



National Malaria Control Centre  
Zambia Ministry of Health



# Using Geographical Information Systems for Indoor Residual Spray Area Mapping

Training Report

July 2007

## Acknowledgments

This report was prepared by Chris Lungu, Indoor Residual Spraying (IRS) and Geographic Information Systems (GIS) Consultant, Malaria Control and Evaluation Partnership in Africa (MACEPA, a program at PATH); Brian Chirwa, Information Officer, Health Services and Systems Programme (HSSP); and John Miller, Monitoring and Evaluation Officer, MACEPA, for the Ministry of Health, National Malaria Control Centre (NMCC). It was developed to support geocoded household enumeration for indoor residual spraying (IRS) activities. Sincere appreciation is expressed to the Ministry of Health, especially to Dr. Elizabeth Chizema Kawesha, Coordinator, NMCC; Dr. Chilandu Mukuka, Deputy Coordinator, NMCC; and Chadwick Sikaala, IRS Technical Officer, NMCC, for support in developing this report.

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## Acronyms

DHMT	District health management team
GIS	Geographic information systems
GPS	Global positioning system
HH	Household
HSSP	Health Services and Systems Programme
IRS	Indoor residual spray
ITN	Insecticide-treated net
LCC	Lusaka City Council
MACEPA	Malaria Control and Evaluation Partnership in Africa
NMCC	National Malaria Control Centre
PDA	Personal digital assistant
PHMT	Provincial health management team
USAID	United States Agency for International Development
WHO	World Health Organization

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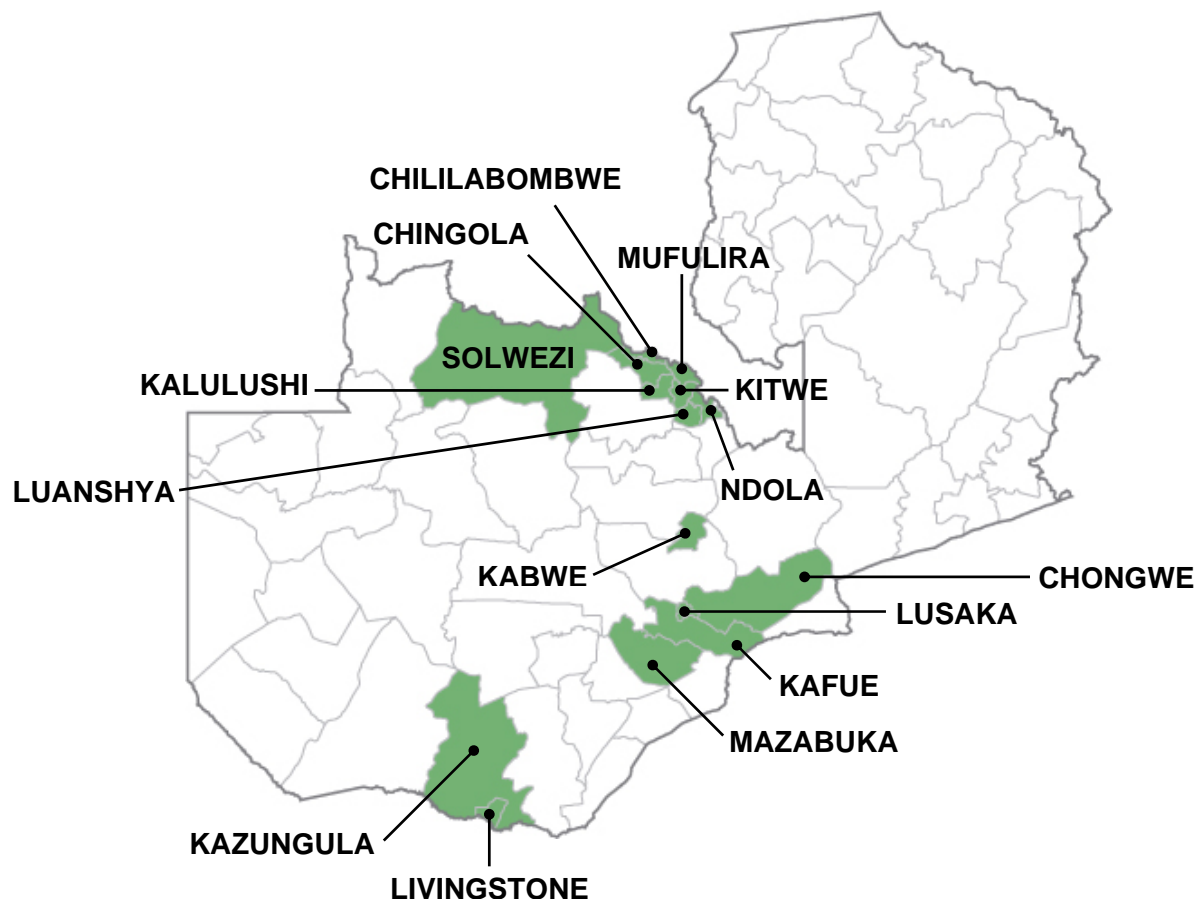
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## Introduction

This training report was developed to help malaria control and prevention planners to understand how to plan and implement a training in the use of GIS for indoor residual spray mapping. The report summarises issues covered during the training sessions, reviews training outcomes, impacts, and lessons learned, and includes annexes that may be useful to those planning to conduct a similar training. This report has been developed as a companion document to *Using Geographical Information Systems for Indoor Residual Spray Area Mapping: Training Manual*, which provides step-by-step lessons in how the related technology works and how it can be applied, including field exercises.

## 1. Background

Indoor Residual Spraying (IRS) is one of the primary malaria prevention strategies in Zambia and is now supported in 15 target districts, representing mainly urban and peri-urban areas. IRS activities have been carried out since 2003, originally in 5 districts, then moving to 8 districts in 2004. The current 15 districts include: Kabwe (in Central Province); Chililabombwe, Chingola, Kalulushi, Kitwe, Luanshya, Mufulira, and Ndola (in Copperbelt Province); Chongwe, Kafue, and Lusaka (in Lusaka Province); Solwezi (in North-Western Province); and Kazungula, Livingstone, and Mazabuka (in Southern Province). Collectively these districts represent roughly 34% and 33% of the total population and total households, respectively, in Zambia. As an intervention, IRS plays a significant role in preventing malaria among a large proportion of the Zambian population. In combination with insecticide-treated nets (ITNs), these represent the main malaria transmission prevention strategies used throughout the country.



IRS activities are conducted annually and routinely. These include district-level planning and budgeting for targeted areas, assessment of spray structures (to determine formal, informal and overall structure counts as well as volumes of insecticides needed), training of spray teams, IRS campaigns, and supervision and monitoring of spray activities. Several post-campaign activities also take place, including reporting on and attending the annual post-spray campaign national meeting of all 15 IRS districts to share experiences and lessons learned.

For monitoring and evaluating IRS activities, clearly defining IRS-targeted areas and identifying eligible households are important for several reasons. First, through the planning process, enumerating IRS households provides quantifiable allocation of spray personnel needs, scheduling, and duration of spray activities. As IRS activities are scaled up within each district, monitoring the changes to the targeted denominators will result in overall increases in resources necessary for conducting IRS activities. Second, according to the National Malaria Strategic Plan 2006-2011, IRS and ITN mass distribution efforts are designed to be mutually exclusive activities. Zambia is striving to achieve high coverage of both interventions for optimal health impact. Households and targeted people not receiving IRS are therefore targeted for ITN mass distribution and net re-treatment campaigns. Finally, in conjunction with studies to evaluate the impact of malaria interventions on malaria-related burden or within vector populations, careful delineation of spray areas and populations is necessary for determining scale of expected impact for each intervention and for the nation as a whole.

Integrating geocoded information from global positioning systems (GPS) for malaria monitoring and evaluation activities has been done successfully elsewhere<sup>1</sup>. This has mainly been for IRS monitoring, geocoding target areas, and using GIS to manage large amounts of information for spray operations. Mozambique and South Africa IRS activities associated with Lubombo Spatial Development Initiative Malaria Control Programme have also been a model for IRS monitoring and evaluation activities using GIS<sup>2</sup>.

Strengthening the national malaria control programme by incorporating a GIS/GPS mapping system would enhance NMCC capacities to plan, manage and report on its intervention activities such as IRS, mosquito net, or integrated vector control measures. For instance, collection and management of information using more effective GIS means could lead to detailed analysis and micro-level planning of intervention activities for cost effectiveness. Similarly, the same process could assist the NMCC to disseminate information more explicitly and accurately.

It is from this background that four three-day training sessions were conducted in Lusaka (for Lusaka, Kabwe and Kafue districts), Livingstone (for Kazungula, Livingstone and Mazabuka districts), Chingola (for Chingola, Mufulira, Chililabombe and Solwezi districts), and Kitwe (for Ndola, Luanshya, Kitwe, and Kalulushi districts). The four training sessions were planned in order to ensure maximum

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<sup>1</sup> [Booman M, Durrheim DN, La Grange K, Martin C, Mabuza AM, Zitha A, Mbokazi FM, Fraser C, Sharp BL.](#) Using a geographical information system to plan a malaria control programme in South Africa. Bull World Health Organ. 2000;78(12):1438-44. Epub 2003 Nov 17.

<sup>2</sup> <http://www.malaria.org.za/lodi/home.html>

participation by the participants. Training small numbers during each session was also aimed at ensuring that there was maximum interaction among the participants, as well as between the participants and the facilitators.

## **2. Objective of the Training**

The overall objective of the training was to enhance the capacities of the NMCC and District Malaria Control Programme to use GIS/GPS-based information collection and management activities. The training programme and agenda are shown in Annex 1. This entailed, among other things, conducting master training sessions along with piloting in all the 15 districts.

The specific objectives of the training were to:

- (i) Introduce participants to basic principles of GIS;
- (ii) Explain the rationale for geocoding IRS spray areas;
- (iii) Familiarize participants with HealthMapper GIS software;
- (iv) Introduce participants to GPS, household enumeration with portable digital assistants (PDAs), and geocoding;
- (v) Explain to participants the software programmes used in a GPS and PDAs;
- (vi) Train participants to extract data from Navio and GPS2 software programmes;
- (vii) Introduce participants to the map production process and products that will be produced and shared with the districts;
- (viii) Explain PDA maintenance procedures and availability procedures for the complete household listing; and
- (ix) Conduct PDA/GPS field exercises in which boundary tracing and IRS household enumeration will be done.

