wheel drive vehicle was needed as it was the rainy season. It became clear that in the next M&E (phase 2) it would be important to allocate two days in order to meet all the people in good time and in recognition of the other important programs the Caregivers may have at that time. This would also enable more time with the beneficiaries and learn from the experiences they had whilst being transported on the bicycle ambulance. A need became apparent to organise a monthly follow up with all the partners as a way to improve usage on the bicycle ambulance and also monitor the project progress.

Katete (Care International)

In all of the health centres that were visited at that time none of them had recorded any usage of the bicycle ambulance. This is believed to be because the communities did not feel a sense of ownership regarding the transport facility hence none of them had felt they had the right to request for it as they thought it was only meant to used for a certain group/class of people. It was also found that in some areas there was a cultural belief whereby some people thought if they used such a facility as a patient their chances of surviving would be narrow due to a feeling that the bicycle ambulance may have satanic associations. Consequently to this effect some people were shunning using the BA.

The other weakness being observed was the attitude from health personnel’s in some RHC’s. In certain places their attitude was not accommodating to the community in terms of usage should there be any request for the BA.

At one point the idea of withdrawing the BA placed at Kagoro Rural Health Centre was considered as they did not seem to show any need for the transport facility. It also became apparent that the Ministry of Health through the district health management team procured a number of BAs in 2006 and one was placed at Kagoro RHC. There was no recorded usage of that 2006 BA to date which raised the question whether it was the attitude of the community who were afraid to request the facility from the RHC which was a contributing factor or whether there were other factors beyond our knowing at this stage.

One intervention planned to tackle these low utilisation figures was further sensitisation though local theatre, however this was not prioritised by the community and unfortunately did not take place. The second intervention was to address this issue at a national level so that a directive could be issued from the main office. Other recommendations raised were door to door information dissemination to raise the profile of the BA being available in the community and it’s potential to save many lives.

Nyampane ADP (Petauke)

During our time in the Petauke ADP we experienced heavy rains and it was almost impossible to meet the caregivers as many communities were not reachable due to fast running streams and many feared being washed away if they travelled to meet us at the central points. Only one third of the Caregivers were able to make this meeting and out of that group only four had used the BA to transport clients to the RHC’s during these first 28 days.
Nyampande is known to be a historically strong working team and as such at this point in M&E it was hoped that even though we did not visit the entire zone, in the next M&E, there would be improved usage of the transport facility and as the rains subsided the facility will be a greater asset to the community. Monthly updates from the community were recommended and discussed with the communities in order to closely monitor daily operations of the BA ahead of the next M&E planned for March 2009.

9.3. Monitoring and Evaluation Phase 2

After distributing 40 bicycle ambulances in Eastern Province in November 2008, a second monitoring and evaluation was conducted four months later in order to understand any difference in the communities in terms of access to health facilities. The key aim as with M&E phase 1 was to assess the impact of the bicycle ambulance in the community. Learning from the lessons from the first M&E, efforts were made well in advance to communicate to those we wished to interview the dates we were coming and to make necessary logistical arrangements.

The second phase of the M&E was carried out between 9th – 14th March 2009 by the Transaid Bicycle Ambulance Project Manager, the WBR Head of Operations - Zambia and the WBR Programme Manager Field Mechanics.

The methods employed during this stage of monitoring and evaluation were:
- Through client and beneficiary interviews and also by involving both stakeholders in focus group discussions.
- Analyse utilisation and distance covered through the records in logbooks.
- Community feedback sessions.
- Meetings with health workers at rural setups levels.

Please see Appendices 5.5 and 5.7 for details of these interviews. The key findings from M&E 2 are also detailed in section 9.4 of this report and in the lessons learned.

Across the three districts approximately twenty five bicycle ambulance custodians attended our meetings. Seventeen logbooks were collected and the records showed that 82 patients were transported to the health facilities using the bicycle ambulance in this period (the last 3 months between Dec and March 2009).

In some places however, there was no utilisation recorded due to the fact that distribution was done in the rain season and the condition of the roads becomes very bad as a result of no drainage which left most roads eroded. Another factor was that the facility was still relatively new to the community and there was need for more sensitisation to be done, which it was noted, must include community leaders and village headmen.

It was brought to our understanding that the time frame for M&E for the project was too short as most zones expect to use the bicycle ambulance more after the rainy season. This is because all the villages come together and work to improve the roads in order to have access to markets for their crops as well as other social amenities.

