Understanding the role of maps in community oriented primary care (COPC): a case study of mapmaking in ward-based outreach teams in Mamelodi

by

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DECLARATION

I, Nina Marí Honiball, student number 21002593 hereby declare that this dissertation, *Understanding the role of maps in community oriented primary care (COPC): a case study of mapmaking in ward-based outreach teams in Mamelodi,* is submitted in accordance with the requirements for the degree PhD in Family Medicine at the University of Pretoria, is my own original work and has not previously been submitted to any other institution of higher learning. All sources cited or quoted in this research paper are indicated and acknowledged with a comprehensive list of references.

Nina Marí Honiball

15 October 2018

DEDICATION

For Mom, Dad and Grandma Ina

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ABSTRACT

This study addresses an observable problem, which is that community health workers (CHWs) struggle to understand medical data maps and healthcare related statistics in community oriented primary care (COPC). COPC is a model of healthcare that was implemented in the city of Tshwane by the Department of Family Medicine (University of Pretoria), the City of Tshwane and Tshwane District Health (Gauteng Provincial Department of Health) as part of a national government drive to reform primary healthcare services in South Africa. COPC is an internationally recognised model of care that is patient-centred and focuses on bringing healthcare to the home. To address the above-mentioned problem, the purpose of the study was to explore if and how different types of participatory mapmaking projects and discussions about these maps could help healthcare team members to make sense of medical data and other healthcare related maps in a different way. The study was conducted in Mamelodi, a township located in the City of Tshwane, South Africa. Participants who took part in the study were nurses, CHWs and registrar medical doctors who deliver COPC.

To gather data for the study, three participatory mapmaking projects were designed and implemented by both the researcher and those who took part in each project. In addition to the mapmaking projects, participants also took part in focus group discussions or semi-structured interviews and completed reflective writing about their mapmaking experience. The focus group discussions and interview data were transcribed, and a thematic data analysis was used to analyse both the transcriptions and participant reflective writing. Data generated led to the discovery of several themes, which were grouped under two headings: *map* and *mapmaking and map discussions*. Themes identified under the heading, *map,* included (a) identifying and locating information, (b) using the maps to plan healthcare interventions as well as (c) to assess and evaluate the performance of healthcare team members. Themes identified under *mapmaking and map discussions* were linked to more tacit qualities such as (d) learning, (e) group work, (f) idea generation and problem solving and (g) team motivation. Findings from the study reveal the value of working with both the map and mapmaking simultaneously to enable ward-based outreach teams (WBOT) to better

understand both the work that they do and the area where they work. These findings have a significant value to offer in both the delivery of COPC as well as to other primary healthcare projects where maps and mapmaking can be utilised to not only improve service delivery but also to foster team building and workplace-based learning amongst healthcare service providers.

Key Terms:

Community oriented primary care (COPC), primary healthcare, mapmaking/mapping, participatory mapping, geographic maps, medical data maps, sketch maps, work-place based learning.

LIST OF ABBREVIATIONS

Abbreviation / acronym	Meaning
CHW	community health worker
COPC	community oriented primary care
GIS	geographic information system
HHR	household registration
LISA	Local Health and Institutional Analysis
PR	Participatory Research
PRA	Participatory Rural Appraisals
WBOT	ward-based outreach teams

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1.   INTRODUCTION

This chapter begins with a description of the study's context. The chapter then presents the study's problem statement, purpose, research questions and objectives. Next, the chapter puts forward a short section that delineates the study and provides a rationale for doing the research work. The chapter finishes off with a description of the researcher's interest in the study and an outline of all the chapters in this thesis.

1.1   Study Context – the South African healthcare setting

In 2016, 56,8% of South Africa's population of 55,7 million people were poor, and 26.7% were unemployed (Statistics South Africa, [sa]a). The country is in the grip of quadruple epidemics which create a disease burden that is difficult to address. The healthcare system itself is fragmented, structurally favours professional and institutional specialisation in hospitals and clinics and is poorly designed to meet basic healthcare needs (Marcus, 2015:2).

Implementing the re-engineering of primary healthcare in South Africa on a district-wide level
Ward based outreach teams (WBOTs) are a policy reform of the National Health Department. As part of a national government initiative to re-engineer primary healthcare they were conceptualised as "add-on services attached to primary healthcare clinics". WBOTs are comprised of community health workers who extend the reach of the clinic to ordinary people at the bottom of the healthcare system (Jinabhai, Marcus & Chaponda, 2015:1).

In 2013 the City of Tshwane's (CoT) resolved to implement WBOTs to support the National Health Insurance (NHI) in the Tshwane District. Working with the Department of Family Medicine at the University of Pretoria, they adopted a community oriented primary care (COPC) approach to the reform. Marcus (2013:7) defines COPC as "primary care where professionals from different

disciplines and approaches work together with organisations and people in defined communities to identify and respond systematically to health and health-related needs in order to improve health". COPC combines the practice of public and primary healthcare to enable everyone to contribute to and benefit from health (Mullen & Epstein, 2002:1748; Perry, Zulliger & Rogers, 2014:400).

The CoT initiated WBOTs in Mamelodi in the last quarter of 2014. Mamelodi is a historically racialised urban settlement of Africans segregated by colour and language. It is located in the east of the City of Tshwane (see Figure 1.1). Mamelodi has a population of 334,577 people or approximately 110,703 households of which a third are female-headed. 98.8% of the residents are of African origin, and 42,5% speak Sepedi as a first language (Statistics South Africa, [sa]b). 61% of households live in formal dwellings, and 38,4% of the population above the age of 20 have completed secondary school.

Figure 1.1: A map of all the South African provinces which highlight the location of the Gauteng province (outlined in black), the City of Tshwane municipality (the pink area), as well as the location of Mamelodi (see the red marker). The image was modified by the researcher from a map found on freevectormaps.com entitled *South Africa with Provinces – Multicolour*.

The Tshwane Health post model

In the Tshwane District, COPC is implemented through the Tshwane health post model (Bam, Kinkel, Marcus & Hugo, 2013:2). The model is built around health posts that are located in communities and healthcare teams who are stationed at the health posts (Kinkel, Marcus, Memon, Bam & Hugo, 2013:3). Health posts are physical structures that are located in schools, clinics, not for profit organisations, or churches. Healthcare teams called ward-based outreach teams (or WBOTs) are based at the health posts. Teams are made up of a number of community health workers (6-20) who ideally live in the communities where they work. Each community health worker is responsible for about 200-300 households or approximately 1000 people (Bam, 2013:2). They are expected to provide services to households in their defined communities that "promote health, prevent and/or detect disease early, and support treatment, rehabilitation and palliation, and to do this in a way that develops capacity and shared responsibility for healthcare between service providers and service users" (Kinkel et al., 2013:3).

In order to pool and mobilise all available resources to meet local healthcare needs, WBOTs also link in with existing institutions and organisations in their geographically defined communities.

How is COPC implemented in the Tshwane health post model?

To implement COPC, WBOTs use town planning maps to demarcate their geographic areas of service. All CHWs are assigned a defined set of households within these areas of service that become their area of practice. CHWs also draw maps of their area of practice in order to familiarise themselves with this area from the ground. They also use these maps to identify active organisations as well as possible partners and potential stakeholders in their area that they need to inform about COPC, support and link with (Bam et al., 2013:2-3).

How this study relates to COPC and the Tshwane health post model?

This study formed part of an umbrella study entitled *Researching the development, application and implementation of Community Oriented Primary Care (COPC). A study in Gauteng (Tshwane) and Mpumalanga Province*, that was conducted by the COPC Research Unit of the Department of Family Medicine at the University of Pretoria. The COPC research unit was set up to conduct a range of research projects to help support the development and implementation of the Tshwane health post model.

1.2   Problem statement

COPC is an internationally recognised approach to delivering primary healthcare. In 2013, the Department of Family Medicine at the University of Pretoria, the City of Tshwane and Tshwane District Health (Gauteng Provincial Department of Health) instituted COPC across Tshwane as part of the national government's drive to reengineer primary healthcare services in South Africa. As part of the operationalisation of COPC, WBOTs conduct local health and institutional assessments (LISA) of the areas they serve (Marcus, 2013:11; Mullen & Epstein, 2002:1751) to identify all the organisations in their defined areas.

CHWs also collect and use health and related information from the households and individuals they serve. Together with team leaders and other health professionals, they need to learn to interpret basic statistics on diseases and other socio-cultural information of the community that they work with in order to implement COPC and provide quality healthcare services.

Literature related to maps and healthcare shows that maps, and in particular medical data maps generated with GIS software, are increasingly being used as part of the implementation and delivery of primary healthcare (Cromley & McLafferty, 2012:14). As McLafferty (2003:25) observes, GIS enables healthcare practitioners to understand the "spatial organisation" of healthcare in an area, identify the impact this has on both the health of a community and people's access to health-related resource, and assist scholars and healthcare practitioners to look

for ways to improve healthcare delivery (McLafferty, 2003:25). As part of implementing community based services, CHWs also draw sketch maps either from memory or from town planning or cadastral maps to assign each team member to specific households in a geographic area.

Corner (1999:217) argues that the act of mapmaking (or mapping) gives people agency that enables them to use maps to generate ideas and see connections in the information that is visible on a map. Applied to COPC, Corner's observation has the potential to extend the use of maps to enable WBOT members to work together to generate ideas to solve problems and encourage participants to look for links and relationships between the information that is visualised on the map. Despite this, it is not yet known how maps, mapping, discussions around maps and reflection on mapmaking experiences can be used by WBOTs to achieve this objective in COPC.

1.3   Study purpose, research questions and objectives

The purpose of this qualitative study was to explore what use and value maps, the participatory process of mapmaking and group discussions about the maps could have for healthcare teams who implement COPC.

The two research questions identified for the study were:
1. What is the role of maps in healthcare?
2. What is the use and value of maps and mapmaking for healthcare team members who implement COPC?

To answer the first research question, it was necessary to first examine the role of maps in healthcare in general. A systematic literature review was conducted to identify how maps have been used in primary healthcare. The review focused on case studies of maps generated with GIS software that were used in both COPC and primary healthcare. The second question was used as the study's primary research question. The question was "emergent" (Creswell 2014:186) in its nature

and was shaped as the study was implemented.

In addition to the study purpose and research questions, objectives identified for the study were threefold. These were:

1. To determine healthcare team member's perception of maps, and the value and use of mapmaking in healthcare delivery.
2. To uncover if doing mapmaking projects with WBOT team members would influence their understanding of maps and the potential contribution of maps in the COPC model of healthcare delivery.
3. To use visual rhetoric and engage participants in focus group discussions to explore what meaning the maps generated had for them (visual rhetoric is a well-established method of visual analysis that is used to uncover how images communicate meaning in a persuasive way).

To address the first objective, three mapmaking projects were conceptualised and implemented as part of the study. The specific themes and purpose of each mapmaking project are further elaborated on in Chapter 3, at the end of Section 3.2.3.1.

1.4   Delineation

The study was conducted in selected wards of Mamelodi, City of Tshwane (South Africa). The COPC project predetermined this study's context. Study participants were WBOT members (nurses and CHWs, but also doctors or allied healthcare workers and professionals). The study was also delineated by selecting the three mapmaking projects, each related to a specific theme that is connected to health.

1.5 Rationale for doing the study

The idea for this study was sparked in 2013 at the initial training workshop of team leaders recruited to deliver COPC in the City of Tshwane. Hans Rosling's 2006 TED Talk entitled: "The Best Stats You've Ever Seen" was screened. In the video Rosling used different coloured circles to depict countries which animated and moved to show how specific health indicators change over time. It was observed that the majority of participants did not respond to the visualisation and the content as Rosling intended or the facilitators had assumed. From discussions about the content it appeared that some participants were unable to interpret his graphic visualisation as representations of quantitative facts. This led to a realisation that there was a need to understand what they actually saw and the meaning they brought to the exposure.

At a subsequent presentation on the role of medical data in primary healthcare entitled *The story that the data tells* participants were exposed to graphic visualisations of health related information. The information was collected on mobile handsets during the 2011-2013 Tshwane District COPC WBOT Pilot project. Participants were shown a bell curve that compared male and female population distribution and bar charts of HIV and TB statistics. During the presentation, there were questions and explanations as well as discussion around the information graphics that enabled people to think and talk about what they were seeing and hearing.

Observing the two presentations, which visually and in process terms were very different, the demeanour and response of the audience changed during the exposition of local information. Facilitation seemed to bring out the importance of data, how it could help participants assess the health status of a community and how it could be used to respond to local health needs. Notwithstanding the differences in the presentation process (a live/interactive session using local data versus an animated clip of global data), what stood out was that the visualisation of data did not have intrinsic meaning and that the information only became meaningful through interactive discussion. A facilitated presentation and group

discussion about the content offered the participants a different way to connect to the visualised data and relate it to their own practices.

From this insight it was then possible to hypothesise that the same may be true for maps and mapmaking, especially the use of medical data maps. When people are involved in collecting data, engaged in discussions about maps and participate in making maps, the value and meaning of the map as a form of information visualisation are likely to change. Furthermore, the process of making observations about the visualised information also enables shared meaning making (Chambers, 1994b:1257).

More generally, it cannot be assumed that people see things in the same manner. Rosling's talk demanded that audience members had prior knowledge of map and graphic schemata even if they were not familiar with the specific content of his presentation. In the words of Robert Lloyd:

> Map reading is an integration and synthesis of knowledge. Even these simple examples require both bottom-up information (the map) and top-down information (information stored in the map reader's memory). The bottom-up information is contained in the lines, colours, shapes, words and so on the cartographer has put on the map. The top-down information is prior knowledge previously acquired by the map reader. It might be general factual knowledge learned in another context, but applicable to map reading, for example the meaning of words or the common names for colours. It might be cognitive abilities to process information that was learned and practised in other contexts, but applicable to map reading. Other top-down information is prior knowledge about maps and the conventions used by cartographers to produce maps. Lloyd (2000:364)

A systematic review of medical journal articles conducted by the researcher in October 2014 revealed that while GIS is being incorporated into primary healthcare projects in order to provide a more holistic understanding of health, very few find a way to link the visualised data back to healthcare practitioners on the ground. Of those that do, it is not known if what is visualised is locally meaningful to them, individually and collectively.

GIS is a component of geographic information science. It refers to a "computer-based decision support system" (Chung, Croke, Mensah & Mullner, 2004:216) that stores, manages, displays and analyses both spatial and spatially attributed data.

GIS comprises both hardware and software, and has the ability to layer and display data onto maps (Chung et al., 2004:217). A key feature of GIS is its ability to superimpose different layers onto each other, making it a useful tool to reveal connections. Data displayed can be generated from any number of sources, including demographic, socioeconomic and medical data (Chung et al., 2004:217).

In the current COPC delivery model, healthcare teams engage in two kinds of activities that relate directly or indirectly to maps and mapmaking. On the one hand, cadastral or town planning maps are used to identify designated service areas (defined community), to allocate community health workers (CHWs) to households and to plan and structure service delivery. On the other hand, CHWs use a mobile phone application to register and collect household and individual health related data from households and individuals.

Given this, why should we investigate additional ways of doing mapmaking and the value they could bring to COPC? The answer is at least twofold. Firstly, the act of mapmaking and engaging healthcare teams around the information generated by these maps increases awareness of how space and time impact on the delivery of primary care (Marcus, 2013:103). Secondly, the use of GIS to visualise health related data in public health will continue to develop and grow (Cromley & McLafferty, 2012:14) and COPC as model endeavours to work with maps as an integral resource that helps healthcare providers structure, plan and deliver primary healthcare.

1.6   Researcher background and interest in the study

The researcher holds a BA degree in Information Design (Communication Design) from the University of Pretoria, and an MA in Narrative Environments from Central Saint Martins College of Art and Design at the University of the Arts London.

She is a designer, design researcher and part-time lecturer at the Department of Visual Arts at the University of Pretoria. Her principal research interests lie in the field of human-centred design, participatory research (or action research) and community engagement.

Before undertaking her doctoral studies, she worked as a graphic designer and public engagement consultant for various design and architecture companies both in South Africa and the United Kingdom.

Interest in the field of the thesis
As a designer and researcher, her principal interests lie in the trans-disciplinary use of design in other disciplines that fall outside of the creative industry such as healthcare and education. The researcher is also committed to participatory and collaborative forms of research and design where authorship is handed over to the users of a product or service to inform and shape the design of a product or process.

Her interest in the study developed out of a collaboration between the Department of Visual Arts and the Department of Family Medicine at the University of Pretoria. As part of the collaboration, the researcher worked with third-year BA Information Design students who were tasked to design a mobile phone application that could assist WBOT teams with their day to day activities.

At the start of the study, the researcher spent three months at the Department of Family Medicine to observe and gain a better understanding of how the Tshwane health post model worked. During this time, she visited several health posts in Mamelodi, joined CHWs to do household visits, sat in on WBOT training sessions and took part in COPC team meetings at the Department of Family Medicine.

Through this process, she was able to identify a suitable research topic that would both align with her background in design, and also be beneficial to the Department of Family Medicine.

Existing practice-based experience in the field of maps and participatory mapmaking

Before the start of the study, the researcher had practice-based experience with the use of participatory mapping as a method used for public engagement in urban design and architecture. In addition, she was also exposed to a wide range of map designs and uses in both graphic design and architecture. These include the use of maps to visualise stories of an area or community, the use of maps to visualise various types of data related to cities and public spaces, and the use of maps as artistic objects that visualised non-geographic related information and experiences of artists and designers.

Apart from having practice-based experience and exposure to creative and participatory map design and uses, the researcher had no prior experience in the field of primary healthcare or the delivery of COPC. However, her personal experience to work with and design maps led her to question if maps could not play a more significant role in the delivery of COPC which in turn informed the study's research question.

1.7   Outline of the thesis

The thesis consists of seven chapters. Chapter 2 contains both a thematic and a systematic literature review. The thematic literature review identified possible meanings and ways to interpret the terms *map* and *mapping*. In addition, the systematic literature review set out to determine what role healthcare related maps, generated with GIS software, could have for primary healthcare and COPC.

Chapter 3 describes the study's research approach and methods. The study is a qualitative study and is situated in a constructivist paradigm. To implement the study, a participatory mapmaking process was designed to engage different levels of healthcare providers involved in COPC in three mapmaking projects. Chapters 4, 5 and 6 each describe the process and results from the three mapmaking projects in detail.

Chapter 7 outlines a comparative summary of the main themes identified across all three mapmaking projects and provides a discussion of the study's main conclusions.

2.   LITERATURE REVIEW

2.1   Introduction – objective of the review, scope, delineation and structure

The review of the literature here has two objectives. One is to define the terms *maps* and *mapping* in relation to geographic space. The other is to look at the role of maps in healthcare, with a focus on the use of maps generated by GIS software in both primary healthcare and COPC.

To achieve the first objective, a conceptual literature review was conducted. The review explored and identified various definitions of the terms *maps* and *mapping*. Journal articles and books from the discipline of geography that dated from 1940 to the present were mainly reviewed. To achieve the second objective a systematic review of medical journal articles related to the use of GIS in primary healthcare research and projects were conducted. The researcher used a systematic review from 2003 by Sarah McLafferty entitled *GIS and Health Care* as a starting point and examined medical journals from 2004 onwards. The following two combinations of search terms were used to identify relevant literature:
1. COPC / Community health & Primary Healthcare & GIS. This search yielded 19 results.
2. GIS & Health / Community / Primary Healthcare. This yielded 65 results.

This literature review begins with the conceptual review. It is followed by the systematic review. The conceptual review starts off by defining maps and discussing their various uses in geography. This is followed by a discussion on the history of cartography, which concludes with an explanation of the "agency of mapping" (Corner, 1999:214), a conceptual take on mapping put forward by landscape architect James Corner. The systematic review is structured around three main headings that summarise key themes emerging from the review process. The headings are *monitoring and evaluation*, *planning and implementation* and *enabling community members to participate in primary healthcare delivery*. The review finishes off with a discussion of the main findings

of both sections, presents limitations identified and puts forward recommendations for further research.

2.1.1 Inclusion and exclusion criteria

For the systematic review only national and international primary research publications were reviewed. The review focused on maps and mapping techniques related to geographic space specifically. This excluded sources focusing on other types of maps and mapping techniques such as cognitive mapping or mind mapping. The following research question was used to narrow down and select relevant sources: "What is the role of maps and mapping for primary healthcare teams delivering community oriented primary care?" In addition to this, a hierarchy of evidence was formulated to preference the selection of articles that reported on research using qualitative or mixed-methods, followed by practice-based articles, then theoretical review articles and lastly quantitative research literature.

2.1.2 Brief overview of the nature of the topic - mature or emerging?

At the outset it must be noted that the study of the map as an artefact has been done for centuries. However, using the map as a tool for research in disciplines outside geography only emerged in the past decades with the rise in new mapping technologies such as GIS and products that combine GIS with web-based software such as Google Maps (McKinnon, 2011:453). This is also the case in respect of the use of GIS to study healthcare systems where it is increasingly used in novel applications (McLafferty, 2003:25). GIS software is now more affordable, desktop computers can process the software itself and access to public data sets that can be used in GIS are more readily available. These advances enable the development of new techniques and models of data analysis that produce innovative ways to process data and information (Chung et al., 2004; McLafferty, 2003).

2.2   Thematic review of the concepts "maps" and "mapping"

2.2.1   What are maps?

Cosgrove states that a map takes a "measure of something" (Cosgrove, 1999:1). Maps allow us to represent insights of the past or show us insights about the future that we connect to the present reality that we are experiencing (Wood & Fels, 1992:7). The map is also a form of "cultural text" (Harley, 1989:281) because it is an object constructed by one or more authors that communicates information. As such, the map carries within itself a rich undercurrent of forces (both cultural, contextual and personal) that help to shape its construction and visualisation (Harley, 1989). According to Corner, maps are in their very essence representations as opposed to descriptions, therefore they are subjective and constructed with an intention to highlight or bring to the foreground certain specific ideas and insights that inform practice (Corner, 1999:213).

2.2.2   A brief overview of the history of cartography

Maps are traditionally created by and studied within the disciplines of geography and cartography. Edney describes the history of cartography as a complex series of "modes". Each mode is bound by its own culture, technical and social reactions, which in turn define a particular cartographic practice associated with the mode (Edney, 2010). This meta-narrative of cartographic history is vastly different from the academic and cartographic ideas that were pervasive in the 1950s-1980s decades that viewed the history of cartography as an empirical practice that was predominantly focused on attaining objectivity and mathematical accuracy (Cosgrove, 1999:2; Edney, 2010:306; Harley, 1989:277; Wood & Fels, 1992:2).

In an historical study of European cartography from 1500 to 1850, Edney identifies three modes of cartographic enterprise: choreography, topography and charting (Edney, 2010:313). During the Enlightenment these modes merged as the pursuit of scientific reasoning and changes in cartographic construction methods gave rise to mathematical cosmography. It endeavoured to construe mapmaking as an

increasingly precise and unitary depiction of a specific place or country (Edney, 2010:319). Systematic mapping and thematic maps emerged from mathematical cosmography as two distinct modes that are most commonly associated with cartography (Edney, 2010:321). It also gave rise to what Edney describes as the "rhetoric of empiricist cartography".

The "rhetoric of empiricist cartography" (Edney, 2010:323) presents cartography and maps as predominantly scientific objects that give an objective, albeit abstracted, view of reality (Edney, 2010:324; Harley, 1989:5). Cosgrove likens this rhetoric to a "narrative of accuracy" (Cosgrove, 1999:8) which denuded maps of the religious, mythic and imaginative qualities they had acquired historically and in different cultures (Cosgrove, 1999:8).

Drawing on Edney's meta-narrative of the history of cartography, this study will use Endey's notion of many "modes", both analytical and non-analytical, to define maps and mapping. "This approach is neither prescriptive nor proscriptive and seeks only to broaden our discussion of the nature and history of cartography to encompass the myriad forms in which maps have been – and in which they continue to be – constructed and used" (Edney, 2010:325).

There have been several reactions to the notion of "objective truth" that is a doxic notion in mathematical cosmology. Harley's seminal article "*Deconstructing the Map*" refers to the map as "text" (Harley, 1989:280). For him, the map is a powerful, socially constructed object that carries within itself various messages, meanings and intentions. As Sparke argues, through the "demythologization" (Sparke, 2010:349) of the map, Harley makes us aware of the "myth of cartographic objectivity, critiquing the notion of the map as a transparent window on the world by revealing the web of power dynamics that undergird it…" (Sparke, 2010:349).

Wood also refers to the map as a notional window because it gives us a very specific view of the world (Wood & Fels, 1992:20-21). The window is socially constructed, which means that it always is an object that has an author, a subject and a theme. And because it has a theme, it also serves an underlying interest.

Therefore, it is impossible for a map to just be a representation of objective truth (Wood & Fels, 1992:23-24).

Rather, maps need to be seen as 'opaque' artefacts in order to make visible the processes involved in constructing the map (such as structuring, omitting and simplifying) and to consider the context of which the map is a product (Cosgrove, 1999:3).

2.2.3   What is mapping?

As a verb, the term "mapping" refers to the act of making a map. Cosgrove defines mapping as a "creative, sometimes anxious, moment in coming to knowledge of the world" (Cosgrove, 1999:2). It involves the complex structure of various signs as well as the act of giving shape or form to these elements to create a map that, in turn, becomes the representation of a world in itself (Cosgrove, 1999:3). Harley describes the act of mapmaking as an act of power because it involves the careful structuring and privileging of certain concepts and elements (Harley, 1989:275). This makes the map not just an object of use but an artefact worthy of contemplation. Awareness of the power inherent in mapping is important because it can be used with positive or negative intent (McKinnon, 2011:453).

2.2.4   The agency of mapping and its value in healthcare practice

Corner argues that mapping is in and of itself a creative activity (Corner, 1999:217). "Mapping is a fantastic cultural project, creating and building the world as much as measuring and describing it … In this active sense, the function of mapping is less to mirror reality than to engender the reshaping of the worlds in which people live" (Corner, 1999:213).

In keeping with Harley, Corner argues that mapping is operational and imaginative. It can therefore be used to enhance the practice of design because a map has the ability to show hidden processes that are not at first visible to the

human eye (Corner, 1999:251). In the process of its creation, the map becomes a canvas that allows people to map out, explore and contemplate new possibilities, ideas and insights. Corner calls this "the agency within mapping" (Corner, 1999:214). The "agency of mapping" (Corner, 1999:214) enables the mapmaker to create and recreate different scenarios and realities that draw on the insights revealed by and discovered in the process of creating the map (Corner, 1999:217).

Applying this to healthcare, mapping can become a process that creatively enables healthcare practitioners to gain new insights and find shared solutions to health-related challenges identified in defined communities.

2.3   Systematic review of the use of maps and mapping in primary healthcare

The following systematic review uses the process described by Helen Aveyard in *Doing a Literature Review in Health and Social Care: A Practical Guide*. The review was conducted over a three-month period. No other researchers were involved in conducting the review.

The review process entailed the following step: Articles were identified through a combination of computerised database searches and hand searches of the bibliographies of selected articles. PubMed was used as the search engine to look for articles on the database, Medline. Two searches were conducted. Both searches were restricted to the English language and focused on the use of GIS in primary healthcare from 2004 onwards. The search process and keyword strategy used is outlined in Appendix 1. The first search looked for articles that included both *GIS* and *community oriented primary care (COPC)* or *community health* as search terms. *Primary healthcare* was added as a search term to ensure the field was covered. This search yielded limited results. A second search was conducted using the search terms *GIS* and *primary healthcare* or *community health* while excluding the term *COPC*. The second search yielded a total of 84 articles for review.

Abstracts of the articles were read to determine the relevance of articles against the research question identified for the review. Through this sifting process, a total of twelve articles were identified as being relevant and used in the final review. Findings from the articles have been synthesised to compare and contrast articles associated with specific themes.

Articles were critically appraised using pre-determined appraisal tools developed by Cottrell (2005:155-157) (see Appendix 2). Codes were assigned to the main findings and discussion points in each article (Aveyard, 2010:129) (see Appendix 3, column 5). Themes were identified from the codes, refined several times and grouped into three headings – see Appendix 4.

Articles that have been appraised are grouped under thematic headings. It is important to note that most address more than one theme and that the themes are often located across different headings. Thus, an article that assesses environmental factors impacting on health may also address the theme of assessing available health resources and touch on the planning of healthcare interventions. In these instances, articles have been discussed under the most prominent theme and will then only be briefly mentioned under additional themes if needed.

The review builds on McLafferty's 2004 systematic review entitled *GIS and Health Care.* In the review she classified the uses of GIS in healthcare under four headings: *analysing need*, *analysing access*, *assessing geographic variation in utilisation* and *healthcare delivery*. The headings and themes generated by the coding process described here differ from McLafferty. Also, the research question here focuses on *primary healthcare rather* than on the general topic of *healthcare*. Taken together, these differences mean that some themes addressed in her review are less relevant to this study and the findings generated also differ.

The review below is organised around three identified topics beginning with *monitoring and evaluation*. Findings under each topic are discussed as themes starting from the most to the least relevant. The relevance of an article has been determined based on the academic weight it carries in terms of this study. This

was identified by the appraisal tool used, and is strongly influenced by the degree to which an article answers the research question under review.

2.3.1   Monitoring and evaluation

GIS is used increasingly to contribute to monitoring and evaluation in healthcare delivery. Monitoring and evaluation, in turn, is essential as it plays a direct role in the success, effectiveness and growth of primary healthcare projects.

Emerging themes are: *using GIS to understand and investigate the environmental factors impacting on health, using GIS to assess healthcare needs* and an omnibus theme that combines *calculating inadequacies related to access of care*, *assessing the health status of a community* and *evaluating the effectiveness of care offered*.

2.3.1.1   Environmental factors impacting on health

GIS is used to help healthcare teams quantify, understand and elaborate on the environmental factors impacting on health. By mapping socio-economic, cultural, environmental and health data researchers are able to visually show how, when overlaid, these factors impact on the health and wellbeing of a community. These factors can also then be analysed to determine the healthcare needs profile of an area (Beyer, Comstock & Seagren, 2010; Dulin, Ludden, Tapp, Blackwell, De Hernandez, Smith & Furuseth, 2010a; Hardt, Muhamed, Das, Estrella & Roth, 2013; Lofters, Gozdyra & Lobb, 2013). Working with local level knowledge, Aronson, Wallis, O'campo and Schafer (2007) and Beyer et al. (2010) also included qualitative data in this analysis to deepen knowledge and expand the stakeholder base to local participants.

Similarly, Dulin et al. (2010a) produced a methodology using GIS to map data and calculate the healthcare needs of an area. Called MAPCATS (Multiple Attribute Primary Care Targeting Strategy), it assigns specific weightings to identified

attributes. Attributes are then combined to create a composite map that shows which areas face the most challenges. Individual attribute maps can also be generated and viewed to determine their prevalence in an area. Working with a regional community network, this methodology was used in a community to identify specific geographic areas most in need of healthcare interventions. Attributes selected in this instance included mapping the area's socioeconomic status, population density, insurance status and assessing the use of hospital emergency departments as primary care facilities.

Berke (2010) argues that doctors need to start to measure place instead of only focusing on patients. In a short review of GIS and its uses in primary health, Berke explains that publically available forms of GIS such as Google Maps can be used by doctors to study the environmental conditions of their patients, assisting them in providing better advice, treatment and care (Berke, 2010:11).

2.3.1.2   Assessing healthcare needs

GIS maps can also be used to visualise the healthcare needs of an area or community. A cross-sectional study used GIS to map cancer screening rates amongst South Asian communities residing in Ontario province, Canada (Lofters et al., 2013:2). Researchers mapped screening rates of breast, cervical and colorectal cancer reported by participants in three focus groups. Data generated was mapped using GIS and an analysis technique called LISA (Local Indicators of Spatial Association) was used to quantify the results by comparing the screening rates with the population density of the area. Choropleth (or shaded) maps were generated to visualise the amount of screenings done per census tract for the three types of cancer - the darker the colour, the greater the absence of screening. In addition, three sets of maps were generated to visualise the results of the LISA analysis (one for each type of cancer). This allowed the researchers to identify the areas most in need of cancer screening interventions.

GIS maps depicting areas in need of care are also used to inform medical education. Bazemore, Diller and Carrozza (2010a) used graphs, tables and GIS

maps to put together an induction seminar as part of the COPC curriculum for a family medicine residency programme. The programme, targeted at recently graduated interns, is part of a three-year community medicine curriculum that forms part of the Masters of Public Health program in COPC at the George Washington University. The seminar was conceptualised in response to a need identified by academic staff to equip interns with a basic level of knowledge and understanding about the area that they would need to service, prior to the start of their residency.

During three sessions, students were exposed to different data types, informed about the community characteristics of an area and presented with an evaluation of patient clinic attendance. A survey conducted before and after the seminar indicated that participants' knowledge of the residency practice and the community served improved from 43% to 73%. Limitations mentioned indicate that generating data maps needed for the seminar is subject to the technical skills of the researcher using the software (in this instance a residency faculty member) and is dependent on the efficiency and amount of time needed to obtain relevant data to generate the maps and visuals (Hayashi, Bazemore & McCintyre, 2011:69).

From the above it is clear that GIS maps can be used to help assess the healthcare needs and assist in healthcare delivery, monitoring and evaluation and education and training for community oriented primary care.

2.3.1.3   Assessing inequalities to access of care, reviewing the health status of a community and using GIS to evaluate the effectiveness of care provided

Although this theme generated very little literature, the issues covered are worthy of consideration, especially in respect of the use of GIS in primary healthcare and COPC.

In case studies of immigrant communities and vulnerable populations, Dulin, Ludden, Tapp, Smith, De Hernandez, Blackwell and Furuseth (2010b) and Bazemore, Phillips and Miyoshi (2010b) used GIS to help healthcare teams

evaluate inequalities related to access to care. Dulin et al. (2010b:115), worked with a Hispanic representative group to identify the health attributes of the community. Choropleth maps generated by the MAPCATS visualisation technique indicating the combined "weighting" of all the attributes measured were generated to reveal the geographical areas most in need of care. Similarly, Lofters et al. (2013) generated hot spot maps to show where South East Asian residents were underserved in terms of cancer screening services.

Comparing these studies, the first uses GIS maps to give a more holistic overview of the community's healthcare needs and patterns of service utilisation by mapping a variety of data attributes. The second uses GIS to address one specific issue. Both studies provided researchers, community representatives and service providers with a way to assess, confirm and address inequalities related to access to care.

In terms of *assessing the health status of a community*, most studies use either choropleth or hotspot maps generated in GIS to visualise the prevalence or intensity of healthcare needs within a specific areas (Aronson et al., 2007; Dulin et al., 2010b; Hardt et al., 2013; Lofters et al., 2013). Depending on the constraints of the project and the context in which research is done, some also combine primary and secondary data to generate maps that give a deeper insight into what is happening in an area. Through it, researchers and healthcare teams are able to follow up on what is discovered by the maps, be it in terms of needs, delivery challenges or further research.

By visualising health disparities or healthcare needs in specific areas, GIS makes it possible to *evaluate the effectiveness of care*. This is demonstrated by Lofters et al.'s (2013) cancer screening study which identified geographic areas with very low screening rates, indirectly pointing to the absence or inadequacy of services relative to the community's needs.

By contrast, Bazemore et al. (2010b) demonstrate the use of GIS maps to enable clinic staff and managers to determine their population reach and to evaluate the effectiveness of the care they provide.

In the USA, community health centres (CHCs) are expected to incorporate medically underserved areas into their community of service. Bazemore et al. (2010b:27) identified that very few clinics use data on utilisation of care to assess their reach. Focusing on a network of primary care clinics, the Robert Graham Centre for Policy Studies in Family Medicine and Primary Care, together with the Baltimore Medical system Inc. (BMI), used clinic data and census data to generate GIS maps to indicate the service distribution and population penetration of the clinics. Findings revealed discrepancies between the areas served by some of the clinics and the medically underserved areas that clinics were funded to serve. These results enabled clinic managers and staff members to reassess the reach of their services and plan for population based care interventions.

2.3.2 Planning and implementation

For primary healthcare services to continue to improve and evolve, it is important that healthcare providers plan services to respond to the healthcare needs identified in defined areas. The themes *assessing patterns of use* and *planning healthcare interventions* demonstrate how GIS can be used to assist and inform this objective.

2.3.2.1 Patterns of use

GIS can help *assess patterns of use* by quantifying how, where, when and what type of healthcare resources people utilise. Dulin et al. (2010b) and Sage, Balthazar, Kelder, Millea, Pont and Rao (2010) both use GIS to analyse how people utilise healthcare resources and commercial services such as grocery stores and public recreational facilities. Their studies measured patterns of use related to a specific set of variables. These data sets were then mapped together with a variety of other data to determine the overall health status of a community.