## **3. Proceedings**

The first of the four training sessions was held at the Health Services and Systems Programme (HSSP) headquarters in Lusaka. The schedule of district trainings is shown in Annex 2. The participants were drawn from the district health management teams (DHMT), the provincial health management teams (PHMT), and the Lusaka City Council (LCC). The training session was officially opened by Dr Robert M. Hollister, Deputy Chief of Party at HSSP. The opening was attended by Dr Abdi Mohamed, MACEPA Country Coordinator; Dr. Kent Campbell, MACEPA Program Director (based in Seattle, USA); and senior representatives from the USAID office in Lusaka.

Subsequent training sessions were held in Livingstone, Chingola and Kitwe. Similarly, participants in these meetings were drawn from the DHMTs and PHMTs. In addition, a representative from Konkola Copper Mines (KCM) and Mopani Copper Mines (MCP) and three representatives from Kitwe City Council attended the Kitwe training session. A list of participants is shown in Annex 3.

The purpose of these trainings was explained to the participants as listed in the objectives above. In order to get to know one another better, participants introduced themselves and briefly explained what role they played in their respective districts.

## **Day One: Background presentations**

The training session started with the facilitators assessing the participants' initial skills in GIS and HealthMapper with a specific focus on geocoding, GPS, and general computer skills. The facilitators explained to the participants the basic functions of computers. Participants were introduced to the basic concepts of hardware and software. The rationale for this presentation was to demonstrate to the participants the type of hardware and software they will be using during the household listing exercises. Special emphasis was made on PDA hardware and software, PDA to PC data transfer software, navigation software and the cabling required to synchronize the equipment.

The facilitators explained the rationale for geocoding IRS map spray areas. This was basically to improve in the planning and IRS service delivery and to identify areas for IRS and ITN service delivery. In this presentation the facilitators emphasized the need to geocode the structures using agreed-upon standards. The facilitators explained that considering that the household listing was being undertaken for the first time and may not be repeated in the near future, it was important that the geocoding was carefully planned to avoid having to repeat the same tasks. Once done, the geocode would register addresses of households where IRS had taken place and at the same time assign a geographical code to the household.

The facilitators explained the 8 steps participants would be expected to do in order to produce IRS spray maps. These are outlined in Annex 4.

A presentation on GIS followed and the participants were introduced to the basic principles of GIS with special emphasis on the HealthMapper GIS software.

The last presentation focused on basic principles of GPS and the basic functions of the PDA. Participants were shown all the basic components of the PDA including its data capture facilities. Each participant was given a PDA to use, and this session prepared the participants for the field exercises.

## **Day Two: Field exercises with PDAs**

Participants were taken to the field to apply lessons from the previous day. Groups were formed and each group was tasked to geocode structures in the respective compounds. Field exercises were carried out in the following compounds or localities:

- Lusaka: Garden compound, mostly informal structures.
- Livingstone: Maramba compound, mostly formal structures.
- Chingola: Kabundi East compound, formal structures.
- Kitwe: Ipusukilo compound, mostly informal structures.

The process for geocoding the structures was initially slow but it speeded up after the participants got used to the enumeration and the use of the PDA. After data collection, the team returned to class where the data was consolidated in one PDA using the 'Beam in' and 'Beam out' features (these features enable the exchange of data between two PDAs – the PDA that is receiving data will beam in while the one



that is sending data will beam out). Using this process, the master PDA can retrieve data from all the other PDAs. The participants were also shown how to display records and how to navigate to specific points of interest. The structures geocoded during the training exercises were eventually imported into HealthMapper and displayed as GIS Point layers.

After the field exercises, facilitators introduced the participants to the World Health Organization (WHO) GIS software (HealthMapper version 4.2). The participants were initially shown how to install HealthMapper software, Microsoft ActiveSync and Indoor Residual Spraying 2007 (IRS2007) household enumeration software.

The trainers emphasized that HealthMapper is a desk top GIS software developed by WHO to map health-related facilities, disease events, and health scenarios. It is a user-friendly software and easy to learn, hence the reason for using it in the training. Various health-related indicators have been included in HealthMapper. On the other hand, the trainers told the participants that Microsoft ActiveSync is a software that enables the computer and PDA to communicate with each other. The IRS2007 household enumeration software enables the transfer of database from the PDA to a computer and at the same time converting it into a Microsoft Access database file format. Once the file is in this format, HealthMapper or any other GIS software can be used to produce map layers showing the various themes.

Using specific scenarios, participants had hands-on training on the use of HealthMapper software to produce thematic maps. The facilitators also showed the participants how to map various malaria health-related indicators that were already embedded in the software.

### **Day Three: Importing IRS household listing**

During this session, the participants were shown how to transfer data from the PDA to a personal computer using the IRS2007 software. This process created Microsoft Access database file which showed all the data collected in the various compounds but organized as useable database files. These files were then imported into HealthMapper and the Maps were displayed in HealthMapper as shown in figures 1 to 8 below.

### ***Lusaka training outputs***

Participants were taken to Garden compound to practice collecting real data using PDAs. Garden compound mostly consists of informal structures with a very complicated numbering system which was not easy to follow because the numbering system does not follow a particular pattern. Structures are also very close to each other and, in a number of cases, households share the same structure. This was a challenging exercise to the participants because it exposed them to a variety of situations that can be found on the ground. With this experience, both the facilitators and the participants were able to agree on some standards to follow when geocoding such structures. These were shared with participants in the subsequent training sessions. Figure 1 shows the points as a large cluster because it is being displayed at a small scale. Figure 2, on the other hand, shows more clusters when these are displayed at a large scale.

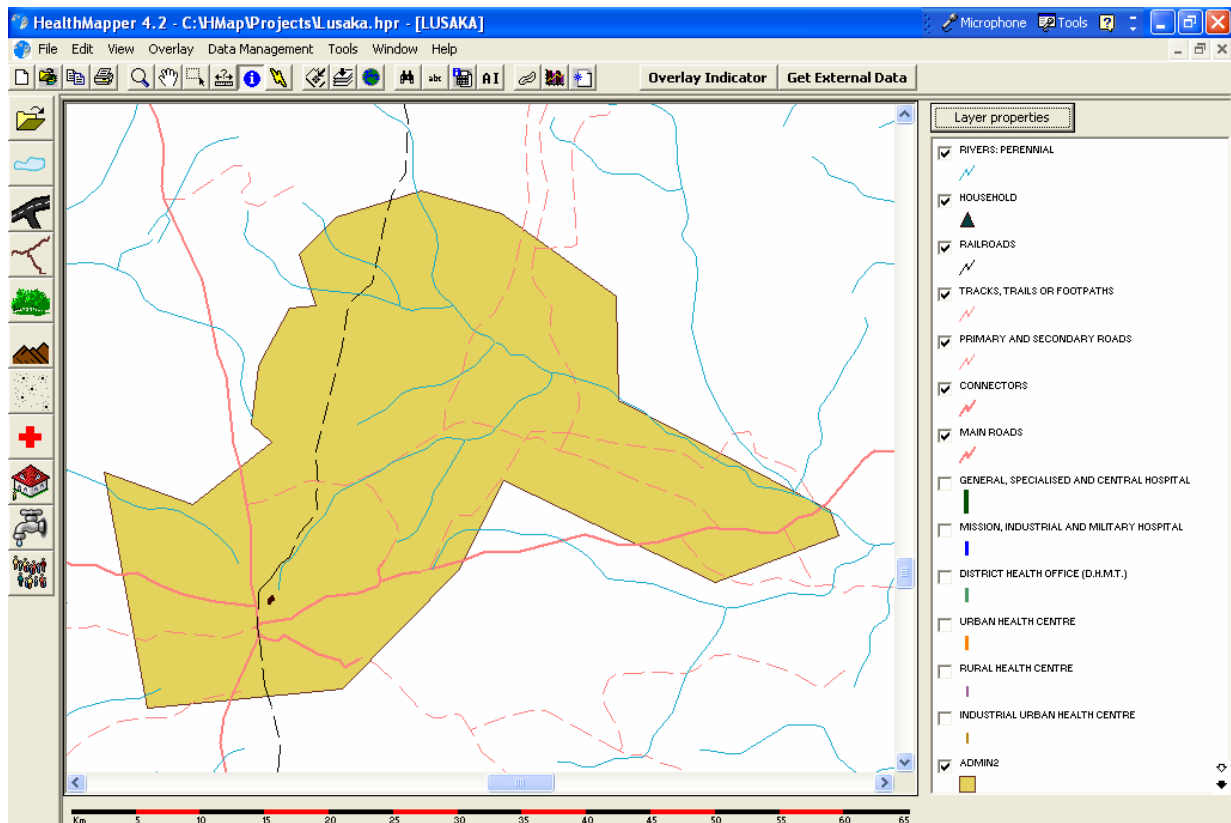


Figure 1. Small-scale map of Lusaka.

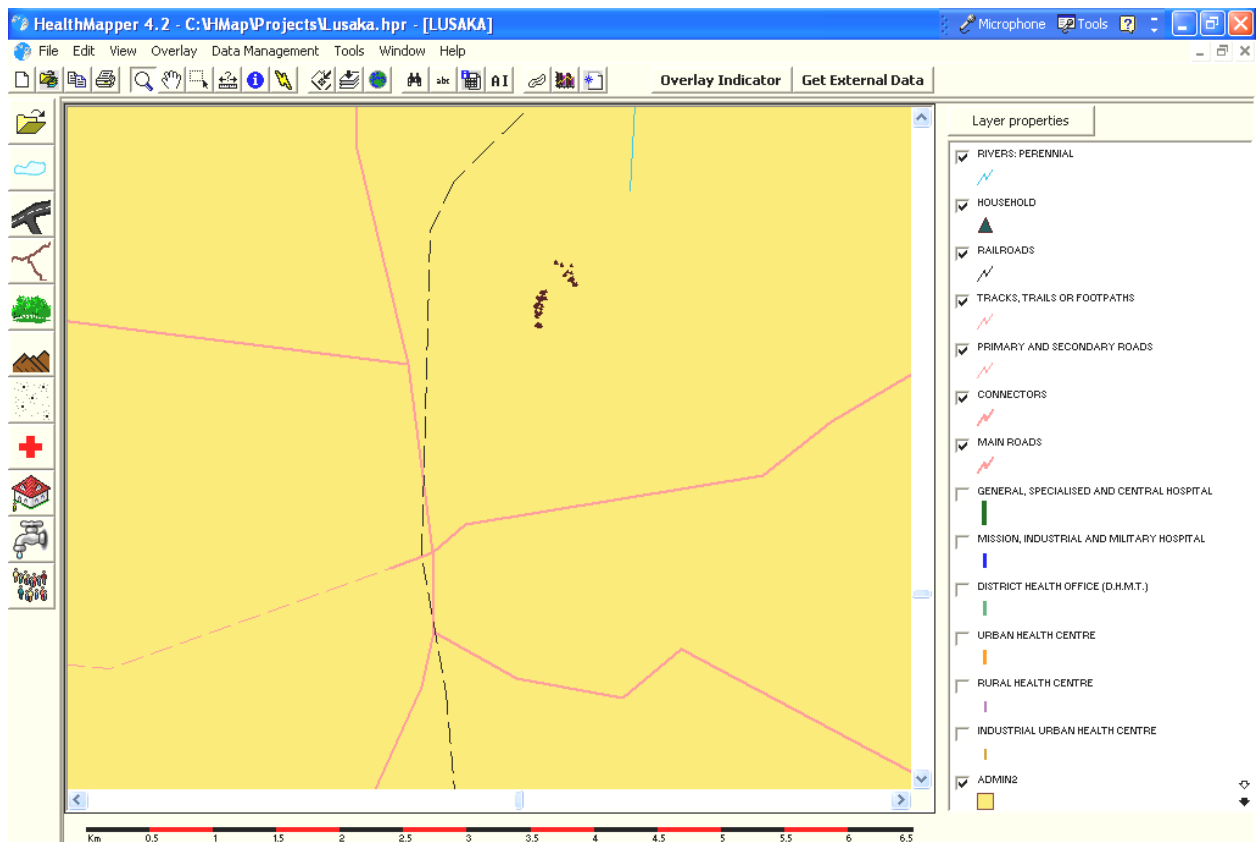


Figure 2. Large-scale map of Lusaka showing points collected from Garden Compound.