9.4. M&E Key Findings Based on M&E Phases 1 and 2

Reasons for use of the Bicycle Ambulance

From the data collected using the logbooks it was found that of the 71 trips with reasons provided, 28 or 40% for the purposes of clients seeking ART. Malaria and pregnancy accounted for 20% and 17% of journeys respectively.
The data for Petauke, Katete and Chipata all show a substantial use of the bicycle ambulance by clients seeking ART;
It was found that the average distance travelled by bicycle ambulances across the 3 states was 10.2 km, although this hides the significant variation between the relatively low average in Petauke of 6km, and the relatively high average in Katete of 16.1km.
The age of clients transported range from a 3 year old boy to a 86 year old man. Of all trips recorded 59% were found to be for female clients while 41% were for male clients.
Client Interviews
Seven beneficiaries were interviewed during M&E 1 and 2, the key observations are noted below from the data collected:

Modes of Transport
The beneficiaries who used the BA were asked in the absence of the BA what mode of transport would they use. 72% responded that they would have used an oxcart, 14% would have walked and the final 14% responded that there was no alternative mode of transport available to them. This interestingly differs from our baseline data which indicated that there was a higher preference for using a bicycle. This could be because the question asked to the beneficiary was theoretically what would they use if the BA was unavailable and most answered an ox-cart. The Caregivers replies at baseline suggested that there was a higher utilisation of the WBR bike over the oxcart. This may be because the clients are imaging a mode which offers a greater level of comfort whereas the Caregivers may understand the reality of the challenges (both time and cost) in assembling an oxcart and see the WBR bike being used more frequently.

Average journey times
Those who would have used the oxcart advised the average journey time on the oxcart would take 73 minutes as opposed to the figure given for an average distance walked which was 240 minutes. It should be noted that some of the beneficiaries found it difficult to accurately give estimates for distances and times covered.

The BA as a comparison was estimated to take 60 minutes when compared to walking the same journey which was estimated to take 240 minutes. When comparing the average journey time for the oxcart (73 minutes) the bicycle ambulances was anticipated to take 46 minutes for the same average journey. When transporting a patient is an emergency capacity this showed an average anticipated reduced journey time of 27 minutes which could mean the difference between life and death.

Cost of transport modes
In terms of cost the beneficiary's average anticipated cost of using the oxcart was 30,000 ZK, but they noted that the cost would often be higher and there was no fixed price. This of course should be compared against the other options they felt viable - walking or using a bicycle ambulance which both have no associated charge.

Availability
Of the seven requests for the ambulance by on behalf of the beneficiaries it BA was available on 6 of these occasions. In the instance where the BA was unavailable the feedback was that the BA was being used to transport another patient.

Interviews with Caregivers during M&E 1 and M&E 2
Twenty six Caregivers were interviewed during M&E 1 and 2 (combined), the key observations are noted below from the data collected:

Enabling Caregivers to do their jobs more effectively
When Caregivers were asked to what extent they agreed or disagreed with this statement; ‘The arrival of the BA improved the ability for me to do my job’ 96% responded that they strongly agreed with this statement. Only one individual did not strongly agree with this statement explaining that he neither agreed nor disagreed with this statement as the facility was new to the community and that he needed longer to see the impact on this ability to do his role more effectively.
Terrain
62% of Caregivers stated that the roads or terrain were bad in their area during M&E phases 1 and 2. They elaborated that some parts in eastern province are hilly and sandy. During rainy season these roads are particularly challenging. It is important to note that when the Caregivers described these roads they are often grading them according to rural area standard. Every Caregiver interviewed said that a vehicle could take the same route but all indicated that a 4x4 would be essential in all seasons.

When asked if the terrain caused them any problems some of the Caregivers explained they did not experience difficulties but the majority found the terrain challenging citing mud caused the rains, sand and hills as factors.

Requesting Transport
The interviews revealed that the BAs were requested in three different ways, either a family member would request the transport, an HBC visit would result in requesting the BA or through a telephone call to request the BA. In the interviews conducted there was a equal split between the number of people who requested the BA through sending a family member (50%) and HBC visits (50%).

Availability
92% strongly agreed with the statement; ‘the bicycle ambulance was available when it was needed’. Those who found the BA unavailable explained it was being used by another caregiver. The BA was never unavailable due to maintenance issues during M&E phases one and two.

Were the trips lifesaving?
We asked the Caregivers to determine how many of the trips were lifesaving, meaning if the BA was not available how many people would have died. The response was overwhelming, 22 of the 26 Caregivers interviewed stated that the trips undertake were 100% lifesaving, 1 stated 90%, 1 stated 60% and one 50%.