Similar case studies mentioned by McLafferty (2003) in her review include the use of GIS to prove assumptions around healthcare utilisation as well as to study how utilisation of healthcare facilities differs between neighbourhoods or geographically defined areas.

Furthermore, GIS is also used to assess the impact of relocating or discontinuing healthcare services in a community. Bazemore et al. (2010a) evaluated the impact on access to care when hospital finances and local politics forced the University of Cincinnati Family Medicine Residency Programme to move its outpatient clinic to a new location. Using an online-GIS application, Health Landscape, they measured the impact of the relocation on vulnerable patients suffering from chronic diseases. Using medical practice data, Health Landscape visualised the difference in the location of patients coming to the clinic before and after the move. This enabled staff to estimate the number and characteristics of patients no longer coming for their treatments.

2.3.2.2   Planning healthcare interventions

GIS maps are useful for intervention planning because they easily link issues to localities, thus identifying areas most in need of care and showing healthcare teams where to implement interventions or locate new facilities for care (Bazemore et al., 2010b; Beyer et al., 2010; Dulin et al., 2010b; Hardt et al., 2013; Lofters et al., 2013).

Optimal Health, a Texas based non-profit organisation, set out to map obesity rates amongst middle school children (grade 6-8). The study developed GIS maps using a combination of school district data that contained fitness assessments screening information (i.e. BMI, height, weight and cardiovascular fitness), publically available data on neighbourhood safety and crime statistics and a business related data-set that identified all the fast food restaurants, convenience stores and grocery stores in the city (Sage et al., 2010:500).

The maps confirmed the seriousness of obesity in all middle schools covered in the project. Local schools, community groups and government bodies were able to take their area specific findings to develop both local and neighbourhood interventions, which included extending the opening hours of neighbourhood parks and initiating an extra bus route to connect residents with limited access to fresh healthy food options to nearby farmers markets (Sage et al., 2010:501).

2.3.3 Enabling community members to participate in primary healthcare delivery

As a model of care, COPC is concerned with the health and well-being of individuals, families and communities. Therefore, when COPC is implemented in an area, it is essential for community members and clinic patients to take part in health promotion, disease prevention and healthcare research (Mullan & Epstein, 2002).

Three themes were distilled from the literature on this topic, namely: *enabling community initiated health interventions*, *contributing local knowledge as qualitative data* and *utilising a Community Based Participatory Action Research (CBPR) approach to health research*.

2.3.3.1 Community initiated healthcare interventions

GIS is used to generate maps that enable community members to set up locally initiated healthcare interventions (Aronson et al., 2007; Hardt et al., 2013; Lofters et al., 2013). These interventions matter because they have the ability to complement and extend the reach of existing healthcare services. However, for GIS maps to serve this purpose they need to be easy to interpret and use. In the articles reviewed, choropleth maps and hot spot density maps[1] appear to be the

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[1] A hotspot map is a map that uses colour intensity to visualise the prevalence of incidences or attributes in an area. The darker the colour, the more prevalent the variable mapped.

maps of choice. Both types of mapping visually show the location and severity of healthcare challenges. The maps also become a tool that can be used by community members as evidence to address policy, raise awareness about specific healthcare challenges and mobilise community groups to act on identified care needs.

Hardt et al. (2013) worked with the University of Florida Family Data Centre to generate a series of hot spot maps to visualise different health indicators in Alachua County (North Central Florida). Drawn from monitoring parameters set out in 1997 by the Institute of Medicine (IOM) in the United States, they mapped medical births, low birth weights, domestic violence, child maltreatment cases, juvenile justice referrals and unexcused school absences (Hardt et al., 2013:4).

They then produced poster size maps and distributed them to local stakeholders, including district school leaders, health department officials, police officers and the mayor of the city over a period of twelve months. The maps were viewed in more than twenty public venues and the research team attended all events to explain and respond to questions about the maps. A steering group was set up by the public library system, a local charity (United Way Alachua County) and members of the university to identify projects that could address the needs identified by the maps.

This health mapping initiative led to medical students from the University of Florida starting a mobile clinic that visits eight locations a week, providing primary care services to residents who previously had little or no access to care. The maps also prompted a group of residents to advocate for services for an underserved neighbouring community. They raised money and set up a neighbourhood and family centre that provides a variety of family support services, including literacy programmes, recreational facilities, parent support and legal aid (Hardt et al. 2013:7).

2.3.3.2 Working with local knowledge as qualitative data

Aronson et al.'s (2007) case study shows how GIS can also be used to *work with local level knowledge.* Local level knowledge refers to observational data generated through direct engagement with community members where participants collect information about how they perceive their environment or area (Aronson et al., 2007:374).

As part of an evaluation of Baltimore Healthy Start, a government funded infant mortality prevention programme in the United States, Aronson et al. (2007:374) used "neighbourhood mapping"[2] to identify and measure the impact that various ecological factors have on infant mortality. Community members conducted a series of neighbourhood walks inviting their fellow residents to answer questions about the environment. GIS maps were created using a combination of primary geocoded community data collected on forms and secondary census and health programme data. Point data[3] and choropleth maps were overlaid with each other to visualise the prevalence of community perceived negative environmental factors, thereby providing researchers and service providers with a better understanding of the program's context.

Limitations mentioned include technical challenges experienced by the staff members to use the software and the need to work with real-time processing of data to keep the findings relevant (Aronson et al., 2007:382). This has cost and time implications, both in term of training staff members and acquiring the software and data needed. In addition, the researchers also make it explicitly clear that working with maps is only one component of the study. Mapping work used in this project also needed to be combined with other methods of data collection such as

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[2] Neighbourhood mapping uses both observational data and secondary data and use GIS to locate neighbourhood features, community resources and show where specific disease incidents occur.

[3] A point data map uses graphic symbols (such as circles or icons) to visualise the location of data attributes. The frequency of the symbols indicates the prevalence of the attribute in a specific area.

interviews and focus groups to evaluate infant mortality, not only from an environmental level, but also on an individual level (Aronson et al., 2007:382)**.**

In terms of working with quantitative data, it is worth noting that most of the more relevant case studies combined secondary and primary data to ensure more accuracy and enable neighbourhood specific findings to emerge (Aronson et al., 2007; Beyer et al., 2010; Lofters et al., 2013)**.** Primary data could be qualitative or quantitative. If qualitative, emphasis is placed on the data analysis method followed to enable GIS to combine the information with existing quantitative facts in a suitable mapping format.

2.3.3.3   Utilising a Community Based Participatory Action Research (CBPR) approach in health research

Two articles report on the use of GIS in Community Based Participatory Action Research (CBPR). CBPR is a research approach specifically developed for healthcare (Israel, Eng, Schulz & Parker, 2005:3-20). Implicit in CBPR is community participation in all phases of the research from problem formulation and research question identification through to data collection, analysis and recommendations (Israel, Schulz, Parker & Becker, 1998:177). CBPR allows for local level knowledge to be present all the time, creating the possibility for researchers to validate findings and propose community specific solutions.

Beyer et al. (2010:637) together with the Iowa Geography Department generated two GIS cancer maps for a rural town in Northwest Iowa. The researches set up a partnership with residents and worked with them to identify factors that contributed to high levels of colorectal cancer in the area. Through seven focus groups and twelve in-depth interviews, participants engaged in a community hazard and asset mapping workshop.

Following a presentation about and discussion of colorectal cancer and the findings shown on the two cancer maps, focus group participants made observations about the environmental hazards that might have contributed to

these results. They also formulated hypotheses about the connection between contributing factors and colorectal cancer in the community. Data from all seven maps were combined to create a composite map that was used by the researchers to compare hazards with identified environmental factors. The study demonstrates how experiential mapping can be combined with analytical data maps to generate a contextual understanding of the factors impacting on health.

Similarly, Bazemore et al. (2010a) used a CBPR approach to identify measurable attributes to describe the primary care needs of Hispanic community members in Charlotte, North Carolina, in a case study discussed earlier. In this instance, the researchers created a community advisory board to help them interpret and evaluate the data.

2.3.4   Discussion

Generally, the reviewed articles point to several different ways of working with maps generated with GIS. Most use a multi-layered approach to mapping, linking primary and secondary data collected through quantitative and qualitative methods to place-based multiple data attributes that relate to health and well-being (these include environment specific health, socio-cultural and socio-economic factors).

Several articles point to the importance of community representation and/or community participation in data generation, interpretation and translation into activities or outcomes. CBPR case studies report on instances where community representatives were involved from start to finish as equal researchers in the project process. Such an approach made it possible to both validate secondary data with residents at the same time as new, neighbourhood specific data was produced. Nonetheless, CBPR is resource and time intensive in both the preparatory and implementation phases.

In terms of mapmaking, the review suggests that the greatest value is added when the process combines data sources, such as those generated by institutions or healthcare facilities in an area, census and other population-based data and

qualitative, local knowledge data. Together they provide a layered and more nuanced insight into neighbourhood specific and individual needs. Finally, barriers to use came up repeatedly as a limitation of using GIS to generate maps. Healthcare teams need training and time to familiarise themselves with GIS software. And while collaboration with geographers, computer scientists or other experts is an option, care needs to be taken to enable a synergistic work relationship that is mutually beneficial (McKinnon, 2011:467).

2.3.5   Summary

The thematic review brought together different definitions of maps and mapping and shows how the use and value of the map has changed over time. It draws our attention to the use of the map as an object of power that can persuade people to act (Wood & Fels, 1992). Furthermore, Corner's "agency of mapping" (Corner, 1999:214) points to mapmaking as a creative act that allows an individual or group of people to make meaning, generate new ideas and uncover hidden networks and connections between things (Corner,1999). Findings from the systematic review of the use of GIS in primary healthcare and COPC point to the value of a multi-layered, multi-dimensional approach to mapmaking in healthcare research. Robust methods of analysis to represent both qualitative and quantitative data are also emerging, often requiring the involvement of residents, patients or local stakeholder groups. Furthermore, maps that show health related findings in a visually accessible and clear way enable community initiated health interventions to materialise, which is beneficial to both the community and the public healthcare system.

The systematic review generated a surprisingly limited number of sources, an observation confirmed by the information specialist at the library who assisted the search process. Of the sources found, only two articles specifically discussed *COPC* and *GIS mapping* together.

Also, although the themes identified in the review indirectly answer the study's research question, it demonstrates that there is considerable scope for further

research. In most cases the method or application of case studies have been used in primary healthcare research, but not in COPC specifically. Audiences involved also typically include researchers from the healthcare field, doctors or medical students and community members but not healthcare teams comprising of community healthcare workers, nurses and doctors (as is found in the COPC model of care implemented in the City of Tshwane).

Therefore, there is a clear need for primary research to be conducted to assess where the extended use of GIS maps and mapping projects that combines local level knowledge with medical data can be integrated into the COPC model of care.

2.3.5.1   Future research

Possible future areas of research:

1. Generating local knowledge mapping projects and combining this data with medical data in GIS for research work in Primary Healthcare and COPC.
2. Adapting existing community engagement techniques that focus on mapping from other disciplines (such as the field of environmental studies or urban design) for use as research or learning tools in primary healthcare and COPC projects. This is evident in the *community hazard and asset mapping* process used in the case study on colorectal cancer conducted in Storm Lake (Beyer et al., 2010).
3. Setting up opportunities to involve academics responsible for generating GIS maps with healthcare teams or community members to allow the researchers to explain the maps to people and assist people in interpreting the data. And in addition, supplying these maps to people in a format that they can use that is accessible and easily understood (such as hotspot and choropleth maps).
4. Increasing the scope of the literature reviews to include articles that address findings related to overcoming barriers of use of GIS systems by medical staff, as well as articles that focus on using GIS to measure quality of service.

3.   RESEARCH APPROACH AND METHODS

3.1   Introduction

This chapter describes the study's approach, worldview and methods. The methods section is broken down into five parts: participant sampling, data collection, data analysis, evaluation criteria and the researcher's positionality, assumptions and biases. The chapter finishes off with a discussion of the ethical procedures identified and implemented to conduct the study.

3.2   Research approach, paradigm, and research design

The diagram below shows how the study's approach, paradigm (or worldview), research design and methods fit together. It is adapted from Creswell's framework for research (2014:5).

In this study, paradigm is understood as "a school of thought, theoretical perspective or set of problems" (Smith, 2003:198). Research approach is understood as the "plans and procedures" selected to implement the study, and consists of a chosen worldview, research design and methods (Creswell, 2014:3). Research design refers to the "strategies of inquiry" (Guba & Lincoln, 2018:59) chosen to implement the study. Methods are the tools and procedures used as part of the study's design to collect, analyse and interpret data (Creswell, 2014:16; Leavy 2017:14).

PHILOSOPHICAL WORLDVIEW/PARADIGM
Constructivism

DESIGN
A participatory
mapmaking processes

RESEARCH APPROACH
Qualitative

RESEARCH METHODS
Data collection (focus group discussions,
in-depth interviews, reflective writing, maps as visual artefacts)
Data analysis and interpretation (visual rhetoric and thematic data analysis)
Validation (trustworthiness and authenticity)

Figure 3.1: Study approach, worldview, research design and methods, diagram by William Creswell (1914:5).

3.2.1   Working with a qualitative research approach

This is a qualitative enquiry. An objective of qualitative research is to uncover the meaning that participants ascribe to the problems or issues being studied (Creswell, 2014:4). In qualitative research, the researcher works with participants in their "natural setting" (Creswell, 2014:185). The researcher is seen as a primary research instrument who goes out to enquire and collect data (Creswell, 2014:186). Data collected is then analysed in an inductive way working from the specific to the general to identify themes (Creswell, 2014:4). A qualitative study can also be "emergent" (Creswell, 2014:185), in that the methods, research processes, participants and even the setting of the study can be adapted during implementation. Also, qualitative research often aims to give a "holistic" (Creswell, 2014:186) account of the issue or problem. The researcher therefore seeks to put forward a multiplicity of views, describe the overall picture of the situation and account for any factors that might have had an influence on the study (Creswell, 2014:186).

3.2.2 Working from a constructivist paradigm

The study uses a constructivist paradigm in which reality is considered to be "socially constructed" (Patton, 2015:15). Meaning is derived from a shared consensus that is reached amongst people about what is "real", useful and intelligible for them (Guba & Lincoln, 2000:167). Ontologically, constructivism is relativist. Accordingly, participants each have their own view of reality, giving rise to multiple constructions that are "socially and experientially based, local and specific in nature… and dependent for their form and content on the individual or person holding the construction" (Guba & Lincoln, 1994:110-111). Unlike positivism, this implies that there is no "ultimate" or universal truth, but rather different constructions of reality situated in particular contexts that vary in sophistication and are open to change and evolution (Guba & Lincoln, 1994:110).

At the start of the study, participants were asked to use drawing and group discussions to characterise themselves and the people around them in social, economic, historical and subjective terms; and to comparatively characterise the ward they live in, in relation to wards around them. This was done in order to get to learn something about them and the context where they live and work.

Epistemologically the relationship between the researcher and the research work was transactional and subjective. The researcher took on the role of producer and facilitator and helped to create the research work in conjunction with the participants as the study progressed (Guba & Lincoln, 1994:111). In addition, the researcher also set out to capture the "diverse understandings and multiple realities" (Patton, 2015:122) constructed by participants about an experience or topic.

Methodological assumptions in a constructivist paradigm are hermeneutical and dialectical. Each person's construction of meaning is continually refined and adapted in the interaction between the researcher and participants. These interactions are interpreted through hermeneutic conditions (in other words, meaning making happens in the moment of the action) and are compared and

contrasted through a dialectical interchange between participants. The ultimate objective of this experience is to reach a "consensus construction" that is more complex and nuanced than previous views and perceptions held by participants prior to the inquiry (Guba & Lincoln, 1994:111).

3.2.3   Research design

Finding a suitable research design for the study required that the boundaries between constructivism and the participatory (transformative) paradigm were blurred. This was necessary because in order to answer the study's research question it was needed to first engage participants in the mapmaking process to generate a body of work that could then reveal the meaning and value of maps and the process of mapmaking for them. Practically, the activity of mapmaking enabled meaning making to happen both in parallel and as a result of the maps generated. This solution was arrived at through an intense intellectual engagement with the methodology.

Initially, participatory action research (PAR) was identified as a potential research design for the study. Kemmis and Wilkinson (2002) define PAR as a research inquiry that "attempts to help people investigate and change their social and educational realities by changing some of the practices which constitute their lived realities" (Kemmis & Wilkinson, 2002:21).

PAR falls under the participatory research (PR) paradigm umbrella (Higginbottom & Liamputtong, 2015:3). From a methodological perspective, PR is characterised by two features that distinguish it from other research paradigms. One, the voices of participants are put first and researchers work with them to design and identify the objectives of the study (Aldridge, 2016: 9). The other is to ensure that there is a change in the "location of power" (Cornwall & Jewkes, 1995:1667-1668) during the different phases of a research project to give participants leverage in decision making (Bergold & Thomas, January 2012:[sp]; Cornwall & Jewkes, 1995:1667-1668). PR therefore goes beyond constructivism because its objective is to drive

change for marginalised people, issues and situations (Creswell, 2014:9; Denzin & Lincoln, 2018: 72).

Given the above, PAR was considered to be inappropriate for the study because it went beyond the study objectives of engaging participants in an exploration of the meaning of maps and mapmaking. Moreover, there were no other, acknowledged, qualitative research design options to work with that would allow the researcher to realise the study's aim and objectives (Creswell, 2014:13-14).

3.2.3.1 Designing a participatory mapmaking process for the study

In response, the study was designed around a series of three pre-selected participatory mapmaking projects. All three followed a common mapmaking process that involved a mapmaking activity, focus group discussions about the activity, individual reflective writing and group feedback on a presentation of analysed data delivered at the end of the process.

This design is illustrated in the diagram below:
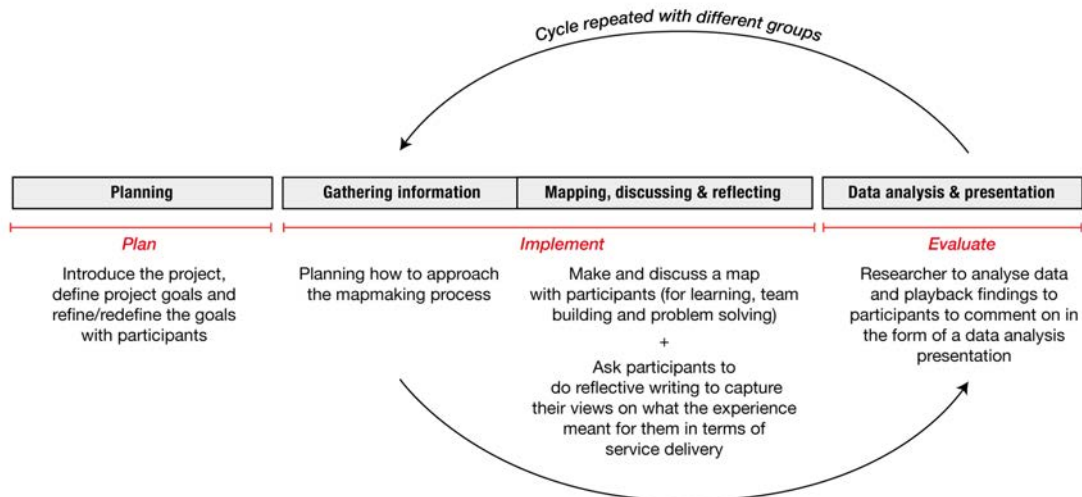
Figure 3.2: Participatory mapmaking process used to implement the 'LISA', 'history of health' and 'community health' maps.

By design, the mapmaking process sought to maximise opportunities that would encourage ontological and educative authenticity. Both types of authenticity form part of constructivist evaluation criteria and are described in Section 3.2.6 In addition, several of the universal characteristics of PR (Higginbottom & Liamputtong, 2015: 5) were incorporated into the mapmaking process[4].

These included:
- Participant's participation in *data collection* that was used for the mapmaking projects ('Local Institutional Support Assessment' or 'LISA' maps and the 'history of health' maps).
- Participant's participation in the *interpretation and analysis* of the maps. This happened during group discussions and through feedback on the findings presented by the researcher in the data analysis presentations.
- *Sharing authorship* of the maps produced. This researcher created the mapmaking process as a framework that participants could then populate with content and make their own ('LISA' and the 'history of health' maps).
- *Knowledge transfer* which happened in the group discussions between participating doctors, nurses and community health workers (CHWs) ('community health' map).

The themes of the mapmaking projects were selected to complement existing community oriented primary care (COPC) related research work. All mapmaking projects were initiated by the researcher and jointly discussed, refined (or adapted) and produced with participants. The mapmaking projects are outlined below and further elaborated in subsequent chapters.

The term mapmaking is used to describe the projects in order to distinguish them from participatory mapping. In participatory rural appraisal (PRA) projects, participatory mapping is seen as a method or tool that enables community members to contribute knowledge about their environment in a visual or written

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[4] See Appendix 5 for the full list of the "universal characteristics" of PR (Higginbottom & Liamputtong, 2015:5).

form to create a map or model that forms part of a "learning and transformative process" (Herlihy & Knapp, 2003:307). Participatory mapping was incorporated into the second project of the study, but it is not relevant for the first or third mapmaking project.

1. *'LISA' map: a mapmaking project using 'LISA' (Local Institutional Support Assessment tool).*
   This mapmaking project was initiated around a collection of existing hand drawn maps that were produced by community health workers as part of the implementation of COPC in their communities

1. *'History of health' map: a mapmaking project assessing the impact of local history on health.*
   This mapmaking project explored the experience and geography of healthcare during the 1980s under Apartheid.

2. *'Community health' map: a health status mapmaking project with a focus on TB and household size.*
   This mapmaking project explored the interpretation of medical data maps that showcased information collected by community health workers using AitahealthTM. The maps were generated with QlikView software and showed household sizes and incidence of TB in an area.

3.2.3.2 Identifying a blurring of boundaries between constructivism and participatory research

By bringing mapmaking into the study, the researcher observed an unexpected "blurring and shifting" (Lincoln, Lynham & Guba, 2018:219) of boundaries between constructivism and PR as a result of the study's methodology. In this, it was possible to bring some of the transformative elements of the PR into a constructivist paradigm (Creswell, 2014: 9; Lincoln et al., 2018: 215). For reasons stated earlier, the elements are by no means enough to classify the study as a form of participatory research. However, they enabled the mapmaking process to

be implemented in a much more "reflexive, flexible and iterative" (Cornwall & Jewkes, 1995:1668) way that is characteristic of PR methodologies.

In the mapmaking process, the researcher stepped back and took on the role of learner and facilitator (Cornwall & Jewkes, 1995:1670). Because of this, participants could then take the lead with some of the actions and discussions that took place (Chambers, 2006:6). The change in roles also enabled a shift in the level of participation that happened in the mapmaking process.

Biggs (1989:4) argues that participation happens along a continuum that extends from shallow to deep modes of participation (Cornwall & Jewkes, 1995:1669) (see Figure 3.3 for an image of the continuum) *inter alia* from contractual to consultative to collaborative to collegiate participation.

In the study, the mapmaking process largely enabled collaborative participation, shifting at times down to consultative participation and in rare instances, shifted up to collegiate participation. Cornwall and Jewkes situate PR at the collegiate level of participation and warn against participatory processes that are predominantly collaborative, because, they contend, participants are merely "participated on" (Cornwall & Jewkes, 1995:1669). Notwithstanding their warning in practice, participation in the mapmaking process was not tokenistic. Without a significant amount of participant input, guidance and choice making the researcher would not have been able to pre-empt the types of maps that would materialise from each mapmaking project nor design the mapmaking projects. Moreover, as voluntary participants, their motivation to participate was linked to "their own implementation intentions, confidence and personal values" (Marcus, 2018:33). They actively took part because the pre-selected topics were relevant to their routine work and they saw the value for themselves and for other people.

The mapmaking process therefore required both participant knowledge and input to guide the way in which the mapmaking projects were shaped and unfolded. Seen in this light they were both a collaborative design endeavour and an exploration of meaning making to identify the use and value of these projects for service delivery.
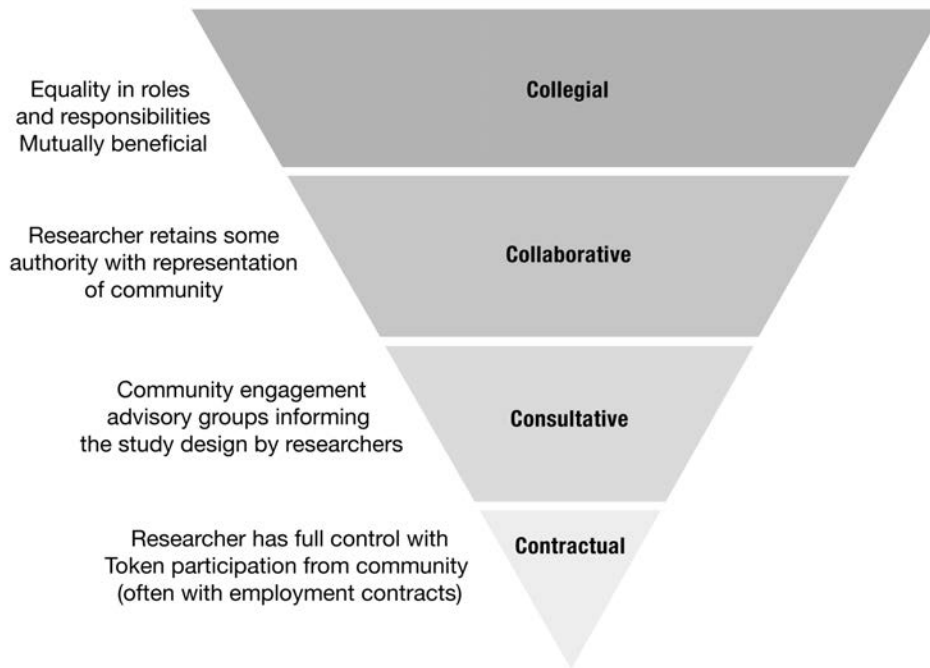
Figure 3.3: Modes of community participation (Higginbottom & Liamputtong, 2015:9).

3.2.4 Participant sampling and data collection

3.2.4.1 Participant sampling

Population and sample

The study population was made up of healthcare practitioners involved in COPC who worked in ward-based outreach teams (WBOTs) in Mamelodi, City of Tshwane.

The City of Tshwane identified Mamelodi as the area in which WBOTs would be initiated. Mamelodi, therefore, provided an ideal setting to explore maps and mapmaking in context. In Mamelodi, COPC was implemented with the assistance of a purposively developed mobile and web information and communication technology (ICT) enabled system, AitaHealth™. AitaHealth™ was developed by the Department of Family Medicine (UP) and Mezzanineware, a subsidiary of the African mobile communications company, Vodacom.

WBOTs consist of team leaders and CHWs. Teams are grouped into clusters and coordinated by cluster managers who fall under a programme manager in the City of Tshwane. At the time of the study, team leaders were all retired professional nurses ansd teams varied in size from 12 to 18 CHWs. They were supported by a medical doctor in specialist training. The mix of healthcare practitioners also differed in each mapmaking project.

The 'LISA' map involved CHWs only (n=45), the 'history of health' map involved team leaders (n=19) and the 'community health' map included a mix of professional nurses (n=7), CHWs (n=7) and doctors (n=5). See Table 3.1 below for a summary of all the participants and logistics involved in each mapmaking project.

Sampling method

Participants were selected using purposive sampling. Through management, teams were informed and invited to participate in the study. Those who were interested, were provided with further information that was project specific. Participants were then selected on a first come, first serve basis. Inclusion criteria depended on the nature of the mapmaking project and individual willingness and availability to take part.

Language spoken during data collection

English was the language used during data collection. All the study participants were literate, and questions were presented to them in English. At times during focus group discussions, some participants would speak in Sepedi (their mother tongue) to each other. Also, during the CHW interviews in the 'community health' map, one or two participants answered a few questions in Sepedi because this was easier for them to do. The study's research assistant was Sepedi-speaking and helped to do the necessary translation either during the sessions or during transcription.

Table 3.1: Summary table of the number of participants and logistics involved in each of the three mapmaking projects

Number of participants and wards represented	Session location	Project duration	Number of sessions	Length of sessions and time required for each part of the project's process	Participants who dropped out
'LISA' mapmaking project Participants: 45 CHWs from 4 different Wards Wards represented: Ward 18 (18 CHWs) Ward 15 (9 CHWs) Ward 93 East (7 CHWs) Ward 16 (11 CHWs)	Ward 18 and Ward 15 – Ikageng Community Hall, Mamelodi East Ward 93 East and Ward 16 – their health post at Stanza Sports Ground, Mamelodi East	June 2015 to September 2015 (4 months)	4 mapmaking workshops (1 with each group) 2 data analysis presentations (the first presentation was for Ward 18 and Ward 15; the second presentation was for Ward 93 East and Ward 16)	Introduction and planning - 1 week per group Mapmaking workshops - 2 mornings per group (from 08:30 am to 13:00 pm) Data analysis - 1 month Data analysis presentation – 3 hours per session *See Chapter 4, Section 4.2.2.2 and Figure 4.4 for more details about the project process*	None
'History of health' mapmaking project Participants: 18 team leaders divided into 3 groups Group one had 5 participants, group two had 9, and group three had 5. Wards represented: Group one: Ward 67 (1 team leader) Ward 28 (2 team leaders) Ward 93 West (1 team leader) 1 Cluster manager from Mamelodi East	Group one – the health post in an unused classroom at Jafta Mahlangu Secondary School, Mamelodi West Group two – Stanza Bopape Community Centre, Mamelodi East Group three –Ikageng Community Hall, Mamelodi East	October 2015 to December 2015 (3 months)	3 mapmaking workshops (1 with each group) 3 focus group discussions (1 with each group) 1 data analysis presentation for all 3 groups	Introduction and planning - 3 weeks per group Focus group discussions - 1 hour 30 minutes per group Mapmaking workshops - 2 mornings per group (from 08:30 am to 13:00 pm) Data analysis - 1 month Data analysis presentation – 1 hour 30 minutes	1 team leader dropped out from group 3

Group two: Ward 17 (2 team leaders) Ward 10 (2 team leaders) Ward 16 (1 team leader Ward 86 (2 team leaders) Ward 97 (1 team leader) Ward 93 East (1 team leader) Group three: Ward 15 (1 team leader) Ward 40 (3 team leaders) Ward 18 (1 team leader)				*See Chapter 5, Section 5.2.2 and Figure 5.3 for more details about the project process*	
'Community health' mapmaking project: Participants: 19 participants Participants were divided into 7 groups. Each group consisted of a team leader, a CHW from her team and a registrar medical doctor. One registrar was shared between group four and five, and one registrar was shared between group six and seven. Wards represented: Ward 17 (1 Team leader, 1 CHW and 1 registrar medical doctor) Ward 23 (1 Team leader, 1 CHW and 1 registrar medical doctor) Ward 28 (1 Team leader, 1 CHW and 1 registrar medical doctor) Ward 40 (2 Team leaders, 2 CHWs and 1 registrar medical doctor) Ward 86 (2 Team leaders, 2 CHWs and 1 registrar medical doctor) (Due to the big size of Ward 40 and Ward 86, each ward had two teams)	Mamelodi Vista Campus	February 2016 to June 2016 (5 months)	19 Individual interviews (1 with each participant) 7 group discussion (1 with each group) 3 data analysis presentations (1 for all the team leaders, 1 for all the CHWs and 1 for all the registrar medical doctors)	Individual interviews – 1 hour Group discussions – 1 hour 30 minutes Data analysis presentation – 1 hour 30 minutes *See Chapter 6, Section 6.2.2 and Figure 6.6 for more details about the project process*	1 CHW dropped out due to illness in her family, she was replaced with a new CHW.

3.2.4.2 Data collection

Data was collected using the following methods and tools:

- *Artefacts, articles and literature* – These were associated with a particular mapmaking project. They included existing information sourced by the researcher and participants.
- *Maps and drawings* – These visual artefacts were generated during each mapmaking project.
- *Group discussions and focus groups* – These were facilitated by the researcher during each mapmaking session. Discussions were audio recorded, translated (as necessary) and transcribed.
- *In-depth interviews* – Open-ended conversations with individuals were audio recorded and transcribed.
- *Individual reflective writing and session evaluation forms* – These were generated by participants during each mapmaking project.
- *Field notes* – These were made by the researcher during and after each mapmaking session.
- *Feedback presentations* – These were conducted to share findings with participants after each project. They were audio recorded and transcribed. Written feedback was also collected in some instances.

The specific methods used to collect data in each mapmaking project are elaborated in detail in the respective chapters. Generally, however, group discussions and focus groups were used to encourage participants to generate ideas, learn from each other and was used as a first step in data analysis. Interviews were used either to enable participants to gather data to use in mapmaking or as part of the mapmaking process itself. Reflective writing was used to help participants to evaluate their experiences and to formulate opinions about the possible use and value of the respective mapmaking projects. See Table 3.2 for an overview of the purpose, theme and data collection methods used in all three mapmaking projects.

3.2.4.3   Pros and cons of the study's data collection methods

The following are the advantages and disadvantages put forward by Creswell (2014:191-192) of the various data collection methods used:

Group discussions focus groups and in-depth interviews
The advantages of the use of group discussions focus groups, and in-depth interviews were: firstly, that they could be scheduled with interviewees and participants at a time that was convenient to them so as not to interfere with their work-routine. Secondly, in the 'history of health' and 'community health' map, the focus group discussion and interviews also enabled participants to share historical information about the past as well as first hand, local-level knowledge of their working situation. This information was both useful and informative for the researcher and other participants who were present in the group discussions or focus groups to hear. Finally, all three data collection methods also gave the researcher control over the types of questions that she could ask to ensure that relevant data was generated to answer the study's research question.

Disadvantages of all three methods were that they produced information that was "filtered through the views of interviewees" (Creswell 2014: 191) and thus at times tended to represent the subjective opinions of participants about certain aspects of COPC and its implementation. All the sessions held were also done in community halls or at health posts instead of being captured in the natural environment where participants worked. Also, the researcher is aware that her presence in these sessions influenced participant bias toward expressing certain views or opinions above others. Finally, not all participants were equally articulate, and in one or two instances participants struggled to express a comment or view in English as this was not their mother tongue.

Individual reflective writing and session evaluation forms
Advantages of asking participants to do reflective writing and fill in session evaluation forms were: firstly, that they allowed the researcher to read participant views that were expressed in their own words and writing style. Also, the answers given were less influenced by the views of other participants. Secondly, the

lengths and quality of the answers given also represented what participants felt was most important for them. Finally, in comparison to transcribing the focus group discussions and interview data collected, digitising the documents were much easier and less time-consuming to do.

The disadvantages of reflective writing and filling in session evaluation forms were that not all the participants who took part were equally articulate to answer the questions or observant of some of the processes and actions that they took part in. Also, some participants did not fill in all the questions which implied that some of the data received were incomplete. Finally, the feedback forms gathered were hand-written and had to be re-typed to be used for data analysis purposes which also took time to do.

Visual artefacts generated: drawings and maps made in the sessions
In the sessions, all drawings and maps generated were visual artefacts that were used as an aid to inform both the focus groups and group discussions. The advantages of creating drawings and maps in the sessions were: firstly, that they were non-obtrusive methods to work with that most participants enjoyed taking part in and could naturally do. Secondly, the drawings and maps made also provided the researcher with rich insights about the personalities and work environments of participants. The information shared through discussions about these drawings and maps included descriptions of the areas where people worked as well as personal stories and experiences of what it was like to work in their community.

The disadvantages of these methods were that the drawings and maps made could only be interpreted with the help of participants. Also, in most instances, both the maps and the drawings were not accessible for people to read and make sense of who was not part of the sessions.