## Livingstone Training Outputs

In Livingstone, the exercises were done in Dambwa Township. The township consists of formal household (HH) structures and formal HH structure numbering. Figure 3 shows the map of Livingstone with a triangular point representing geocoded HH structures in Dambwa. To see these structures, HealthMapper has a capacity that allows seeing detail. This results in seeing the individual points as shown in Figure 4. The points are displayed showing the house numbers and in some cases the name of the head of the HH. Where no occupants were found at the premises, these are displayed with “vacant” following the house number. These kinds of structures, unlike those in Garden compound, are easier to count because almost all of them are of a standard type.

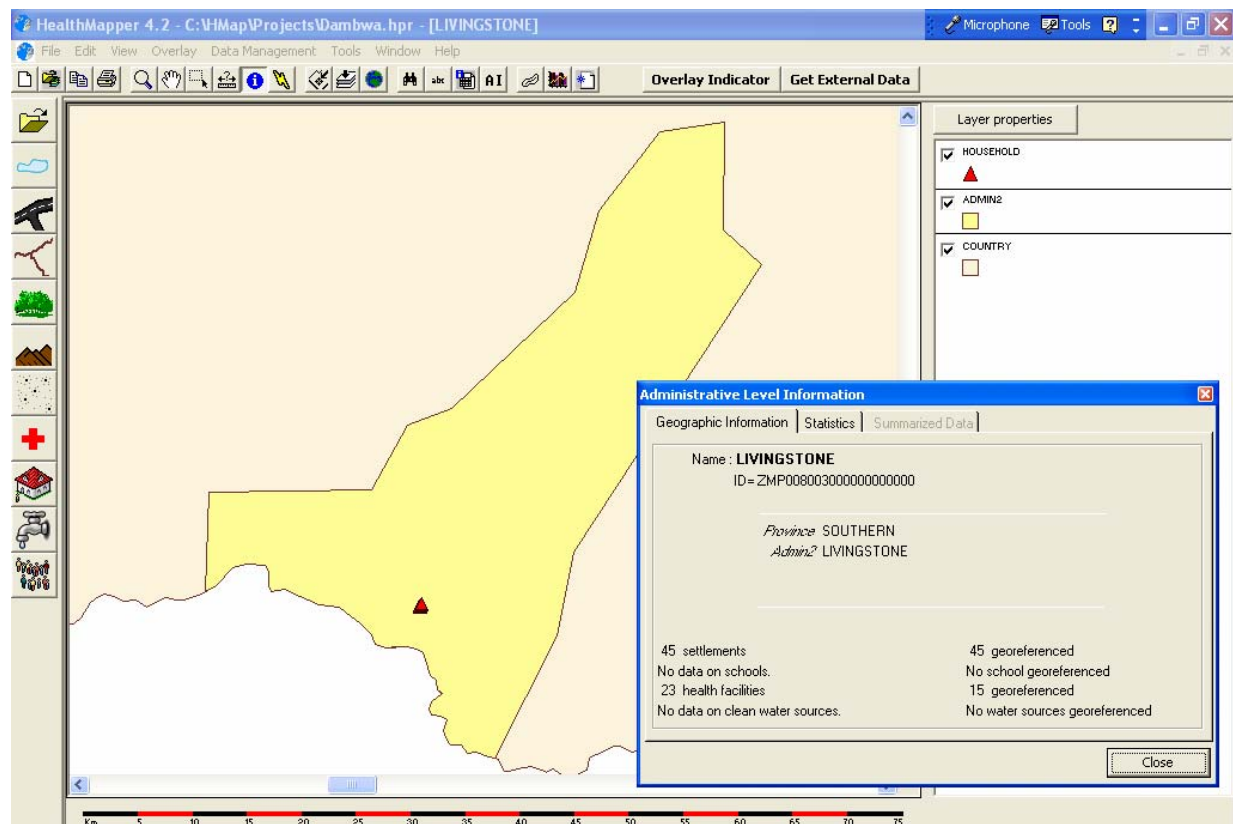


Figure 3. Map of Livingstone.

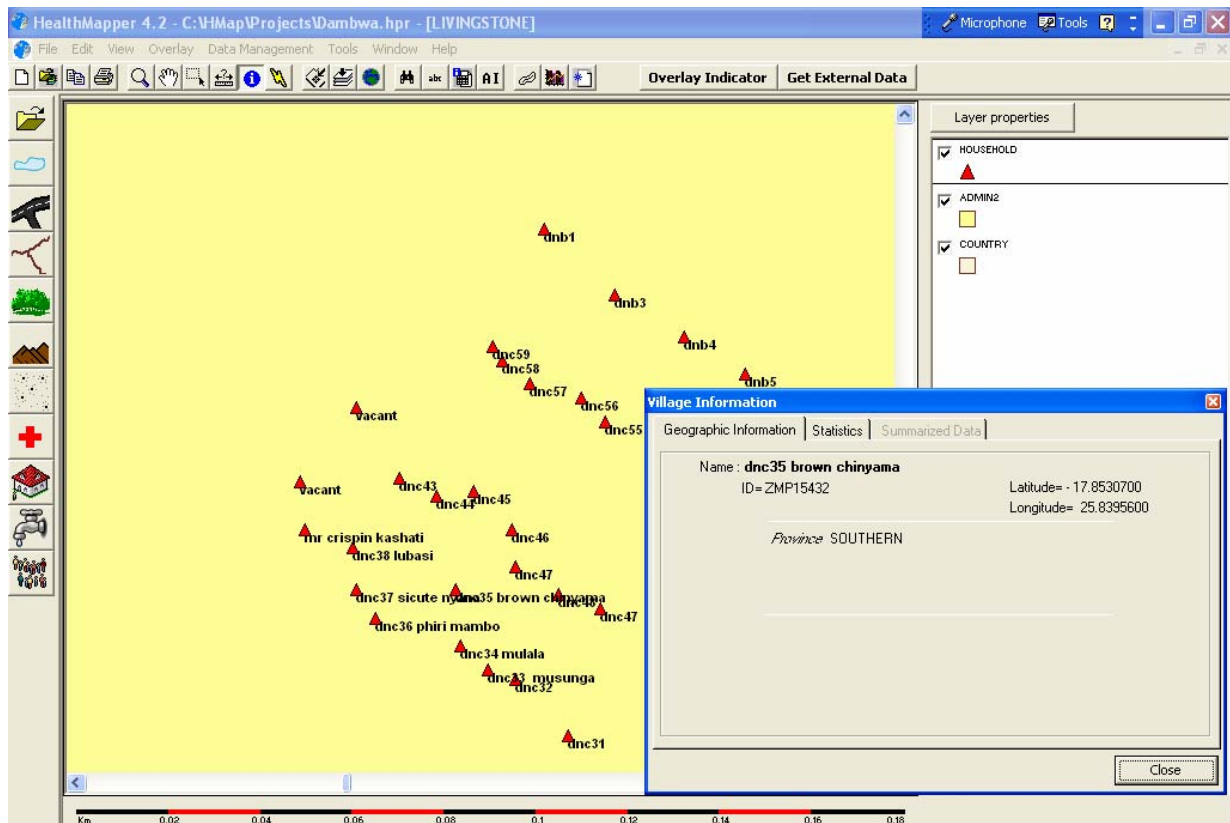


Figure 4. Display of points collected from Dambwa in Livingstone.

### Kitwe Training Outputs

Field exercises in Kitwe were conducted in Ipusukilo compound, east of Buchi and Kamitondo (Figure 5). Unlike Garden compound, Ipusukilo compound consists almost entirely of informal HH structures. However, the plot numbers are in numerical order and easy to follow. Figure 6 shows a large-scale portion of Kitwe and displays the HH structures showing the number of people living in each household. The “0”s indicate that the premises were locked. Accessibility in these circumstances was a major challenge to the participants and this made them much more careful when geocoding locked premises so that structures are not left out by mistake.