Safety
When asked to what extend they agreed or disagreed with the statement ‘I felt confident and safe pedalling the ambulance on the side of the road with cars passing by’ 73% of the Caregivers said they strongly agreed, 8 % said they agreed, 11% said the neither agreed nor disagreed, 4% said they disagree and 4%c said they strongly disagreed. Additional comments were made that the poor condition of the rods led to people feeling unsafe when using the BA.

Unhinging the BA
The Caregivers were asked if they ever had to unhinge the ambulance from the bicycle to pull it by hand (i.e. uphill or over paths that are not bicycle accessible). 24 of the 26 interviewed had not had to unhinge the ambulance while two had had to unhinge the BA. In these two examples the first took less than 20 minutes although the Caregiver was not sure of the exact time required and the second instance took 5 minutes to unhinge the ambulance and reattach it.

Removing the stretcher
In the interviews only one of the Caregivers had removed the stretcher from the trailer/wheels to transport the client. This instance was to carry a patient across a stream where the bicycle could not be ridden across.

**Difficulties in the controlling the bicycle**
The Caregivers were asked if they had any difficulties in controlling the bicycle while pulling the ambulance and if so to explain what these were. 65% of those interviews indicated that they did have difficulties in controlling the bicycle and the main causes were explained as the rubber hinge on the Disacare model with the quarter canopy which was too flexible and could push the bicycle forwards, another key cause cited was turning right when using the Disacare full canopy mental hinge model.

**Changes to the design**
The Caregivers were asked what changes, if any they would make to the BA. Suggestions varied according to the design allocated in that area but key observations were to reduce the weight on the bicycle ambulance, consider the addition of gears to help with cycling uphill and to consider equipping the BA with a toolkit, first aid kit and lights. For more details around the design of the BA please refer to the lessons learned in section 9.6 of this report.

**Lying flat or sitting on the BA**
From the interviews conducted, 92% of the trips made transported the patient lying flat. We were told at baseline that 62% of Caregivers used the WBR bicycle to transport a patient (prior to distribution of the BA) and clearly transporting a patient on the back of a bicycle does allow them to lie down yet in 92 % of cases where there was an option to lie down this was the preference. 8% adjusted the stretchers position to allow them be transported in a seated position.

**Maintenance requirements**
The Caregivers were asked three questions during M&E phase 1 and 2 to understand what maintenance had been required on the BA, the cost of this and where the funds for this were obtained. The other M&E tool used here was the maintenance sheets, although with all meetings held with the Caregivers we spoke to the individuals had experienced no maintenance challenges themselves and the logbooks they brought to the meetings remained blank. Two Caregivers had heard of minor maintenance requirements. They explained the first was a flat tyre which required 1000 ZK to mend where the funds for this were provided by the Caregiver. The second was a on a rod holding the cover for the quarter canopy. This was damaged during transporting and required welding which cost 5000 ZK and again was paid for by the Caregiver.

**Additional comments**
It was also commented that the BA has come at the right time during HIV/AIDS pandemic and the impact in the community will change many lives for both the caregivers and the clients. One caregiver explained that the only issue they have is that some zones have more than fifteen villages and one BA is not enough.

### 9.5. Lessons Learned

#### 9.5.1. Importance of allocation sufficient time for meaningful M&E

The amount of time required to do monitoring and evaluation on even a relatively small project should not be underestimated. There are very real challenges to accessing care givers for interviews and information gathering as the work they do is so vital in the community and of course that must be respected. The interviews with both the care givers and the beneficiaries is often time consuming as we found most of the questions needed to be translated into the local languages and time need to be taken to ensure that this was done accurately and that the integrity of data collected was not compromised through translations.

The beneficiaries were the hardest group to interview as they were often still unwell when we tried to interview them and these interviews clearly needed to be sensitively handled. From the first M&E when
the challenges of locating and arranging interviews with beneficiaries was so clear (only one was located) we responded by arranging well in advance of M&E 2 for our coordinators on the ground to support with arranging this as far as possible.

We also saw the need to hold focus groups to encourage open discussion about the impact of the bicycle ambulances and the pros and cons of the designs. These were arranged for M&E 2. It was also recognised that refreshments would need to be provided for these focus groups which represented an additional cost outside the budget but was felt necessary to help create a relaxed environment where people were happy to sit down and share their views over a drink with each other.

9.5.2. Challenges of distributing at beginning of rainy season and importance of M&E over 12 month period

Distributing during rainy season proved to be challenging. roads were in a bad condition, even for a 4 x 4. It is anticipated that the utilisation of the bicycle ambulances will increase as the rainy season ends and as such the results presented in this report have shown the bicycle ambulances operating in the most of challenging of Zambia’s seasons.