Table 3.2: Overview of the three mapmaking projects

Project name	Preselected theme	Project purpose	Data collection
'LISA' map	To do a mapmaking project that worked with the Local Institutional Support Assessment ('LISA') tool. The 'LISA' tool enables healthcare teams to identify and create a directory of the services available to them in their area, list the places where healthcare services are needed as well as identify gaps in support or in their own capacity.	To help community-based healthcare providers link to existing organisations to maximise resources and streamline healthcare.	Artefacts: 'LISA' forms Visual artefacts: drawings and the 'LISA' map made by each team (four 'LISA' maps were generated in total) Focus group discussions Individual reflective writing and session evaluation forms Field notes
'History of health' map	To create a map of the history of health in Mamelodi during the 1980s Apartheid era which assessed the impact that history had on health both experientially and geographically.	To see what team leaders could learn from the past and to explore whether a history map, based on their recollection of historical events and experiences, could be of value to them in service delivery today.	Interviews (conducted by participants with community members) Visual artefacts: drawings and the 'history of health' map made by each team (four 'LISA' maps were generated in total) as well as the final consolidated map designed by the researcher Focus group discussions Individual reflective writing and session evaluation forms Field notes
'Community health' map	To create a 'community health' map from AitaHealth™ data that visualised information about TB and household sizes in different wards of Mamelodi.	To explore how WBOT team members interpreted medical data maps that showcased Aitahealth™ data and identify what use and value group discussions about the maps could have for them in the delivery of COPC.	Interviews Group discussions Individual reflective writing and session evaluation forms Field notes

3.2.5   Data analysis

In each of the three mapmaking projects, data collected was classified as either
visual text (i.e. maps or drawings created during sessions) or *written text*
(transcripts of audio recordings and reflective writing). *Visual rhetoric* was used to
inform questions asked to participants in focus group discussions and in-depth
interviews to analyse the maps generated while *thematic coding* was used by the
researcher to analyse all written text.

3.2.5.1   Visual rhetoric

Visual rhetoric is used to look at the way in which an image communicates. It belongs to the discipline of rhetoric (Foss, 2004b:141), a "branch of knowledge" dating back to Aristotle and ancient Greece that studies the way language is used to generate persuasive arguments (Foss, 2004b:141). Conceptually, visual rhetoric can be interpreted either as a way to describe a visual image or object that has been constructed with a particular message in mind - in this case the maps (Buchanan, 1985; Foss, 2004a) or as a theoretical approach used to study the nature and/or function of the image or evaluate the message carried in the image from a rhetorical view (Foss, 2004a: 304-306).

A map is an example of visual rhetoric because it is an image or object that has been constructed with a specific meaning and it gives preference to the display of certain types of information and signs (Harley, 1989:275; Kostelnick, 2004:217). In the study, maps were created by participant teams or generated by software to address the research question of the study. In response to the maps made, participants all shifted their perception about either the healthcare needs of the area where they worked or about their own productivity (or lack therefore). The maps therefore persuaded participants to see the information displayed in a different way which in turn encouraged them to think about ways to take action. Because maps are a form of visual rhetoric, the formulation of questions asked in all focus groups were informed by the work of author Sonja Foss who offers a useful framework to identify the visual rhetoric of an image. This way of 'seeing' is not neutral and was informed by either the researcher's objective for each project, or by the selections that participants made themselves when they constructed the maps.

To describe the "nature of the visual rhetoric" (Foss, 2004a: 307) in the maps each group was required to look at the *presented elements* visible in the image as well as to go through a process to uncover the *suggested elements* in the image (Foss, 2004a: 307). Identifying the presented elements involved looking for and naming all the visual elements and features people saw in the maps - such as colour, shape, form, and texture. Uncovering the suggested elements implied going deeper to look for ideas, themes, insights, and concepts that could be deduced from the image.

Focus group questions were deliberately phrased and structured to encourage participants to describe both the *presented* and *suggested elements* of the maps. Because they had to identify the suggested meanings, the question-asking process itself stimulated metacognition - or thinking about thinking (Marcus, 2018:36). Through the questions, participants were forced to think about the work that they had done and how they had thought about approaching the respective activities. This process, in turn, helped them think about better or different ways of working so that they could improve. The process, including the use of visual rhetoric to support the construction of meaning, could be regarded as a way of stimulating learning and the development of capability (Marcus, 2018:36).

The questions asked in the three mapmaking projects were tested and refined during the 'LISA' map project. The rationale for making the changes and the outcomes are described in the 'LISA' map project chapter (see Section 4.2.4 in the 'LISA' map chapter and Appendix 13: 'LISA' map group discussion question adaptations). The refined questions were subsequently used in both the 'history of health' and 'community data' maps (detailed in the appendices of the respective chapters).

3.2.5.2 Thematic data analysis

Textual data analysis happened during and after the mapmaking projects and was continuous throughout the study (Casey & Krueger, 2015:141). All textual data was analysed thematically. According to Braun and Clark (2006:79-82) thematic analysis is a "method of identifying, analysing and reporting patterns (themes) within data" in a way that is rich in detail but not theoretically bound (Braun & Clarke, 2006:79). In this it differs from other types of analysis that also look for patterns across a body of data.

In thematic analysis, a theme represents something important about the research question. Themes are determined by their "prevalence" and "keyness" (Braun & Clarke, 2006:82). Prevalence or "extensiveness" (Casey & Krueger, 2015:154) refers to the presence and commonness of an issue. "Keyness" refers to the insight that observations or activities contribute to the research question or what Casey and Krueger (2015:154) term "specificity" and "emotion" in focus group discussions.

Data was coded inductively, without using a predetermined theoretical framework to look for predetermined themes. Furthermore, the data analysis process followed Braun and Clark's six phases of doing thematic analysis (Braun & Clarke, 2006:87) and was informed by reading from several authors on the topic. The process implemented is described below.

- *Phase one and two: data familiarisation and generating initial codes:*

    Familiarisation and identifying codes
    Data was read several times and coded for specificity and extensiveness. Also, ideas that surfaced were recorded as notes.

    Summary memorandum
    Within each mapmaking project a memorandum (memo) was written for each participating group. In order to reflect on the findings, the memo identified the general ideas being generated as well as their tone and the

impression of their overall depth, credibility and use of the information (Creswell, 2014:197).

- *Phase three: Identifying themes and constructing an initial thematic framework*
  All the data was first re-read to identify an initial set of themes (Spencer, Ritchie, Ormston, O'Connor & Barnard, 2014b:282). The data was re-read a second time to identify insightful and unexpected quotes. These were highlighted in the text.

  Generating initial themes (indexing data)
  Data was then indexed. Spencer, Ritchie, O'Connor, Morrell and Ormston (2014a:303) define indexing as the process of "applying labels to similar chunks of data" that relate to the same theme or concept. Using NVivo, a CAQDAS software package, all interview and focus group transcripts were indexed in full but only highlighted texts were indexed for the reflective writing. Themes identified were revised and adapted during the indexing process (Spencer et al., 2014b:283; Rubin & Rubin, 2005:208-209) so that they were deliberately selected to be "descriptive and grounded in the data" (Spencer et al., 2014a:300).

  Working with NVivo made it easy to manage the study's data as all the coded transcripts of each mapmaking project were located in one NVivo project file. The software also enabled one to assign multiple themes to a paragraph of text with ease and display the assigned themes alongside the transcript in the form of coloured coding stripes that were easy to see and review (each colour represented a theme).

- *Phase four: reviewing themes*
  After all the data was indexed, a thematic framework was identified and themes were refined. The thematic framework was set up in NVivo as a node structure and all data was re-read a third time and re-coded in the software. As part of the re-coding process, the thematic index was continually updated and refined to accommodate the selected texts (quotes)

identified for coding. Once all the data was coded, themes were further refined in NVivo by reading through all the coded data indexed under each theme to see if the data extracts formed "a coherent pattern" (Braun & Clark, 2006:91). To accomplish this task, NVivo allowed the researcher to run a search query to extract all the coded data that related to a specific theme to view. The researcher could click on a hyperlink above each coded data extract and go back to the original transcript that was coded. This feature of the software was useful to work with when the themes assigned to the data extracts were reviewed, and in some instances, changed to refine the data extracts that related to each theme.

Themes with insufficient data-linked extracts, those that addressed the same concepts and those that were too complex or needed simplification were reorganised and reworked (Braun & Clark, 2006:91). In addition to reviewing the themes in NVivo, thematic maps were used as a visual aid to reflect on the relevance of each theme and to further reduce and rework the themes (Braun & Clark, 2006:90).

Thematic maps visualise themes and sub themes and can be used to identify connections between them. Braun and Clark recommend the use of thematic maps throughout the data analysis process as an iterative visual aid, used to assist in the theme reduction process.

- *Phase five: defining and naming themes*
  After completing phase four, a final thematic map was created to reduce and refine the identified themes for the last time. The meaning of each theme was then defined and evidence (quotes indexed) for each was reviewed to identify nuance and meaning. Texts indexed as unexpected or negative were also selected, irrespective of their particularity or uniqueness. From the indexed quotes, meaningful texts were then identified that conveyed the essence of the written summary for each theme. The summary text of each theme and selected texts were then used to write the data analysis section for each of the map projects.

- *Phase six: reporting on the findings of the data analysis process*
  Data was written up to describe the identified themes and to make an
  argument that addressed the research question. Themes described were
  evidenced with relevant texts that captured the essence of the theme's
  meaning (Braun & Clark, 2006:93).

Please download and the ZIP file *NinaHoniball _DataAnalysis.zip*. The file has
been uploaded together with this thesis on UP Space and contains a selection of
documents that show some of the data analysis phases implemented (the list
below details the documents included in the ZIP file). A transcript from the
'community health' mapmaking project was used as an example to illustrate the
thematic analysis process.

Documents included in the ZIP file are:
1. A screenshot of the node structure (thematic index) set up in NVivo and
   used to index (code) the data;
2. An example of the themes linked to the coded text in the transcript
   visualised as coding stripes in NVivo;
3. Three thematic maps were drawn to show the theme reduction process
   used.

3.2.6   Trustworthiness and authenticity – working with fourth generation
         evaluation criteria

Guba and Lincoln (1989: 245) propose two sets of criteria to evaluate research
work conducted from a constructivist paradigm. Both sets of criteria were used to
inform the study and the data interpretation process described above.

The first parallels positivist criteria and evaluates methodology with a particular
focus on the methods used in the research process. The second evaluates the
product and outcome of the study and the processes and choices made to
generate these (Guba & Lincoln, 1989:245).

Criteria used to ensure trustworthiness (Guba & Lincoln, 1989):

- *Credibility (paralleling internal validity)* - all findings presented in the study represent an accurate and truthful representation of insights and meanings of participants. Member checking was used to ensure that participants were able to give feedback on findings. Member checking is "the process of testing hypotheses, data, preliminary categories, and interpretations with members of the stakeholding groups from which the original constructions were collected" (Guba & Lincoln, 1989:239). Member checking happened throughout the mapmaking process in formal and informal ways (Guba & Lincoln, 1989:239) during focus group discussions, as part of the in-depth interviews and in the data analysis presentations. Fourth generation evaluation criteria favour member checking above triangulation as a form of validity checking to ensure that participants are able to affirm that the findings presented are a truthful and accurate representation of their own views.

- *Transferability (paralleling external validity)* - a detailed account of the hypotheses generated and the conditions under which the mapmaking projects were conducted has been documented. In addition, all three data chapters provide a "thick description" (Guba & Lincoln, 1989:241-242) of the mapmaking projects and conditions needed for their implementation in order to enable other researchers to draw from them in their own work.

- *Dependability (paralleling reliability)* - dependability was measured together with confirmability (mentioned below) by doing a "dependability audit" (a process proposed by Guba and Lincoln (1989:242-243) that is outlined in each of the mapmaking projects. A dependability audit evaluates the way in which the mapmaking processes (research design) of the study was recorded and whether they were adapted when implemented. This is something that is common in qualitative studies that are "emergent" in their design (Guba & Lincoln, 1989:242-243).

- *Confirmability (paralleling objectivity)* - the data analysis process was made transparent and available to people outside of the study to review. Guba and Lincoln (1989:243) refer to this as a "confirmability check" because it ensures that data, interpretation and findings can be traced back to the participant comments that they related to.

Criteria to ensure authenticity (Guba & Lincoln, 1989):

- *Fairness* - refers to the extent to which the data reveals different constructions generated by different participants. Fairness was achieved by the types of participants selected and by making sure an open negotiation of views happened during the focus group discussions and data analysis presentations.

- *Ontological authenticity (which enlarged personal constructions)* - refers to the extent to which a participant's own worldview was "improved, matured, expanded and elaborated, in that they now possess more information and have become more sophisticated in its use" (Guba & Lincoln, 1989:248). To evaluate ontological authenticity, participants were asked to reflect on their experience of taking part in the mapmaking projects at different points in the research process (Guba & Lincoln, 1989:248). Participants' initial articulations of what maps meant to them were also compared against written responses to similar questions completed by them at the end of the study. Special care was taken to ensure that questions asked at the end of each project would stimulate reflection to solicit ontological authenticity.

- *Educative authenticity (leads to improved understanding of constructions of others)* - refers to the ability of participants to learn from each other's views and opinions. This was experienced during the research process through focus group discussions, as well as in the data analysis presentation where participants worked in groups to share their views on the findings presented.

- *Catalytic authenticity* - refers to the extent to which participants were encouraged to take action in response to the evaluation process (Guba & Lincoln, 1989:249). In all three mapmaking projects focus group discussions stimulated participants to come up with a plan to take action in response to information visualised by the map.

3.2.7 Researcher positionality, assumptions, and biases

Researcher positionality

The researcher had no formal connection or affiliation with the Department of Family Medicine, COPC or any of the healthcare team members who took part in the study prior to the start of the study. The researcher is affiliated with the Department of Visual arts at the University of Pretoria as a part-time lecturer in Information Design (a four-year Bachelors of the Arts degree offered by the Department). The researcher was made aware of the opportunity to take part in research work for the Department of Family Medicine in 2012, after hosting a project with design students who collaborated with the medical students and Department of Family Medicine staff. The researcher's position and role in study itself is defined as part of the epistemology of constructivism in Section 3.2.2.

Researcher assumptions

Two assumptions influenced the study's design. Both are linked to the researcher's background in graphic design and her experience as a public engagement facilitator who worked in the built environment for architects and urban designers. One is that maps encourage creative thinking and problem solving. The other is that information visualisation or making information visual aids comprehension.

Researcher biases and strategies implemented to overcome them

Biases which influenced how the mapmaking projects and findings were interpreted and perceived by the researcher:
- To look out for the value of participation and the co-creation of the mapmaking projects.

- To pay close attention to the value of making information visual and what effect this had on map interpretation.
- To work from a constructivist paradigm - which implies that shared meaning making should take preference over the more experiential or tacit knowledge that participants might gain through mapmaking or other study related techniques.

To limit these biases, the researcher sought:
- To give preference to participants' views generated through the mapmaking projects.
- To work with participatory processes to enable these views to surface.
- To select an inductive approach to data analysis in order to ensure that themes identified as findings were grounded in participant views.
- To engage in continuous self-reflection throughout the study in order to be conscious of and respond to bias.
- To be in constant dialogue with the study's primary supervisor, a sociologist, in order to seek a different perspective of the mapmaking projects as well as participants' responses.
- To declare the study's paradigm and make explicit the subjective role and position of the researcher in the study.

3.3   Ethical considerations

The study protocol as well as the umbrella study that this study falls under was granted ethical clearance by the Research Ethics Committee of the Faculty of Health Sciences, University of Pretoria (study ethics number 160/2015 – see Appendix 6.1; umbrella study ethics number 102/2011 – see Appendix 6.2). The study also adhered to the following four guidelines discussed by Christians (2000:144-145) that underpin most value-free social science ethics codes:

- *Informed Consent* - at the start of the study all participants were given a consent form to indicate whether they wanted to take part in the study. The researcher read through the consent form with participants and gave them a chance to ask questions, clarify any uncertainties and decide if they wanted to take part. The consent form also clearly set out the aim and purpose of the study, outlined all the projects that formed part of the study, indicated the duration and the methods used and listed any consequences related to each session. The consent forms also clearly stated that participation was completely voluntary and optional (see Appendix 7, 8 and 9 to view the different types of consent forms used for the three mapmaking projects).

- *Deception* - in terms of deception, the researcher declares that all projects and participatory sessions were hosted free from deception, ensuring that participants were aware of the purpose of each session and were notified that all material generated during the projects were collected, analysed and used for academic research purposes.

- *Privacy and Confidentiality* - every effort was made to ensure privacy and confidentiality bearing in mind that each mapmaking project was conducted with specific people in specific localities that involved a participatory process. In addition, all information presented by the researcher to groups or in publications or presentations was also anonymised through use of pseudonyms.

- *Accuracy* - the researcher was committed to compile valid data during each mapmaking session that was created solely by the participants and analysed according to rigorous principles as is set out in the data analysis section under Section 3.3.

3.4   Summary

To conclude, the chapter outlined the researcher's position and worldview - that of constructivism with some tendencies towards the participatory (transformative) paradigm as a result of the study's methodology. In addition, the chapter described the challenge experienced to find a suitable research design for the study and put forward a mapmaking process designed to address the research question. The mapmaking process was adapted into the three mapmaking projects that each corresponded to a preselected theme. The chapter also stated how the evaluation criteria of the worldview and selected characteristics of PR informed the mapmaking process. In addition, the types of methods used and the rationale for their use was described. These included the mapmaking process itself, focus group discussions, in-depth interviews and reflective writing. Visual rhetoric and thematic data analysis were used to shape the way data was analysed and the results were subjected to trustworthiness and authenticity verification to ensure validity. By way of conclusion, a summary of the four procedures used to ensure that the research work was conducted in an ethical manner was provided. The next chapter describes and presents findings from the study's first mapmaking project, the 'LISA' map.

4.   ‘LISA’ MAP: PROCESS DESCRIPTION AND DATA ANALYSIS

This chapter begins with background information that explains how the ‘Local Institutional Support Assessment’ (‘LISA’) map was conceptualised and designed. The chapter then describes the ‘LISA’ mapmaking process itself, and puts forward findings from a thematic data analysis process conducted on the project data collected.

4.1   Introduction

The ‘LISA’ map was undertaken over a four-month period between June 2015 and September 2015 with four teams of community health workers (CHWs) from Mamelodi East.

The list of community healthcare teams who took part in the ‘LISA’ map were:
Ward 18 – 18 CHWs
Ward 15 – 9 CHWs
Ward 93 East – 7CHWs
Ward 16 – 11 CHWs

4.1.1   Process overview

The ‘LISA’ map project was structured according to the participatory mapmaking process visualised in the research approach and methods chapter (see Figure 3.2). The pre-selected theme identified for the ‘LISA’ map was to do a project that worked with the Local Institutional Support Assessment (‘LISA’) tool used in community oriented primary care (COPC) to identify and mobilise the asset base

in defined geographical areas. A Design Thinking[5] approach to problem solving (Brown, 2009:4; Howard, Senova & Melles, 2015:184) was used to adapt the mapmaking process into a unique project.

Stanford d.school's five modes of Design Thinking (Doorley, Holcomb, Klebahn, Segovia & Utley, 2018:[sp]), although slightly modified, were used to inform the design of the mapmaking process. In this project, the first three modes, namely 'empathise,' 'define' and 'ideate' were used (Doorley et al., 2018:[sp]). Modes four and five – 'prototype' and 'test' (Doorley et al., 2018:[sp]) – were intentionally excluded because the focus of the mapmaking project was not to design and test a product, but to work with the modes to ensure that the objective of the mapmaking process was relevant for participants to take part in.

An overview of the mapmaking process:
The mapmaking process involved four steps. The first step (empathise) was to understand how ward-based outreach teams (WBOTs) implemented the LISA - a checklist designed to determine the nature, variety and extent of organisational capital in their defined geographical area. The information they provided then served as the basis for the second step (define and ideate), which related to the design of the participatory mapmaking process. In the third step (implement) participants took part in a mapmaking project and a focus group discussion of the map. These discussions happened either during or immediately after the making of the map. Step three was repeated with each of the four groups of CHWs and refined iteratively with each implementation. The fourth and final step involved analysing the findings generated from the mapmaking project. Results were presented back to participants for further discussion, verification and refinement a month after mapmaking. In addition, the 'LISA' map project and initial findings

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[5] Design Thinking is an approach used to solve problems in a human centred way (Howard, Senova & Melles, 2015:184). In the study Design Thinking was used as a "set of principles" (Brown, 2009:7) that informed the idea generation and design of the mapmaking project to match a need identified from working with CHWs with available resources and project constraints (Brown, 2009:4).

were presented by the researcher and three participant CHWs at a COPC "masterclass" session run by the University of Pretoria Department of Family Medicine for team leaders, managers, clinicians and academics.

4.1.2   What informed the 'LISA' map?

As mentioned in Section 1.1 of the study's introduction chapter, the initial steps of COPC involve establishing a healthcare team and defining the geographical boundary that each team will work within (Marcus, 2015:108). Healthcare team members use a map of the area to mark out the geographic boundaries of their team's community. Once the team's physical boundary of service is determined, each community health worker in the team is given responsibility for a defined number of households (approximately 200 - 300) within it.

Apart from the people who live in the geographical place of the defined community, there are also organisations and institutions that operate and provide services within those areas. These organisations have a bearing on health and care, either as sites of employment and activity that need COPC support, or as service providers who may be able to support COPC. One of the important initial tasks of the community-based healthcare teams is to gather information about all the organisations and institutions in their area. Healthcare teams do this by conducting a local institutional support assessment using a 'LISA' tool. The purpose of doing the LISA is to help community-based healthcare providers link to existing organisations to maximise resources and streamline healthcare (Marcus, 2015:111).

CHWs use the 'LISA' tool, also called a 'LISA' checklist (see Appendix 10), to find out about the organisations and institutions in their areas (Marcus, 2015:111). The LISA data enable healthcare teams to identify and create a directory of the services available to them in their area, list the places where healthcare services are needed as well as identify gaps in support or in their own capacity (Marcus, 2015:121-123). LISA also shows healthcare teams an organisations' potential interest to participate in COPC. The process of data collection as well as the

information generated through LISA then allows the team to do a local institutional analysis.

Through the local institutional support analysis, healthcare teams can identify the organisational and institutional partners within their service community and determine their interest in and relevance for community-oriented primary care (Marcus, 2015:110 -111). Organisations and institutions can vary from schools, non-profit organisations such as hospices and faith-based organisations, to government departments or divisions such as the Department of Social Development (Marcus, 2015:110).

The 'LISA' map was conceptualised to incorporate the 'LISA' tool as well as the local institutional analysis into the mapmaking process itself. Both the 'LISA' tool and the local institutional analysis are described in *COPC – A Practical Guide (2018)*.

4.2   Empathise, define, ideate and prototype - designing the 'LISA' map

To design the 'LISA' map, the first team of participants was visited three times to observe how the team had implemented the LISA process a year earlier in Mamelodi.

During the first visit, the project was introduced and community health workers were invited to consider to take part in the study. On the second visit, participants gave informed consent and explained the 'LISA' maps that they had created the year earlier. The third visit involved walking with two CHWs through their area of service to hand out 'LISA' checklists.

Prior to visit one, two team leaders of the participating teams were consulted on site in order to determine the value to them of the mapmaking project. The goal of the project was explained and team leaders were invited to provide input and give guidance on how to approach mapmaking with the CHWs, both in terms of the

mapmaking project itself as well as how to ensure that the research did not interfere with ongoing service delivery.

This three-visit process was repeated with each of the other teams involved in the project.

4.2.1   Empathise - drawing on two insights from the field

Insight one – forms in a cupboard
From the first visits, it was found that the LISA process was incomplete. Not all CHWs had given out and collected LISA checklists during the previous year. Also, team leaders had been instructed to hand those that had been done to the cluster manager in the City of Tshwane. Eventually, it was only possible to locate 38 forms, not even enough to account for three of the 21 WBOTs active in Mamelodi at the time.

In addition, these forms were kept in a filing cabinet at the City of Tshwane's head office. This meant that none of the checklists were available to teams and CHWs to do a local institutional analysis. The LISA process was therefore used as an administrative exercise instead of an activity that CHWs and WBOTs use to identify services and build partnerships with organisations.

Knowing that not all CHWs had done the LISA process, WBOTs who took part in the 'LISA' map project were willing to repeat the process. CHWs who had done the activity the previous year also felt that it was important to repeat the process in order to determine which organisations were still operational and to include new stakeholders.

Insight two – recognising the value of the sketch maps that CHWs had made

Apart from the local institutional assessment and 'LISA' tool, CHWs also drew their maps of the households that they had been assigned to. The maps looked like sketch maps[6], but the process of drawing the sketch maps has been adapted into an activity called "physical mapping" (Marcus, 2015:9). In COPC, physical mapping is a confirmatory mapping activity where CHWs and team leaders verify the number and position of households assigned to team members. This is especially important in a context where households are not synonymous with houses, stands or yards.

To create the physical maps, CHWs walked through and drew all the households, streets and organisations of their assigned areas (see Figure 4.1). They used a town planning map as reference to work from and drew maps using marker pens, ballpoint pens, coloured pencils and highlighters. Some used A2 or A3 sheets of cardboard, although those who were unable to buy cardboard used the back of old calendars or posters. Every map had its own key to identify all the elements drawn on the map.

> In the beginning, we went out to the community to count street by street how many of the households each street has and after we finished to count the households our team leader handed out the LISA form to go and look for organisations to give them and fill them for us, we did that and went back to collect them. Some they gave us same day so we came back and sat down to draw our mapping as we were allocated 200 households each, so we shared by pairing in two. (MP1-P39, CHW Ward 16, female, reflective writing)

During the second visit, participants took turns to show and explain their sketch maps to the researcher. They presented their own maps with pride and a sense of achievement. In addition, their explanation of the process revealed both the value and challenges of the task. Generally, CHWs felt that the physical mapping activity gave them confidence to start their work because it helped familiarise them with their assigned area.

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[6] Sketch maps are: "Free-hand maps which are drawn from memory and help us to ogranize spatial information" (Metz 1990:114).

It was tough because it was something new to be done by me. I went to the area where I was located, did a survey, count my 200 houses according to the street names; and write the number of houses. Draft the map comparing to the big map. Somewhere somehow the numbers differ. I had to take my spreadsheet and draw on the street. (MP1-P18, CHW Ward 15, female, reflective writing)

At first I was confused my area was so big. I didn't know how to start, where to start - are the community going to allow us to work together, especially the organisations? But finally, we won their trust. (MP1-P14, CHW Ward 18, female, reflective writing)

My experience is that you can play along with your map, decorate, it is easier to give direction than the big map e.g. highlight the shops; salons; schools; crèches etc. It makes you be creative and more focused on what you do. It brings joy and excitement. (MP1-P18, CHW Ward 15, female, reflective writing)

Initially the researcher thought that the physical mapmaking activity could be revised and used as the participatory group mapmaking project for the 'LISA' map. However, the second visit made it clear that the physical mapmaking activity was an individual learning experience that was important for CHWs to go through. Therefore, a choice was made to keep the physical mapmaking activity as is and to use the 'LISA' map project to build on the process.

Figure 4.1: A collage of sketch maps created by participants from Ward 18, Mamelodi 2015. Photographed by the researcher.

Figure 4.2: A CHW explains her sketch maps to the researcher, Mamelodi 2015. Photographed by a CHW of Ward 18.

4.2.2 Define and ideate

Another insight from the second visit to Ward 18, sparked the idea to develop the 'LISA' map into a participatory mapmaking project that could integrate the LISA checklist, the local institutional assessment and the sketch maps.

4.2.2.1 Define - the observation that inspired the design of the 'LISA' map

The team leader of Ward 18 had displayed most of the sketch maps on the walls inside the health post. Although they were beautiful drawings, it was not possible to make sense of the information on them beyond the particular and personal meaning that they had for the individuals who had made them. In other words, not being able to read the maps together meant that their value and use were limited.

In response, the researcher questioned whether the physical mapping activity could not be taken a step further. Looking at the maps on the walls, it was as if people had drawn pieces of a puzzle that one could put together. It therefore seemed useful to work with the team to do a participatory mapmaking project that would use the sketch maps as a starting point to create a composite or unified map of all the organisations in their area. Moreover, creating a composite map of the stakeholders would allow the team to 'see' the number of organisations and institutions in their area and look for patterns and draw insights from what would show up on the map.

The participatory mapmaking project was conceptualised around Corner's idea of "layering" (Corner, 1999:231). He puts layering forward as one of four techniques to work with when using maps in design and planning (Corner, 1999:231).

Corner argues that layering allows maps to have different types of information and content stacked on top of each other, which in turn opens up the possibility for new information to emerge and connections to form between the layers (Corner, 1999:231). As Corner states: "Unlike traditional plans, maps share this open-ended characteristic. Maps are not prescriptive but infinitely promising. Thus, as constructed projects, mapmaking strategies proposed organizational field-systems that both instigate and sustains a range of activities and interpretations in time." (Corner, 1999:236).

To design the 'LISA' map, a City of Tshwane town planning map of Mamelodi was used (Figure 4.3). Town planning maps show the number of stands in each ward and because they are vector-based drawings, they can be enlarged and printed on A1 or A0 size for use in a group mapmaking project.
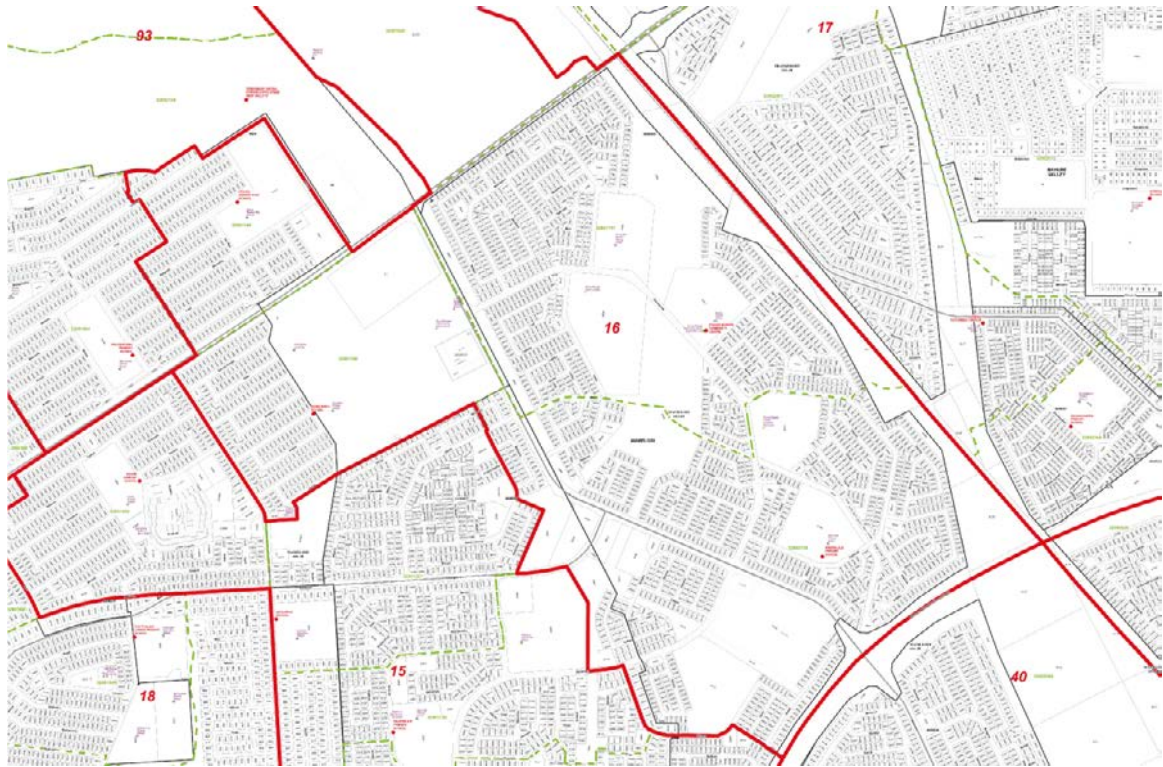
Figure 4.3: Example of a town planning map of Ward 16 in Mamelodi – red lines show ward boundaries. Image obtained from the City of Tshwane's Town Planning Division.

4.2.2.2 Ideate - turning an idea into a mapmaking project

For the project, the town planning map image was pasted onto sturdy cardboard to create a base map. Thereafter, participants were asked to cut out the area where they worked from three printed copies of the map. This gave each CHW three layers that they could put different information on.

Three activities were then identified to create the map as a visual extension of the data collected in the LISA checklist. The first was to work with a unified colour coding system and create a *stakeholder layer* that would show the organisations and institutions in the ward (see Figure 4.5). The second was to create an *availability layer* to show the interest of organisations to take part in COPC. Participants had to assign a colour to each stakeholder to show if they were willing to take part (green was used for respondents who said yes, orange was for those who were unsure and red was used for those who did not want to be part of COPC).

The third activity was to create an *action planning layer* to help CHWs identify their interaction with organisations and plan follow-up contact. Here, participants worked with two colours - purple and blue - to show how many interactions a CHW had with an organisation. Blue signified that a LISA checklist had been given to an organisation or institution and purple that the CHW had gone back to do one or more follow up engagements.

The mapmaking project was prototyped and tested several times and refined both before and during implementation. A rubber-like poster adhesive was used to stick the layers on top of each other. Participants used felt tip pens to colour in the block-like shapes of the property stands on a town planning map. Each coloured block represented a stakeholder. Colours used were dictated by the three different activities.

The process of implementing the 'LISA' map is illustrated in Figure 4.4 and described in detail below. It was repeated with each of the four teams.
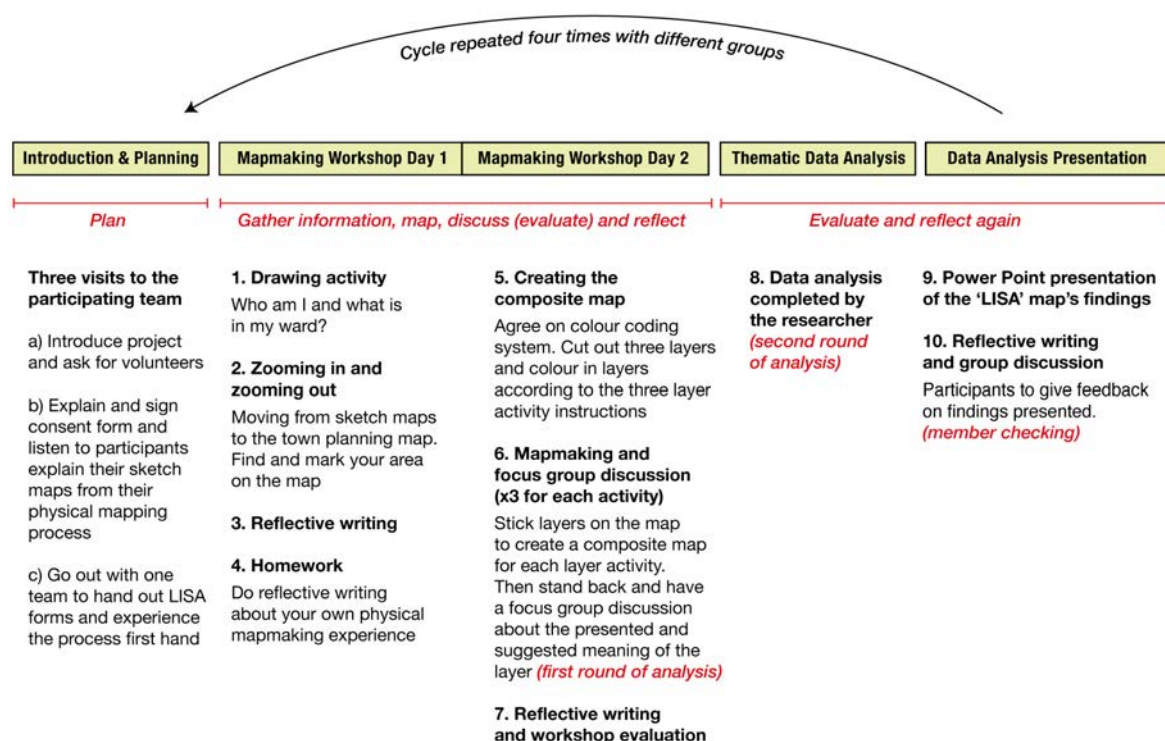
Figure 4.4: Workshop activities used to create the 'LISA' map

Figure 4.5: Participants creating the first layer of the 'LISA' map, Ikageng Community Hall, Mamelodi 2015. Photographed by Ronald Mosweu (research assistant).

4.2.3   Implementing the 'LISA' map

A two-day mapmaking workshop was facilitated by the researcher to guide participants through a series of activities to make a composite map using LISA data. The section below outlines these activities and the session guide (see Appendix 11 and 12) sets out questions asked during each activity and explains how the mapmaking workshop was delivered.

4.2.3.1 Mapmaking workshop day one: getting people on board and ready to map

The first day of the mapmaking workshop started with a general introduction and drawing activities described in Appendix 12, *Session guide for 'LISA' map*, subsection. *Who am I? What is in my area?*

"Zooming in and zooming out"
Working in pairs or groups of three, participants were asked to draw sketch maps of the visible assets and personality of their defined communities. Once completed, participants had to locate the households allocated to them on the town planning map. Participants used coloured markers to mark their designated areas on the A1 map and labelled their sections with a sticky note that had their name on. After the labelling was done, participants were also asked to talk about the differences that they saw between their own sketch maps and the A1 town planning map (see Figure 4.6).