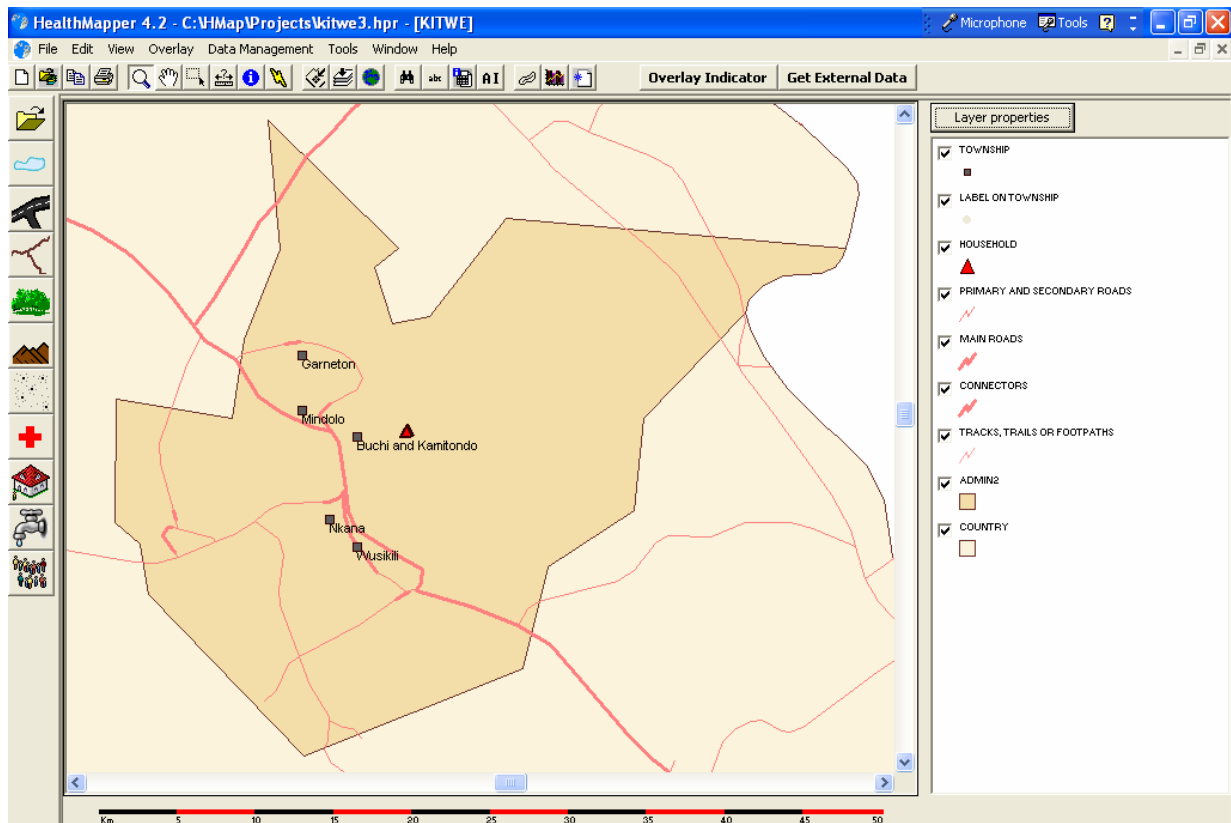


Figure 5. Map of Kitwe.

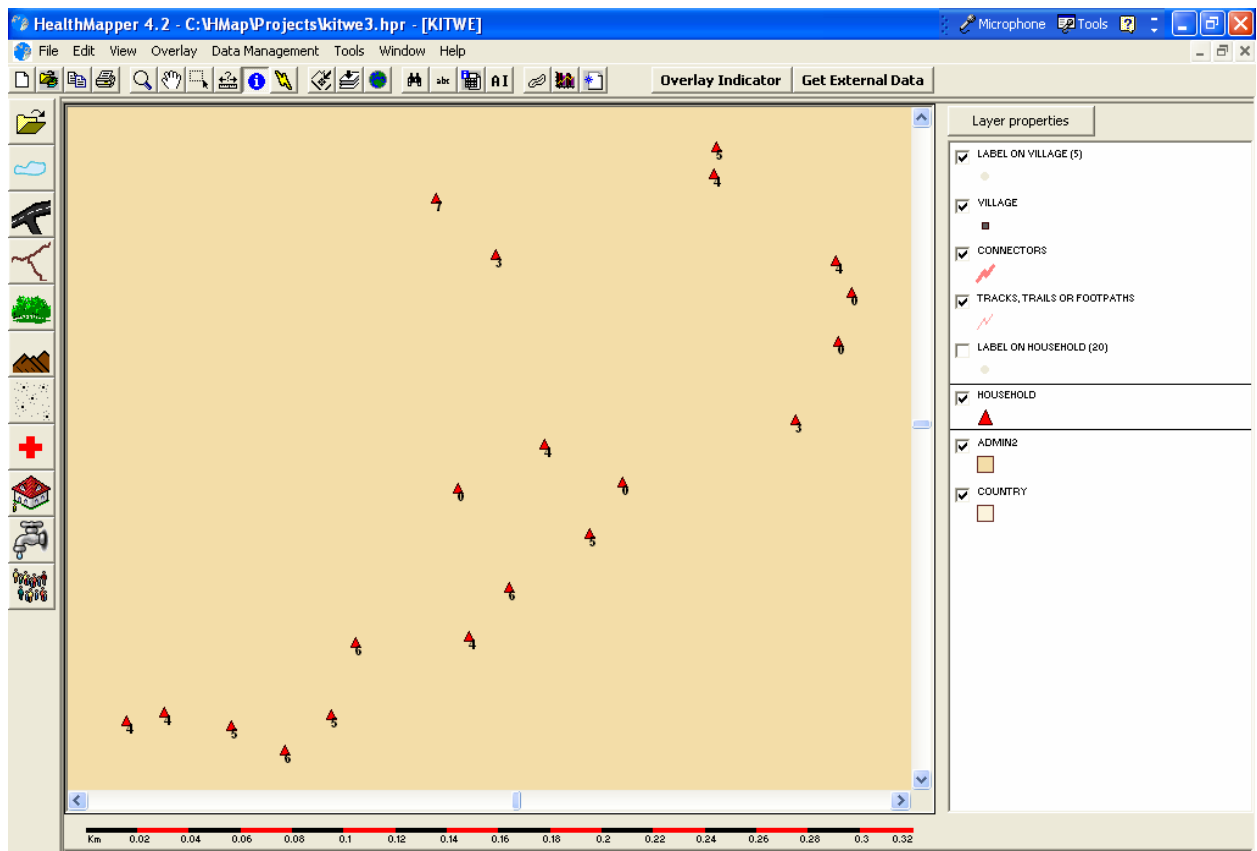


Figure 6. Points collected from Ipusukilo Compound in Kitwe.

## Chingola Training Outputs

Field exercises were conducted in Kabundi East. This is one of the townships in the mine area with formal structures. The numbering of structures is in a logical format with street names providing extra information for the structures. These structures were far easier to geocode than those in Ipusukilo and Garden compound. Figure 7 shows the structures as a single triangular representation. Figure 8, on the other hand shows that this point actually comprises many points representing the HH structures enumerated.

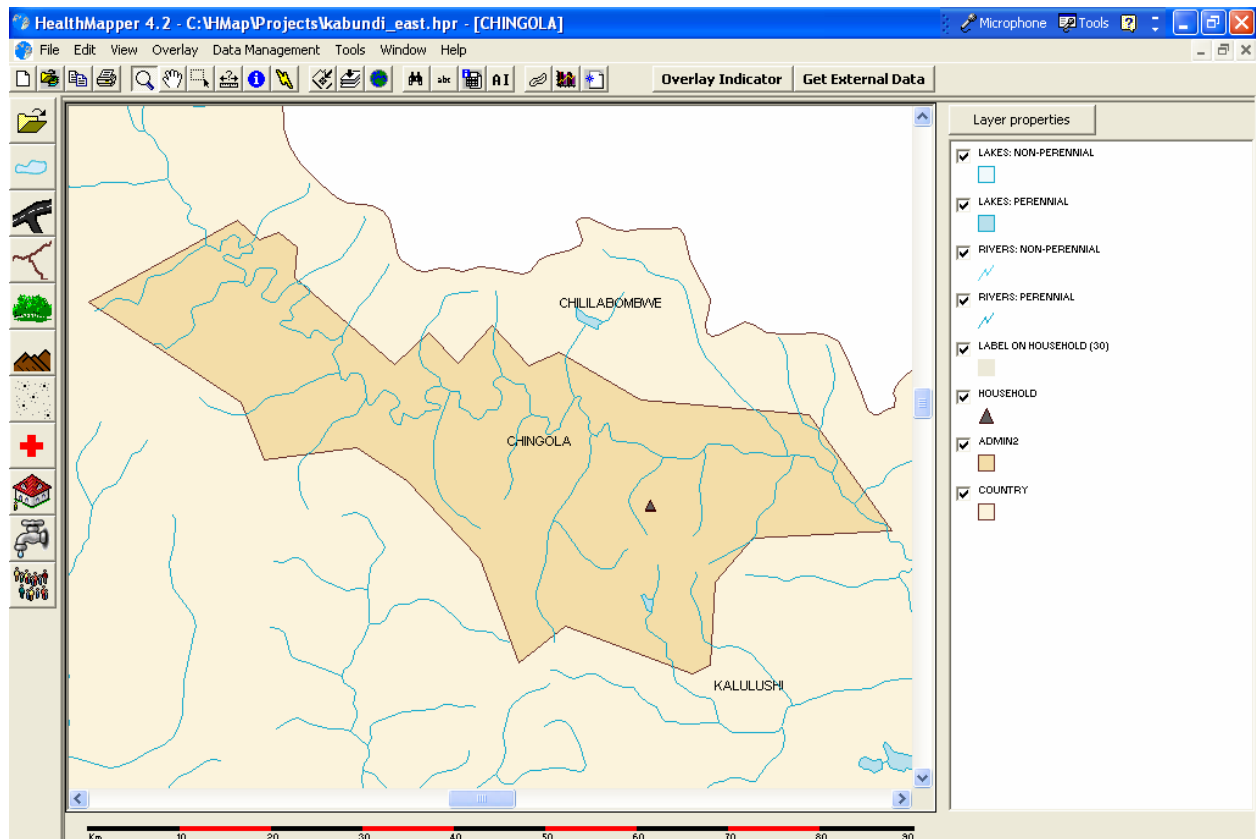


Figure 7. Small-scale map of Chingola.