9.5.3. Having a stronger presence of the ground - beyond reliance on partners

Working with multiple partners has a clear number of benefits and their support has been invaluable in this project. In terms of taking this project to scale it is also recommended however that there is funding allocated to ensure a full time operational presence on the ground. This person can help take sensitisation further into the community and answer questions. Having a presence on the ground would help Caregivers and beneficiaries.

If a full time presence was not possible due to practical/financial constraints it is recommend that the organisation who are leading the implementation visit the project sites themselves on a monthly basis to both gather the information, continue sensitisation and make interventions on other operational issues.

9.5.4. Position on the bicycle ambulance

All of the Caregivers interviewed transported their clients lying down on the bicycle ambulance. This really highlights that transporting patients on the parcel rack of a bike is unpractical. Especially if we look at the types of illnesses the clients had we will see the majority were HIV/AIDS related, malaria or maternal cases and option the option to lying down was very important.

9.5.5. Feedback on the different models and the merits of each design

Even though there was a high demand from the locals for the transport facility there were still a number of challenges which where affecting daily operation of the bicycle ambulance and these vary according to design.

**Disacare model - full canopy**

Of all the three designs distributed the Disacare full canopy with the metal hinge is the one which was preferred by the largest number of clients and Caregivers interviewed. The reasons given were related to the rainy season and the protection that was provided by the full canopy as most of the Caregivers thought their clients were very well protected from the rains during transportation. It must be considered in context that these bicycle ambulances were distributed in the rainy season and so the Disacare stretcher was positively received as it provided shelter from the rain and also privacy. The communities also felt that this design would be favourable in the dry season as well as it would allow shelter from the sun and allow air through the option to roll up the sides of the canvas.
Turning right is however seen as a problem on the design with the metal hinge. Whilst the full canopy has its advantages it was also considered quite heavy there were requests to reduce the weight.

Disacare model - quarter canopy
The Disacare quarter canopy with the rubber hinge pushes against the bicycle when stopping and that can cause difficulties to the cyclist. The canopy is too also small on the rubber hinge design.

Namibian model
The Namibian was second preferred design as it had very good turning in both directions and clients have the option to face either backwards or forward. The only disadvantage was that the design with the canvas stretcher was not completed exactly as it should have been from the source design (BEN Namibia).

The canvas has straps with a middle pipe to support it from breaking, on the ground that seems to be causing discomfort because of the same middle pipe is felt through the canvas and is resulting in back ache for some patients.

There were five Namibian designs with a canvas stretcher and one of these was white due to a lack of materials and this proved a very unpractical colour for transporting patients. The caregivers observed that the BA should have came with supporting tools for attaching the BA to the bicycle and a pump in a case of a flat tyre on the BA while transporting the client to the RHC.

If the Namibian design had been made exactly according to the BEN Namibia design with the canvas made correctly there would be no need for a mattress or a metal sheet that supports the mattress, therefore reducing the cost and the weight of the BA.

General suggestion on designs:
• A bicycle should be provide to accompany the ambulance permanently, this would also serve to prolong the life of the threads used in the hinge.
• There is need to ensure that tools match with the spanners of the bicycle as that can be easily accessed rather than what is currently on the ground.
• Tools should be provided with the ambulance including a pump, first aid kit, spanners for attaching to the bicycle.
• Need to provide light for night riding as some emergence cases take place at night.
• Reduce the weight or provide some gears so that when going up hill it may be easier.
• Apart from provision of a high visibility vest a rain coat should be considered.
• The were a couple of comments that the metal plate on the stretcher was not strongly welded.
• The width on the Namibian design is wider than standard door frame causing problems when moving patients.
• A basic suspension system would help reduce vibrations and bumps which might exacerbate the client’s condition.

Braking
The WBR bicycles are fitted with coaster hub brakes (foot brake) which work by cycling backwards. In addition to the footbrake a handbrake is recommended.

The 10 bikes which trialled the rubber hinge (radial tyre for the hinge) were seen to have disadvantages as the ability to stretch means the ambulance can flex and while it doesn’t physically touch, the momentum that is created pushes against bicycle.

Night Riding
Although the BAs were distributed with high visibility vests there was an assumption that the bicycle ambulances would be used predominately in the day. The log books have shown that these bicycle ambulances have been used at night with some regularity. When the ambulances were required the
community needed to use their initiatives, for future project this needs to be considered at design stage and reflectors added.