Reflective writing
The session closed with a reflective writing activity that was to be completed individually, at home. Participants were asked two questions about their experience of the session and three questions about the sketch maps that they had drawn at the start of COPC. In their responses, they were encouraged to think about their own physical mapmaking experience because this influenced how they perceived maps and their value for service delivery.

Figure 4.6: Zooming in and zooming out – examples of the sketch maps drawn by participants and images of participants identifying the areas where they work on the town planning map, Ikageng Community Hall 2015. Photographed by Ronald Mosweu (research assistant)

4.2.3.2 Mapmaking workshop day two: the participatory mapmaking project (building a composite map from the layers)

On the second day of the mapmaking workshop participants agreed on a map key. They listed all the organisations in their area and assigned a colour to each stakeholder category[7]. After agreeing on the map key, participants were asked to

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[7] Categories listed were different for each group and were dependent on the nature of the area where the group worked. Examples of categories mentioned were: schools, crèches, spaza shops, taverns, churches, traditional healers, hair salons, non-profit organisations, mortuaries and dumping areas.

cut out the area where they worked from a copy of the town planning map. They did this three times in order to have three layers to apply to the base map.

For the first layer, participants worked with the group's map key and their own sketch maps to locate and colour all the organisations in their area. For the second layer, CHWs coloured in the willingness of organisations to be involved in COPC as either green, orange or red. The third layer showed the type of contact that CHWs had with organisations.

To create a composite map for each of the three activities, participants stuck their layers on top of each other onto the mounted copy of the A1 town planning map one at a time. After each activity's composite layer was assembled, the group stood back and were asked to describe what they saw and thought about when they looked at the map. The three composite maps were built on top of each other (see Figure 4.7 for a collage of images that shows some of the activities described above).

4.2.3.3   Data analysis presentation

The 'LISA' map's process concluded with a data analysis presentation that was shared with participants' findings from the mapmaking project. Participants were asked to give feedback on the findings presented. For logistical reasons, the presentation was made twice, to two teams at a time.

During the presentation participants were asked questions and could give their views on the findings through individual reflective writing and small group discussions. This feedback was analysed together with the other textual material generated through the rest of the mapmaking project (see Appendix 14 for a table of the reflective writing questions given to participants).

Figure 4.7: Group discussion – creating the composite map from participant layers, Ikageng Community Hall 2015. Photographed by Ronald Mosweu (research assistant)

4.2.4   Process adaptation and refinement (dependability audit)

During implementation, insights from practice required that changes be made to make the mapmaking process more functional.

1. *Using the mapmaking process in informal settlements where no town planning map is available:*
   In Ward 93 East, CHWs worked in an informal settlement where no town planning map was available. Participants used a GIS-generated map that visualised households with electricity connections in their area as a guide and drew their household stand map on A3 cardboard. The drawing was enlarged to an A1 format and used for the mapmaking project, which worked well (see Figure 4.8).

2. *Combining the focus group discussion with the mapmaking activity:*
   The map discussion of the first group was held as a stand-alone focus group activity and conducted after the mapmaking was done. During the focus group, participants were generally unresponsive. To encourage participation, the focus group discussion was integrated into the mapmaking process. Implementing this change with the remaining three groups resulted in a significant improvement of participant responsiveness.

3. *Adapting questions to ensure that their meaning was clear:*
   Questions asked during the map discussions were reviewed and rephrased several times (see Appendix 13 and 14). The research assistant helped to identify when a question needed to be changed. Changes were made if participants did not understand or respond to a question.

4. *Phrasing focus group questions to elicit a visual rhetorical response:*
   Focus group discussion questions were purposefully phrased to first reveal the presented meaning of a map layer and then to ask participants about the suggested meaning of the layer (Foss, 2004a:307). It took a few attempts to work out how to phrase these two questions. In the end, it

worked best to simply ask "what do you see"' followed by asking "what is the map telling you" and use prompts to draw out more information from a participant about his or her response.

5. *Doing action planning in the moment:*
The objective of the third layer was to give each participant a visual snapshot of the amount and types of interactions that they had with the organisations in their area. Participants were asked to write an action plan and think about how they wanted to engage with their organisations moving forward. We ran out of time with the second group and did the planning session together as a team while we were mapping. The task led to the group doing 'planning in the moment' which ended up being both enjoyable and useful because participants shared experiences and helped each other with ideas on how to approach 'hard to reach' organisations.

6. *Evolving questions asked to participants in the data analysis presentation*
It was difficult to work out how to ask participants to give feedback on the findings presented during the data analysis presentation. Two sets of questions were developed (the one evolved out of the other in an attempt to improve the questions and participant interactions). Looking back, the first set of questions were the best to use to ensure member checking and give participants a chance to provide enough written feedback on the findings presented (see Appendix 14). However, this participant discussion format of the second presentation worked much better. This format gave participants a better opportunity to share and debate their views which ensured fairness and educative authenticity. In future, it would also be best to deliver the session four times - once to each group. Working with big groups made it difficult for people to hear individuals presenting their group's views at the end of the session and prevented the researcher from engaging with some of the groups during their discussions.

Figure 4.8: Hand drawn map of an informal settlement used for the mapmaking project of Ward 93 East, Mamelodi East 2015. Photographed by Carla van Rensburg (research assistant).

4.2.5   Process Insights

The map made by each group was kept by the researcher for analysis. In hindsight, it would have been better if the maps were returned to participants to keep and use. Moreover, giving back the maps creates the possibility of extending their use as well as the project itself. By adding a second phase, one could leave the maps with participant groups and come back after a defined period to see if and how the maps were used over time.

4.3   Thematic data analysis

Data from the 'LISA' map was analysed according to the process outlined in the research approach and methods chapter. Data used includes different types of reflective writing collected at three intervals during the mapmaking process of workshop day one, workshop day two and the data analysis presentation, as well as transcripts of the focus group discussions held during the mapmaking process with all the groups.

Findings generated from the 'LISA' map data were all collected under two main themes: map and mapmaking. The first main theme has two themes with related *sub-themes*. The second main theme consists of five separate themes with related *sub-themes* – see Figure 4.9 for an overview of the two main themes, themes and *sub-themes* of the 'LISA' map. Also, see Appendix 15 to 18 to view the 'LISA' map's thematic index and the theme maps generated to reduce the index down to the final themes described below.
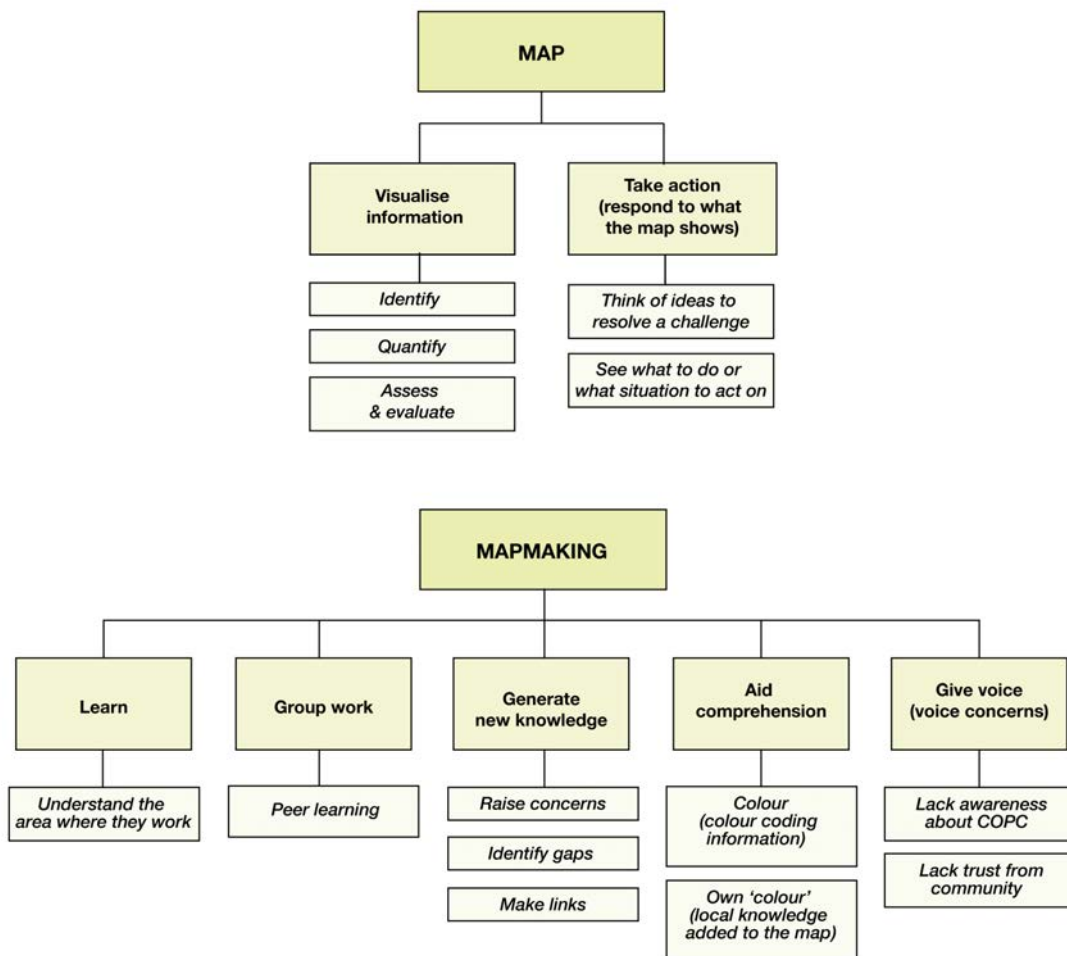
Figure 4.9: 'LISA' map main themes, themes and sub-themes

4.3.1   The use and value of the 'LISA' map

The two themes, visualise information and take action both relate to the use and value of the 'LISA' map as an artefact or finished representation and are grouped under the main theme: map.

4.3.1.1   Visualise Information

The 'LISA' map not only consolidated all the information collected with the LISA forms, but also made it visual. For the first time, participants could *identify*, *quantify* and *assess and evaluate* all the organisations in their ward together as a group.

Participants found that the map also helped them to *identify* the different types of organisations and resources available to them. This essential use of the map enabled all the other themes to open up (e.g. *quantify the number of, assess productivity, spot gaps*, etc.).

> Yes, maps are important to use to get around different areas, they even make it easier find places you are looking for. (MP1-P24, CHW Ward 15, female, reflective writing)

> … [the map] is still an easy way to find my household and my organisations. (MP1-P3, CHW Ward 18, female, reflective writing)

> Mapping gave me a light, I can direct anybody to anywhere now, because of mapping. I can go directly to my patients or household because of mapping. (MP1-P31, CHW Ward 93 East, female, reflective writing)

> I feel happy because this research can make things simple when you want to go there and I don't have to doubt to take you there [clear direction]… (MP1-P28, CHW Ward 93 East, female, reflective writing data analysis presentation)

The 'LISA' map also enabled participants to *quantify* the number of each type of organisation in their ward. Participants could then work together to better understand what the numbers show and imply.

> Yes. It allowed me to see how many stakeholders I have to approach and bring WBOT service to. (MP1-P21, CHW Ward 15, female, reflective writing)

My experience of today's presentation was like: Comparing my previous physical map with 'LISA' map. There is a great difference. On the previous map we did not mark the stakeholders. We also [did] not count them. Now on [the] 'LISA' map we can see the number of households is very high and we can see how many people agree to work with us. By using these three layers we can see where we are and where we can re-correct us [improve our service delivery] by giving health talk or explaining to the people about COPC. And, to check the gaps from our map. We also get challenges from the community especially the stakeholders like traditional healers and tavern owners. (MP1-P43, CHW Ward 16, female, reflective writing)

...I have learnt more about my area. I know how many taverns, how many people, shops, schools churches etc. From today I know how to map my place or area. (MP1-P31, CHW Ward 93 East, female, reflective writing)

Many of the CHWs also felt that the mapmaking activity helped them to *assess and evaluate* their own productivity as well as the types of organisations in their ward.

Yes, I will use this [the map] as a COPC team member, because the three layers can help us to know our area very well and the three colours will tell us whether we are working well or we are not working well. (MP1-P41, CHW Ward 16, male, reflective writing)

The second layer gives us input that too many of our stakeholders don't have trust in our work. And at least we have some that are in, but we still need to work more to get others. (MP1-G2, CHW Ward 15, female, focus group discussion 28-Jul-15, Ikageng Community Hall Mamelodi)

My experience with today presentation was wonderful. Because it was a true reflection of my everyday work. I can see what is happening throughout the ward from the 'LISA' map, but being at one point. This indicates the successes [we] have achieved in WBOT and the challenges we are facing. (MP1-P44, CHW Ward 16, male, reflective writing)

Yes, I would use it. Somehow it helped us be aware of the people, businesses, and organisations we haven't reached. If we use colours and different layers it would help us reach our monthly target. (MP1-P24, CHW Ward 15, female, reflective writing)

4.3.1.2   Take action and respond to what the map shows

There are two sub-themes that relate to the theme take action and respond to what the map shows. These are to *think of ideas to resolve a challenge* and *to see what to do or what situation to act on*.

During focus group discussions several participants were able to use the mapmaking process to progress from *making links* or *raising concern*s to finding solutions to challenges identified on the map, as is illustrated in the conversations below.

> F1: People must be informed.
> R: And what tools would you use to inform them?
> M1: Media.
> F1: TV, the media is the best.
> R: Now imagine we don't get media or TV because it is budgets that is millions.
> F3: The campaigns.
> M1: Newspapers, Rekord...we have.
> R: So, what is a good way to make a campaign? Who can you...I mean...
> F2: Maybe by spreading the word.
> R: So, one idea is to spread the word right, one idea is spread the word.
> F1: Campaigns on vaccines...making...giving...providing under 5-year-old vaccines.
> R: OK, that is an idea.
> F2: (Sepedi) But they already do that?
> F1: No, not for WBOT. (MP1-G2, Researcher and CHWs of Ward 15, focus group discussion 28-Jul-15, Ikageng Community Hall Mamelodi)
> M2: Or maybe if we can make something like a year calendar, so that they must know in advance.
> M2: Yes, so they can be part of our programs.
> R: This is a good idea. I wonder if you as a team you can make a choice and say, in summer we want to do this, winter we want to do this and then you share. It's like... what he was saying, he is saying perhaps you can make a year calendar and share that and then it is a reason for the stakeholders to know what you want to do and then also it gives them a reason to come to you or to, you know, because they can benefit. (MP1-G4, Researcher and CHWs of Ward 16, focus group discussion 20-Aug-15, Health Post, Stanza Sports Ground Mamelodi)

Several participants also mentioned that the information on the map showed them *what to do or what situation to act on*. Focus group discussions enabled participants to take stock of their work - what they had or had not done - and to come up with possible solutions. Through reflective writing, participants were also able to think of responses to what the map showed them.

> The session of today gave us ideas of what kind of stakeholders we have in our ward. And how much they know about WBOT. Much needs to be done to engage with our stakeholder. (MP1-P44, CHW Ward 16, male, reflective writing)

Ward 16, neh, according to this map... we have more blue colours, so we must work hard to try to change these colours. (MP1-P39, CHW Ward 16, male, focus group discussion 20-Aug-15, Health Post, Stanza Sports Ground Mamelodi)

My feeling about this finding of Ward 16 is that it has different stakeholders, we must try to bring them together first by establishing steering committee so that our information can reach everybody in the ward. By knowing our place because of [the] 'LISA' map we can easily direct people to different stakeholder. By engaging with our stakeholder, we can see who is interested to take part in WBOT, who lacks information… (MP1-P44, CHW Ward 16, male, reflective writing)

4.3.2   Taking part in the mapmaking activity

Five themes relate to the second main theme, mapmaking. These are learn, group work, generate new knowledge, aid comprehension and give voice.

4.3.2.1   Learn and group work

All participants found that the mapmaking activity helped them to better *understand the area where they worked.*

> ...understanding our place is the first thing that we need to know before we can even start working with the stakeholders, as most of them were already participating in WBOT. As our area is an informal settlement, directions are a bit challenging but now we can see it clearly through zooming in and out of [the] map. In our place there is no place for recreation. This is a danger to our community member as there are lots of taverns. Our teenagers are expose to alcohol, due to lack of recreations. (MP1-P32, CHW Ward 93 East, female, reflective writing data analysis presentation)

> … [making the map] was like a big thing to me because I have more information of where I am working and now I know what is inside my demarcation. (MP1-P36, CHW Ward 16, female, reflective writing)

> And, also how we brought different section into one map. And I did learn that at least in our ward there are more resources that can help our community like a library, sport ground, schools, day care, health facility/clinic, internet café, traditional healer and others. (MP1-P39, CHW Ward 16, male, reflective writing)

> … I was not aware of things that is on our map and it shows that we should go back to the community and educate them. (MP1-P15, CHW Ward 18, female, reflective writing)

Peer learning could also happen because participants worked together in groups to make their map.

> I did enjoy [the mapmaking activity] very much. I got different opinions from others. Especially on how we can solve the problem of stakeholders who don't want to work with us. (MP1-P39, CHW, Ward 16, male, focus group discussion 28-Jul-15, Ikageng Community Hall Mamelodi)

> It [the mapmaking project] made me realise that there are things that you cannot know and [that is] known by your colleagues. Then as you work in a group you can pick it [up] there. So, it is very important to share with other people. (MP1-P39, CHW Ward 16, female, focus group discussion 28-Jul-15, Ikageng Community Hall Mamelodi)

> The presentation was good. I loved how group work made things come together. (MP1-P24, CHW Ward 15, female, reflective writing)

> Yes; because it [the mapmaking activity] brought us together and the task teams was good because many people are reluctant to do anything but there you broke the ice. (MP1-P18, CHW Ward 15, female, reflective writing)

4.3.2.2   Generate new knowledge

Working with different layers of information also enabled participants to make *links, identify gaps* and *raise concerns*. Participants were therefore able to generate new knowledge and formulate insights because of the mapmaking activity.

> Layers open up or enlightened us to see what needs to be done, what is at stake since we started this project. How simple things can detect big things and tell the whole story. (MP1-P18, CHW Ward 15, female, reflective writing)

> ...at Ward 93, there's lots of tuck shops and taverns, lack of road infrastructure overcrowding and limited open space also dumping [illegal rubbish] is the main challenge in this area. NB Only one crèche for the whole area and it shows unemployment and unhealthy eating, it shows us people who are not part of WBOT, some are scared about license [shops trading illegally]. And there's no space for recreation (sports ground). (MP1-P27, CHW Ward 93 East, female, reflective writing data analysis presentation)

> It is the good thing that we have lot of spaza shop because we are able to get fresh bread and other things that we need. So, it's unfortunate that we have lots of taverns. When people get drunk they can practice unsafe sex. [Tavern] owners need to practice health talks and [have] health promotion pamphlet at their places. (MP1-P39, CHW Ward 16, female, reflective writing)

I was shocked to find out that our school don't know anything about WBOT, when we were issuing out LISA forms, but school health is there in our schools. They are supposed to work together [with us], when [they] co-ordinate health issues in the school. MP1-P44, CHW Ward 16, male, reflective writing)

4.3.2.3 Aid comprehension

The 'LISA' map also visualised information. Using *colour*, participants were able to see the organisations that were willing, unsure or not interested to work with COPC. In addition, several participants also said that drawing and creating layers on top of the town planning map gave them an opportunity to add their *own 'colour'* to the map. Here 'colour' is used as a metaphor for local knowledge and personal meaning that participants could add onto each layer.

> … [now] I will be able to understand better who wants to work with us and who is still doubting and again who does not want to work with us by just looking at the colours on the layers. (MP1-P39, CHW, Ward 16, male, reflective writing)

> … we know how to use colours now to make our maps easier to read. (MP1-P24, CHW Ward 15, female, reflective writing data analysis presentation)

> ... the colours make it easy to show us direction, e.g. Police station, NGO, Clinic etc. To go to the stakeholder simply. (MP1-P4, CHW Ward 18, female, reflective writing)

> It was amazing how the colours could tell you more about the map. (MP1-P25, CHW Ward 15, female, reflective writing)

> Brighten up the dull map & [the map] told a story to us. Stimulating the mind on how WBOT can improve in our communities. (MP1-P21, CHW Ward 15, female, reflective writing)

> The difference between those [sketch maps] drawings and this one [town-planning]… this one is very cold and that one [physical map] has got lots of personality… because it lacks some life… so it's up to us to give it life then. (MP1-P45, Researcher, female, focus group discussion Ward 15 28-Jul-15, Ikageng Community Hall Mamelodi)

4.3.2.4 Voice concerns

Mapmaking also allowed participants to voice concerns about COPC. The two strongest sub-themes that relate to give voice are: *lack of awareness about COPC* and *lack of trust* to take part in COPC.

Many participants felt that organisations were not aware of COPC or did not understand how COPC could benefit them.

> ...according to the [second] layers presented to us there are lot of green colours that really shows us that some of organisations are interested to work with us and for those who refused to speak with us, it shows that they were unclear about what COPC is and what are we doing. (MP1-P39, CHW Ward 16, female, reflective writing)

> The second layer gives us input that too many of our organisations don't have trust in our work. And at least we have some that are in, but we still need to work more on getting others. (MP1-G2, CHW Ward 15, female, focus group discussion 28-Jul-15, Ikageng Community Hall Mamelodi)

> Yes, some stakeholder they do not trust us, so we must try to build a relationship with them. (MP1-P11, CHW Ward 18, female, reflective writing)

> I learned how organisations need more information - to know about the benefits of participating. (MP1-P25, CHW Ward 15, female, reflective writing)

Some also felt that an official launch or formal introduction was needed to stimulate community trust.

> Yes, that our area as a whole need a proper launch or campaigns so that all our people can be formally introduced. (MP1-P25, CHW Ward 15, female, reflective writing).

> Another thing is that this project, it was never advertised to the people last year. Some they don't know what it is about. (MP1-G4, CHW Ward 16, female, focus group discussion 20-Aug-15, Health Post, Stanza Sports Ground Mamelodi)

> I think also more roadshows are needed for people they don't know about this project. Like the clinic must help us to promote WBOT. (MP1-G4, CHW Ward 16, male, focus group discussion 20-Aug-15, Health Post, Stanza Sports Ground Mamelodi)

4.4 Data analysis findings and insights

4.4.1 Findings

Overall, the four most prevalent themes identified from the data analysis process are: generate new knowledge and insights about an area, visualise information, take action and give voice. The section below reflects on the use and value of the four themes for service delivery.

Generate new knowledge and insights about an area

The theme generate new knowledge and insights about an area allows participants to learn new information about their ward and to create shared knowledge and insights when they talk about the map in the group discussion. These qualities are valuable for service delivery because they encourage CHWs to think beyond the surface level meaning of information on the map.

Visualise information

The next theme, visualise information*,* puts forward the sub-themes *identify*, *quantity*, *measure progress*, and *assess and evaluate*. Together, the group of sub-themes give CHWs both feedback about their own work and information about the area where they work to help them with service delivery.

Take action

Participants from three of the four groups could identify challenges from the information visualised on the map which enabled them to generate ideas to act on. This finding shows that the mapmaking process encourages idea generation and helps participants to plan, which is a precursor step to taking action. Action was therefore indirectly enabled through the mapmaking project which is an unexpected finding.

Give voice

Another unexpected theme that surfaced from the data analysis process is give voice. Participants from Ward 15 had a heated discussion about layer two. The majority of organisations in their area were coloured in with orange which signalled that many CHWs had not done their work to hand out LISA forms and introduce organisations to COPC. During the group discussion about the layer, participants stated that they were unhappy about the way that the project was launched. Also, it surfaced that CHWs were under the impression that many organisations did not trust them because they had no uniform or identification at that time to give them credibility. In addition, unhappiness was expressed towards team leaders who were slow in following up on both patient and stakeholder needs reported by CHWs. The experience was particular to one group. However, the strength of the

reaction demonstrated the power of making information visual because it confronted CHWs with their own lack of accountability.

4.4.2 Insights

Ontological authenticity – were CHWs able to expand their understanding of the value and use of maps?

Reflective writing and data analysis feedback show that some participants were able to see the value of the mapmaking project and enlarge their understanding of what maps and mapmaking could mean for COPC (Guba & Lincoln, 1994:111). In contrast, the focus group discussions show that although the majority of participants could talk about the value of the mapmaking project for service delivery in the group discussion, they did not always retain these insights afterwards. When asked to reflect on their experience in writing at a later stage, some participants' definition of maps and their views about the use or value of mapmaking for COPC remained the same as before the study. This finding confirms that growth in learning is a process and momentary insights are not retained unless they are consolidated in practice.

4.5 Roles - how were the researcher and participants engaged in the mapmaking project?

Roles that the researcher took on:

In the 'LISA' map, the researcher *designed* the participatory mapmaking process to create a platform that could enable participation and dialogue. The researcher also *facilitated* the mapmaking project and participated in the focus group discussions. Finally, she *analysed* all the data generated through the project and presented the findings back to participants to comment on.

Roles that participants took on:

Participants *gathered data* - CHWs handed out the LISA checklists that were used as the starting point for each mapmaking project.

Participants *participated* in the mapmaking project and created the map – participants drew themselves and their area and took part in the mapmaking project where they generated the content of the layers mapped.

Participants helped to *analyse* the map - during the focus group discussions, participants did a visual rhetorical analysis of the map to identify the presented and suggested meaning of the different layers. In the data analysis presentation, participants could also do *member checking* (Creswell, 2014: 201) as they were given an opportunity to tell the researcher in writing and through informal group discussions if they agreed with the findings presented or not.

Some participants did *action planning* either on their own or with the group - in the third layer activity, participants were asked to come up with a plan to do an introduction visit or follow-up engagement with the organisations in their area. If participants struggled to do a follow-up engagement, group members could also help each other plan how to overcome the challenge that they experienced.

Participants *reflected* on their experience - participants were asked to write down what they had learnt from the mapmaking project and tell the researcher if they felt that the process would help them to deliver COPC.

Participants engaged in *peer learning* - throughout the mapmaking project participants were also asked to share ideas and insights with the group and listen to how their peers felt or responded in return. At the end of the data analysis presentation, participants also worked in groups to share and discuss the findings presented. In both instances described, ontological and educative authenticity was enabled because participants could grow or mature in their thinking about the subject matter discussed and expand their awareness of the 'constructs' of others (Guba & Lincoln, 1989:248).

Participants also co-created the meaning of the mapmaking experience with the researcher - focus group discussions of the map layers enabled the researcher and participants to draw on their own as well as each other's views to formulate an opinion of the use and value of the project for the delivery of COPC.

4.6   Summary

This chapter described the first mapmaking project of the study. The chapter presented a summary of the process followed to conceptualise and design the mapmaking project. The first three modes of design thinking were used to inform the design process. Once designed, the mapmaking project was then implemented and used by four participant groups of CHWs. Each group worked with the mapmaking process to create their own 'LISA' map. The chapter also put forward a data analysis section that presented main themes, themes and sub-themes uncovered from the mapmaking project and participant reflective writing. Prominent themes identified include generate new knowledge about an area and visualise information. The first theme highlights the value of the 'LISA' map project as a learning process that enables participants to learn more information about the community where they work. The second theme, visualise information, illustrates how the maps made helped CHWs to *identify, quantify* and *assess and evaluate* different types of organisations in their area. The chapter then put forward a summary of findings and insights deducted from the data analysis process and listed the roles that both the researcher and participants took on during the mapmaking project. The next chapter describes the second mapmaking project of the study and presents findings generated from this project.

5. THE 'HISTORY OF HEALTH' MAP: PROCESS DESCRIPTION AND DATA ANALYSIS

Similar to the 'Local Institutional Support Assessment' ('LISA') map, this chapter begins with a summary that explains how the 'history of health' map was conceptualised. The chapter then describes the 'history of health' mapmaking process, and presents findings from a thematic data analysis process conducted on the project's data.

5.1   Introduction

The 'history of health' map was undertaken over a three-month period from October 2015 to December 2015. Team leaders and cluster managers who worked in Mamelodi were invited to participate in the project. Initially 20 (of 22) team leaders and one cluster manager agreed to participate, although one team leader from group one withdrew on the first day. The team leaders divided themselves into three groups based on geographic proximity. Each group identified a venue that was free of charge to meet and hold a mapmaking workshop.

Team leader groups:

1. Group one (Mamelodi West) - four team leaders and one of the cluster managers of Mamelodi. Wards represented:
   One team leader from Ward 67
   Two team leaders from Ward 28,
   One team leader from Ward 93 West.

2. Group two (Mamelodi East) - nine team leaders. Wards represented:
   Two team leaders from Ward 17
   Two team leaders from Ward 10
   One team leader Ward 16
   Two team leaders from Ward 86

One team leader from Ward 97

One team leader from Ward 93 East

3. Group three (Mamelodi East) - five team leaders. Wards represented were:

One team leader from Ward 15

Three team leaders from Ward 40 (one only attended day one of the workshop)

One team leader from Ward 18

Mapmaking workshop venues:

Group one – the health post in an unused classroom at Jafta Mahlangu Secondary School

Group two - Stanza Bopape Community Centre

Group three - Ikageng Community Hall

5.1.1   Process overview

The 'history of health' map was also structured around the participatory mapmaking process visualised in the research approach and methods chapter (see Figure 3.2). The pre-selected theme was to explore health in Mamelodi during Apartheid, both geographically and experientially. The content for this project was generated from existing archive maps as well as personal memories and interviews with residents who lived in Mamelodi during that time. The mapmaking technique used to create the map was participatory mapping.

Participatory mapping is used as an activity in a wide variety of research and development work (Herlihy & Knapp, 2003:302-303). Participatory rural appraisal (PRA) scholars see participatory mapping as a form of "diagramming and visual sharing" (Chambers, 1997:134). In PRA, participatory mapping is used as a tool to enable participants to take part in "progressive learning" (Chambers, 1997:134). It allows people to work together and record their knowledge of a topic or place onto a physical map (Lydon, 2000:4). The mapped content is then discussed, and the insights are shared by contributors (Amsden & Vanwynsberghe, 2005:361).

Through mapping, participants add, change or modify information and in the process, take ownership of the content they visualise. According to Chambers (1997:135), "the information is visible, semi-permanent, and public to the group, and can be checked, verified, amended, added to and owned, by the participants".

Participatory mapping was selected for the 'history of health' map, because the process allowed each participant to contribute personal knowledge of the map topic towards the mapmaking project. The maps made could then also be used as a repository for the information to share with others. In contrast to the 'LISA' map, the researcher did not have to design a custom mapmaking project from the study's mapmaking process. As a method, participatory mapping could simply be used as part of the study's mapmaking process by each participant group to generate their own map.

The project process of the 'history of health' map differed from 'LISA' map in two ways: First, participants were asked to interview people and gather stories and experiences that could be used to inform the mapmaking project. Secondly, the focus group discussion about the map was held as a stand-alone activity a few weeks after the participatory mapping sessions. This was necessary as time was needed to combine the information from all three groups into a unified map that could be used in the focus group discussion.

An overview of the mapmaking process:
Team leaders were first asked to provide a written autobiographical account of their experiences of healthcare in Mamelodi during the 1980s. Next, they interviewed two or three people who had been either givers or receivers of healthcare in the area in that time. The objective was to incorporate this information into a participatory mapping project alongside information from the team leader autobiographies. The three groups then took part in a participatory mapping activity and each created their own 'history of health' map. After the activity, the researcher combined the three maps into a unified 'history of health' map.

As work in progress, the unified map was used as the centre point of a focus discussion with each group. The aims of the focus group discussions were to establish the accuracy of the facts on the map, to engage participants in a visual rhetorical conversation about the meaning of the map, and to determine the possible use of the map in community oriented primary care (COPC) in Mamelodi.

Findings generated from the focus group discussions as well as participant reflective writing were then analysed and presented back to participants in the form of a data analysis presentation. The presentation happened a month after the participatory mapmaking projects were completed. During the presentation, participants discussed and provided feedback on the results, some of which were incorporated into the final map.

The 'history of health' project and the final map were presented at a monthly City of Tshwane COPC meeting. The meeting was attended by all team leaders, WBOT coordinators and participating Department of Family Medicine faculty and staff. The purpose of the presentation was to share the process and findings with everyone present and hand over a printed copy of the final map to individual project participants.

5.1.2   What informed the 'history of health' map?

The history and origin of COPC
COPC was first implemented as a practice in Pholela in the 1940s by Dr Sidney and Dr Emily Kark and Edward and Emily Jali. It originated in national and international interest to address the health needs of marginal and excluded populations, as well as the harsh economic, political and social circumstances in South Africa post World War II (Marcus, 2014:5).

Whilst studying medicine at the University of Witwatersrand in Johannesburg, the Karks attended classes in history and anthropology. They integrated what they had learnt from these classes into their "clinical and epidemiological practice" to conceptualise COPC (Marcus, 2014:6). Furthermore, the Karks were the first in

the world to create a primary healthcare system that "systematically made people's social relationships an integral part of the daily practice of health service" (Marcus, 2014:5). Their understanding of anthropology and history, as well as their medical background, enabled them to pioneer COPC as an integrated system of healthcare that relied on partnerships with community members, stakeholders in the community and other healthcare professionals to share knowledge with and train community members to implement healthcare in their community (Marcus, 2014:21).

As part of the re-introduction of COPC through primary care reengineering, the history and origins of COPC were included in WBOT training to locate its 21st century iteration in context. It was considered important that healthcare practitioners look to the past to inform their current practices, because "the past gives us roots and it allows us to imagine the future" (Marcus, 2014:3). Linking history to the practice of COPC in Mamelodi, the 'history of health' map set out to explore the impact of the past on health and healthcare delivery in Mamelodi. The purpose of the map was to see what team leaders could learn from the past and to explore whether a history map, based on their recollection of historical events and experiences, could be of value to them in service delivery today.

The 1980s period was used as a time marker for the project, because most of the team leaders worked as nurses in either the Mamelodi West Clinic or in other state hospitals and clinics in and around the city of Pretoria, in Tshwane. Team leaders were also motivated to contribute to a record of the history of health in Mamelodi, as little has been documented on the subject. Finally, Mamelodi was selected as an area of focus because it was established in 1951 as part of enforcing racial segregation under the Groups Areas Act of 1950. African people were relocated to Mamelodi through forced removals (Darity & De Gregori, 1987:51). There is also a long history of struggle against Apartheid and several nationally well-known Anti-Apartheid activists lived or were born in Mamelodi.

Activists include:

- Solomon Mahlangu (executed in 1979) (South African History Online, 2017)
- Stanza Bopape (arrested, tortured and killed in 1988) (South African History Online, 2011)
- Doctor FD Ribeiro and his wife Florence Ribeiro (assassinated in their home in Mamelodi in 1986) (South African History Online, 2015).
- Reverend Nico Smith who lived in Mamelodi with his wife during this time (Reverend Smith died in 2010) (Carradine, 1989).

5.2   Plan and implement

The purpose of the 'history of health' map was to record and assess the impact and implications of Apartheid on healthcare in Mamelodi during the 1980s period. This section describes how the project purpose was refined and adapted into a participatory mapmaking project.

5.2.1   Planning the 'history of health' map

5.2.1.1   Context

At the start of the 'history of health' map, the researcher worked with two team leaders to identify how to implement the project. Together they examined the purpose of the project set out in the study protocol and explored ways to adapt this into a workable mapmaking project. These discussions led to the following objectives:

1. To look at a person's origin (Where did you come from? Where did you live during the Apartheid period and where are you living now?).

2. To share experiences of growing up during Apartheid.

3. To share knowledge about health issues, access to healthcare and the use of healthcare services during the 1980s (Where did people go to receive healthcare? What treatment was offered?).

The last two objectives led to several discussions about painful or traumatic past experiences that both team leaders shared. On the recommendation of her supervisor, the researcher contacted a psychologist and sought advice and support on how to approach working with the subject matter. Through the psychologist, she attended a two-day workshop on trauma support and resiliency hosted by the Applied Counselling and Development Institute of South Africa (ACDiSA).

The workshop addressed misconceptions of 'trauma' and people's resilience in the face of exposure to traumatic events. Particularly, workshop attendees were shown ways to ask questions that allowed people to move beyond the traumatic event and to focus on the actions they took to move forward. Suggested questions included:

- What did you do to move on?
- How did you survive?
- What actions did you take during and after the incident?
- What helped you?
- Do you think your responses had a positive impact on your life?