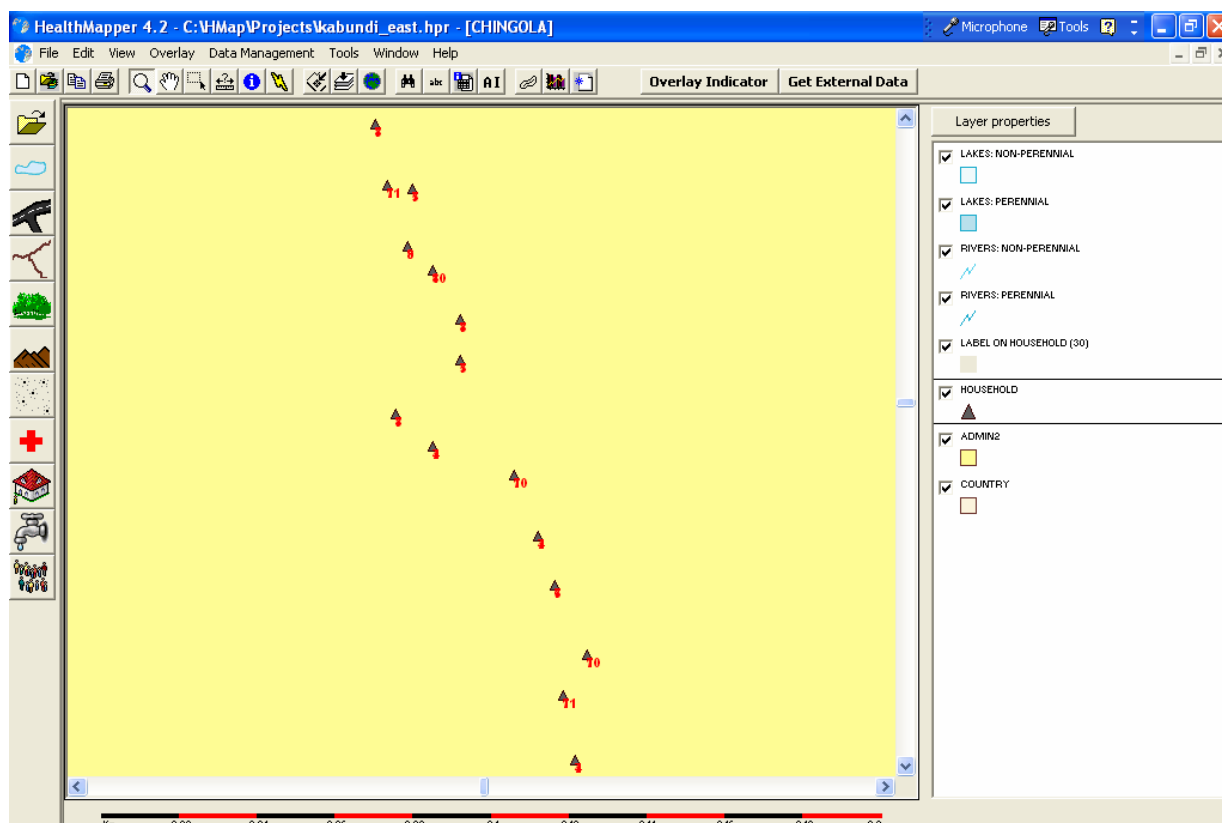


Figure 8. Large-scale map of points collected from Kabundi East in Chingola.

The figures above show the basic ways in which HealthMapper can be used in information management. It has far more capabilities than have been displayed.

### Planning the way forward

The training was appreciated by the participants. They felt that GIS was a good tool to use in planning and management. It was felt that this tool would improve efficiency and that the geocoding of the structures will go a long way in assisting them in knowing the true numbers of structures in the IRS areas. (Pre- and post-training evaluation forms are shown in Annex 5.)

At the end of each training, a planning session was held to discuss the way forward. It is obvious that the activities following the training exercise would have a cost implication. The first activity that each district will have to embark on soon after training is to train the enumerators on how to use PDAs so that they are able to geocode the structures in their respective districts. The shortage of PDAs also needs to be resolved. Currently, there are only 30 PDAs, and these are not sufficient to carry out the enumeration of the structures within the shortest possible time. Each district was therefore requested to come up with an estimate of the number of enumerators that would be needed to do the exercise, the number of PDAs as well as the number of days it would take to do the exercise, and any other logistical requirements that would make the exercise successful. The budget estimates for all the districts are shown in Annex 6.

## **4. Training Impact, Lessons Learned, and Conclusions**

As stated above, participants were engaged in a lively discussion to assess the major impact and some key lessons learned during the training sessions. A few of the key areas of impact, lessons learned, and conclusions as a result of the training activity are identified below. These experiences will be taken up during the district implementation of household enumeration using the PDAs.

### **Impact**

The major impact of the training included the following:

- The training created awareness among NMCC and district staff on the use of GIS and enhanced their skills in the use of PDA and HealthMapper GIS software. This was shown in the results of the pre- and post-training surveys; for Lusaka, the results of the pre- and post-training evaluation are presented in Annex 7.
- The training also showed that it is possible to integrate geocoded information from GPS for malaria monitoring and evaluation to quantify structures, rooms, population, and ITN activities done in all the IRS districts.
- Districts have been incorporated into the planning process through the development of district-based budgets for enumerating IRS target structures.
- The training successfully demonstrated the transition from paper-based enumeration to a digital data management process using the PDA.
- There is now potential for NMCC to develop a spatial data infrastructure to support malaria activities in Zambia.

### **Lessons learned and conclusions**

Key lessons learned and conclusions include the following:

- A three-day training on PDAs and GIS software provided basic skills on the use of geocoding for indoor residual spraying. While more time is necessary for the full scope of functions available in WHO Healthmapper, a three-day training was sufficient to cover the PDAs and the importation of geocoded structures into Healthmapper and to review how to overlay relevant available information for mapping.
- Districts, when requested, submitted appropriate budgets for conducting the enumeration of IRS target households using PDAs to complement spray activities. These budgets formed the basis of support for enumerating spray structures that has been implemented to date.
- IRS data handling at the district level will require some form of standards to be established in order to guide the activity. Guidelines are needed which will incorporate forms, procedures, targets for IRS, definitions, IRS manuals, and other relevant information.



- The NMCC has only some of the data required to adequately plan and monitor its activities. The NMCC would benefit from collaborating with institutions producing key spatial and non-spatial datasets (such as the Central Statistics Office and Surveyor General's Office) to improve its analytical capabilities.
- Use of GIS in planning and monitoring IRS spraying and ITN activities will assist in quantifying the allocation of spray personnel needs, scheduling, and duration of spray activities by districts.
- Careful delineation of spray areas and populations will assist in determining the scale of expected impact of malaria interventions through evaluation of IRS activities on malaria-related burden or within vector populations.
- Digital identification of households not receiving IRS will make it easier to target ITN mass distribution and net re-treatment campaigns.
- Development of an IRS decision-support information system to support IRS planning and monitoring needs vertical and horizontal integration to overcome some of the existing institutional barriers. In addition, the information system must address all pre- and post-IRS planning and monitoring activities.
- Malaria prevention and control is complex, requiring coordination and information-sharing among a range of systems at the local, district, national, and even regional and global levels. At the national level, there is need to link the IRS information system to the overall National Health Management Information System.

## Annex 1: Training Programme and Agenda

### IRS Mapping Training of District Personnel

The training was designed to last 3 days and build skills in using PDAs to enumerate households and structures for indoor residual spraying. The programme for the training included the following sessions:

- A) Introduction to geographic information systems (GIS). Participants to be introduced to the basic principles of GIS.
- B) Rationale for geocoding IRS spray areas.
- C) Familiarisation with HealthMapper software. It is proposed that HealthMapper be used at district level for viewing and processing electronic map files and GPS data in the districts. The software is freely available from WHO.
- D) Introduction to global positioning system (GPS).
- E) Household enumeration with PDAs and geocoding.
- F) Overview of the software programmes used. These programmes include GPS2, Navio, ActiveSync, and GPS2 Desktop data downloader.
- G) Data extraction from Navio and GPS2 programmes.
- H) Overview of the map production process and the products that will be produced and shared with the districts.
- I) PDA maintenance procedures and availability procedures for the complete household listing.
- J) PDA/GPS field exercises in which boundary tracing and IRS household enumeration will be done.

### Training Agenda:

#### DAY 1

0800-0830	Registration
0830-0900	Introductions and course objectives Skills assessment (pre-test)
0900-10:00	Introduction: Computers, hardware, and software Rationale for geocoding IRS spray areas
1000-1030	Break
1030-1230	Introduction to GIS
1300-1400	Lunch Break

1440-1700	Introduction to GPS, PDA and geocoding
1700	Close of Day 1

## DAY 2

0800-1300	Field exercises
1300-1400	Lunch break
1400-1530	Sharing data across PDAs HealthMapper with practical sessions
1530-1600	Break
1600-1700	HealthMapper continues with practical sessions
1700	Close of Day 2

## DAY 3

0800-1300	Transfer of files from PDAs to computers Importing data into HealthMapper
1300-1400	Lunch break.
1400-1530	Discussion on the way forward
1530-1600	Break
1600-1700	Skills assessment (post-test) Evaluation and closing
1700	End of training

### Facilitators:

John Miller, MACEPA, National Malaria Control Centre  
 Brian Chirwa, HSSP, National Malaria Control Centre  
 Christopher Lungu, Consultant, MACEPA  
 Chadwick Sikaala, MoH, National Malaria Control Centre  
 Sampson Katikiti, WHO East and Southern Regional Office  
 Dayton Makusa, HSSP, IRS Technical Officer  
 Mercy Mwanza, MIS and Surveillance Officer  
 Monje Shimukowa, HSSP Logistics Officer

## **Annex 2: Schedule for District IRS Trainings**

### **February 2007 to March 2007**

A minimum of two participants were trained in each district, while four were trained at the NMCC.

#### ***February 26 – 28***

Lusaka (Province, District and LCC), Kabwe, Chongwe, Kafue and NMCC  
Venue: HSSP, Lusaka

#### ***March 7 - 9***

Livingstone (Province & District), Kazungula and Mazabuka  
Venue: Livingstone

#### ***March 14 - 16***

Solwezi (Province & District), Mufulira, Chililabombwe and Chingola  
Venue: Chingola

#### ***March 19 – 21***

Ndola (Province & District), Kitwe, Luanshya, Kalulushi, KCM, MCM and KCC  
Venue: Kitwe

## Annex 3: List of Participants

### Lusaka and Livingstone Workshops

District	Organization	Name	Surname	Title	Telephone	Fax	Email
	HSSP / NMCC	Moonje	Shimukowa	IRS Officer	097 85 64 44		moonje@nmcc.org.zm
	MOH / NMCC	Chadwick	Sikaala	IRS Officer	097 61 03 73		chsikaala@nmcc.org.zm
Chongwe	DHMT	Alex	Chilabi	Health Inspector	01-620023 / 097 697067		chilabialex@yahoo.com
Lusaka	LCC	Ernest	Munsanje	Land Surveyor	097871723		ernestmunsanje@yahoo.co.uk
Lusaka	LCC	Benjamin	Zulu	GIS Technician	097585954		bennyzulu@yahoo.co.uk
Lusaka	DHMT	Levi	Mbulo	Health Information Officer	01-235554 / 096 848060		mbulolevi@yahoo.com
Kabwe	DHMT	Josephine	Maala	Health Information Officer	05-221615 / 097 752774		josephinemaala@yahoo.com
Kabwe	DHMT	Alick	Chirwa	IRS Focal Point	05-221618 / 097 892798		
Lusaka	DHMT	Phillip	Mulenga	IRS Focal Point	01-235554 / 096 956630		mulengaphillip@yahoo.com
Livingstone	DHMT	Clarence L.	Musumo	Health Information Officer	03-324070 / 097 895311	03-324016	cmusumo@yahoo.co.uk
Livingstone	DHMT	Chipo	Sikazwe	Manager Planning and Development	03-322208 / 097 851499	03-324016	chiposikazwe@yahoo.co.uk
Livingstone	PHO	Emmanuel	Kooma	EHT	03-324435 / 099 959951	03-323391	ekooma@yahoo.co.uk
Mazabuka	DHMT	Bernard	Uteka	Health Inspector	03-230951 / 097 783398		bernarduteka@yahoo.com
Kazungula	DHMT	Lubinda E	Mushala	Health Information Officer	03-322645 / 097 446924		mushal-lubinda@yahoo.com