In future projects in the interests of safety it is recommended that an additional chain is attached both the ambulance and the bicycle to act as a contingency back up in case the hinge/hook fails while in operation. The chain should be as lightweight as possible.

**Supporting tools**
It is recommended that the BA is distributed with a basic tool kit containing a basic set of spanners and a pump. Currently the BAs were distributed with nuts which do not match the spanner size in the WBR bike toolkits. To counter this it is recommended a small set of spanners that can be used for the complete structure the bicycle ambulance from the

There were also requests for the provision of first aid kit / space for some basic first aid items such as a bandage. The average distance covered from M&E 1 and M&E 2 was 10.2kms, with the longest recorded journey being 28kms. Consequently the need to equip the Caregivers as well as possible is clear.

**Maintenance**
In all the zones visited the Caregiver highlighted the fact that the current structure of placing the bicycle ambulance in the community in very ideal as all the problems of emergency cases are found in the communities such that if they have the transport facility within in becomes very accessible.

In terms of sourcing for funds to expense the parts needed during maintenance the caregivers highlighted that it very workable as even in the past they have been doing some fundraising to on other issues among themselves and one zone shared with us there financial record which amounted to K392.000 balance to date. Its very clear from our side they were comfortable with the current structure,

One key component of any sustainable project that has not been examined here is the financial viability of the community maintaining, and eventually replacing the bicycle ambulance. The data required to establish whether or not the project can be financially sustained by the community will include calculation of maintenance costs and to date the maintenance costs have been practically non-existent.

It is hoped that through Transaid’s interest in this project data will be collected in the coming years to help establish this important aspect.

**Hybrid Design**
It is therefore recommended that the hybrid design should have a full canopy with a canvas stretcher and must have a seat post hinge. This will reduce the weight of the bicycle ambulance and also it will provide maximum turning in both directions.

**Allocation of the BA Health Centre Vs Community/ Zones**
All the caregivers highlighted the fact that the bicycle ambulance are better placed and can be well utilised if the are placed at the community level rather than at health centre. This was also confirmed by all the health personnel’s. The caregiver also did mentioned that the challenges in found in the community and if the BA is available by the time the emergency occurs it will be help to reduce on the second delays in accessing health facility.

We can therefore conclude that should there any replication of such project the BA should be placed in the communities as this will ownership in the communities and

**10. Conclusions**

The bicycle ambulance project saw the production and distribution of 40 ambulances in Eastern province. These 40 bicycle ambulances covered an average distance of 10.2 km over the four months they were monitored and completed approximately 70 life saving journeys.
By trialling three different designs of bicycle ambulance valuable feedback has been obtained to help identify the most appropriate design for future projects. It is clear that the timeframe for monitoring and evaluation should be conducted in a period of not less than six months and the quality and quantity of the M&E data in this project would have been considerably improved through a 12 month M&E framework. It is also recommended that any implementation of an IMT project should begin in the dry season as this will allow the communities to become accustomed to using the facility while the roads are more accessible. Any future IMT projects should provide for detailed M&E in at least the first 6 months, starting M&E in the dry season should allow higher utilisation figures and therefore simply even more valuable feedback on the project.

This project has also seen capacity built within Zambia’s eastern province for the construction and maintenance of these bicycle ambulances. Ten field mechanics were trained in the construction and maintenance of the bicycle ambulances and indeed played a key role in the construction of these forty which are showing a positive impact in their communities of eastern province.

The total cost of the project was $43,000 USD which included the production, distribution and monitoring and evaluation of the project. $43,000 USD is approximately half of the cost of a motorised 4 x 4 ambulance and yet this amount has provided these communities with forty bicycle ambulances which have virtually zero running costs and have provided numerous life saving journeys.

The next step is to implement this project on a larger scale, covering all seasons and monitoring the impact over a longer period of time to truly determine both the impact and sustainability of the project.
Picture 1.5 shows a success story of a bicycle ambulance baby. Tomela T Miti from Kamiza in Katete was transported on the bicycle ambulance about 4.5km by a traditional birth attendant to the RHC where she gave birth to a baby girl.

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i De Silva, R., Transport - The Missing Link? A catalyst for achieving the MDGs, Presentation for the International Federation of Rural Transport Development

ii Hamlin, C., (2004), Preventing Fistula: Transport’s Role in Empowering Communities for Health in Ethiopia, (August 30-September 13, 2004) BACK TO OFFICE REPORT, Addis Ababa Fistula Hospital


iv Reference about the impact in Kenya of home-based care providers (gateway.nlm.nih.gov)