The researcher used this learning to rephrase the second theme to include the word 'resiliency' - "Experiences growing up during Apartheid - memories of strengths and resiliency demonstrated by yourself, your family and community in relation to health and wellbeing (both in the home and in the workplace)". Also, she set out to adopt a resiliency mind-set when asking and phrasing questions throughout the development of the 'history of health' map.

5.2.1.2   The information collection process

Two meetings were held to initiate the project with the 19 participants who had expressed interest to participate in the project. At the first meeting, participants were introduced to the project, invited to take part and asked to give informed consent. They also divided themselves into three groups. Each group discussed the possible value of mapping the history of health for them as a team and shared

their thinking with all participants. They also collectively reviewed and refined the list of project objectives identified by the researcher and the two team leaders.

Thereafter, they worked together to adapt the objectives into a set of questions (see Appendix 19, sub-section three), which they were asked to use as a guide to write their individual biographical accounts. These questions were later also used to guide interviews that participants conducted with residents of Mamelodi.

The purpose of the autobiography writing was to encourage participants to practice answering the questions themselves first, before posing them to others. Several participants reported that they found it stressful to write their own autobiographies and some even showed resistance towards the process at first. However, they subsequently acknowledged that the process had been valuable for them as a first step to take in the project.

A second session was set up separately with each of the three groups. The objective of this round of meetings was to review the progress made with individual autobiographical writing. During the meeting, participants were also asked to interview residents of Mamelodi who either worked in healthcare or experienced the healthcare system in the 1980s first hand. This was done to collect extra information to use in the mapmaking project.

To support participants with the interviews, they were each given a handout on how to do an interview that was reviewed by the group. The handout was downloaded from the *Community Tool Box*, a free online resource developed by the Centre for Community Health and Development from the University of Kansas – see Vilela ([sa]:[sp]) *Conducting interviews*.

In addition to receiving the interview handout, participants were also given a consent form for interviewees to complete. The form was approved by the Research Ethics Committee of the Faculty of Heath Sciences (University of Pretoria) and gave participants permission to conduct the interviews (see Appendix 8).

5.2.2 The mapmaking process

The mapmaking process was tested and refined with the help of group one. Participants started the mapmaking process with a 1991, A1 roadmap of Mamelodi obtained from the archives of the Department of Geography, Geoinformatics and Meteorology (University of Pretoria). It was photocopied and mounted onto A0 cardboard to provide space to write and add information around the image. Participants were given small post-its and white sticky dots to write and link comments on the map to specific geographic locations (see Figure 5.1 and 5.2).

Identifying how to do the mapmaking project with the help of group one:
Although it was not initially clear how to undertake the participatory mapping activity, through trial and error, the themes, and types of suitable information to map were worked out with participants from group one (see Appendix 19, sub-section four).

The initial plan was to map the historical facts and the stories that participants had collected during their interviews. However, interviews received were limited, not to brief, and of poor quality, No one had managed to contact healthcare practitioners who worked in Mamelodi in the 1980s, all had interviewed neighbours and friends, and several interviews were incomplete.

The group then decided to map their own knowledge, memories and experiences as healthcare practitioners who worked in Mamelodi in the 1980s. Although this solution helped overcome the problem encountered with the interview data, it shifted the purpose of the map. Instead of depicting information and facts collected from key community informants, the map now visualised the healthcare service experiences of the team leaders who lived and worked as nurses in Mamelodi at that time.

Figure 5.1: Participatory mapmaking workshop day two, Jafta Mahlangu Secondary School Mamelodi 2015. Photographed by Vhutu Sivhabu (research assistant).
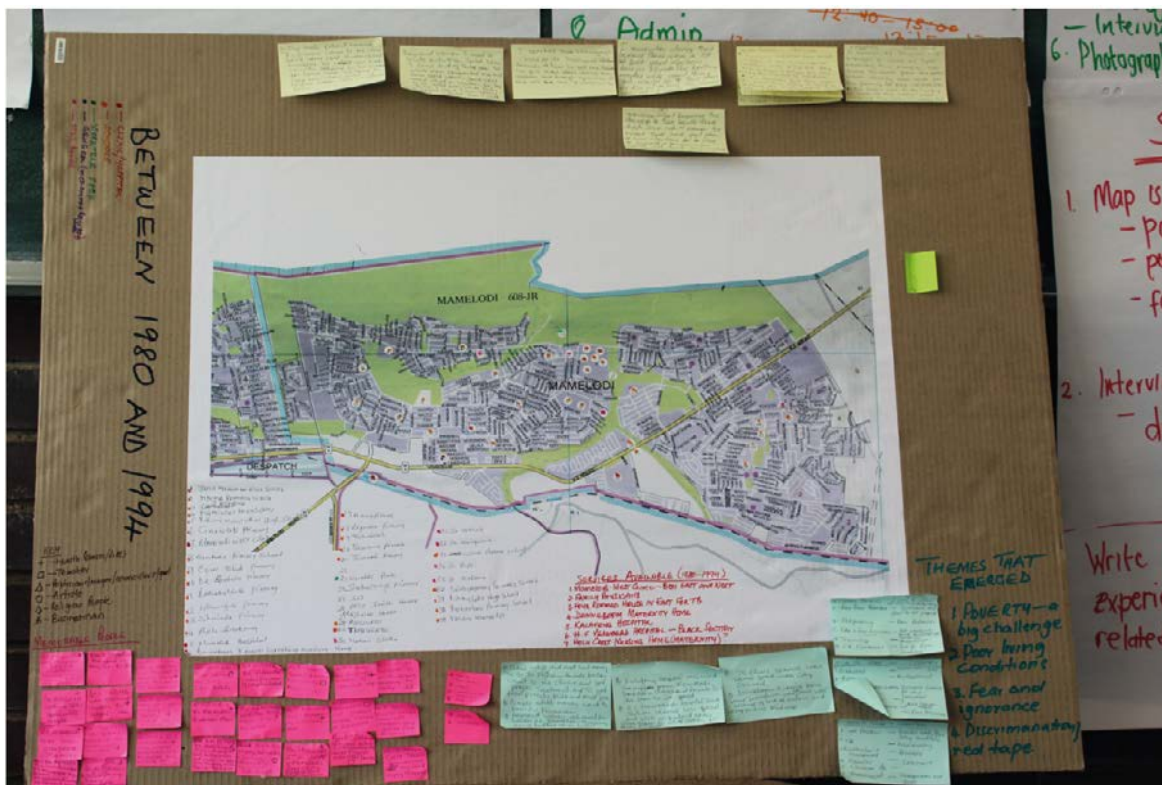
Figure 5.2: Example of a participatory map created by group one, Jafta Mahlangu Secondary School Mamelodi 2015. Photographed by Vhutu Sivhabu (research assistant).

The diagram below details the implementation process followed to generate the 'history of health' maps.
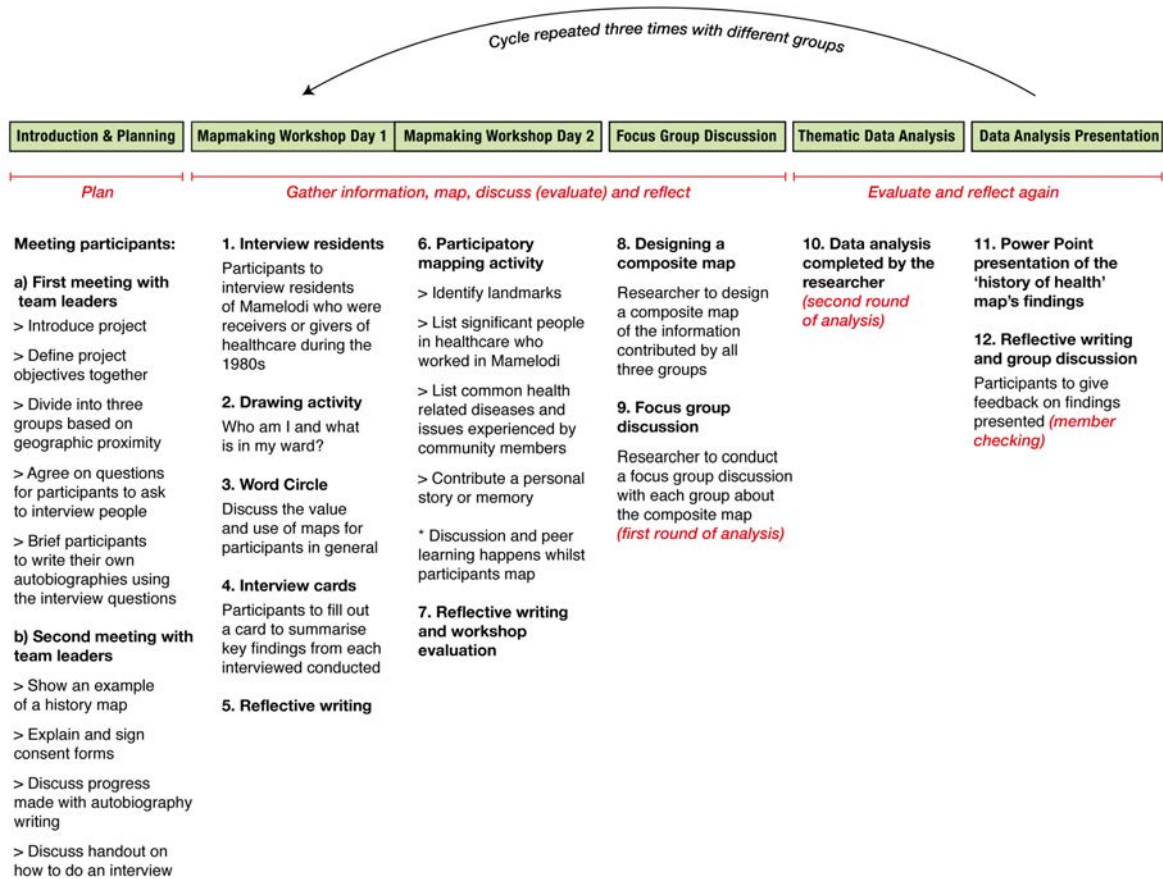
Figure 5.3: Workshop activities used to create the 'history of health' map

5.2.3   Implementing the 'history of health' map

To implement the mapmaking project, the researcher facilitated a two-day mapmaking workshop that guided participants through a series of activities and concluded with a participatory mapping activity. Information generated by the three groups were combined to create a 'history of health' map of Mamelodi for the project. Afterwards, there were individual sessions with each group to discuss and review the unified map. The section below outlines these activities (see Appendix 20 to view the 'history of health' map's session guide for questions and workshop procedures).

5.2.3.1 Mapmaking workshops day one: getting people on board and ready to map

The mapmaking workshop started with a general introduction and the two drawing activities referred to in Chapter 3 (see Appendix 20*, Session guide 'history of health' map* subsections. *Who am I? What is in my area?).* Thereafter, participants were engaged in the following three activities.

Word circle

Participants took part in a word circle activity to define and discuss their perception of maps and the potential uses or value of maps in healthcare delivery. A word circle is a visual thinking tool developed by design educator Alastair Fuad-Luke to help participants establish "a key concern or focal point" (Fuad-Luke, 2013:182) about a topic.

To make the word circle, participants had to respond in writing to the question "If you think of a map, what words come to mind?" They then took turns to paste their notes on a circle drawn on flip chart paper, explain their responses to the group and look for links and connections between words and ideas mentioned.

The word circles generated rich information about the use of maps and their value in healthcare delivery across all three groups. The activity ensured that everyone actively partook in identifying ideas and distilling them down to a few key concepts (Fuad-Luke, 2013:182). The word circles were put up on the wall of the workshop venue and kept in place for the duration of the mapmaking project.

Summaries

Following the word circle, participants summarised the main ideas and insights they had recorded in their autobiographical accounts and interviews using A4 interview cards (see Appendix 21). Once the task had been completed, participants took turns to share key information with the group.

Reflection

The workshop day ended with reflective writing. Participants were given two questions to reflect on that related to their experiences of the day. The questions were the same ones given to participants at the end of the first day of the 'LISA' mapmaking workshop (see Appendix 20, subheading *Reflection of today* listed before the mapping workshop outline for day two).

Figure 5.4: Word circles created by group one and group two, Mamelodi 2015. Photographed by Vhutu Sivhabu and Carla van Rensburg (research assistants).

5.2.3.2 Mapmaking workshops day two: the participatory mapmaking project

On the second day, participants took part in a participatory mapping activity. Little facilitation was necessary as it was a visual engagement tool that enabled participants to work together and learn both from the process and each other (Chambers, 1997:135).

All groups used the topics established by group one to guide them through the process. These were:

1. To map important landmarks and social spaces that were significant during the time, and identify the addresses where team leaders lived during the 1980s.
2. To list the names of healthcare givers and other significant individuals who contributed to health and healthcare delivery in Mamelodi during the 1980s (people mapped included prolific teachers, head masters of schools, artists, mayors and struggle activists).
3. To list and discuss common diseases and illnesses found in hospitals and the community at that point in time.
4. To write down stories or memories related to the three topics above.

To create the map, each group was given the A1 base map and stationary. Groups addressed each topic and worked out their own system to log, add and categorise their information on their map. Throughout the process participants were in constant active discussion and debate. They also helped the workshop scribes to summarise their ideas and the facts mentioned that they wanted to add to the map.

Of the three topics, the richest body of information was generated around the diseases prevalent in the community during Apartheid. These indirectly described the socio-economic conditions of the time.

5.2.3.3   Unified map and group discussion

The researcher used the three participatory maps to create a unified map that combined all the information together (see Appendix 24). A colour (purple, green and orange) was assigned to each group to enable readers to link information to their group source. A map legend on the unified map explained the colour coding system to the reader.

Ideas, information or comments mentioned by more than one group were depicted by two or more colours in one sentence. This was done to intentionally show what each group contributed. Where multiple colours were assigned to a comment, it increased the significance of the comment and added a layer of depth and nuance to the idea expressed.

Three examples of sentences from the types of diseases mapped:

Backyard Abortions - Poverty, lack of facilities; ignorance; fear of parents; many girls & women were dying of backyard abortions.

Malignancy (cancer) - Hereditary; ignorance; poor research; oesophageal cancer due to pipe smoking.

STI (Sexually Transmitted Infections) - Proximity; syphilis and gonorrhoea (STD), poor sexual habits; STIs were rife.

The unified map was reviewed in a focus group discussion with each group (see Appendix 22 to read the questions asked). As with the 'LISA' map, participants were asked to describe what they saw when they looked at the map and to think about what the map was telling them.

Participants were also given a summary handout with selected quotations from their autobiographies and interviews. When asked to read the handout and highlight quotes that resonated with them, they selected those that captured vivid memories of past experiences. The discussions that these handouts triggered solicited additional information, and helped participants to make decisions about extra information to incorporate into the 'history of health' map. This last process was only concluded in one of the three groups, as time ran out. The process was therefore set aside to be able to finish the project on time.

5.2.3.4   Data analysis presentation:

The 'history of health' map concluded with a data analysis presentation delivered to all participants a month after the focus group discussions took place. Similar to the 'LISA' map, the presentation shared findings from the mapmaking project. Participants were asked to comment on and provide feedback on the findings through further group discussions and reflective writing (see Appendix 23 for a list of questions asked to participants after the presentation).

5.2.4   Process insights

Groups favoured certain mapmaking objectives above others
Participant groups had more information to contribute that related to the objectives that they favoured most as a group. This also differed between the three groups. Group one enjoyed mapping all the health-related landmarks the most, group two excelled at mapping diseases while group three was better at listing the names of significant healthcare practitioners. It is possible that the collective past experiences of team leaders influenced what they knew more about. However, this shows how the participatory mapping process was open and allowed each group to focus on what they felt was most important.

Limited personal stories were shared during the mapmaking process
The fourth theme of the participatory mapping activity asked participants to share a personal story or experience and add this to the map. Very few stories were shared and the task became obsolete. A possible explanation for this could be attributed to role-playing. In the participatory mapping process team leaders took on the role of professional healthcare providers and shared more objective facts rather than personal stories. This shows that participatory mapping as a method is perhaps not the most suitable tool to collect sensitive and personal information.

A missed opportunity - to map quotes of personal experiences captured in participant autobiographies and interviews

Because we ran out of time, groups two and three could not complete the task at the end of their focus group to select from participant autobiographies and community interviews to add to the map. In contrast to the facts mapped by participants in their participatory mapping process, these quotes and stories added a rich, personal dimension to the body of information generated by the project. Also, team leaders from group one who completed this process found it both valuable and moving to read the quotes and stories from others because they resonated with them. Should the mapmaking process be repeated in future, it is advisable to add an additional small session to the project to complete this last step and include the information in the final map.

Team leaders resisting to take part

Initially, some of the team leaders resisted taking part in the project because they could not see the value that a 'history of health' map would have for them in terms of service delivery. To make the link between the Karks and seeing themselves as the modern-day pioneers of COPC in Tshwane gave most an incentive to take part, however poor-quality interview data received still shows that a few remained resistant at first. Despite this, reflective writing completed at the end of the project shows that the participants all agreed that the process was both valuable and rewarding for them to undertake. In response, participants advised the researcher to spend more time in future explaining the benefits and use of the project to participants up front.

The magic of participatory mapping

It was unexpected to see how much team leaders were engaged in the participatory mapping process. Despite initial resistance expressed by some stated above, when team leaders made their maps, everyone took part and enjoyed the experience. This finding is confirmed in the data analysis themes listed in the next section of the chapter.

A different form of member checking

The first thing participants did when they had to answer focus group questions was to check the accuracy of the facts on the map, and make sure that what they said was listed. From a facilitation point of view, this was frustrating at first as participants had to be prompted several times before they answered questions asked about the presented and suggested elements that they saw on the map. However, the researcher later realised that this process of fact checking was a different form of member checking (Creswell, 2014:201; Guba & Lincoln, 1989:238). What is more, member checking is an important part of constructivism because it allows participants to verify whether their ideas and comments are interpreted in the right way (Guba & Lincoln, 1989:238).

5.2.5   Process findings

The value of mapping health related history for COPC

A person's lived experience of health always takes place in a community context. Undertaking a mapmaking project about historical diseases and healthcare resources, gave participants an opportunity to compare what they are doing in the present with what happened in the past. The map therefore made participants aware of history and simultaneously made history relevant to the present and future. To a large extent, our knowledge of health is also based on our past experiences with healthcare systems. What matters to an individual is who is there to serve him or her when they need help. As COPC aims to improve a community's experience of health, the 'history of health' map has value for COPC because the map generated describe community specific healthcare experiences and perceptions.

The value of using participatory mapping as a visual tool to work with in COPC

The participatory mapping process gave participants a chance to speak up about past events, enabled peer learning to happen, and gave participants a chance to take ownership of the map and content created. Together, this enables learning and team building to happen, and help to improve service delivery. This finding is also corroborated in the data analysis.

Health is a team endeavour

Participants felt that healthcare providers were not the only role-players in healthcare delivery; schoolteachers and the mayor were also important. Schoolteachers ensure that children brush their teeth, are given basic health healthcare education and are encouraged to exercise at school. The mayor was also listed because participants felt that, if there was a healthcare related problem in the community, he would be one of the first people to address the community. This finding is a reminder that the entire community needs to play a role in the delivery of COPC.

5.3   Thematic data analysis

Data for the 'history of health' map was analysed according to the data analysis process outlined in the research approach and methods chapter. The section below describes the findings that emerged from the data that was analysed. Similar to the 'LISA' map, data analysed included different types of reflective writing collected at three intervals during the mapmaking process (workshops day one, workshops day two and the data analysis presentation) and transcripts of the focus group discussions held during the mapmaking process with all three groups.

Findings generated from the 'history of health' map data are collected under the two main themes: map and mapmaking (participatory mapping). The first main theme has seven themes, and the second main theme has three themes with one *sub-theme* - see Figure 5.5 for an overview of the two main themes, themes and *sub-themes* of the 'history of health' mapmaking project. Also, see Appendix 25 to 28 to view the 'history of health' map's thematic index and the theme maps generated to reduce the index down to the final themes described below.
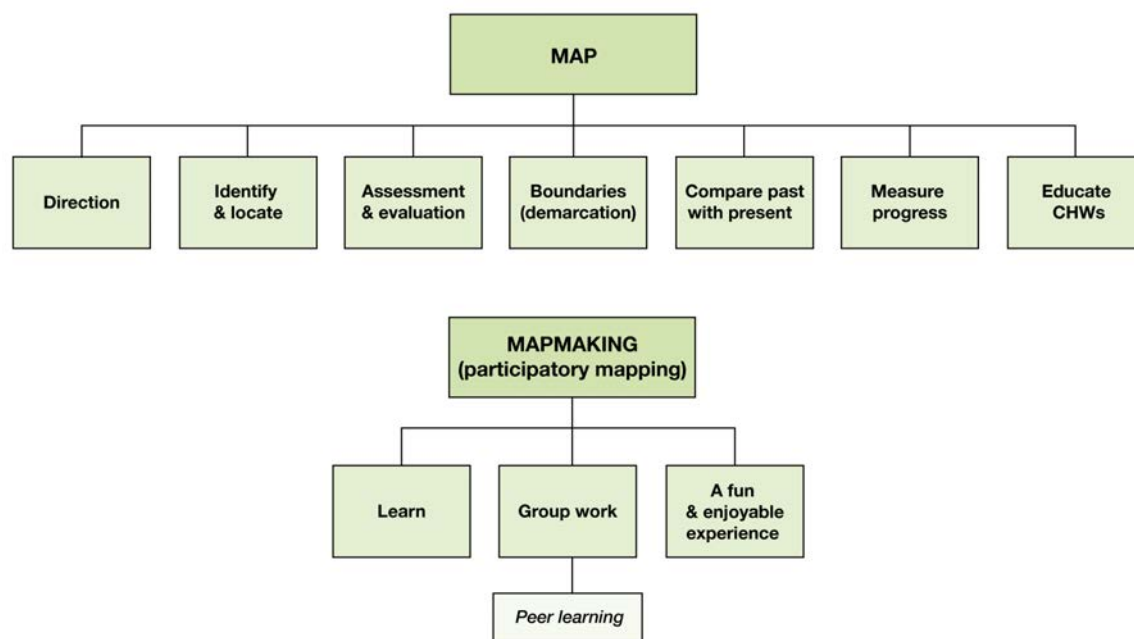
Figure 5.5: 'History of health' map main themes, themes and sub-themes

5.3.1 The more general use and value of the 'history of health' map

Assessment and evaluation, identify and locate, direction, and boundaries (demarcation) are the first group of themes identified through the data analysis process that falls under the main theme: map. All four themes relate to more general uses of maps. Quotes below describe how they are articulated in different ways.

> If you think of a map it gives you the picture of problems and challenges experienced by the community, it is a vehicle to assess things you would not otherwise know about. You could get the prevalence of disease in certain areas. (MP2-P7, team leader Ward 97, female, reflective writing)

> The importance of mapping and the role it can play in assisting the WBOT project among other things - location, direction, boundaries, can analyse the disease profile in a particular area. (MP2-P2, team leader Ward 28, female, reflective writing)

> The mapping assists in location of different places (landmarks). Will help in Local Institutional Support Assessment (LISA) and disease profile of the area to enhance COPC. (MP2-P3, cluster manager Mamelodi, female, reflective writing)

…one can locate different areas in your ward, do a situational analysis, do a disease profile of your area and have direction as to where to go when looking for [a] household, school, clinic etc. (MP2-P2, team leader Ward 28, female, reflective writing)

That mapping demarcates, directs also [it] is a learning tool. Helps in tracing (analysis) location etc. Gives information. (MP2-P5, team leader Ward 67, female, reflective writing)

[The] Map is collection of all information pertaining to a community e.g. location, culture, structures, assets, and way of life. (MP2-P7, team leader Ward 97, female, reflective writing)

COPC - Mapping is important because you can identify shortage of resources. Mapping is what you have to do before you can work in an area and that leads to effective implementation of health. (MP2-P14, team leader Ward 10, female, reflective writing)

5.3.2   Specific uses and values of the 'history of health' map

The next three themes are also grouped under the main theme map. In contrast to the previous group of themes, they are all specific to the use and value of the 'history of health' map itself. The themes are: compare the past to the present, measure progress, and educate CHWs.

5.3.2.1   Compare the past to the present

Participants had both positive and negative comments to share about the way that healthcare services have changed. Positive changes mentioned include more health facilities being built that people have access to and community members having access to more healthcare information.

There are more schools, taverns, clinics, doctor surgeries etc. Mamelodi has grown from what it was in the 80s. (MP2-P2, team leader Ward 28, female, reflective writing)

In comparison with the 1980, there is an improvement with health issues i.e. more clinics have been built. [The] Community is getting information, which means reduction of diseases. (MP2-P6, team leader, Ward 17, female, reflective writing)

> They're getting education. There was no education. People are getting education now. Children are being immunised. (MP2-D1, group one, female, group discussion, 27-Oct-15, Mamelodi West Community Hall)

> Demarcation i.e. Tsonga had own cultural beliefs. Dehydrated child taken to sangomas before are now taken to hospital to be hydrated. Circumcision. Pregnant women not to eat eggs, not to exercise - umbilical-care using cow's dung. Disabled person hidden behind doors. Alzheimer/ Dementia treated as witches and killed. (MP2-P14, team leader Ward 10, female, reflective writing data analysis presentation)

Some participants also mentioned negative changes that people experience today. Challenges mentioned relate to a shortage of healthcare facilities, lack of medication, overcrowding at clinics, facilities not being clean and informal settlements that have no access to infrastructure for water and sanitation.

> Clinics were not as overcrowded and people were not turned back. Medicines were never out of stock and clients received the best medications. (MP2-P2, team leader Ward 28, female, reflective writing)

> We had a lot of medicine, we had good medication, now they have cut off everything. You cough they say go and drink water and lemon, you don't even have [a] lemon tree in your yard. Yet we had good cough mixtures. And the health facilities were clean and now the health facilities are filthy. (MP2-D2, group two, female, group discussion 21-Oct-15, Stanza Bopape Community Hall Mamelodi)

> People are still using the bucket system for sewerage disposal in informal settlements. There is a need to build a new hospital in the East of Mamelodi as there are more people and mostly young people in the East in comparison to the West of Mamelodi. A second clinic is also necessary to be built in the West of Mamelodi to relieve overcrowding of clients in the existing Mamelodi West Clinic. (MP2-P4, team leader Ward 93 West, female, reflective writing)

5.3.2.2 Measure progress

The 'history of health' map also helped participants to measure progress made in primary healthcare delivery. Examples mentioned include improvements made to eradicate or control diseases through immunisation and advancements made in terms of medication and medical treatment.

It shows that people had diseases in those days but now they're under control. (MP2-D1, group one, female, group discussion 27-Oct-15, Mamelodi West Community Hall)

Another thing is that I will be able to show my community health workers that we now have improved immunisation programs. We no longer have these childhood diseases… (MP2-D3, group three, female, group discussion 20-Oct-15, Ikageng Community Hall Mamelodi)

The session was interesting and it enlightened us on the progress made as far as health is concerned. (MP2-P14, team leader Ward 10, female, reflective writing)

It was an eye opener - it explained clearly about health history from the said period to now. What challenges were faced then and the improvements made. (MP2-P10, team leader Ward 86, female, reflective writing)

5.3.2.3   Educate community health workers

Participants also felt that the information on the 'history of health' map can be used to educate community health workers (CHWs).

… important aspects are mentioned on the map especially the prominent people and buildings in the community. This will be interesting to teach the CHWs. (MP2-P11, team leader Ward 17, female, reflective writing data analysis presentation)

Because you structure the diseases on the map according to children and adults, it is good for educating CHWs if you want to talk to them about kind of diseases. (MP2-D2, group two, female, group discussion 21-Oct-15, Stanza Bopape Community Hall Mamelodi)

Felt that we can make use of the information, if need be, about where we come from, what we did not have and what we need to add or improve. (MP2-P17, team leader Ward 40, female, reflective writing)

5.3.3   Taking part in the participatory mapping activity

The last three themes identified are learn, group work and have a fun and enjoyable experience. All three themes are specific to the process of doing a participatory mapping project and have been grouped under the main theme, mapmaking (participatory mapping).

5.3.3.1 Learn

Participants identified and mapped facts related to the four objectives of the mapmaking project. As part of the mapmaking activity, learning happened because they could then discuss facts and form their own opinions about the information.

> The facts showed the scarcity of resources and the accessibility and availability of health services. Mapping showed exact location of health institutions, the diseases that were prevalent and are no longer there. It also brought painful memories of the experiences that were there during that time e.g. poverty - people not affording going to health institutions. Cultural beliefs were also a drawback to improving health. (MP2-P14, team leader Ward 10, female, reflective writing data analysis presentation)

> What I liked was learning about people who contributed to the community in various areas - health, education, business, community involvement etc. One gained, as I was out of Mamelodi most of my adult life. Learning about the segregation at certain health facilities and seeing where we are today. (MP2-P3, cluster manager Mamelodi, female, reflective writing)

> Yes, what I learned was [about] the landmarks, which were shown on the map. (MP2-P15, team leader Ward 18, female, reflective writing)

> …sharing of ideas and old history related to health facilities, segregation of facilities regarding black and whites only. (MP2-P9, team leader Ward 16, female, reflective writing)

> Clinics were not as overcrowded as they are now. The Doctors in Mamelodi used to have underground surgery to remove the bullets from victims of apartheid. There was one clinic operating in the whole Mamelodi during the 80s. I have learnt that the Hospital (Mamelodi) used to teach the traditional healers how to take blood pressure and vital signs. (MP2-P14, team leader Ward 10, female, reflective writing)

5.3.3.2 Group work

All participants also valued working together as a group. Group work allowed them to share ideas, build on each other's views and make links between facts.

> I enjoyed working with others because at the end we became one family and we were complementing each other, reminding each other of certain events and some could highlight it better. (MP2-P7, team leader Ward 97, female, reflective writing)

I like the spirit that we have working together. Sharing ideas of early 1980s conditions of healthy lifestyles, diseases with not enough services. (MP2-P9, team leader Ward 16, female, reflective writing)

Yes, to be together and to reflect on things of health that affected our work and our lives as we see it with the eyes of today. (P2-P17, team leader Ward 40, female, reflective writing)

Group work also enables *peer learning*. Participants worked together to generate the ideas and facts to map, and also learnt with and from each other.

Participated in the workshop. It enabled us to share ideas and know our community and surroundings better. (MP2-P1, team leader Ward 28, female, reflective writing)

Each one had a chance to participate and [was] listened to. Sometimes questions arose from what one said and [they] could further explain. (MP2-P7, team leader Ward 97, female, reflective writing)

The session was brainstorming as you had to think hard and work together to locate the schools and the area where they were. (MP2-P4, team leader Ward 93 West, female, reflective writing)

Workshop was informative, learning from each other. I can do more of these workshops, they are fulfilling to share knowledge with others. (MP2-P3, cluster manager Mamelodi, female, reflective writing)

Very fulfilling and enlightening. Learnt a lot from getting different views from colleagues and hearing how people interviewed feel and see [the] same issues differently. (MP2-P2, team leader Ward 28, female, reflective writing)

Yes, I enjoyed working with my colleagues as we shared our experiences because we didn't work at the same hospitals, clinics, or other departments so we had different experiences. (MP2-P1, team leader Ward 28, female, reflective writing)

It is a learning experience I wish all the team leaders were participating. We learnt from each other. (MP2-P3, cluster manager Mamelodi, female, reflective writing)

5.3.3.3   A fun and enjoyable experience

Finally, almost all the participants enjoyed taking part in the mapmaking project, because they could share their experiences and help each other remember facts and information to add to the map.

I enjoyed that very much. Sharing each other's experiences, looking back at the journey we have travelled as health workers. We were laughing like small kids as we shared our experiences. (MP2-P2, team leader Ward 28, female, reflective writing)

I must confess that at first, I was a bit reluctant to join my group. But after the first session, I was as active as a toddler who was getting used to schooling. (MP2-P11, team leader Ward 17, female, reflective writing)

It was fun working with our colleagues especially when identifying important people in the community and events attached to them e.g. those community members who were involved in community work e.g. mayor. (MP2-P14, team leader Ward 10, female, reflective writing)

Yes, everybody was talking and laughing at each other but it was a good experience. (MP2-P8, team leader Ward 10, female, reflective writing)

Such sessions are worth repeating (MP2-P11, team leader Ward 17, female, reflective writing)

5.4   Findings

The five predominant themes uncovered from the data analysis process are: learn, identify and locate, compare past with the present, group work (with *peer learning* as a sub-theme) and assessment and evaluation. The section below reflects on the value of the themes for service delivery.

Identify and locate and assessment and evaluation
Two of the strongest themes that surfaced from the data analysis process relate to the broader use and value of maps as opposed to the theme of the history map itself. Together with the themes direction and boundaries (demarcation), the themes all coincide with the results of the word circle activity. This is unexpected and shows that the biggest growth participants made in terms of learning (or ontological authenticity) was to expand their understanding of the broader use and value of maps for healthcare and service delivery. In addition, it could also show that the purpose of the map, which is to look back at history, is novel to investigate but that team leaders have a far greater need to use maps for the above-mentioned reasons.

Learning, group work and peer learning

The mapmaking process becomes a powerful tool for learning when the theme of a history map is combined with participatory mapping. Here, learning takes place not only in terms of collecting and finding out historical information about an area but peer learning also happens when participants do a group work activity and learn from and with each other. The themes uncovered through the data analysis process are useful for service delivery because they link in with the learning model of COPC and show how participatory mapping assist healthcare team members to work together and learn from each other.

Measure progress

The theme measure progress relates to the use and value of making a 'history of health' map. The other two themes are compare the past with the present and educate CHWs about healthcare diseases that have been eradicated. Together all three themes show how a 'history of health' map can be of use and value for COPC to measure change and enable WBOTs to learn from past practice to inform service delivery in the present.

5.5   Roles – how were participants engaged in the project?

Roles that the researcher took on:

In the mapmaking activity of the 'history of health' map, the researcher took on the role of facilitator allowing participants to take ownership of the participatory mapping process. Later in the project, the researcher assumed the role of a designer again to create the unified map and took part in the group discussions about this map. Finally, the researcher also analysed the data generated through the project and presented the findings back to participants.

Roles that participants took on:

Participants helped to *define the objectives of the project* – the initial purpose of the project set out in the study's protocol was adapted into a set of objectives with the help of participants both at the start of the project and during group one's mapmaking process.

Participants *created and collected data* – once the project objectives were established, participants had to generate and collect information to use in the participatory mapping activity.

Participants *helped with data analysis* – during the focus group discussions of the unified map, participants were asked to tell people what they saw when they looked at the map, and think about what this was telling them. In addition, participants also took part in the data analysis presentation where they could give feedback on the project findings presented.

Participants also *reflected on their experience* – participants were asked to reflect in writing on their experience at different intervals during the project. Reflective writing was captured after each day of the mapmaking workshop and after the data analysis presentation.

Participants were *engaged in peer learning* – during the participatory mapping activity, the focus group discussions and the data analysis presentation, participants were able to interact with and learn from each other.

Participants also *shared decision-making power* – with the help of participants, the project objectives of the 'history of health' map were identified and adapted twice. Once, after the objectives were presented to all participants for the first time in the first group meeting, and a second time by group one in their mapmaking process after limited interview data was received (see Appendix 19 to review the adaptations). In the modification process, team leaders were given *shared decision-making power* (Bergold & Thomas, 2012:9) to help the researcher redefine the objectives.

5.6 Summary

This chapter described the 'history of health' mapmaking project. The chapter started with a descriptive overview of the process that informed the planning and conceptualisation of this map. Participatory mapping was used as a method to engage three groups of team leaders in a mapmaking project. The purpose of the project was to generate information about the history of health in Mamelodi during Apartheid. Information contributed by the three groups were collated in the form of a unified map that was used in focus group discussions with participants to review the information visualised on the map. As with the 'LISA' map, the chapter also outlined the mapmaking workshop processes used to create the project. The chapter then presented a data analysis section that identified main themes, themes and sub-themes generated from the project data. Themes that relate to the main theme, mapmaking (participatory mapping), highlight the value of using participatory mapping as a potential tool to work with in future map-related COPC projects. In addition, themes associated with the main theme, map, identified the use and value of doing a 'history of health' map for COPC. Of the themes uncovered, compare the past with the present was the strongest theme that participants felt they could use the map for in their work. This chapter then presented a summary of findings and insights deducted from the data analysis themes and main themes. The chapter concluded with a list of roles that the researcher and participants took on during the mapmaking project. The next chapter focuses on the third mapmaking project of the study, the 'community health' map.

6.   THE 'COMMUNITY HEALTH' MAP: PROCESS DESCRIPTION AND DATA ANALYSIS

The 'community health' map is the study's final mapmaking project. Similar to the previous two chapters, this chapter provides background information about the mapmaking project, and describes how the map was conceptualised. The chapter then outlines how the mapmaking process works and concludes by presenting thematic data analysis findings for this project.