District	Organization	Name	Surname	Title	Telephone	Fax	Email
Kafue	DHMT	Mwango	Kandetta	Health Information Officer	01-311148 / 097 174861		kandetta_mortuw@yahoo.co.uk
	HSSP / NMCC	Brian	Chirwa	IRS Information Officer	099 70 02 10 / 01-233895		bchirwa@nmcc.org.zm
	HSSP / NMCC	Dayton	Makusa	IRS Officer	282455 / 097796128		dmakusa@nmcc.org.zm
Livingstone	DHMT	Rose C.	Banda	EHT malaria focal point	03-324016 / 097 829393	03-324016	rosecbanda@yahoo.com
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Kabwe	DHMT	Teddy	Wakunuma	Health Inspector			Tedwakunuma@yahoo.co.uk
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## Kitwe Workshop

Edinburgh Hotel, 19<sup>th</sup> to 24<sup>th</sup> March, 2007

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<b>Name</b>	<b>Designation</b>	<b>Organisation</b>	<b>Telephone</b>	<b>Fax</b>	<b>Cell</b>	<b>Email</b>
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## **Annex 4. Steps for Geocoding IRS Map Areas**

- Step 1:** Delineate District digital base map to ward/standard enumeration area (SEA) level from NMCC contact point.
- Step 2:** Identify wards/SEAs where IRS activities are taking place.
- Step 3:** Digitize the HHs using the PDA GPS2 program.
- Step 4:** Download the data from PDA into your computer.
- Step 5:** Use Navio to connect the points into a polygon (boundary tracing).
- Step 6:** Overlay the boundary map on the base map.
- Step 7:** Load your new IRS Map area into HealthMapper.
- Step 8:** Use HealthMapper to answer your questions.

## Annex 5: Pre- and Post-training Evaluation Forms

### Pre-training Evaluation Form

What are your expectations from this training workshop?

What is your understanding of the following items listed below?	Very Good	Good	Satisfactory	Poor	Very Poor	N/A
	5	4	3	2	1	0
<b>Introduction to GIS</b>						
(i) GIS and health						
(ii) Databases						
(iii) Presentation of GIS data						
(iv) Geocoding IRS areas						
<b>Familiarization with HealthMapper Software</b>						
(i) Installation						
(ii) Displaying maps						
(iii) Producing point, area and thematic maps						
(iv) Data capture, updating using data manager						
<b>Use of PDAs for collecting information</b>						
(i) Use of software						
(ii) Application of software to health mapping						
<b>Introduction to GPS, PDA and geocoding</b>						
(i) Use of a PDA						
(ii) Use of GPS						
(iii) Principles of geocoding						
(iv) Knowledge of geocoding IRS spray map areas						
(v) Data extraction from GPS/PDA						
<b>Map production process and products and sharing methodology</b>						
(i) Principles of digital mapping						
(ii) Health mapping (point, area, thematic)						
<b>PDA maintenance procedures and household listing procedure</b>						
(i) Maintaining PDA						
(ii) Data capture of HHs using PDA						
<b>PDA/GPS field exercises (boundary tracing)</b>						
(i) Boundary tracing						

## Post-training Evaluation Form

What have you achieved during this training course?

What is your understanding of the following items listed below?	Very Good	Good	Satisfactory	Poor	Very Poor	N/A
	5	4	3	2	1	0
<b>Introduction to GIS</b>						
(v) GIS and health						
(vi) Databases						
(vii) Presentation of GIS data						
(viii) Geocoding IRS areas						
<b>Familiarization with HealthMapper Software</b>						
(v) Installation						
(vi) Displaying maps						
(vii) Producing point, area and thematic maps						
(viii) Data capture, updating using data manager						
<b>Use of PDAs for collecting information</b>						
(iii) Use of software						
(iv) Application of software to health mapping						
<b>Introduction to GPS, PDA, and geocoding</b>						
(v) Use of a PDA						
(vi) Use of GPS						
(vii) Principles of geocoding						
(viii) Knowledge of geocoding IRS spray map areas						
(v) Data extraction from GPS/PDA						
<b>Map production process and products and sharing methodology</b>						
(iii) Principles of digital mapping						
(iv) Health mapping (point, area, thematic)						
<b>PDA maintenance procedures and household listing procedure</b>						
(iii) Maintaining PDA						
(iv) Data capture of HHs using PDA						
<b>PDA/GPS field exercises (boundary tracing)</b>						
(ii) Boundary tracing						

## Annex 6: Household Listing Budgets (in Zambian Kwacha)

### 1. Lusaka District

Item	Description	Unit Measure	Days	Number of people	Unit Cost	Number	Total Cost
	Equipment						
1	PDAs and accessories (cables, etc.)					19	
	Mobilization and training						
2	Mobilization and recruitment	Days		5	50,000	6	1,500,000
3	Training of enumerators		3	19	15,000	10	8,550,000
	Implementation						
6	Allowances for enumerators	Lump sum	53	19	15,000	10	151,050,000
7	Health centre supervisors	Lump sum	53	19	20,000		20,140,000.00
8	Program managers	Lump sum	53	6	50,000		15,900,000.00
9	Transport refund for managers	Lump sum	58	6	25,000		8,700,000.00
10	Driver incentive	Lump sum	58	1	50,000		2,900,000.00
11	Fuel	Litre	58		7,000	20	8,120,000.00
12	Lubricants	Litre			100,000	1	100,000.00
	Stationery						
13	Reams of paper	Ream			40,000	10	400,000.00
14	Toner	Unit			500,000	2	1,000,000

**Grand Total**

**218,360,000**

## 2. Chongwe District

Item	Description	Unit Measure	Days	Qty	Unit Cost	Total Cost
	<b>Equipment</b>					
1	PDA's and accessories (cables etc)	Each		20		
	<b>Mobilization and training</b>					
	Orientation of DHO staff					-
	Notebooks	Each	1	4	5,000	
	Snacks	Each	1	8	3,000	
	Dinks	Each	1	8	1,500	
	Lunch	Each	1	8	50,000	
3	Hire of hall	Each	3	1	150,000	450,000
4	Tea break	Each	3	26	10,000	780,000
5	Lunch	Each	3	26	15,000	1,170,000
5	Dinner	Each	3	26	15,000	1,170,000
6	Breakfast	Each	3	26	10,000	780,000
7	Fuel	Litres	1	20	6,000	120,000
8	Accommodation	Each	3	26	50,000	3,900,000
9	Transport refund	Each	2	26	30,000	780,000
10	Pens	Each	1	20	1,500	30,000
11	Paper	Ream	1	1	30000	30,000
12	Flip charts	Each	1	1	30000	30,000
13	Markers	Pkt.	1	1	25000	25,000
	<b>Implementation</b>					
14	Lunch allowance for enumerators	Each	4	20	50,000	4,000,000
15	Lunch allowances for supervisors	Each	30	4	50,000	6,000,000
16	Fuel	Litre	20	20	6,000	2,400,000
17	ID cards	Each	1	15000	100	1,500,000
18	Stickers	Litre	5	100	6,000	3,000,000

**Total**

**26,165,000**

### 3. Kafue District

Item	Description	Unit Measure	Days	Number of people	Unit Cost	Number	Total Cost
	<b>Equipment</b>						
1	PDAs and accessories (cables etc)					20	
	<b>Mobilization and Training</b>						
2	Tea break		2	22	10,000	2	880,000
3	Water		2	22	2,000	2	176,000
4	Venue		2		100,000		200,000
5	Lunch		2	22	20,000		880,000
6	Paper		2		25,000		50,000
7	Pens		22		1,000		22,000
8	Flip charts		1		30,000		30,000
9	Out of pocket (staff)		2	10	40,000		800,000
10	Out of pocket (community)		2	12	10,000		240,000
11	Transport		2	22	20,000		880,000
12	Facilitation		2	4	100,000		800,000
13	Folders				2,000	22	44,000
	<b>Implementation</b>						
14	Allowances for enumerators (community)	Lump sum	21	12	20,000	6	5,040,000
15	EHTs	Lump sum	21	6	50,000		6,300,000
16	District supervisors	Lump sum	21	2	50,000		2,100,000
17	Fuel	Litre	21		6,000	15	1,890,000
18	Lubricants	Litre					-
20	<b>Stationery</b>						
12	Reams of paper	Ream			25,000	1	25,000
		Unit					-

**Grand Total**

**20,357,000**

#### 4. Kabwe District

Item	Description	Unit Measure	Days	Qty	Unit Cost	Total Cost
	<b>Equipment</b>					
1	PDA's and accessories (cables etc)	Each		40		
	<b>Mobilization and Training</b>					
2	DSA (Meal & transport)	Each	4	40	15,000	2,400,000
3	Supervisors and DHMT lunch	Each	4	5	50,000	1,000,000
4	Trainers lunch	Each	4	3	50,000	600,000
5	Folders and clips	Each	1	50	5,000	250,000
	Pens	Pkt.	1	1	30,000	30,000
6	Note books	Each	1	40	5,000	200,000
7	Paper	Ream	1	1	30,000	30,000
8	Flip chart	Each	1	1	30,000	30,000
9	Drinks	Each	4	60	3,500	840,000
10	Snacks	Each	4	60	3,000	720,000
11	Fuel for daily staff collection	Litre	4	30	6,000	720,000
12	Vehicle hire fo practicals	Each	3	2	200,000	1,200,000
	<b>Implementation</b>					
13	Allowances for enumerators (community)	Each	15	40	15,000	9,000,000
14	Lunch for staff	Each	15	5	50,000	3,750,000
15	Breakfast	Each	15	50	6,500	4,875,000
16	Vehicle hire	Each	15	2	200,000	6,000,000
17	Fuel for daily staff collection	Litre	15	30	6,000	2,700,000

**Grand Total**

**34,345,000**

## 5. Livingstone District

PDA: 20

Description	Quantity	No. of days	Unit cost	Total cost
Lunch allowance facilitators and supervisors	3	3	50,000	450,000
Tea breaks	34	3x2	15,000	3,060,000
Mineral water	34	3x2	2,500	510,000
Lunch allow for enumerators	20	3	15,000	900,000
Resource allowance DHO	3	3	50,000	1,890,000
Transport refund for facilitators	3	3	20,000	180,000
Lunch allowance for secretariat/ logistics officer	1			
Transport refund for enumerators	20	3	20,000	1,200,000
Fuel	35 litres	3	6,000	630,000
Lunch allowance for driver	1	3	50,000	150,000
Note books	34		10,000	340,000
Pens	34		1,000	34,000
Plain papers	5 rms.		30,000	150,000
Venue	1	3	350,000	350,000
Markers	5		10,000	50,000
<b>Resource person from Lusaka</b>				
Accommodation				
Fuel				
Lunch				
Lunch allow from and to Lusaka				
Super				
Resource allowance				
Out of pocket				
<b>Budget for enumeration</b>				
Lunch allowance supervisors	4	30	50,000	6,000,000
Transport refund for supervisors	4	30	20,000	2,400,000
Lunch allow for enumerators	20	30	15,000	9,000,000
Transport refund for enumerators	20	3	15,000	60,000
Lunch allowance for driver	1	30	50,000	1,500,000
Fuel	30 litres	30	6,000	5,400,000
Lunch allowance for DHO/PHO monitors	3	30	50,000	4,500,000
<b>Total</b>				<b>38,754,000</b>



## 6. Kazungula District

Training Of 20 GIS enumerators and 4 supervisors; duration of the training is 4 days.