6.1   Introduction

The 'community health' map was undertaken over a five-month period from February 2016 to June 2016 with seven team leaders, seven community health workers (CHWs) and five registrar medical doctors[8].

Each participant took part in an individual semi-structured interview and a group discussion. Group discussions were attended by a team leader, a CHW from her team and the registrar associated with the team. Two registrars took part in two group discussions each to ensure that a doctor was present in all sessions. All interviews and group discussions were held at the University of Pretoria's Mamelodi Campus.

Registrars and team members (CHWs and team leaders) from the following wards took part in the project: Ward 17, Ward 23, Ward 28, Ward 40, Ward 86. In bigger wards there are often two or more teams operational. Therefore, Ward 40 and Ward 86 had two team leaders with their CHWs who took part in the 'community health' map.

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[8] Registrars are medical doctors who are doing masters studies in different disciplines over four years. In family medicine, they do COPC and are assigned to WBOTs where they work with team leaders and community health workers to provide clinical care, enable service integration and support learning.

In addition, participants from the wards were also assigned to the following groups for the discussions:

Group one: Ward 17

Group two: Ward 23

Group three: Ward 28

Group four and five: the two teams from Ward 40

Group six and seven: the two teams from Ward 86

6.1.1 Process overview

The 'community health' map was structured around the participatory mapmaking process shown in the research approach and methods chapter (see Figure 3.2). The pre-selected theme was to do a map of infectious diseases with a focus on tuberculosis (TB). Data used to create the map was collected by CHWs on mobile devices during household registration, assessment and triage. Maps were generated using the software QlikMaps, which is a mapmaking visualisation and location-based analytics engine.

Working with computer generated maps changed the primary focus of the mapmaking activity away from mapmaking to discussing pre-populated information on the maps. However, during the concluding part of the 'community health' map, participants were able to draw on projections of the maps which brought an element of participatory mapmaking back into the project.

An overview of the mapmaking process:
Data collected using AitaHealth™ was used to generate a series of 'community health' maps. CHWs use the AitaHealth™ app on mobile devices to collect household and individual health related data. Data is collected while CHWs provide healthcare services to individuals and families in their homes and places of work.

At the start of the project, all participants were introduced to the objectives of the study and to medical data maps. All participants then took part in their interview where they were shown a series of TB data maps. After the interviews, participants were asked to evaluate the session and reflect on their experience in writing.

Once the interviews were completed, each team leader, their CHW and the registrar linked to the team were invited to take part in a group discussion. In the group discussions, the same maps participants had seen individually were reviewed to identify actionable tasks. To conclude the group discussions, each participant was asked to answer two questions to reflect on their experience.

Initial findings were presented to team leaders, community health workers and registrars in three separate data analysis presentations. At the end of each presentation, participants were given an opportunity to discuss and comment on the findings presented.

Findings from the 'community health' map were also presented to key stakeholders at a routine community oriented primary care (COPC) AitaHealth™ data governance meeting, and at a team leaders and managers training session as part of the Gauteng roll out of COPC. In addition, the project was also presented to master's students of the Department of Geography, Geoinformatics and Meteorology (University of Pretoria). The students gave feedback on the visual look and feel of the data maps generated and put forward recommendations to improve the maps.

6.1.2   What informed the 'community health' map?

The process design of the 'community health' map was influenced by two articles from the study's systematic literature review. In the first article, titled *Disease maps as context for community mapping: a methodological approach for linking confidential health information with local geographical knowledge for community health research*, authors Beyer et al. (2010:639) asked participants to contribute

information about their environment onto a digital map. Participants were each given a paper map and were able to also add information directly onto a digital version of this map for everyone to see and discuss (Beyer et al., 2010:639). The project used real-time, digital maps in a group discussion setting and participants could interact with the information presented to assist the researchers of the study to better understand the healthcare and environmental challenges of their area.

In the second article titled *Neighbourhood-Level hot spot maps to inform delivery of primary care and allocation of social resources*, Hardt et al. (2013) illustrated the importance of the type of map visualisation technique selected to generate medical data maps. In the study, researchers generated hot spot density maps of health disparities experienced in a community (Hart et al., 2013:4). The hot spot maps were easy for community members to understand, and could be enlarged to a poster size to be distributed amongst local stakeholders. In response to the maps, several healthcare interventions that the local community could benefit from were initiated by the stakeholders.

In addition to drawing on both these articles to inform the process design of the project, the purpose of this mapmaking project was to explore how WBOT team members interpreted medical data maps that showcased Aitahealth™ data. Furthermore, the project also set out to explore what use and value group discussions about the maps could have for participants concerning the delivery of COPC.

6.2   Plan and Implement

To create the data maps for the project, Dr Fritz Kinkel, a physician, researcher and staff member at the Department of Family Medicine, was approached and asked to give advice on the types of data to combine and work with. Dr Kinkel's field of research expertise is focused on the Human Immunodeficiency Virus (HIV), TB and COPC.

He suggested that we generate data maps to visualise the TB status of individuals and households in an area. This suggestion was made both because of the importance of the condition, and because of the need to find solutions at a household and community level to contain the epidemic. It was also expected that the maps could be used to identify clusters and patterns of cases that, in turn, would encourage participants to make predictions and plan for intervention. In the words of Dr Kinkel:

> I think, the maps need to really touch a responsive nerve of the observer... i.e. the observer needs to be (or at least potentially be) fascinated by the topic, and the map needs to display some complexity and things to be uncovered. A bit like a toy... if you cannot do much with a toy the child soon loses his or her interest. 'Doing' in your sense means 'seeing', and 'seeing', if I understand your approach correctly, is not just, looking at something, but 'discover', 'recognise', 'detect' and 'understand' through visualisation. And what can be 'discovered', 'recognised', 'detected', 'understood' etc. are 'patterns' and what makes a 'pattern' a 'pattern' is eventually the principles/rules (and exceptions) that allow [you] to predict the 'pattern'. (Dr Kinkel, email correspondence, 04/03/2016)

A challenge that had to be considered was the frequency of the disease. Dr Kinkel explained that the low frequency of TB occurrence posed a challenge because the scale of coverage shown on the map had to be sufficiently large to make possible patterns visible. According to Kinkel "If you only have 1000 households you will hardly find more than ten cases (pixels), which may not be enough to recognise a pattern."

Through further conversation and email correspondence, it was agreed to generate and work with the following sequence of maps:

1. A map of household sizes of homes screened in an area to establish context.
2. A map that depicted the number of people diagnosed in an area with TB.
3. A map of households where one or more members in the household were diagnosed with TB.
4. A map that visualised two sets of data together to show household members diagnosed with TB, and show if there was one or more members of the household who had TB symptoms but who were undiagnosed.

5. A map of households where one or more members were diagnosed with TB but not on treatment.

6. A map that also combined two sets of data together to show data from map 5, and identify which households also had one or more members in the home who had TB symptoms but were undiagnosed.

6.2.1.1 Software limitations and a project process change

In addition to working with Dr Kinkel, the researcher was also asked to work with Wellnicity to generate the data maps. Wellnicity is an actuarial consulting and business intelligence solutions company that support the Department of Family Medicine's analysis of COPC data. Wellnicity routinely uses QlikMaps to visualize data. While the researcher anticipated to work with their maps, the software could only generate one type of map visualization (symbol maps[9]) and did not support large format printing (see Figure 6.1 below).

Print size was an issue because the project was initially conceptualised around a series of focus groups with large printouts of the data maps that participants could review, discuss and draw on together. However, the maps generated in QlikMaps could only be printed as A4 screenshots of the digital map images at a very low image resolution, and could therefore only realistically be used by individuals instead of a group.

In response to the printing size limitations, a choice was made to project the maps onto a whiteboard (see Figure 6.2). This solution eliminated the need to print, and

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[9] A symbol map is a type of map visualisation that depicts a symbol scaled to "values at a point" (Dent, Torguson & Hodler, 1999:8). A circle is most commonly used in symbol maps and the location of the symbol can either be a specific location or it could be calculated as the centre point of an area or unit (Dent et al., 1999:8). A symbol map is a type of thematic map (Dent et al., 1999:8) and thematic maps illustrate the distribution of a single subject matter or theme (Kraak & Ormeiling, 2013:42).a

it brought a participatory element into the 'community health' map as participants could draw and write on the map projections with a whiteboard marker.
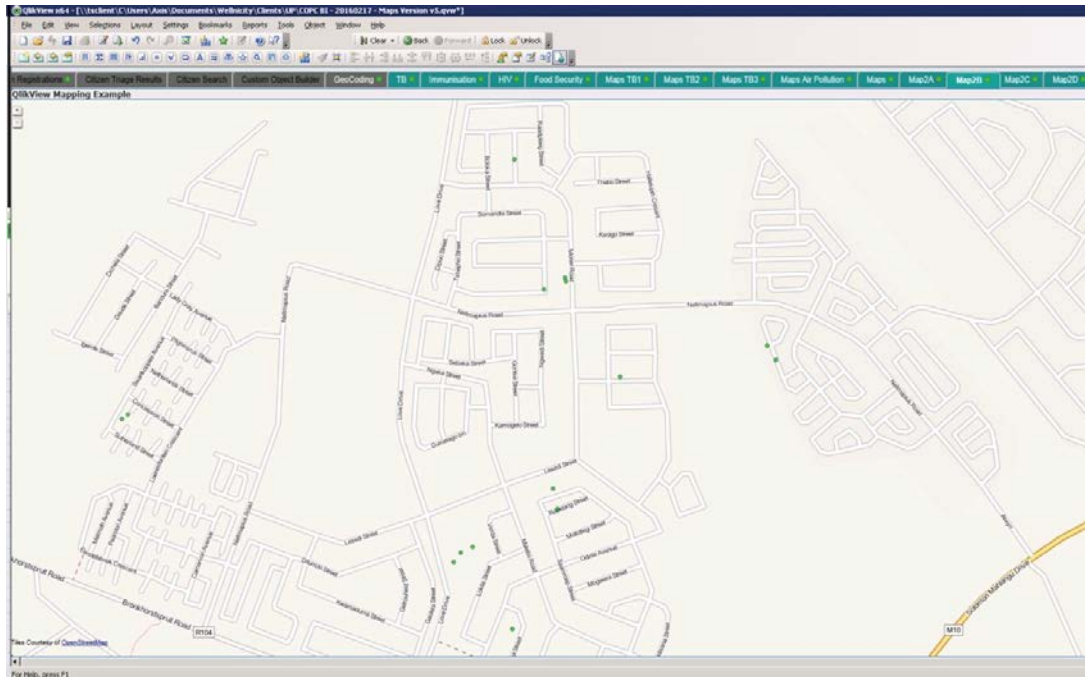
Figure 6.1: A symbol map of green dots – each dot represents a households where one or more members of the household have been diagnosed with TB, Mamelodi 2016. QlikMaps Screenshot.
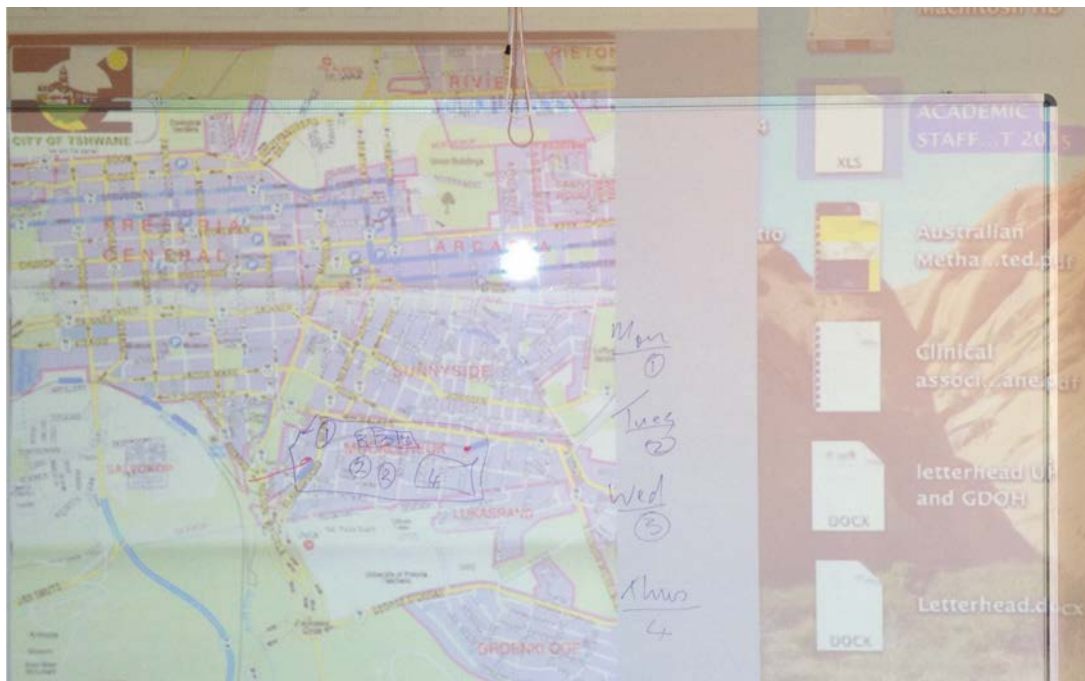
Figure 6.2: Map projected on a whiteboard. Pretoria 2016. Photographed by the researcher.

In addition to the map format change, the project process of the 'community health' map also had to be adapted. The new process replaced focus groups with individual interviews and smaller group discussions. The group discussions were held as a stand-alone activity after the individual interviews. This gave participants an opportunity to review the maps as a group, discuss any challenges identified and record their ideas and comments on the map.

6.2.1.2   Refining the visual look and feel of the maps

Data maps were generated and projected at each session with the assistance of Wellnicity. The researcher defined the visual look and feel of the maps using five colours: red, orange, green, grey and dark blue. Only two colours were used together at any point in time. Also, where relevant, the symbolic meaning of each colour was considered. Information that needed an immediate response was visualised in red. Information that was not urgent but still a concern was visualised in orange. Green, grey and dark blue were used to show data that was neutral and just needed to be noted or considered.

Through trial and error, it was agreed that dark blue would be used for the first map that showed population density. Dots were adjusted to reflect scale - the bigger the dot, the more people in the household - and were opaque to enable the map to show where several households were located in close proximity to each other (see Figure 6.3). Green was chosen to show the first set of TB data where one or more household members were diagnosed with TB (see Figure 6.4). Orange was selected to show households where one or more members of the home was undiagnosed with TB but had TB symptoms. Red was used to show household members who were diagnosed with TB and not taking their medication. At times orange was also used where two data sets were combined and a household matched both queries raised (see Figure 6.5).

Figure 6.3: Household size map, Nelmapius, Mamelodi 2016. QlikMaps Screenshot.
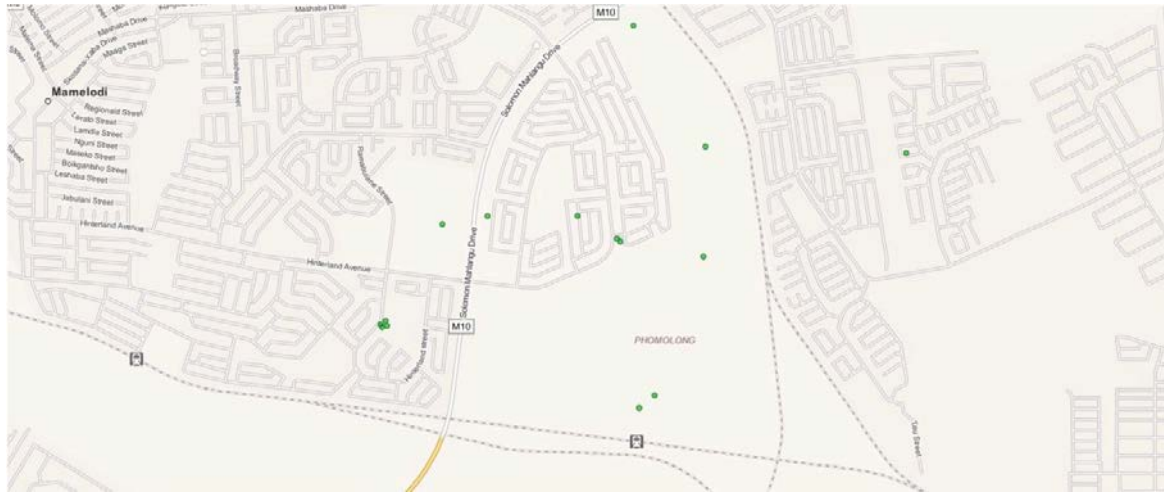
Figure 6.4: Symbol map of households with TB diagnosed members in the home (green dots), Nelmapius, Mamelodi 2016. QlikMaps Screenshot.
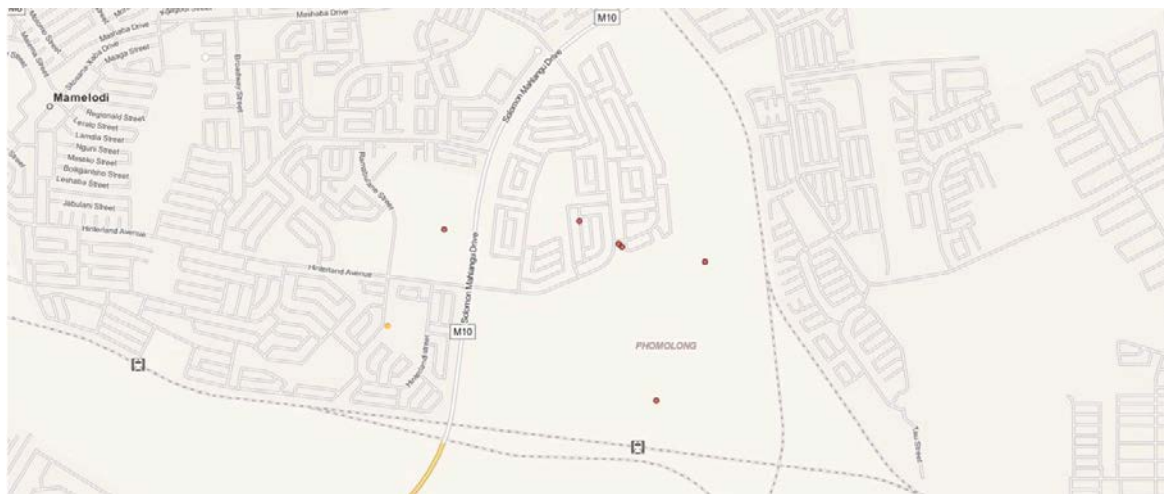
Figure 6.5: Symbol map that combines two sets of data and shows households diagnosed with TB where one or more members in the household are not on treatment (red dots) and orange (bottom left) where there is also someone in the household with possible TB symptoms, Nelmapius, Mamelodi 2016. QlikMaps Screenshot.

Test and refine the data maps

The series of 'community health' map projections were tested to ensure visual quality, information clarity and establish the time needed to generate each of the six maps. In addition, an example interview was role-played to test and refine the interview questions.

The sequence of the maps, as well as the size of the area visualised and in certain instances, the combination of data shown, had to be adapted for the different participant group interviews. Team leaders and registrars needed to see data for the entire ward, whereas CHWs were only shown maps of their assigned 200-plus households.

Figure 6.6 shows the 'community health' map's project implementation process. The individual interviews were an hour long, and were conducted with the 19 participants who took part in the project. After the interviews were completed, the seven group discussions were held with a team leader, CHW and registrar present. Finally, a data analysis presentation was delivered three times – once for the all the team leaders, CHWs and registrars.

6.2.2   Implementing the 'community health' map

To create the 'community health' map, each participant took part in an individual, semi-structured interview, which was followed by a group discussion a few weeks later. Prior to the interviews, CHWs and registrars took part in either an introduction meeting or workshop. The activities outlined below differ from the general mapmaking project process described in Chapter 3 to accommodate printing challenges.

Cycle repeated three times

Introduction & Planning	Individual Interviews	Group discussion	Thematic Data Analysis	Data Analysis Presentation
Plan	*Discuss and reflect*	*Discuss, draw and reflect*	*Evaluate and reflect again*	

1. Collaborate with Dr Fritz Kinkel and Wellnicity to generate the data maps

a) Work with Dr Fritz Kinkel (Department of Family Medicine) to identify the data to work with and combine

b) Work with Wellnicity to visualise the data

2. Introduction workshop and meetings

a) Deliver introduction workshop about medical data maps to CHWs

b) Individual meetings with Drs to explain the mapping project, discuss medical data maps and invite them to take part

* Team leaders already familiar with maps from previous project therefore a workshop/introduction was not needed

3. Individual semi structured interviews with: 7 team leaders, 7 CHWs and 5 registrars medical doctors

Maps generated for each type of health care practitioner (e.g. team leaders, CHWs and registrar doctors) differed in terms of the size of the area covered. However, the same data sets and data combinations were used to generate the maps shown to all participants *(first round of analysis)*

4. Reflective writing and interview evaluation

5. CHWs to do action planning and respond to what the maps showed

6. Map discussions and drawing (mapping ideas)

CHW to present an action plan to their team leader and registrar

Each group to be shown the data map of their ward (or area where they work) for a second time

Group to discuss a series of open ended questions asked by researcher

Participants encouraged to draw on the maps, and discuss issues, challenges and ideas related to the information visualised on the map

7. Reflective writing

8. Data analysis completed by the researcher *(second round of analysis)*

9. Power Point presentation of the 'community health' map's findings

10. Reflective writing and group discussion

Participants to give feedback on findings presented *(member checking)*

Figure 6.6: Workshop activities used to create the 'community health' map

6.2.2.1   Introduction to the project

CHWs participated in a four-hour introductory workshop. The workshop touched on the history of maps, asked participants to create a word circle to discuss the meaning that maps had for them and introduced participants to medical data maps and their value for healthcare delivery.

Registrars were introduced to the project in individual one-on-one meetings, to accommodate their work schedules. They were also given a handout that explained the project and process.

Team leaders were introduced to the project during their routine monthly meeting as they were familiar with the study processes, having participated in the 'history of health' map.

6.2.2.2 Individual interviews - seeing the data come to life

Individual face-to-face interviews were guided by a semi-structured interview schedule (see Appendix 29). To do the interviews, a laptop, data projector and an internet connection were needed and the maps were projected onto a clear white wall (see Figure 6.7). Participants were interviewed consecutively in one-hour sessions over a two-day period in the following set of groups - team leaders, CHWs and registrars. There was a gap of three to four weeks between each group's two-day interview cycle.

Figure 6.7: Team leader interviews, University of Pretoria Mamelodi Campus 2016. Photographed by Carla van Rensburg (research assistant).

Maps shown to team leaders and registrars followed the sequence of maps listed earlier. However, data maps shown to CHWs were more zoomed in and only showed the 200-plus households allocated to each CHW. In this instance it was necessary to adapt the map sequence slightly, as well as the questions asked to them. Also, because registrars only attended an introduction meeting, questions asked in their interviews included additional questions at the start of their interviews to understand how each perceived the area where they worked, and capture their thoughts on the use and value of maps for service delivery.

Participants were given a set of cue cards to use during the interview. The cue cards explained the meaning of the colour and size of the dots used on the maps (see Figure 6.8). In the interviews, participants had to describe what they saw when they looked at the map, explain what each map was telling them, and give their opinion on the value of making the data visible. Participants could also request to zoom in or zoom out of certain areas of the map whenever they wanted. In addition, CHWs and team leaders were also encouraged to note down the address of households in need of follow up. A household address appeared when one hovered over a dot on the map with a mouse.

After the face-to-face interviews, CHWs were also asked to create an action plan. To do this, CHWs used a predetermined form with rows that indicated tasks or objectives and columns that listed seven questions to help them achieve the objectives listed.

The interviews ended with reflective writing. Participants were asked to evaluate the session and were given seven questions to answer to reflect on their experience. The questions were adapted from the reflective writing questions given to participants on the second day of the mapmaking workshops of both the 'Local Institutional Support Assessment' ('LISA') and 'history of health' maps (see Appendix 31, Section 1 and 2).

Figure 6.8: Cue cards handed to participants, University of Pretoria Mamelodi Campus 2016. Designed by the researcher.

Figure 6.9: CHW writing down registrar feedback in response to her action plan presented. UP Mamelodi Campus. Photographed by Ronald Mosweu (research assistant).

6.2.2.3   Group discussions

After the interviews, each team leader, together with the CHWs in her team and a registrar took part in an hour and a half long group discussion. As in the individual interviews, the data maps were generated for each group discussion with the assistance of Wellnicity.

Group discussions took place over a two-day period a week after all the individual interviews were completed. The discussions were based on issues arising during the interviews and had two objectives – i) to review the CHW action plans and ii) to plan a response to an issue or need identified by one or more participant of each group during their interviews. A discussion guide was put together for each group that listed an agenda and a list of TB data maps to show in each session (see Appendix 30). The agenda was different for each group and was informed by the issue or challenge unique to the group that surfaced from participant interviews.

TB data maps used in the group discussions were the same as the maps generated for the interviews. Participants were also free to ask Wellnicity to generate additional maps during their sessions. Maps generated tended to show data for the entire ward and where relevant, this could be followed up with a map that showed information specific to the CHW's households.

The group discussions were initiated by CHWs who presented their action plans. CHWs worked with their team leaders and other CHWs in their teams to complete their action plans. During their presentations, the registrar of each group was able to listen to, and comment on the plan presented (see Figure 6.9).

Thereafter the researcher asked group members open-ended questions, and Wellnicity generated the necessary data maps that were projected onto a whiteboard. Group members took turns to answer questions and wrote down their ideas on the map projection using a whiteboard marker (see Figure 6.10). In addition, they also used the process to locate health posts, flag up areas of the data maps with an uneven spread of dots, and made connections between

elements visualised on the map. Some groups also did scenario planning and focused on specific households with complex challenges.

Through a process of combining projected and hand-written information, participants were able to make sense of and respond to the data available to them. At the end of the session, participants were given two questions to reflect on their experience of the process (see Appendix 31, Section 3).

Figure 6.10: Group discussion sessions with registrars and CHWs drawing over map projections on the whiteboard. UP Mamelodi Campus. Photographed by Ronald Mosweu (research assistant).

6.2.2.4   Data analysis presentation

A month after completing the 'community health' map, initial findings were presented to team leaders, CHWs and registrars in the format of a data analysis presentation. Participants commented and provided feedback on the findings individually and as a group (see Appendix 32 for a list of questions asked).

6.2.3   Process adaptations and refinements (dependability audit)

Adaptations were needed in order to respond to the implementation challenges encountered.

Methodology change
As mentioned, it was necessary to adapt the project process to individual interviews and smaller focused group discussions. In addition, it was envisioned that participants would work together on paper-based map printouts of the data maps, but the printing limitations necessitated that maps shown were digital. In hindsight, working with digital maps pushed the project process in a new direction allowing for greater malleability and responsiveness.

Showing a different set of data maps to each participant group and adapting questions asked
It was also necessary to make small adaptations to the questions asked and map sequences shown to team leaders, CHWs and registrars to relate to the area and tasks that they were responsible for. This happened organically as the project progressed.

6.2.4   Process insights

Not being able to see any patterns in the data
Although it was not possible to discern patterns in respect of TB as the data set was too small, the maps enabled participants to practically respond to individual and local TB service needs.

Data analysis presentation findings encourage participants to plan and take action
The 'community health' map introduced a new discussion format at the end of the data analysis presentation with participants collectively summarising their feedback on a flip chart paper. Several participants who read their feedback to the group, would pause on points listed and make suggestions for action. Adding this last step helped participants to realise that they had and could do something about the findings visualised on the map. The group setting and support from their peers also encouraged participants to take small steps to drive change both on their own and with the help of their team leaders.

6.2.5   Process findings

Topics identified from the group discussion
CHWs action plans showed they were well informed about how to respond to TB in the home and the community. The challenges they shared in their interviews and group discussions, were often related to the service and environmental context in which they worked. For the teams, the challenge was the diversity of the disease burden and the fact that there was a need to respond properly to all at the same time.

Poor data quality collected
Although data is collected and saved in real time, there were challenges of connectivity that affected the visualisation of information on the maps. Several symbol maps showed clusters of TB dots which potentially signalled a TB outbreak. However, this was an artefact of poor internet connectivity rather than a reflection of health indicators, as CHWs data were uploaded at the health post

rather than at the households where they were collected. This work-around voids the validity of the data for any spatial map visualisation as the GPS coordinates of the data are incorrect.

Map group discussions surfaces local knowledge
Interview questions and group discussions around maps created a way of harnessing local knowledge and experience that was relevant to all levels of service providers, managers, and the researcher.

6.3   Thematic data analysis

Data for the 'community health' map was analysed according to the data analysis process outlined in Chapter 3. The section below describes the findings identified from the data that was analysed. Similar to the 'LISA' and 'history of health' maps, data used included different types of reflective writing collected at three intervals during the mapmaking process – after the individual interview, group discussions and the data analysis presentation respectively. In addition, transcripts of the interviews and group discussions held over the course of the mapmaking process with all participant groups were also included.

Findings generated from the 'community health' map data were collected under the two main themes: map and maps discussions. The first main theme has three themes with related *sub-themes*. The second main theme has four themes with related *sub-theme* – see Figure 6.11 for an overview of the two main themes, themes and *sub-themes* of the 'community health' mapmaking project. Also see Appendix 33 to 36 to view the thematic index and the theme maps generated to reduce the index down to the final themes described below.
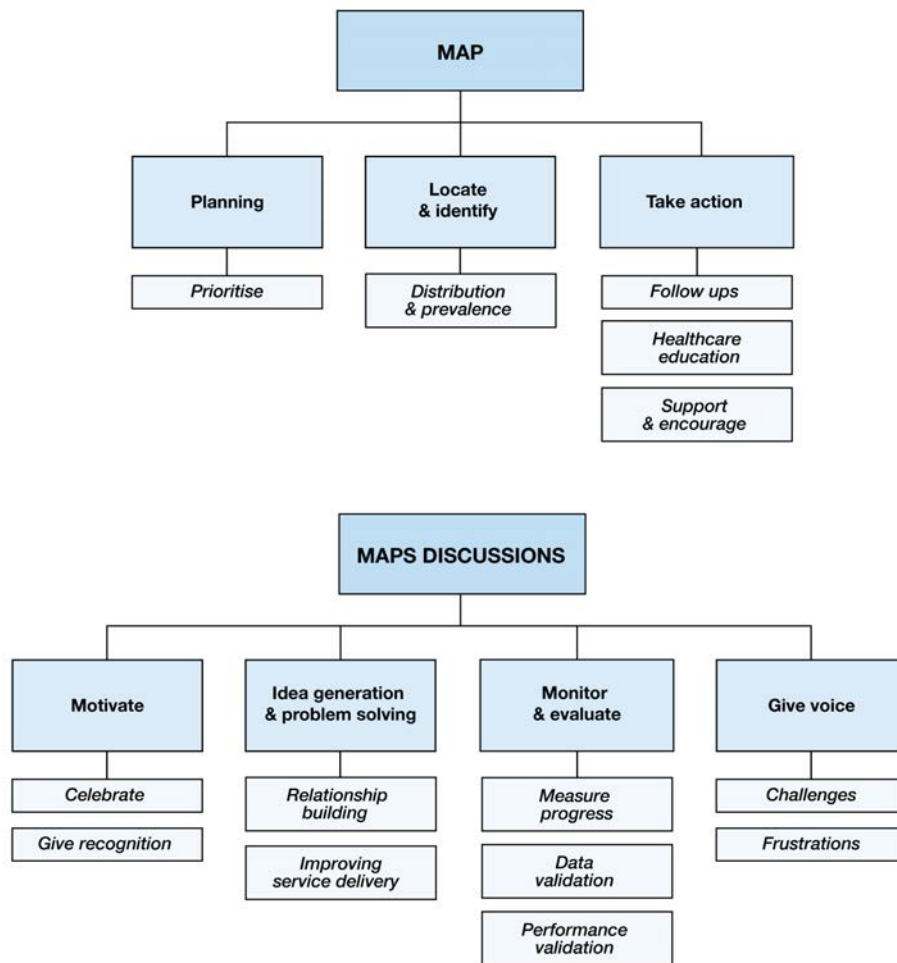
Figure 6.11: 'Community health' map main themes, themes and sub-themes

6.3.1   The use and value of the 'community data' map

Three themes were identified that related to the main theme, map. All three themes are examples of the more typical uses and values of maps in primary healthcare. The themes: planning, locate and identify and take action (or act in response to what the map shows).

6.3.1.1 Planning

As a variant of medical data maps, 'community health' maps enabled healthcare providers to plan service delivery.

> When you look at the map and you can see cases of TB, cases where there are suspects, it gives you an idea of how much TB education one should actually do. (MP3-P5, team leader Ward 40, female, interview In16-Mar-16, UP Mamelodi Campus)

> I see mapmaking as a good way of planning medical services for a population, living in a set demographic area... I will use these types of maps in prevention of diseases in the community and in follow-ups. (MP3-P16, registrar Ward 28, male, interview 19-Apr-16, UP Mamelodi Campus)

> How it will help in planning. What the team leader could do is… she can [work] with her CHW and say so this is the one street, and there is the other street, in this amount of time we need to cover all these households. (MP3-P17, registrar Ward 23, male, group discussion 25-Apr-16, UP Mamelodi Campus)

> I mean if you want to visit all those homes, then maybe you will group them… so that one day you will go in one area where you'll be able to see most of the dots, and so on. (MP3-P19, registrar Ward 40, male, interview 19-Apr-16, UP Mamelodi Campus)

Data maps also assisted healthcare providers to *prioritise* certain household visits.

> I can see there are certain households who are having too much problems, so I must put more effort and should be concerned about those households. (MP3-P11, CHW Ward 40, female, interview 11-Apr-16, UP Mamelodi Campus)

> It actually gives you your ward as it is and you know that it means I must go to this area where the problem is. (MP3-P2, team leader Ward 86 team 2, Mamelodi, female, interview 16-Mar-16, UP Mamelodi Campus)

> The maps are very useful because they give me feedback of what I am doing in the community through the CHWs. They also show me which action to take next from the maps that I saw. (MP3-P15, registrar Ward 16, female, interview 19-Apr-16, UP Mamelodi Campus)

> It's telling me …that these are areas where I should be looking at from a service delivery point of view and this is where I should be focusing my resources. I would then be asking my next questions in terms of COPC…where the health posts are situated within these clusters and where the primary healthcare centres would be then located. (MP3-P17, registrar Ward 23, male, interview 19-Apr-16, UP Mamelodi Campus)

6.3.1.2   Locate and identify

'Community health' maps also helped healthcare teams to physically locate and identify households that needed attention.

> Looking at the table, it's just names there that shows you so many people [have TB]. But looking at the map, it shows you where actually that person is so that you can concentrate on that area... (MP3-P2, team leader Ward 86 team 2, Mamelodi, female, interview 16-Mar-16, UP Mamelodi Campus)
>
> I found the household number and street of the people living with TB and TB symptoms. That is why I agree to use this map. (MP3-P8, CHW Ward 16, Team 6, female, reflective writing)
>
> What I liked is that one could get the street name and address of the identified household with a condition - TB in this case. (MP3-P4, team leader Ward 28, female, reflective writing)

Data maps also showed the *distribution and prevalence* of a disease which can alert a team to an outbreak of a disease. In addition, the maps also help to identify patterns that occur when the data is spatialised, albeit that in respect of TB no clusters were found.

> I liked the fact that I could see the density of population of the area of my work. One could also see the intensity of TB cases in the area, those that have symptoms and were not on treatment. This would give health personnel an idea of the education that is needed in the area. (MP3-P6, team leader, Ward 40 team 2, female, reflective writing)
>
> It can help us to see really where TB [is] concentrated. We can see the defaulters as well and you can have a plan of action on how to tackle these things. (MP3-P5, team leader Ward 40, female, interview 16-Mar-16, UP Mamelodi Campus)
>
> These maps can be used to predict increased incidence and prevalence of e.g. TB. (Since TB is usually found in densely populated areas.) (MP3-P16, registrar Ward 28, male, reflective writing)

6.3.1.3 Take action

The maps generated also helped participants to take action in response to the visualised data. The main responses that the maps solicited were those that are standard in community-based services, namely, to give community members more *healthcare education*, to do *follow up* visits to confirm TB and to *support and encourage* people to go to the clinic to get tested and assist patients to continue to take their medication.

Healthcare education

> I would use the maps to identify Health Education in TB... to intensify follow-up and supervision visits on high risks areas. (MP3-P6, team leader, Ward 40 team 2, female, reflective writing)

> And now it means we have to go back, maybe they don't understand the importance of taking the medication until they complete the treatment. Because usually after taking treatment for a few weeks, they feel better and they think they are healed and then they stop taking the treatment. Maybe we need to go back and [do] re-education on the importance because not only will they not get well but they might end up with a stronger infection, MDR or something. And then they will infect the community, the households and anybody they come across. So, it's the education, maybe they don't understand, maybe they think they are healed, or something... (MP3-P4, team leader Ward 28, female, interview 16-Mar-16, UP Mamelodi Campus)

> Screening, we educate them about the signs and symptoms of health... they must open the windows like having ventilation. And then over-crowded - they must open the windows and then hygiene they must wash their hands before they start doing food. And then they must not spit the sputum. (MP3-P10, CHW Ward 28, female, interview 11-Apr-16, UP Mamelodi Campus)

Follow-up

Follow-up is a standard operating procedure in healthcare delivery where people are identified as at risk of a condition, are sick/have a condition and are in need of service, or are sick/have a condition and are on treatment.

> I would use them [data maps] to do follow-ups of identified clients to see if they are complying - e.g. after referring a client and having been to see if she or he went to the clinic, one would remember to do visits for support and encouragement. I could use them to check if other family members are not affected or infected especially if one of them did not go for treatment - e.g. TB - reinforce Health Education to the family and hear their concerns if any. (MP3-P4, team leader Ward 28, female, reflective writing)

I think there is a lot of value in the information we get from these maps. We could test the validity by sending CHWs to the households to check if the data is correct. (MP3-P17, registrar Ward 23, male, reflective writing)

Going to ask the client actually you are going to educate [them] about the signs and symptoms and then the clients said yes, I am a TB client and the first question you want to see (is) this card. The card first yes, to check whether he or she has done some follow up for the checkup. And then secondly, we ask him or her about the medication he or she is adhering to and tell him or her about the importance of taking medication. (MP3-P10, CHW Ward 28, female, interview 11-Apr-16, UP Mamelodi Campus)

You have to go to the household and check and after you must give referral if maybe he [or she] is not on medication. And after giving him or her the referral, you have to go back and do a review. (MP3-P14, CHW Ward 23, female, interview 11-Apr-16, UP Mamelodi Campus)

They should report to say, in this household, there's someone on TB but they're not on treatment. Report to the team leader and then if they still cannot bring that person to the clinic, we should go to them. (MP3-P15, registrar Ward 16, female, interview 19-Apr-16, UP Mamelodi Campus)

Support and encourage patients to take their medication

Patients need to be supported and encouraged to continue to take their medication.

It's just very important to find out what's the story with someone who knows that they've got TB and is not taking their treatment. Is it that they don't want to take treatment or are they so sick that they can't get to their clinic or what is the reason they're not taking it? (MP3-P18, registrar Ward 86, male, interview 19-Apr-16, UP Mamelodi Campus)

Yes, it is different because here you are actually able to see. You see ...where there are people having this particular condition and then you are able even to go follow-up, I mean even if they are not new cases there, just to give support and that you are able to go there and encourage and motivate. And like here where they are undiagnosed, you are able to go back and see where you missed out. Maybe at the time when the community health workers went there...maybe there were no people then with this symptoms and maybe it happened earlier and they haven't gone back there. So, it does help to... because you actually see and it helps with what you can do about it. (MP3-P4, team leader Ward 28, female, interview 16-Mar-16, UP Mamelodi Campus)

6.3.2 Taking part in the map discussions

Unlike the 'history of health' and 'LISA' map projects, the 'community health' map involved very little participatory mapmaking. Participants mainly discussed or spoke about what they saw when they looked at the maps during both their individual interviews and group discussions. These discussions generated four themes that can be grouped under the main theme, map discussions. These are: motivate, idea generation and problem solving, monitor and evaluate and give voice.

6.3.2.1 Motivate

Maps generated from AitaHealth™ data showed a team how many households they had registered in their ward or area. In the group discussions, registrars and team leaders could also use the maps to *celebrate* and *give recognition* to CHWs for their work.

> The data we captured is a clear picture of our community and we can see the accuracy and the value of our job. (MP3-P9, CHW Ward 86 team 2, female, reflective writing)

> In a way it encourages you that at least you've gone this far. (MP3-P2, team leader Ward 86 team 2, Mamelodi, female, interview 16-Mar-16, UP Mamelodi Campus).

> I think the, the visual will give a sense that it's something that's doable. (MP3-P19, registrar Ward 40, male, interview 19-Apr-16, UP Mamelodi Campus)

> Showing the ward-based outreach teams (WBOTs) the efforts of their work. To show them how to interpret data/maps and how to use them to make their jobs easier and to deliver effective service. This sort of knowledge can be a great motivator to encourage (them) to continue and improve the way they work, collect data and deliver service. (MP3-P17, registrar Ward 23, male, reflective writing)

6.3.2.2 Idea generation and problem solving

Data maps also enable participants to generate ideas and solve problems. Ideas generated during the interviews and group discussions can be categorised into two sub-themes: *relationship building* and *improving service delivery*.

Relationship building

Participants identified two types of relationships that needed to be strengthened –
i) with local clinics, and ii) with local authorities (or ward councillors). In addition,
registrars also thought that 'community health' maps would be a valuable tool to
show to clinic staff, ward councillors and at community meetings. This would allow
these individuals and organisations to see the health status of their community,
and illustrate to them how COPC supports targeted health interventions.

> Actually, the clinic has to see value in you, the TB sister must know that you
> are helping them in the community... so maybe every now and then as team
> leaders if you can be part of those meetings, just so that there is
> communication. (MP3-P19, registrar Ward 40, male, group discussion 25-Apr-
> 16, UP Mamelodi Campus)

> I think one of the recommendations also is just for us to build the relationship
> with Stanza One so that they are aware of what we are doing in the
> community, because our job, and what the CHWs are doing, is alleviating the
> clinic work. If we go to meet with the clinic, I know they are aware of the work
> we are doing so that when we refer a patient to them they can at least write
> back on the referral. (MP3-P15, registrar Ward 16, female, group discussion
> 25-Apr-16, UP Mamelodi Campus)

> There might be a place for really presenting data to the clinic... It might be
> good to present some of the data that we feel that's relevant to the clinic. Just
> for them to understand what the data is about. I think they don't understand it.
> (MP3-P18, registrar Ward 86, male, interview 19-Apr-16, UP Mamelodi
> Campus)

> Also, part of the COPC is to involve the local politicians. I mean a map like
> this, you can show to the Ward Councilor… if you need to [do] an
> intervention… you involve them so that they can help with the security
> concerns… They've also got community meetings. So, actually, a map like this
> can [also] be shown at community meetings, so that people take ownership.
> Obviously, it would have to be done anonymously… (MP3-P19, registrar Ward
> 40, male, interview 19-Apr-16, UP Mamelodi Campus)

Improving service delivery

Issues visualised by the data on the maps stimulated registrars and some team
leaders to also consider ways to improve service delivery. Ideas expressed tended
to either support a CHW or team leader to solve a problem, or enabled the team to
improve service delivery.

...if maybe they open more, have more clinics or clinic services, I mean expand it to Saturdays where there are more people, family people can help bring them [patients] to the clinic. And then there is also, if they increase staff for DOT medication. (MP3-P1, team leader Ward 17, female, interview 16-Mar-16, UP Mamelodi Campus)

If you wanted to do a quality control for TB with regards to how good your community health workers are actually plotting. Then, for every case that is red… so wherever the doctor has started them on TB medication, there's a register. There's a TB register in every clinic and every hospital which you can access that has the patient's details, with their address. So, if you wanted to, you can do a quality control, you can match what is in there, with what the community health workers are saying. (MP3-P16, registrar Ward 28, male, interview 19-Apr-16, UP Mamelodi Campus)

We came up with an action plan. Invite sisters from the clinic to come and view our mapping. They will have an insight of what WBOT is doing regarding TB. (MP3-P3, team leader Ward 86 team 3, female, group discussion 26-Apr-16, UP Mamelodi Campus)

6.3.2.3   Monitor and evaluate

Monitor and evaluate is a ubiquitous theme found in the data, with particular reference made to the value of maps as ways to *measure progress*, and enable *data and performance validation*.

Measure progress:

Participants saw the data maps as a way to visibly monitor progress in their work.

The data is more clear to me because it shows how much work I have done so far. (MP3-P9, CHW Ward 86 team 2, female, reflective writing data analysis presentation)

I liked that TB cases is not too much in my area - because we always campaign about it and teach them that TB is curable and how to prevent it. (MP3-P13, CHW Ward 86 team 3, female, reflective writing)

We will use these types of maps to indicate the disease we have captured and, also to determine the difference we make in the community. And we can also use these maps to see how people are improving on their medication and how many people are, still need us to put more effort into them. (MP3-P11, CHW Ward 40, female, reflective writing)

...another point would be after six months, you do another follow-up and see what's happened to the dots. Did the dots disappear? So then follow up in terms of treatment completion, or in terms of new cases. And if those new cases affect the same places… I mean, we'll be looking at the migration of the dots, or whether they stay the same. (MP3-P19, registrar Ward 40, male, interview 19-Apr-16, UP Mamelodi Campus)

Data validation

The maps also made it possible for participants to fact check their work against the visualised evidence.

> Ah, I'm surprised because with the group that I am working with, they will always …give me verbal reports that uh, no we found this HIV patient who is coughing a lot, signs and symptoms of TB are there, but the person is in denial, the person said we must not come back, does not want us in the house. Now how... so the map must correlate with verbal reports that they give me. (MP3-P6, team leader Ward 40 team 2, female, interview 16-Mar-16, UP Mamelodi Campus)

> I mean just thinking of the amount of people that come to the clinic with TB and then seeing how few people are captured with TB that seems to be a discrepancy I would say. (MP3-P18, registrar Ward 86, male, interview 19-Apr-16, UP Mamelodi Campus)

> I wish we had more qualified people to do data collection in the household so that the data can be trusted. (MP3-P15, registrar Ward 16, female, reflective writing data analysis presentation)

Performance validation

The group discussions stimulated by the maps also allowed healthcare team members to identify gaps in coverage as well as assess and review CHW performance.

> They [the dots] are on the periphery ja. It's like they are following a road. Because I see Tsamaya road, then I see the railway here and I see Solomon Mahlangu drive. Then there where, I'm not sure if it's Solomon Mahlangu drive or what is it. There's nothing happening there it's almost… and then when you go there, it's in the bush. What's there? There I think maybe it should be Lusaka. Is it not there? (MP3-P15, registrar Ward 16, female, interview 19-Apr-16, UP Mamelodi Campus)

> Because if you look at streets … I don't know how they plotted. It's also not plotted on both sides, unless the signal detection is not that accurate. (MP3-P16, registrar Ward 28, male, interview 19-Apr-16, UP Mamelodi Campus)

> No, I am just checking these...where there are no dots, what's happening. Does it mean we haven't registered the households there? (MP3-P2, team leader Ward 86 Team2, Mamelodi, female, interview 16-Mar-16, UP Mamelodi Campus)

6.3.2.4   Give voice

Give voice articulates the *challenges* and *frustrations* that community-based health professionals and workers face.

Challenges

The challenges reported by participants included environmental and social conditions, difficult households and living conditions, difficult socio-economic conditions such as poverty and unemployment, as well as challenges with patients themselves who do not want to comply or respond to advice.

> That a lot of people are living in an unhealthy area. And they can get illnesses very easily because they are clustered together. Like the other day, our CHWs came across a foreigner, he is a tenant somewhere and there are children in the yard, and he was, she was coughing and productive cough, so they referred her. She didn't want to go, we went there, we, we talked to her, we show her the dangers of her not going to the clinic because there are younger children here. She is going to affect the children. Okay, she refused to even... we wrote out a referral form for her to go, they say when the husband came, YOH! it was, he fought... he fought with the owner of the house. He said now you calling people to come and tell us... my wife is not sick. My wife is just okay. And she was so sick, you could just see that person is very sick. Their eyes were also yellow, you know she is so weak, and she is sitting out there with fruits, she is selling fruits to the people. (MP3-P3, team leader Ward 86 team 3, female, interview 16-Mar-16, UP Mamelodi Campus)

> There are a lot people who do not work. When you go for home visits, you pass men walking about, you just wonder what happens. Are these people not working at all or what? What's going on? The women, yes they are there but the men, it's just a lot of them. And a lot of foreigners also. (MP3-P2, team leader Ward 86 team 2, Mamelodi, female, interview 16-Mar-16, UP Mamelodi Campus)

> People are living under very, very unhealthy, poor conditions. …I think people's mind is just to make money from these tenants. He [a landlord] will have 10 houses in one... 10 shacks in one yard or more. There are no windows, just a small room. (MP3-P3, team leader Ward 86 team 3, female, interview 16-Mar-16, UP Mamelodi Campus)

> And I do have a child headed household with nine children in that house. The mother died because I think even though I think she was HIV positive so she applied for POP by 2012 so that they can, she is owing the municipality, something like 22 or 23 thousand for electricity. So, she died, she left those children in that house. They are not working, the other one …had epilepsy and there is no food. They will stay two, three days without food, just drinking water …On that case even I can't help, I don't know, I don't have time. I just help them, there is the other lady at extension three which is doing a soup kitchen so I will call that lady to just, when she put that soup kitchen, to ask them just to put more, they can eat there for two to three days. But when I get

there it's very terrible …you even feel a guilty to get in that house because I woke up in the morning, I ate. (MP3-P9, CHW Ward 86 team 2, female, interview 11-Apr-16, UP Mamelodi Campus)

Other challenges mentioned included system and operational issues.

...some of the clients are demotivated by the overcrowding at the clinics. They have got to wake up at 5 o'clock to book because you find that the staff cannot cope with large numbers. You find that they are being cut [from cues], some of them have got to be seen the following day, and then everyday there are new people, they start seeing those people who were there the previous day then overtime there's that recurring decimal. (MP3-P1, team leader Ward 17, female, interview 16-Mar-16, UP Mamelodi Campus).

I mean one of the things I've realised, there are quite a lot people who get TB, you know. They are sick but … two weeks later they're back at work. So, I don't know if you're gonna capture them data wise. No, no, I'm just saying because they won't be there. (MP3-P18, registrar Ward 86, male, interview 19-Apr-16, UP Mamelodi Campus)

Social workers also don't have that food. There are no food parcels. I do not have anybody that can give us food parcels. And another challenge for WBOT, is no airtime. If you have to phone a social worker or you have to phone an ambulance, your own airtime. (MP3-P5, team leader Ward 40, female, group discussion 25-Apr-16, UP Mamelodi Campus)

Frustrations

Healthcare workers and professionals also articulated uncertainty about the usefulness of interactions between levels of service. WBOTs felt that the clinic and community members did not always understand the work that they do. In addition, registrars also stated that clinic staff sometimes felt that WBOTs were not helping them with their work.

There's quite a bit of frustration from the clinic side where they feel the ward-based teams don't have time to help with, for example looking for TB contacts and following up on people, loss to follow up, and pap smears. (MP3-P18, registrar Ward 86, male, interview 19-Apr-16, UP Mamelodi Campus)

I am not sure that the information I am collecting is going to benefit my community because I have collected data [and] no action has been taken. (MP3-P9, CHW Ward 86 Team2, female, reflective writing)

The community [is] asking us about our job. What are you doing with our information without giving answers to us? After doing registration, are you going to take us to the clinic & hospitals? They [the clinic] don't take our referral clients seriously. (MP3-P10, CHW Ward 28, female, reflective writing)

6.3.3   Findings

The six most prevalent themes found in the data are: planning, take action, idea generation and problem solving, monitor and evaluate, motivate, and give voice.

Planning and take action

Data maps trigger action. They show teams where to go, help them identify households to prioritise and plan how to work smarter. In other words, they support practice with science. In the 'community health' map it was possible to extend taking action beyond planning to implementation. In their interviews, team leaders were able to write down the addresses of households that needed following up on. One team leader visited all the households flagged in her interview, and could report back to Wellnicity on her findings. Finally, a registrar also planned to show the health data maps to the TB sister at the clinic that his team was connected to. Unfortunately, in the end, his plan fell through. Nevertheless, his idea is a good example of the value of group discussions to encourage participants to take action in response to 'community data' maps.

Motivate

'Community data' maps also motivate CHWs. They give them a sense of achievement, not only because they can see the work they have done, but also because they can see the relevance of collecting data.

Idea generation and problem solving

Asking participants questions about the maps and talking about the maps as a team generate ideas that help healthcare team members to address problems and issues in their areas. Idea generation also gives participants the opportunity to come up with ways to use the data maps to improve service delivery.

Monitor and evaluate

By visualising AitaHealth™ data collected from their own service communities, healthcare providers are able to monitor and evaluate their own work. Data maps show CHWs and team leaders both the amount of progress they have made in doing their work, and the amount of work they still need to do.

Give voice

The maps provide an opportunity for healthcare team members to collectively discuss work, environmental and context-related issues that affect their ability to deliver services. By talking about on the ground challenges and conditions in the homes, the whole team, including registrars, are exposed to the practicalities of delivering COPC to the home. Through this engagement they are also able to work together as a team and consider solutions to problems.

In addition to the above mentioned, there are two findings to mention that are not specific to the data analysis themes:

The use and value of data maps for different healthcare practitioners

The role that healthcare practitioners play in COPC influences how they interpret the maps, both in terms of what they identify on the maps and how they would act. In their reflective writing, CHWs said that the map would help them do follow up visits and evaluate their own progress. In addition to these responses, team leaders said they could use the maps to monitor and evaluate CHW performance. Registrars tended to look for patterns, connections and relationships between data on the maps. They also envisaged that maps could support quality assurance and, depending on the amount of data visualised, they would also help them to improve service delivery.

Additional data map requests

During the project, participants requested the following additional types of health data maps set out below. The list of requests shows the potential value to work with data maps as part of service delivery. Maps requests made were:

- Data maps that show chronic conditions (Diabetes, Hypertension, HIV);
- Data maps that show children under five and elders older than 60;
- Combination maps of age and chronic conditions: HIV and TB, children under five exposed to TB and HIV, children under five with TB;
- Data maps that show unemployment;
- Data maps that show pregnant women and pregnant women attending antenatal care;
- Maps that show healthcare related landmarks on all the maps - NGOs, healthcare facilities, the location of WBOT health posts, social workers and any relevant support groups in a ward.

6.3.4   Insights

Environmental and household conditions that impact healthcare delivery

Five of the seven teams that participated in the 'community health' map work in areas of Mamelodi with informal settlements. They all told stories of challenging environmental and household conditions that impacted directly on service delivery, including tough living conditions, too few healthcare resources, long distances to clinics, inaccessibility of homes, no access to food or social workers and lack of close family members within homes. These stories show both the complexity of the home context that WBOT teams work with, as well as the need for generalist care, integrated service delivery, team work and continuous learning to assist teams to address the challenges that they encounter.

This insight also relates to the problem statement of the study, namely the potential of maps and mapmaking to create an awareness of place and space for healthcare service providers, including clinic and facility-based professionals.

Drawing on the map projections in the group discussions

During the group discussions, healthcare team members were free to draw on the map projections, write down facts and ideas and add extra landmarks that were not visible. In addition, teams could also draw pictures next to the map projection on the whiteboard to visualise household members and write down issues or challenges related to individuals in the home. This enables healthcare teams to use drawing as a form of visual problem solving to help them with their work.

6.4 Roles - how were participants engaged in the project?

Roles that the researcher took on:

In the 'community health' map, the researcher took on the role of designer and collaborator to help conceptualise the types of data maps to generate for the project. This was done with the help of Doctor Kinkel and Wellnicity. In addition, she gave design input to help refine the visual look and feel of the data maps. She then also conducted interviews with participants, facilitated and took part in the group discussions and analysed all the data generated through the project to present the findings back to participants.

Roles that participants took on:

Participants *co-created* ideas and insights together – during the group discussions participants could share, talk and think with each other. They were also given ownership of the group discussion process and could steer the direction of the conversation and request additional maps to view and discuss.

Participants *reflected* on their experience – participants were asked to reflect in writing on their experience after their individual interviews, group discussions and at the end of the data analysis presentation.

Some participants also *took action* and made improvements or changes in response to the data visualised on the symbol maps.

Participants were also engaged in *peer learning* – during the group discussions and data analysis presentation, participants could listen to and learn from other group members who presented challenges or spoke about ideas and insights to improve service delivery.

6.5 Summary

This chapter described the last mapmaking project of the study. The chapter first provided an overview of the process that informed the planning and conceptualisation of the mapmaking project, and then outlined data analysis findings. To implement the project, maps were generated from data collected by CHWs using the AitaHealth™ application. A series of data maps were produced with QlikView software that focused on TB statistics of the communities where WBOT teams worked. Seven groups of participants took part in individual interviews and group discussions where they were able to look at, review and interact with digital projections of the data maps. In addition to the design of the project, the chapter also put forward a summary of all the mapmaking project processes that participants were engaged in. This was followed by a data analysis section that presented main themes, themes and sub-themes identified from the mapmaking project data and participant reflective writing. In terms of the data analysis findings, most themes identified all relate to the main theme, map discussions. This finding illustrates the value of incorporating group discussions into mapmaking projects in COPC. Themes identified that related to the main theme, map, show the use of medical data maps to help healthcare team members with planning, which in turn informs action. The data analysis section was followed by a summary of findings and insights deducted from themes. The chapter then also presented a list of roles that the researcher and participants took on during the project. The next chapter compares and contrasts findings from all three mapmaking projects with one another and puts forward the main findings of the study.

7. CONCLUSION

This study set out to explore if different types of maps, and the act of taking part in mapmaking and team discussions about the maps, could help ward-based outreach teams (WBOT) to understand and make sense of healthcare related maps in a different way. The study worked with nurses (team leaders), community health workers (CHWs) and registrar doctors who form part of ward-based outreach teams (WBOTs). WBOTs deliver community oriented primary care (COPC) in Mamelodi, in the City of Tshwane, South Africa.

COPC is an approach to healthcare delivery that delineates communities by geographic area. It is therefore essential for healthcare team members to know and understand the place and space where they work (Marcus, 2013:103). Maps are descriptive tools that enable healthcare team members to understand and make connections between the social dynamics and entities of an area (MacKian, Elliott, Busby & Popay, 2003:222). The need for the study was therefore identified after an observation was made that in the delivery of COPC, maps were only used in a limited capacity. Furthermore, the study's thematic literature review revealed that the act of mapmaking has "agency" (Corner, 1999). The act of mapmaking thus enables WBOT team members to extend the use and value of maps in healthcare service delivery to generate ideas and see new insights (Corner, 1999:217). To implement the study, different groups of participants were asked to take part in three mapmaking projects, and reflect on their experience in writing.

This chapter begins with an overview and comparative summary of prominent themes uncovered in each of the three mapmaking projects implemented as part of the study. Main themes generated across the three mapmaking projects are grouped under two headings, *map* and *mapmaking and map discussions*. The chapter then discusses the underlying conclusions that can be deducted from the study's findings in light of relevant literature. This section is followed by a discussion of the study's research approach and methods. The chapter finishes off with recommendations for further research, a chapter summary and a suggestion on how to implement the study's findings.

7.1   A summary of the three mapmaking projects

Comparing the three mapmaking projects, each was conceptualised around a different theme and had a different purpose. The 'Local Institutional Support Assessment' ('LISA') map set out to translate an existing paper-based activity that formed part of the implementation of COPC into a mapmaking process. Apart from visualising and translating 'LISA' into a map-based format, the project also incorporated a task to assess the willingness of organisations and institutions to participate in COPC and evaluated the type of interactions that community health workers had with them. From these activities, participants planned further engagements with these organisations and institutions.

The purpose of the 'history of health' map was to uncover local knowledge about the history of health in Mamelodi during the 1980s under Apartheid. Through participatory mapping, participants, all of whom were skilled health professionals (team leaders or cluster managers), generated and mapped facts and comments onto an A1 size map of Mamelodi. The objectives of this map were firstly, to collect local knowledge about a topic on which there is little known recorded information, and secondly, to determine if a local history map could be of value in the delivery of COPC.

Lastly, the purpose of the 'community health' map was to display maps created from AitaHealth™ data collected by community health worker teams in the course of delivering community-based services. The objective of this third project was to identify the value and use of data maps and discussions about them for healthcare teams in their work.

Summary of the main themes identified for each mapmaking project
An analysis of themes reveals both similarities and differences in the effect of each of the projects (see Figure 7.1 for a summary diagram of themes identified in each mapmaking project).

The 'LISA' map project enabled participants to learn more about the organisational landscape of their places of practice. Through the mapmaking process, CHWs were able to *identify gaps*, *raise concerns* about aspects that they identified on the map, and *make links* between information on the different layers. By visualising the information on the 'LISA' forms, the project also helped CHWs to *identify* and *quantify* the information, as well as *assess and evaluate* their own performance.

As a participatory project, the 'history of health' map enabled participants to co-create a sense of place as they made sense of their own individual experience and knowledge. Through the process of mapmaking and their understanding of local health history, they learnt new information and new ways to cooperate. The project also helped them to reflect on present practices and circumstances.

The 'community health' maps project enabled participants to identify issues, share ideas and to find responses to opportunities and challenges visualised on them. Discussions around the meaning of the health data collected gave voice especially to community health worker and team leader concerns about problems experienced in their work place. The project maps also supported monitoring and evaluation, as they enabled participants to reflect on their own and their team's performance. Additionally, the maps made the amount of work that CHWs had done visible to the team as a whole. Furthermore, the maps supported adaptive action planning and prioritisation, both of which are essential practices given the complexity of providing quality general healthcare.
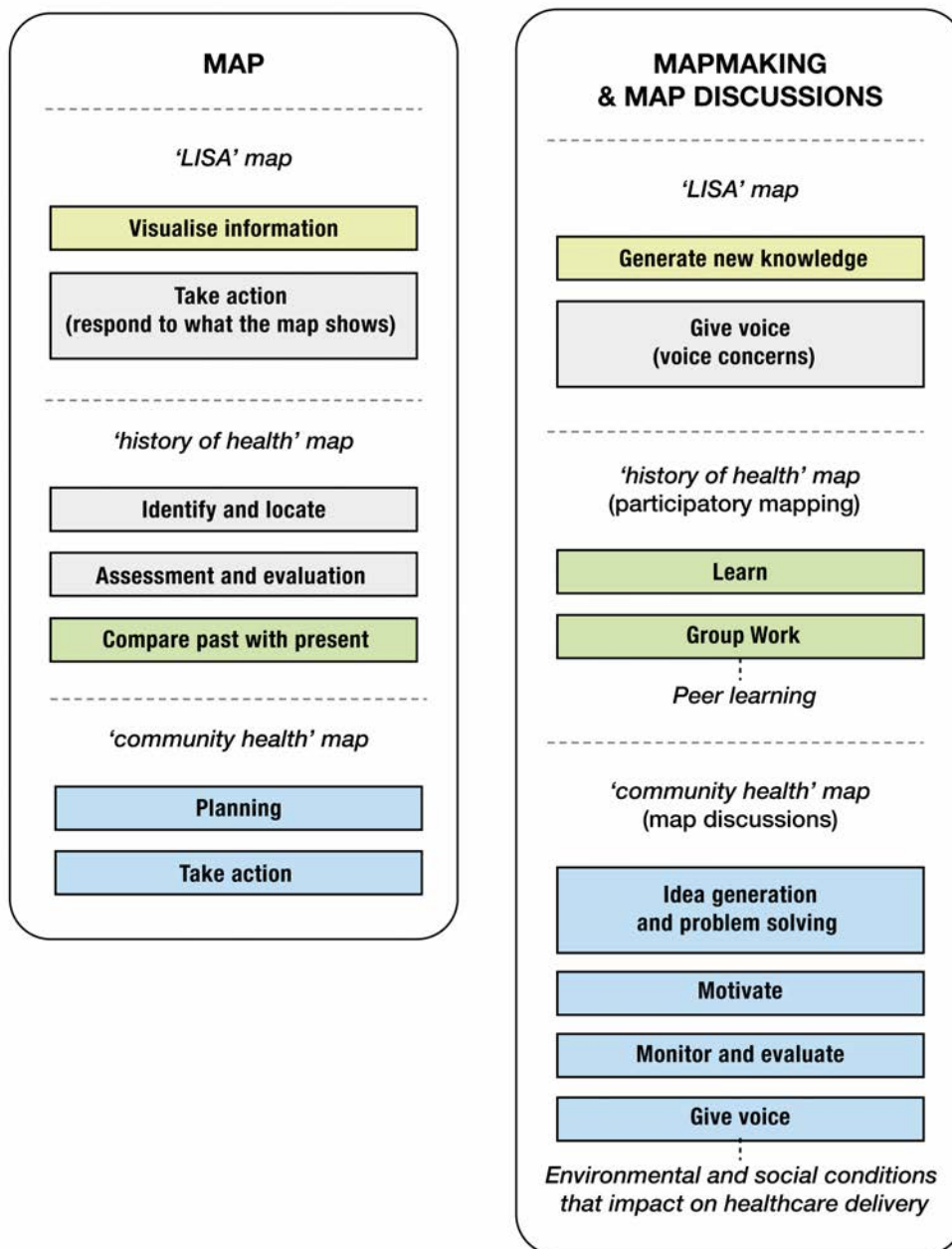
Figure 7.1: Summary diagram of prominent themes discussed in the data analysis findings section of each mapmaking project chapter. Themes in colour were identified as the strongest themes that captured the essence of each project.

7.2   Conclusions

The use of GIS maps in COPC, why there is room to grow

The first conclusion that can be deducted from the study's findings relates to maps themselves, particularly the use of medical data maps generated with GIS in public as well as primary healthcare delivery. Several themes identified through the data analysis process correlate with themes identified in the systematic literature review. However, there is still room for growth and improvement.

None of the articles found in the study's systematic literature review was South African. Nevertheless, the knowledge gathered from these articles were both relevant and useful for two reasons. Firstly, all the articles related either to COCP or primary healthcare projects. Therefore, their findings are relevant in South African primary care projects that work with maps and medical data maps generated with GIS. Secondly, the headings under which the articles were grouped in the review have also been useful to identify and compare how findings from the study are similar to and different from what the review put forward.

As in the systematic literature review, this study found that the 'community health' map project was particularly valuable for planning and implementation, and monitoring and evaluation. In addition, there are several themes identified underneath each main heading of the literature review that also matches with findings from the 'community health' map (see Appendix 37 for findings that overlap).

However, apart from the themes that overlap, case studies in the literature review also point to other types of medical data maps that utilise a much wider variety of thematic data map visualisation techniques. Although not used in these ways during the project, these types of thematic map visualisations can also be used by healthcare professionals to improve service provider performance and healthcare outcomes in future.

Mapmaking as a participatory learning process

The study reveals that mapmaking in COPC generates themes that expose tacit qualities linked to service delivery, team building and workplace-based learning. Although this finding seems quite distant from the way the concept of mapmaking is defined in the literature, on closer examination this is not the case.

For Cosgrove, mapping (or mapmaking) relates to the process of constructing a map. Once constructed, the map becomes a world in its own right. Here the intent of mapmaking is for cartographic purposes because the map is a representation of reality (Cosgrove, 1999:3). In contrast, Harley regards mapmaking as an act of power. By this he means that a map is always made by an author, who uses the process of mapmaking to give preference to certain concepts and elements on the map (Harley, 1989:275). In Harley's definition, mapmaking is always a particular interpretation of a reality. Lastly, Corner asserts that mapmaking is a creative activity that allows a person to see new possibilities and connections inside the map (Corner, 1999:250). As such, the process itself has a kind of agency, and it is this process that makes it useful for design and planning in the built environment (Corner, 1999:214-217).

For all their differences, the common thread that connects the three definitions revolves around intent or purpose. Formulated from the perspective of two geographers and a landscape architect, all three authors define mapmaking in relation to both their discipline and the intent or their use of mapmaking. Likewise, the study findings show that the meaning of maps and mapmaking in healthcare is informed by the intent and purpose of COPC.

The study findings resonate with Corner's understanding and use of mapmaking, as participants uncovered new insights about the information that they visualised or discussed in all three projects. Even though the themes that emerged around mapmaking related more to map uses for service delivery than to Corner's notions of map creation or design, the study also shows that the process of mapmaking encourages creativity through interaction, dialogue and learning. This happens both through interactions between participants and through the interactions between participants and the map. The mapmaking process itself created an

opportunity for these qualities to materialise between healthcare practitioners. Mapmaking also improved team morale, encouraged group work and stimulated individual performance which strengthened the implementation of COPC.

Furthermore, the way mapmaking is used in this study is also both similar to and different from the way participatory rural appraisal (PRA) scholars use and define mapmaking. It is similar in that in both, mapmaking is seen as a form of "visual diagramming and sharing" (Chambers, 1994b:1257; Mascarenhas & Kumar, 1991). This implies that the focus shifts from the map as an object and concentrates on the use of the map as a tool that stimulates interaction and dialogue.

PRA is part of a "… family of approaches and methods [used] to enable local (rural or urban) people to express, enhance, share and analyse their knowledge of life and conditions, to plan and to act" (Chambers, 1994b:1253). In PRA projects, mapmaking is a participatory process where authorship is handed over from the researcher to the community (Chambers, 2006:6). Community members draw maps on paper or on the ground and add information about the area where they live on to the map. As the information is visible to everyone, participants can debate, alter and change the information (Chambers, 1994b:1257).

Similarly, in this study, the mapmaking processes were also participatory and inclusive. As people worked together to make, add information to and talk about the maps, they interacted, generated new knowledge, and considered ways to apply their learning. In this, the mapmaking facilitated shared understanding and decision making.

As a result, mapmaking is used as a learning tool and an action tool in both approaches, albeit adjusted for purpose and context. Both are about empowerment and inclusivity. Both also support learning and entail joint knowledge creation. However, whereas PRA has been designed to engage directly with community members, to address local issues such as natural resources management, agriculture or for example health and food security (Chambers, 1994a:953), participatory mapmaking in this study was designed to

focus on healthcare providers and the delivery of services to communities through COPC.

Identifying the value of sketch maps and physical mapping for COPC
In the first two mapmaking projects, participants drew sketch maps as ice-breaker activities. They then used them to tell everyone more about the area where they worked and, in some cases, also lived. A sketch map is a drawing that visualises what a person knows about their environment (Blades, 1990:327). It also shows the things that they notice and can recall (Horan, 1999:196).

In this study, sketch mapping was accomplished by all with ease and most participants reflected after they finished these drawings that they now 'knew how to do mapping'. One way to make sense of this response is to consider the impact of the sketch map activity on their sense of self-confidence. By drawing the sketch maps, participants realised that they already knew a lot of information about their areas simply from doing their work, and that they could demonstrate what they knew.

According to Blaut, humans, irrespective of culture, have a natural ability to map without being taught how to do so (Blaut, 1991:322). He terms this "natural mapping" (Blaut, 1991) and suggests that mapmaking is something that is instinctive for people to do (Blaut, 1991:323). His statement is useful because it offers a possible explanation as to why drawing sketch maps was both easy and rewarding for CHWs and team leaders to make, which in turn instilled a sense of confidence in them.

In practice, sketch maps and town planning maps are combined in the physical mapping activity that is done in the initial implementation of COPC in a defined geographic area. CHWs physically walk through and draw a map of the area they are assigned to. Designed to ascertain the relationship between stands and dwellings, the study showed that the physical mapping activity was not only useful for household allocation, but also helped participants familiarise themselves with the community and area where they worked.

Even though many CHWs found the task difficult to perform, they reflected back that it had competency and practical value. Physical mapping helped them know where to go and made them familiar with the organisations and institutions in their areas. The learning triggered through the disruption of physical mapping also helped them develop their abilities to do the physical mapping activity and fitted in with the capability approach to learning[10] used in COPC (Marcus, 2018:23-42).

Using both the map and mapmaking together in COPC - the whole is greater than the sum of the parts
Although the literature shows that both maps and mapmaking are used in public health, there does not appear to be much evidence of their use in combination. Also, maps and mapmaking have tended to be used in a way that engaged management and community members, respectively, rather than service providers. By combining maps and mapmaking and using both activities to engage with and support healthcare practitioners, this study shows that they deepen their application and have practical service delivery value.