Time frame: 1<sup>st</sup> week of May

No	Activity	Inputs	Qty	Days	Unit cost(k)	Total cost(k)	
1	Training of 20 GIS enumerators and 4 supervisors	<b>Stationery</b>					
		Paper (reams)	1	1	30,000	30,000	
		Pens	20	1	2,000	40,000	
		Pencils		1	1,000	0	
		Note pads	20	1	3,000	60,000	
		Ruler		1	3,000	0	
		Rubber		1	1,000	0	
		<b>Transport</b>					
		Transport refund		24	2	20,000	960,000
		Fuel		60	1	6,000	360,000
		<b>Accommodation</b>					
		Venue		1	3	250,000	750,000
		Accommodation of participants		24	4	50,000	4,800,000
		<b>Meals</b>					
		Breakfast		24	4	15,000	1,440,000
		Tea breaks		52	3	5,000	780,000
		Lunch		26	3	25,000	1,950,000
	Dinner		24	4	25,000	2,400,000	
	<b>Resource persons</b>						
	Out of pocket for enumerators		2	4	100,000	800,000	
	Out of pocket for supervisors		20	3	20,000	1,200,000	
	Photocopying		6	3	40,000	1,800,000	
	Binding						
	<b>TOTAL COST (K)</b>					<b>17,370,000</b>	

### The Actual Enumeration Of Structures

The exercise will be conducted for 60 days (2 months). This length of time is needed because of the long distances between households and villages, and the long distances between catchment areas. Kazungula District is a completely rural district and enumerators will have to spend nights when counting houses in 5 areas (Moomba, Ngwezi, Nyawa, Kauwe and Nanyati). To conduct the exercise we will need 26 PDAs.

Time frame: May to July

No.	Activity	Inputs	Qty	Days	Unit Cost(K)	Total Cost(K)
1	Enumeration exercise in 14 catchment areas	Lunch for enumerators	20	42	20,000	16,800,000
		Lunch for supervisors	6	42	50,000	12,600,000
2	Enumeration exercise in 5 catchment areas where people will have to sleep	Lunch for enumerators	20	18	20,000	7,200,000
		Lunch for				



## 7. Mazabuka District

Item	Description	Unit Measure	Days	Qty	Unit Cost	Total Cost
	<b>Equipment</b>					
1	PDAs and accessories (cables, etc.)	Each		25		
	<b>Mobilization and training</b>					
2	Selecting of household enumerators	Each	1			-
3	Hire of hall	Each	3	25	10,000	750,000
4	Tea Break	Each	3	1	200,000	600,000
5	Lunch	Each	25	3	10,000	750,000
5	Facilitators' allowance	Each	3	3	210,000	1,890,000
6	Coordinators' allowance	Each	3	2	50,000	300,000
7	Secretarial expenses	Each				-
7	Drivers' allowance	Each	3	1	50,000	150,000
8	Exercise book	Each		25	1,000	25,000
9	Pens	Each		25	1,500	37,500
10	Pencils	Each				-
11	Paper	Ream		1	30,000	30,000
12	Flip charts	Each		1	30000	30,000
13	Markers	Pkt.		1	25000	25,000
	<b>Implementation</b>					
8	Allowance for enumerators	Each	30	25	35,000	26,250,000
9	Allowances for supervisors	Each	30	4	50,000	6,000,000
10	Allowance for data manager	Each	30			-
11	Hire of vehicle	Each	30	1	250,000	7,500,000
12	ID cards	Each		25	20,000	500,000
13	Fuel for community sensitization	Litre	5	100	6,000	3,000,000

**Grand Total**

**47,837,500**

## 8. Chingola District

Item	Description	Unit Measure	Days	Qty	Unit Cost	Total Cost
	<b>Equipment</b>					
1	PDA's and accessories (cables, etc.)	Each		18		
	<b>Mobilization and training</b>					
2	Meals	Each	2	18	25,000	900,000
3	Drinks	Each	2	36	2,500	180,000
4	Transport refund	Each	2	20	10,000	400,000
5	Fuel	Litre	2	40	6,000	480,000
6	Snacks	Each	2	18	15,000	540,000
7	Facilitators Resource	Each				-
	<b>Implementation</b>					
8	Meal allowance	Each	10	10	30,000	3,000,000
9	Transport refund	Each	10	10	5,000	500,000
10	Hire of a bus	Each	10	1	350,000	3,500,000
11	Fuel	Litre	10	60	6,000	3,600,000
12	Lunch allowance - supervisor	Each	10	3	50,000	1,500,000
13	Monitoring supervisor - allowance	Each	10	5	50,000	2,500,000

**Grand Total**

**17,100,000**

## 9. Solwezi District

Item	Description	Unit Measure	Days	Number of people	Unit Cost	Number	Total Cost
	<b>Equipment</b>						
1	PDAs and accessories (cables etc)					12	
	<b>Mobilization and Training</b>						-
2	Tea break			3	300,000		300,000
3	Water						-
4	Venue						-
5	Lunch for enumerators		2	25	50,000		2,500,000
6	Lunch for supervisors		2	4	50,000		400,000
7	Paper						-
8	Pens						-
9	Flip charts						-
10	Out of pocket (staff)						-
11	Out of pocket (community)						-
12	Transport refunds			29	20,000	2	1,160,000
	<b>Implementation</b>						
13	Allowances for enumerators (community)	Lump sum	21	12	20,000	6	5,040,000
14	EHTs	Lump sum	21	6	50,000		6,300,000
15	District supervisors	Lump sum	21	2	50,000		2,100,000
16	Fuel	Litre	21		6,000	15	1,890,000
17	Stationery						
18	Reams of paper	Ream			25,000	1	25,000

**Grand Total**

**19,715,000**

## 10. Mufulira District

### A. Mufulira DHMT

#### IRS Training of enumerators in GIS

Item	Unit Measure	Unit Cost	Qty	Total Cost
<b>PDA's and accessories</b>	<b>Each</b>		<b>35</b>	
<b>Total PDA's: 70</b>				
Note Books	Each	2,500	35	87,500
Pens	Each	1,000	35	35,000
Photo copying	Per page	200	1300	260,000
Flip chart	Each	35,000	2	70,000
Hire LCD	Each	50,000	2	100,000
Soft Drinks	Each	1,500	160	240,000
Snacks	Each	2,500	160	400,000
M/Allowance & Transport (enumerators) 2 days x 35	Each	30,000	70	2,100,000
Lunch (facilitators) 5 x 2days	Each	50,000	10	500,000
Facilitation	Each	50,000	10	500,000
Fuel	Litre	6,105	50	305,250
<b>Total</b>				<b>4,597,750</b>

#### Community sensitization meeting with RDCS, NHCS and counselors in one day

Item	Unit Measure	Unit Cost	Qty	Total Cost
Soft drinks	Each	1,500	120	180,000
Water	Each	2,000	120	240,000
Snacks	Each	4,000	120	480,000
Transport refund	Each	10,000	120	1,200,000
Fuel	Each	6,100	50	305,000
<b>Total</b>				<b>2,405,000</b>

#### GIS Field Exercise

Item	Unit Measure	Unit Cost	Qty	Total Cost
Enumerators' allowance (35 x 10 days)	Each	30,000	350	10,500,000
Supervisors (10 days)	Each	80,000	10	800,000
Hire vehicle (transport)	Per day	350,000	10	3,500,000
Communication services	Each	60,000	10	600,000
Toner cartridge (for printing services)	Each	750,000	2	1,500,000
Soft drinks	Each	1,500	350	525,000
Snacks	Each	2,000	350	700,000
<b>Total</b>				<b>18,125,000</b>

**ZMK 25,127,750**

**(B) Mopani Mines****IRS Training of Enumerators in GIS**

Item	Unit Measure	Unit Cost	Qty	Total Cost
<b>PDA's with accessories</b>	<b>Each</b>		<b>35</b>	
Notebooks	Each			0
Pens	Each			0
Photocopying	Per page			0
Flip chart	Each			0
Hire LCD	Each	50,000	2	100,000
Soft drinks	Each	1,500	112	168,000
Water	Each	2,000	112	224,000
Snacks	Each	4,000	112	448,000
Facilitation	Each	50,000	2	100,000
Fuel	Litre			0
<b>Total</b>				<b>1,040,000</b>

**Community sensitization meeting with RDCs, NHCs and counselors in one day.**

Item	Unit measure	Unit cost	Qty	Total cost
Soft drinks	Each	1,500	130	195,000
Water	Each	2,000	130	260,000
Snacks	Each	4,000	130	520,000
Transport refund	Each	10,000	130	1,300,000
Fuel				0
<b>Total</b>				<b>2,275,000</b>

**GIS Field Exercise**

Item	Unit Measure	Unit Cost	Qty	
Numerators Allowance (35 x 10 days)	Each	30,000	350	
Supervisors (6 x 15 days)	Each	50,000	90	
Hire Vehicle(Transport)	Per Day			
Fuel	Litres			
Water	Each	2,000	390	
Soft Drinks (26 x 15 days)	Each	1,500	390	
Snacks	Each	2,000	390	
<b>Total</b>				
Summary				
<b>MUFULIRA GIS PROGRAM</b>				
<b>(DHMT &amp; MOPANI ACTIVITY BUDGET)</b>				
(a )GIS training of enumerators.				6,237,750
(b) Community sensitization meeting with RDCs, NHCs, and counselors in one day.				4,680,000
(c ) GIS field exercise.				35,270,000
<b>TOTAL</b>				<b>ZMK 46,187,750.00</b>

## 11. Chililabombwe District

Item	Description	Unit Measure	Days	Qty	Unit Cost	Total Cost
	<b>Equipment</b>					
1	PDA's and accessories (cables, etc.)	Each		12		
	<b>Social mobilization</b>					
	Lunch	Each				-
	Fuel	Litre				-
	Snacks	Each				-
	<b>Training of Enumerators on PDA</b>					
	Enumerators' lunch	Each	2	12	30,000	720,000
	Enumerators' transport	Each	2	12	10,000	240,000
	Supervisor lunch	Each	2	4	50,000	400,000
	Supervisor transport	Each	2	4	30,000	240,000
	Resource staff lunch	Each				
	Resource staff transport	Each				
	Tea break	Each	2	18	10,000	360,000
	Fuel	Litre	2			-
	Transport to hire to Chimfushi	Each	1	1	-	-
	Paper	Ream		1	30,000	30,000
	Markers	Each		6	15,000	90,000
	Hire of venue	Each	2	1	150,000	300,000
	Flip chart	Each		1	40,000	40,000
	<b>Enumeration of household</b>					
	Enumerators' lunch	Each	12	10	30000	3,600,000
	Enumerators' transport	Each	12	10	10000	1,200,000
	Supervisor lunch	Each	12	4	50000	2,400,000
	Supervisor transport	Each	12	4	30000	1,440,000
	Resource staff lunch	Each				-
	Resource staff transport	Each				-
	Transport hire to Chimfushi	Each	12	1	150000	1,800,000
	Production of IDs for enumerators	Each		18	30000	540,000
	Community guide	Each	12	3	20000	720,000
	Fuel	Litre	12	30	6000	2,160,000
		<b>Total</b>				<b>16,280,000</b>





### 13. Ndola District

#### Mobilization and Training

##### PDA's 80

No	Item	Qty	Days	Unit Cost	Total Cost
1	Meal allowance for enumerators	80	2	15,000	2,400,000
2	Transport refund for enumerators	80	2	5000	800,000
3	Tea break				
	Snacks	93	2	4,000	744,000
	Drinks	93	2	4000	744,000
4	Resource cost	5	2	50,000	1,000,000
5	Supervisors' meal allowance	13	2	35,000	910,000
6	Transport refund for supervisor	13	2	15,000	390,000
7	Ream of paper	1		25,000	25,000
8	Pens	85		500	42,500
9	Flip chart	1		25,000	25,000
10	Markers	4		2,500	10,000
11	Venue	1	2	150,000	300,000
	<b>Implementation</b>				
1	Wages for enumerators	80	40	30,000	96,000,000
2	Allowance for supervisors	8	40	50,000	16,000,000
3	Allowance for monitors	5	40	50,000	10,000,000
4	Transport refund for enumerators	80	40	5,000	16,000,000
5	Fuel	30 litres per day	40	6,000	7,200,000
6	Notebooks for monitors	5	-	3000	15,000
	<b>TOTAL COST</b>				152,605,500



## 15. Kalulushi District

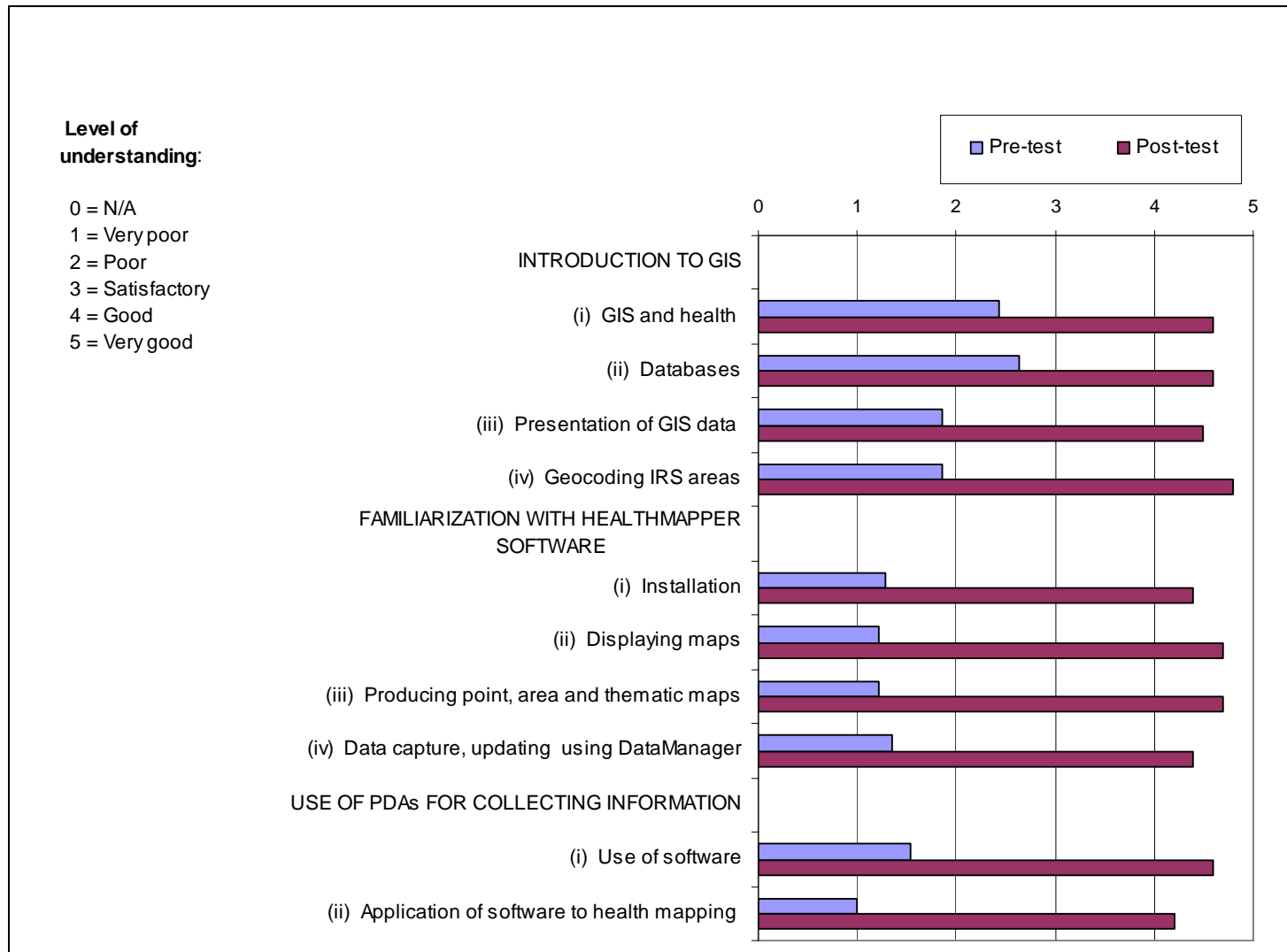
Item	Description	Unit Measure	Days	Number Of people	Unit Cost	Number	Total Cost
	Equipment						
1	PDAs and accessories (cables, etc.)					25	
	<b>Training for Enumerators</b>						
2	Drinks		2	25	25,000	3	3,750,000
3	Lunch for enumerators		2	25	50,000	1	2,500,000
4	Lunch for supervisors		2	4	50,000	1	400,000
5	Paper		1	1	25,000	1	25,000
6	Pens		1	25	1,000	1	25,000
7	Marker		1	1	10,000	3	30,000
8	Flip charts		1	1	30,000	1	30,000
9	Transport refunds		2	25	20,000	3	3,000,000
10	Exercise books		1	25	1,000	1	25,000
							<b>3,085,000</b>
	<b>Field Work</b>						
11	Enumerators transport refund		12	20	10,000	6	14,400,000
12	Enumerator lunch		12	20	30,000	1	7,200,000
13	Supervisor lunch allowance		12	4	50,000	1	2,400,000
14	Supervisor transport refunds		12	4	20,000	1	960,000
15	T-shirts		1	30	30,000	1	900,000
16	ID cards		1	30	20,000	1	600,000
17	T-shirts printing		1	30	20,000	1	600,000
18	Public address		4	1	500,000	1	2,000,000
19	Transport hire		12	1	350,000	1	4,200,000
20	Fuel	Litre	10	1	7,000	50	3,500,000
							<b>36,760,000</b>
				Total			39,845,000
				Contingency (5%)			1,992,250
				<b>Grand Total</b>			<b>41,837,250</b>

## Summary of all districts

No	District	No. HHs sprayed 2007	Reported targeted HHs	Total request for training and implementation (ZMK)	Total request (US\$)	No. of PDAs	Unit price for PDA (US\$)	Total	Price in ZMK (1usd = 4300)	Cost per HH targeted
1	Ndola	56718	66616	152,605,500	35,490	80	500	40,000	172,000,000	0.53
2	Kazungula	15801	15801	89,370,000	20,784	20	500	10,000	43,000,000	1.32
3	Mazabuka	33293	42000	47,837,500	11,125	25	500	12,500	53,750,000	0.26
4	Chingola	4685	5000	17,100,000	3,977	18	500	9,000	38,700,000	0.80
5	Kitwe	56096	56096	68,714,800	15,980	40	500	20,000	86,000,000	0.28
6	Luanshya	21355	28205	34,860,000	8,107	20	500	10,000	43,000,000	0.29
7	Chililabobwe	2441	5425	16,280,000	3,786	12	500	6,000	25,800,000	0.70
8	Kabwe	24149	32508	34,345,000	7,987	40	500	20,000	86,000,000	0.25
9	Solwezi	16253	13325	19,715,000	4,585	12	500	6,000	25,800,000	0.34
10	Kafue	11570	19000	20,357,000	4,734	20	500	10,000	43,000,000	0.25
11	Lusaka	204676	300000	218,360,000	50,781	19	500	9,500	40,850,000	0.17
12	Mufulira	17943	17943	46,187,750	10,741	70	500	35,000	150,500,000	0.60
13	Kalulushi	11378	15000		-		500	-	-	-
14	Livingstone	45640	36000	38,754,000	9,013	20	500	10,000	43,000,000	0.25
15	Chongwe		20000	26,165,000	6,085	20	500	10,000	43,000,000	
										<b>Average 0.43</b>

<b>Total (ZMK)</b>	<b>830,651,550</b>	<b>193,175</b>	<b>416</b>	<b>208,000</b>	<b>894,400,000</b>
Total - Lusaka, Kitwe, Ndola	439,680,300	102,251			
All others	390,971,250	90,924			
<b>Grand total (ZMK) (with PDAs)</b>	<b>1,725,051,550</b>				
<b>Grand total (US\$)</b>		<b>401,175</b>			

## Annex 7: Results of the Pre- and Post-Training Self-Evaluation (Lusaka)



**Level of understanding:**

- 0 = N/A
- 1 = Very poor
- 2 = Poor
- 3 = Satisfactory
- 4 = Good
- 5 = Very good