Therefore, the significance of the mapmaking projects in the study lies not only in the specific list of themes identified under the two main themes of each map, but also in ensuring that a project is conceptualised to bring parts together. While different mapmaking projects are likely to surface with similar and different themes underneath each main theme, there always needs to be both a map that visualises data or information and an opportunity for participants to engage with the map. Participants engage with the map when they are able to help make or draw on the map and have a group discussion about its meaning. In all instances, the process also needs to be guided by facilitated question asking. This is to encourage

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[10] In its application in South Africa, COPC uses a capability approach to learning. Capability is defined as: "...a state of being and a way of doing. As a state of being, capability is the justified self-confident integration of knowledge and skills with motivation, values and a commitment to learn. As a way of doing, capability is the on-going application of current and potential abilities and values to problems in familiar and changing situations through active learning." (Marcus 2018:26).

participants to look at and think about the presented and suggested meaning of the information visualised on the map (Foss, 2004a: 307).

Finally, the discussions that the maps and mapmaking generated served both to democratise ideas and increase equity in a hierarchical healthcare system. The process of working together and taking part in the mapmaking process gave clinicians, managers and community health workers a chance to interact with and leave their own mark on the map each time they made, drew or added information. By making and engaging with maps, the maps themselves also became more tangible, understandable and accessible.

In this instance, the word 'understandable' does not refer to understanding the map better but apply to service delivery instead. WBOT members can now understand how to do their job better. This happened both because of what the map shows them, and because they can ask questions or come up with solutions to problems when they make, interact with and talk about the map as a group. As a result, this also changes how WBOT team members think about the role of maps and mapmaking in COPC, and shows how the map, the participatory process of mapmaking and group discussions about the map together play a role to enable this shift in understanding to happen. Ultimately once a person makes the shift, he or she can then continue to explore with and uncover new ways to use maps in their work.

7.3   A discussion of the study's research approach and methods

Reflections on the study's research design - why this is both a weakness and a strength of the study

It is critical in all qualitative research studies to select an appropriate research design for a study. Creswell (2014:12) defines research design as the type of inquiry that a researcher utilises within qualitative, quantitative and mixed-methods research. Researchers use a research design in a study because it gives them guidance on the procedures to work when they plan and implement their research work (Creswell, 2014:12).

While the researcher agrees that it is important for a study to work with one of the accepted types of qualitative research designs to ensure validity and reliability in a project, it was not easy to find a suitable option to use in the study (see Chapter 3, Section 3.2.1 for a rationale that explains this argument). Not being able to find a suitable research design to work with was an unexpected challenge encountered in the study that can be perceived as both a limitation and a possible weakness.

This said, the mapmaking process that became part of the study's research design significantly contributed to the study in that it became a way to enhance service delivery in COPC. Working with the mapmaking process pushed the value of the maps that were used or made beyond them being informative artefacts and made them a source of learning for WBOT members that they could then use to improve service delivery. The mapmaking process also informed the study's last conclusion - namely to recognise that it is essential to work with both the map and mapmaking together in COPC to enhance service delivery.

Towards the end of the study, the researcher was made aware of alternative research design options utilised in the field of Design Research. These options could potentially have offered the researcher an accepted research design to work with (see the writing from authors Carole Gray and Julian Malins in the book *Visualizing Research: A Guide to the Research Process in Art and Design*). A recommendation for future research would be to work with one of the options mentioned as this could provide the researcher with the necessary methodological freedom to not only find a suitable research design but also to improve on how the mapmaking process was designed and used in the study.

Reflecting on the best questions to use in the study
Throughout the study, the best questions to ask during the focus group discussions were "what do you see?" and "what is this telling you?". The first question enabled participants to describe the presented elements that they saw on the map, and the second question encouraged them to uncover the suggested elements that could be deduced from the map (Foss, 2004a:307) (see Chapter 3,

Section 3.2.5.1 to read more on visual rhetoric and how this influenced the two questions asked).

For the 'LISA' and 'history of health' maps, the best questions to ask in data analysis presentation were the questions used in the presentation delivered to Ward 15 and Ward 18 of the 'LISA' mapmaking project (see Appendix 14, column 1). Questions asked to participants in this session enabled member checking to happen and generated a rich body of data that the researcher could work with to analyse. The 'community health' map used a different set of questions in the data analysis presentation delivered to CHWs and registrar doctors. These questions encouraged participants to think of ideas to take action in response to the questions asked (see Chapter 6, Section 6.2.4). If required, some of these questions can also be added to the questions mentioned above to stimulate participants to plan and generate ideas in future.

Reflective writing and session evaluation questions asked to participants was mostly kept the same in the three mapmaking projects. All of the questions asked were useful and helped the researcher to find answers to the study's research question and objectives.

Reflecting on the transparency of the research process as a strength of the study
The study used Guba and Lincoln's (1989) constructivist evaluation criteria of trustworthiness to inform and evaluate how the study's research approach and methods were conceptualised and implemented. In addition to working with trustworthiness, authenticity was also used to inform and evaluate the processes used to conceptualise and generate the three mapmaking projects that participants took part in (see Chapter 3, Section 3.2.6 for an explanation of both sets of evaluation criteria). As a result of working with their evaluation criteria, one of the strengths of the study lies in the use of confirmability.

Confirmability is one of the four evaluation criteria that fall under trustworthiness. It refers to the extent to which the data analysis process was made transparent for people outside of the study to review and inspect (Guba & Lincoln, 1989:243). This happens to ensure that the "data, interpretations and outcomes of inquiries are

rooted in contexts and persons apart from the evaluator…" (Guba & Lincoln, 1989:243). In the study, the data analysis process was explained in detail in the research approach and methods chapter to ensure confirmability. Also, examples of how data was analysed were also made available for people outside of the research to review and inspect (see the links provided in Chapter 3, at the end of Section 3.2.5.2). All written data collected for the study was also coded twice, once by hand and once with NVivo to help the researcher to rework and refine the themes identified for each mapmaking project and ensure that the findings were an accurate representation of participants' views.

Working with ethical guidelines in the study - a second strength of the research work conducted

In addition to working with Guba and Lincoln's evaluation criteria, another strength of the study lay in the use of the ethical guidelines that informed the research work conducted (see Chapter 3, Section 3.3 for a description of the guidelines used). In line with the guidelines, all consent forms used in the study set out both the project process and purpose of the study to participants in a language that was clear and easy for them to understand. Participants were also made aware of the possible benefits that the process could have for them, and informed that the work generated would be used by the Department of Family Medicine at the University of Pretoria for research purposes. This information enabled participants to make an informed and voluntary choice to take part in the study. As part of the ethical guidelines, participant identities were also protected in the study through the use of pseudonyms. A rigorous data analysis process was also followed to ensure that participant views were presented accurately. All three data chapters also used multiple quotations from various participants to ensure that participant voices and opinions were made visible in the thematic data analysis section of the respective chapters.

Finally, care was also taken to protect patient anonymity in the data maps that were generated and displayed in the 'community health' mapmaking project. All map viewing sessions from this project were purposefully structured to only show data maps of specific areas to the CHW, team leader and the team's registrar doctor that was relevant to the group. Here, the purpose of the data maps was to

support healthcare delivery. Given this, the respective healthcare team members were expected and allowed to know the person, the household, and the conditions in the households visualised through the maps. Furthermore, a representative from Wellnicity was also present in all the map viewing sessions to generate and project the data maps used in this project live from their company laptop.

Generating and projecting the maps live ensured that what was visible to the researcher or anyone else in the session was transient. After the project, the researcher was also only given screenshots of the symbol maps generated for the sessions to use in this thesis which does not show any information about the household addresses or patients in the households.

7.4 Study limitations

At the outset of the study, the researcher observed that team leaders who attended the introduction training workshop on how to implement COPC did not respond to Hans Rosling's TED talk that visualised and animated world health statistics. While the study used mapmaking and group discussions as a way to assist participants to make sense of the maps generated and used in the three mapmaking projects, the study is limited in that it did not address map reading and map literacy. Furthermore, evaluations of the study are only limited to the short-term effect of the research work completed. In response, a recommendation for further research was put forward to do a longitudinal study of maps and mapmaking to address this limitation. The study also did not aim to use the maps generated from the mapmaking processes as finished end-products. Boundaries were drawn to use the maps only as work in progress artefacts that enabled the researcher to find answers to the study's research question. Similar to the previous limitation, a recommendation for further research was also put forward in response to this limitation.

The transferability of the findings are also limited because they are derived from a qualitative rather than quantitative enquiry into WBOTs that implement COPC, use workplace-based learning in their practice and work with ICT enabled technology. However, some of the findings are of relevance to healthcare settings outside this specific context, as the sketch maps, the participatory mapping activities used in the 'history of health' map and aspects in the 'LISA' map are transferable.

7.5   Recommendations for further research

The following are recommendations to put forward for further research:

1. Further research is needed to identify techniques and processes that can improve map literacy among team leaders and CHWs. This need correlates with one of the study's limitations identified about map reading. There is a vast amount of literature available on research work that investigates how people perceive space and read maps. This literature could be combined with reading more on, for example, how projects that work with participatory GIS (PPGIS) use facilitation to help community members to work with GIS software and interpret maps.

2. There is a need for further research into additional types of medical data map visualisation techniques and data combinations to test which would work best for community-based service delivery. Software limitations implied that maps generated in the 'community data' mapmaking project could only use basic visualisation techniques and data combinations. Investing time and money in this would increase the usability of the maps and enable the Department of Family Medicine at the University of Pretoria to generate the additional types of data maps that participants wanted to see and use in their work (see the last paragraph of Section 6.3.3).

3. There is a need for longitudinal research to understand the value and role of mapmaking in the implementation of COPC over time both in terms of the impact that this has on service provision as well as on healthcare.

4. There is a need to conduct implementation science in order to determine the frequency and extent of repetition required to engender mapmaking into WBOT practice. This type of research work will help to identify how many times WBOTs need to view and discuss the 'community health' maps per quarter and establish how many times each team needs to review and update their 'LISA' maps.

5. Lastly, there is room for further design research work to be done to explore ways to formalise the mapmaking projects into a product that is cost-effective and can be used at a provincial and national level. The mapmaking projects used in the study were never designed to be a prototype or an end product in their own right. Design researchers who work with design thinking would be able to explore and develop this further to support service delivery.

7.6   Summary and recommendation for implementation

This qualitative study set out to explore what use and value maps and mapmaking could have for the delivery of COPC in the City of Tshwane, South Africa. A systematic literature review conducted at the start of the study revealed that medical data maps help healthcare team members with both monitoring and evaluation and the planning and implementation of service delivery. The systematic literature review also highlighted the value of maps to enable community members to take part in primary healthcare delivery and contribute local level knowledge to medical data maps or use medical data maps to initiate healthcare interventions.

Building on these findings, the three mapmaking projects of the study revealed similar themes about the use and value of geographic maps for healthcare delivery in COPC. However, the data analysis process also uncovered a new group of main themes which revealed what use and value the participatory process of mapmaking and group discussions about the maps have for WBOTs who deliver

COPC. Furthermore, the discussion section of this chapter also put forward four underlying conclusions that could be deducted from the study's main themes. These are: (a) to improve on and expand the type GIS maps used in the third mapmaking project and incorporate these maps into the delivery of COPC, (b) to see and use mapmaking as a participatory learning process for WBOT team members in COPC, (c) to continue to use both sketch mapping and physical mapping in COPC as an learning activity that enable CHWs to familiarise themselves with their area of service delivery, and (d) to use both the map and the process of mapmaking together to improve how WBOT team members understand the area where they work as well expand their awareness of the value, uses and different roles that maps can play to help them improve the work that they do.

Chapter 7 concludes this research study. The recommendation put forward by this study is to incorporate the learnings generated from the three mapmaking projects into WBOT training to continue to improve the delivery of COPC in the Tshwane health post model.

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9.   APPENDICES

Appendix 1: Medline search strategy

Overview of the search process followed

The following terms were combined for the search process:

Concept 1

Exp *Geographic Information Systems

(GIS or geographical or geomapping or map or mapping).tw.

Concept 2

Exp Health/ or exp Community Health Planning/ or exp Community Health Centers/ or exp Community Health Services/ or exp Community Mental Health Centers/ or exp Community Mental Health Services/ or exp "Delivery of Healthcare"/ or exp Community Health Nursing/ or exp Community Health Workers/ or exp Comprehensive Healthcare/ or exp "Delivery of Healthcare, Integrated"/

Concept 3

(COPC or community oriented primary care).tw. or exp primary healthcare

Process followed:

1. The first search conducted looked for sources that combined all three search concepts (referred to in the systematic review as: COPC / community health & Primary Healthcare & GIS - which yielded only19 results)

2. After this the concepts were combined without concept 3 to produce more results (GIS & Health / community / Primary Healthcare etc. - this yielded 65 results).

2. Medline search strategy used for the first search:

Set	Search Terms
1	exp *Geographic Information Systems/
2	(GIS or geographical or geomapping or map or mapping).ti.
3	1 or 2
4	exp Community Health Planning/ or exp Community Health Centers/ or exp Community Health Services/ or exp Community Mental Health Centers/ or exp Community Mental Health Services/ or exp "Delivery of Healthcare"/ or exp Community Health Nursing/ or exp Community Health Workers/
5	(COPC or community oriented primary care).tw.
6	exp primary healthcare/ or 5
7	3 and 4 and 6
8	Limit 7 to (English language and humans)

Appendix 2: Systematic literature review – critical appraisal tools used

Critical appraisal tool 1 – used to evaluate journal articles (Cottrell 2005:157).

Concise critical notes: Articles and papers

Names of author(s)	
Full title of article	
Full title of journal	
Year published	Month
Volume number	Issue number

Hypotheses: What is the paper setting out to prove? Are research hypotheses supported?	
What is the theoretical position underlying the research? Type of theory?	
What is the key literature used as background to the article or paper?	
Which research methods are used?	
What kind of sample is used?	
Key results	
Key conclusions or recommendations	
Strengths of the research: • How does it advance our understanding of the subject or how to research it? • Are there appropriate hypotheses, methods to test the hypotheses, sample sizes or types controls for variables, recommendations? • Consideration of ethics?	
Weaknesses of the research: • In what ways is it limited? When and where would it not apply? • What are the flaws in the research, in the hypotheses, research design and methods, sample size and type, conclusions drawn on the basis of the results?	

Critical reading and note-making   157

Critical appraisal tool 2 – used to evaluate practice-based literature (Cottrell 2005:155; Aveyard, 2010:114).

Concise critical notes: Analysing argument

Names of author(s)/source			
Title of book/programme			
Web-site address		Date downloaded	
Date and/or time		Edition	
Publisher/channel		Place published	
Volume of journal		Issue	

Author's position/ theoretical position?	
Essential background information	
Overall argument or hypothesis	
Conclusion	
Supporting reasons	1 5 2 6 3 7 4 8
Strengths of the line of reasoning and supporting evidence	
Flaws in the argument and gaps or other weaknesses in the argument and supporting evidence	

Critical reading and note-making 155

Appendix 3: Systematic review – codes identified

Final 12 sources selected	Year	Type of Research	Synopsis	Codes	Method & Results (if of interest)	Relevance (low, med, high)	Can source help me answer my RQ (Y/N)	Critique
Search Terms: COPC / Community health, PHC & GIS								
1. Hardt, NS, Muhamed, S, Das, R, Estrella, R & Roth, J. 2013. Neighborhood-level hot spot maps to inform delivery of primary care and allocation of social resources. *The Permanente Journal*, 17(1):4-9.	2013	Case-Study	Medical data maps produced - hotspot maps were created (had potential to be given / shared with local community members and medical students / healthcare teams). Result mobile clinic came about and new community centre was created. Remarkable tale of true community engagement made possible by sharing of the maps & the fact that the maps in themselves offered concrete proof (empirical data) that was made more clear to understand & revealed unknown insights about the community that needed attention from local and medical people.	M&I community engagement Spatial epidemiology (visualisation of diseases) Analytical Data maps Visualisation data (Hot-spot as successful vehicle) Data visualisation as a vehicle for grassroots level change / community mobilisation	Two sources of data used: Descriptive statistics (publicly available - e.g.. census data & Florida Department of Health's Community Health Assessment Resource Tool Set CHARTS etc.) & from local health planning agency (Florida Council) Data geocoded and mapped onto defined area with ArcGIS (quite complex process) Created density maps of health indicators generated (gave much clearer picture of what was happening that table data of zip codes) Density maps generated, explained and given to community stakeholders (local university's med faculty and various other stake holders) > had a huge amount of people present (1000) > remarkable insights were generated about distance to care and areas that were very under served with care & various community facilities Results: novel public-private sector partnerships forged (library, university, children & family service providers) Mobile Clinic created Family resource centre built in area of greatest need	High	Y (it shows that data medical data maps can be a) visualised and b) distributed in such a way as to spark both medical intervention as well as motivate local stakeholders to act on non-health related needs identified by maps)	

2. Lofters, A, Gozdyra, P & Lobb, R. 2013. Using geographic methods to inform cancer screening interventions for South Asians in Ontario, Canada. *BMC Public Health*, 13(1):395.	2013	Quants (cohort / cross-sectional)	GIS & LISA (pure COPC) to identify need for care They refer to LISA as a "local Indicators of Spatial Association) - different to our interpretation	P&I Management & Service Delivery	Used GIS, included local indicators of spatial associations (LISA) using GeoData software + population level administrative data. Created Multi-layered maps from this to show: rates of cancer screening over percentage of South Asian residents over location of primary care practices & community care centres Results: Intervention Planning - Maps shared partner service org. (both from health care and who focus on community service) at a meeting to confirm results and discuss with focus of planning interventions.	Med	Y (means you work with GIS to identify health needs that you can share with community and other health organisations to act on) > So we can share it with other community organisations to help us act? we can also share it with other people providing care to confirm some of our findings > Like the discuss bit (so you check in with what others have experienced on ground level daily)	

| 3. Hayashi, A.S., Bazemore, A. & Mcintyre, J. 2011b. Transforming community health and primary care education using clinical and administrative data and geographic information systems. *Journal of Map and Geography Libraries,* 7(1):61-70. | 2011 | Quants: Cross Sectional (surveys done to test pre and post workshop knowledge) | Method suggested for an intern-orientation seminar.

Seminar targeted at recently graduated Family Medicine interns.

Challenge identified > interns have limited time to familiarise themselves with the health care context of the clinic where they will be stations.

Function of the seminar is to introduce students to GIS maps of the area to help create a better understanding of the health care status and most prevalent diseases in the area.

Details of participants - needing to complete a 3-year community based curriculum based on the COPC model (COPC model = used by Masters of Public Health at the George Washington University > p63) | M&E

GIS & Education (simulating reality & using this to inform students of health care characteristics specific to a particular community) | Produced a map in GIS (working with clinic data & population data) > map used in a seminar.

Participants were given a questionnaire before the seminar (survey was done to assess knowledge about the clinic, county, and relevant facts related to the population & health in that particular area)

During seminar interns were given 3specific questions as the objective of the session:
to learn / familiarise students with available data sets they had access to (both at the clinic, and related to publicly available data)
Students tasked to be able to identify the characteristics of the clinic population & area that they would be stationed at
Students needed to be able to describe the common health issues encountered by patients in your areas

Post session students needed to complete a survey again > results were compared with survey done pre-test

In short:
maps created in GIS
Pre and post seminar survey done to evaluate specific knowledge of participants related to the health status and characteristics of a specific area
Seminar was given with objective of informing students of health care needs and characteristics of specific areas and familiarised with various data available to them both from the clinic and from public databases | High (specifically focused on medical students) | Y (use of GIS to further / enhance the education of medical students especially in the context of delivering COPC)

Case study is definitely worth looking at as an approach to incorporate at the university. | Concern about pre-assumptions created as a response to process

Overly trusting "analytical data" as the truth & Lack of voices of "local participants"
- relying on data that could be faulty (inaccurately captured - this accounts for both clinic and government data)

Lack of cross-checking data with current status of an area (given that area is constantly changing and evolving)

Recommendation: Integrate an activity of neighbourhood mapping into the curriculum for interns to complete during their visit (if at all feasible given time and resources this would require > possibility to also set up a team at the clinic to help complete this task across various health care team members stationed at the clinic) |

4. Beyer, K.M., Comstock, S. & Seagren, R. 2010. Disease maps as context for community mapping: a methodological approach for linking confidential health information with local geographical knowledge for community health research. *Journal of Community Health,* 35:635-644.	2010	Mixed Methods (Data maps created - audience involved > Action Research)	Article puts forward a method that draws on both geographic data mapping and local knowledge mapping. key focus - statement - health = product of many aspects (includes both "individual biological & behavioural influences as well as contextual influences"). Challenge identified - how to include community members in local knowledge mapping when working with confidential data. Case study - method to use to work around this.	P&I (showing patterns of health) GIS & assessing environmental impact on health GIS & participation / engagement (local people contributing to knowledge to inform assessment and decision making in a particular area.	Working with existing data maps of Colorectal cancer in a specific area (adaptive spatial filtering was used as a method) Focus group of participants were recruited to conduct participatory mapping work (modelled on a technique used for "community hazard and asset mapping" [technique used to identify community resources and problems]. Participants... attended a presentation on colorectal cancer (informing them on various aspects related to the disease) Explained how they calculated disease rates and mapped them (presentation given) Included in a brainstorming session - to think about why colorectal cancer was so prevalent in this area. Engaged in a mapping exercise - working with GIS in real time - where they located locations that was indicated as places that would increase or decrease your risk for colorectal cancer) {method used very fascinating > to be reviewed}	High	Y (the technique of community mapping proposed can definitely be something we work with / can apply - unsure if my study will be able to engage with a medical issue in this depth, Process of doing a "live community mapping" project working directly into GIS definitely seems like a good tool to use in one of the mapping projects to implement, try out and evaluate.	
5. Dulin, M.F., Ludden, T.M., Tapp, H., Smith, H.A., De Hernandez, B.U., Blackwell, J. & Furuseth, O.J. 2010b. Geographic information systems (GIS) demonstrating primary care needs for a transitioning Hispanic community. *The Journal of the American Board of Family Medicine*, 23(1):109-120.	2010	Quants Cross-sectional > the article itself (mapping) [actually CBPR - in terms of research design]		M&E (understanding patterns of health care use) + P&I (long term) Locating needs > planning health interventions	Multiple attribute primary care targeting strategy (layering of maps > specific mapping process used) Geographically defined area - looked at generating maps about various factors that impacts on health / gives an indication of health care needs (socio-economic status, insurance status, population status, use of emergency dept as a primary care safety net)	High	Y (definitely relevant case study for socio economic maps).	

6. Berke, E.M. 2010. Geographic information systems (GIS): recognizing the importance of place in primary care research and practice. *The Journal of the American Board of Family Medicine,* 23(1):8-12.	2010	Practice based > a discussion article written by an expert in the field (special communication article for the journal - not a lot of reading)	John Snow's breakthrough mentioned, pointing out that GIS enables layering of data which communicates a very important picture of health related to a context Understanding patient context when offering PHC - massive difference this makes - e.g. can't ask someone to change their diet if nothing fresh is available	M&I Measuring Access to care Taking health to the home	Very brief overview of article structure: First looks at GIS in research setting > tool to study population Then calls for a shift to study investigating the context of the individual (so environment that impacts on individual health) Use of GIS for Primary care researchers > how this translates into clinical practice (nb - Table matches measurements taken of place / habitat > points to the research application)	Med-High (it's practice based)	Y (short - his point is to not just map big census / population data - to take health into the home - so use GIS to better understand context of a patient and offer health care service keeping this in mind)	
7. Bazemore, A., Phillips, R. L. & Miyoshi, T. 2010b. Harnessing geographic information systems (GIS) to enable community-oriented primary care. *The Journal of the American Board of Family Medicine,* 23(1):22-31.	2010	Mixed Methods First created maps (Quants) then they interviewed people on their experiences related to working with maps.		M&E (possibly also P&I)	Focus is on working with these maps to assess/ evaluate how effectively clinics serve their local catchment areas and see what can be done to make changes to address disparities	High	Y (the novelty is that it the article argues for the widespread implementation of GIS. It evaluates people's responses to using analytical mapping and sets out the benefits and challenges faced by clinic staff)	
8. Bazemore, A., Diller, P. & Carrozza, M. 2010a. The impact of a clinic move on vulnerable patients with chronic disease: a geographic information systems (GIS) analysis. *The Journal of the American Board of Family Medicine,* 23(1): 128-130.	2010	Practice based article	Clinic was relocated in a black & Hispanic community. GIS used to measure the impact of the move on vulnerable patients.	GIS & access to care (measuring impact of service re-location)		Med-Low	Y&N (not directly relevant to my study, yet a wonderful example of how GIS can benefit PHC delivery.	

| 9. Dulin, M.F., Ludden, T.M., Tapp, H., Blackwell, J., De Hernandez, B.U., Smith, H.A. & Furuseth, O.J. 2010a. Using geographic information systems (GIS) to understand a community's primary care needs. *The Journal of the American Board of Family Medicine*, 23(1):13-21. | 2010 | Practice based / Qualitative Research (unsure - not an academic institutions) | Improve health by addressing access to primary health care + preventative services (indirectly reducing cost). Using GIS to identify areas most in need of care to re-consider distribution / locations of care facilities. | M&E + P&I Monitor and evaluate + plan targeted care services | Check on this... Applied GIS to community and patient level data Strategy called "Multiple Attribute Primary Care strategy" Objective: to identify areas greatest need for of increased access to PC (primary care) First identified attributes that would give an indication of PHC "needs", then they identified access to care. They did this by working with local health care practices (participants drew on their knowledge of the community). Factors they identified to look at: socio economic status, population density, insurance status, emergency department and primary care safety-net utilization [only these 4 things]. | Med-High | Y (what I did with Owen, and definitely something to do with doctors and Nurses servicing an area - especially if they have worked in an area for a while & we can draw on knowledge of key medical staff that they have been working with) | |

| 10. Aronson, R.E., Wallis, A.B., O'campo, P.J. & Schafer, P. 2007. Neighborhood mapping and evaluation: a methodology for participatory community health initiatives. *Maternal & Child Health Journal,* 11(4):373-383. | 2007 | Mixed Methods (generated both Analytical data maps & local knowledge maps)

Study as a whole is an experiment to test something (so quantitative from this angle)

Local knowledge maps could be a form of Action Research

Hypothesis drawn is that process enables for a better understanding of ecological factors impacting on health (which is more Qualitative - i.e. answer to the question - "what is x?" | Project looks at the use of "neighbourhood mapping" - to better understand the correlation between environmental factors and infant mortality prevention in specific areas.

"Mapping can be used to study

Neighborhood mapping implies working with both knowledge maps (generated by participants) with analytical data maps - to gain a better understanding of the impact and relationships that exists between ecological factors and the health care status of a particular community | GIS & community involvement / engagement (working with local people on the ground to contribute knowledge)

Use of GIS to assess the health care status of a community

GIS & impact of environment on health | Conduct community walks with local residents to create local knowledge maps (mapping of insights related to environmental factors impacting on infant mortality)

Combined this data with other forms of analytical data (e.g. census, city / state data, birth certificate data).

Data - geo-coded & worked with "exploratory factor analysis to create spatial density indicators of neighbourhood features.

Result - analysis could be done on associations between neighbourhood features and health outcomes (composite scale created as a result to indicate risk factors associated with particular physical neighbourhood features - e.g. vacant buildings - see article for more details)

Specific terms of interest:
Point and choropleth maps - identified as good tool for visualizing neighbourhood features | High | Y (working with local people to gain knowledge of an area & combine this with analytical data to a) get a more clear picture of the health status of an area and b) analyse the impact of physical neighbourhood features on health) | Initial stab at being critical:
Costly (time wise & in terms of mobilising the community)
Very speculative - wonderful as a piece of qualitative research, unsure what gravitas would be for many medical institutions who firmly believe in pure analytical data use.

{Either that / conclusions drawn are too lightweight - perhaps rigor is lacking > read article first - so in terms of what they measured and what they compared - could perhaps do this in a more strategic way like the case study above} |

#	Year	Type	Description	M&E / P&I	Findings / Gap	Relevance	Build upon	Critique
11. McLafferty, S.L. 2003. GIS and health care. *Annual Review of Public Health,* 24(1):25-42.	2003	Thematic Review (Literature Review) Note theme broad: on GIS & Health (so not PHC + COPC)	Literature review on GIS & health care. Key insights generated on uses of GIS - are all related directly / indirectly to Monitoring & Evaluation or Planning & Implementation) Themes put forward: Analysing Need for health care Analysing Access to health care (measuring access & evaluating inequalities) Geographic visualisation in utilisation GIS in health care delivery (locating health care services, Spatial decision support systems, GIS & Homeland security) Critique offered at the end: about data required / that people need to have access to for GIS to be used effectively & a "gap" pointed out to understand spatial behaviours of providers and consumers better.	M&E (assessing health care needs; access to care & looking at the planning and evaluation of service locations) P&I (looking at patterns of use; and offering support in spatial decision making for health care delivery)	n/a	High (crux / point of departure for my whole literature review)	Y (sources mentioned & themes concluded / identified are all things that I intend to build upon / expand) Also the literature review gives me a synopsis of how GIS is used / has been used - most - or in fact all of - these uses are relevant to my work)	Critique: Themes identified coincide with min more or less. What's missing is concept of PPGIS & notion of using GIS for future forecasting (seems to be two new streams of case studies that have either evolved based on continual use of GIS)
Search Terms: PHC & GIS								
12. Bloch, J.R., 2011. Using geographical information systems to explore disparities in preterm birth rates among foreign-born and US-born Black mothers. *Journal of Obstetric, Gynecologic & Neonatal Nursing,* 40(5), pp.544-554.	2011	Quants Descriptive geographic-spatial research	Examine spatial patterns of stressful environmental factors on preterm birth and nativity	M&E P&I (Planning & Implementation)	Nurses can use GIS to better understand living conditions of mothers & plan targeted interventions in areas with greatest need Gap: further research needed on spatial factors - it is clear that where a mother live matters	High	Y (proves that knowledge about environment impacts on health)	

13. Sage, W.M., Balthazar, M., Kelder, S., Millea, S., Pont, S. & Rao, M. 2010. Mapping data shape community responses to childhood obesity. *Health Affairs,* 29(3):498-502.	2010	Practice based	Using GIS to measure factors impacting on child obesity. Ripple effects of maps produced indicates that if visualisation of data is clear and easily comprehendible they can be passed on to community level organisations who can act on a ground level	M&E Data visualisation as a vehicle for grassroots level change / community mobilisation	Unsure		Med-High (participatory aspect / community oriented focus & connection to food map)	Y (could be a good quality to measure / mapping to produce for food security mapping project)	

Appendix 4: Systematic review – themes identified

i) Initial themes identified from codes grouped into topics

Themes Identified from codes	
Topics	**Themes**
Monitoring & Evaluation	1.1 Access to care 1.2 Assess healthcare needs / reason for needs 1.3 Health Resources available (doctor / patient ratio; assess effectiveness of use) 1.4 Assess quality / effectiveness of healthcare resources and care (focusing on clinic evaluation; service improvement) 1.5 Understand environmental factors impacting on health (multi-layered maps; understanding context / impact of space on health) 1.6 Assess health status of a community
Planning & Implementation	2.1 Review patterns of use 2.2 Planning healthcare interventions or improving services & allocation of health resources 2.3 Shared decision making & planning (partnership building amongst different stakeholders)
Predicting healthcare scenarios	3.2 Educational Processes (familiarise students with context; community profile)
Community Participation in healthcare delivery	4.1 Open access to health data & shared decision making (Community Based Participatory Action Research > participant engagement throughout process) 4.2 Contributing local knowledge to inform decision making (Community Engagement > engagement during data collection) 4.3 Sharing of results to enable community initiated healthcare interventions (Community Engagement post mapping)

ii) Refined themes used for final systematic review

Themes listed above were further refined. In this process selected themes were re-structured or merged together and topic 3 fell away (it was merged into theme 1.2)

Themes Identified from codes	
Topics	**Themes**
Monitoring & Evaluation	1.1 Environmental factors impacting on health 1.2 Assessing healthcare needs 1.3 Assessing inequalities to access of care 1.4 Assessing the health status of a community 1.5 Evaluating the effectiveness of care provided
Planning & Implementation	2.1 Reviewing patterns of use 2.2 Planning healthcare interventions 2.3 Shared decision making & planning (partnership building different stakeholders)
Community Participation in healthcare delivery	3.1 Sharing of results to enable community initiated healthcare interventions (Community Engagement post mapping) 3.2 Contributing local knowledge to inform decision making (Community Engagement > engagement during data collection) 3.3 Open access to health data & shared decision making (Community Based Participatory Action Research > participant engagement throughout process

Appendix 5: The universal characteristics of PR (Higginbottom & Liamputtong, 2015: 5)

Research task	Ownership by participants and researchers
Goals of the research/topic setting	Defined by participants or community, but may be academically articulated by the researcher.
Setting of research questions	Co-constructed by the participants/community and researcher.
Operationalisation of the research	A process of mutual cooperation between the participants/community and researcher.
Acquisition of funding	Usually, though not exclusively, the researcher.
Data collection processes	Co-constructed by the participants/community and researcher.
Data analysis	Co-constructed by the participants/community and researcher.
Interpretation of the findings	Co-constructed by the participants/community and researcher.
Knowledge transfer	Co-constructed by the participants/community and researcher.
Implementation of findings	Participants/community.
Authorship of research products	Both the participants/community and researcher.
Research collaborations	Long-term commitment between the participants/community and researcher.
Educative and critical consciousness dimensions	A mutually beneficial and reciprocal cyclical learning process.
Knowledge translation	Knowledge transfer and implementation in multiple spheres, including praxis and political spheres. Usually, but not exclusively, a challenge to inequity.

Appendix 6.1: Ethical clearance certificate for the study

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Health Sciences

DATE: 30/08/2018

Ms Nina Honiball
Department of Visual Arts
University of Pretoria

Dear Ms Nina Honiball

RE.: 160/2015 ~ Letter dated 28 July 2018

Protocol Number	160/2015
Protocol Title	UNDERSTANDING THE ROLE OF MAPS IN COMMUNITY ORIENTED PRIMARY CARE (COPC): A CASE STUDY OF MAP MAKING IN WARD-BASED OUTREACH TEAMS IN MAMELODI (Umbrella study: 102/2011)
Principal Investigator	Ms Nina Honiball Tel: 117886227 Email: nina.honiball@up.ac.za Dept: Visual Arts

We hereby acknowledge receipt of the following documents:

- Renewal of Ethics approval of study has been granted for 1 year until end of August 2019.

Which has been approved at 29 August 2018 meeting.

With regards

Dr R Sommers; MBChB; MMed (Int); MPharMed; PhD
Deputy Chairperson of the Faculty of Health Sciences Research Ethics Committee, University of Pretoria

Research Ethics Committee
Room 4-59, Level 4, Tswelopele Building
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Fakulteit Gesondheidswetenskappe
Lefapha la Disaense tša Maphelo

Appendix 6.2: Ethical clearance certificate for the umbrella study

The Research Ethics Committee. Faculty Health Sciences, University of Pretoria complies with ICH-GCP guidelines and has US Federal wide Assurance.
* FWA 00002567, Approved dd 22 May 2002 and Expires 13 Jan 2012.
# IRB 0000 2235 IORG0001762 Approved dd 13/04/2011 and Expires 13/04/2014.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Health Sciences Research Ethics Committee
Fakulteit Gesondheidswetenskappe Navorsingsetiekkomitee

DATE: 27/06/2011

PROTOCOL NO.	102/2011
PROTOCOL TITLE	Researching the Development, Application and Implementation of Community Oriented Primary Care (COPC) a study in Gauteng (Tshwane) and Mpumalanga Province.
INVESTIGATOR	Principal Investigator: JFM Hugo
SUBINVESTIGATOR	None
SUPERVISOR	None
DEPARTMENT	Dept: Phone: 012 3542463 Fax: 012 3541317 E-Mail: jannie.hugo@up.ac.za
STUDY DEGREE	None
SPONSOR	None
MEETING DATE	22/06/2011

The Protocol was approved on 22/06/2011 by a properly constituted meeting of the Ethics Committee subject to the following conditions:

1. Provisionally approved pending changes.
2. The approval is valid for 5 years period [till the end of December 2016] , and
3. The approval is conditional on the receipt of 6 monthly written Progress Reports, and
4. The approval is conditional on the research being conducted as stipulated by the details of the documents submitted to and approved by the Committee. In the event that a need arises to change who the investigators are, the methods or any other aspect, such changes must be submitted as an Amendment for approval by the Committee.

Members of the Research Ethics Committee:

Prof M J Bester	(female)BSc (Chemistry and Biochemistry), BSc (Hons)(Biochemistry); MSc(Biochemistry); PhD (Medical Biochemistry)
Prof R Delport	(female)BA et Scien, G Curationis (Hons) (Intensive care Nursing), M Sc (Physiology), PhD (Medicine), M Ed Computer Assisted Education
Prof JA Ker	MBChB; MMed(Int); MD -- Vice-Dean (ex officio)
Dr NK Likibi	MBB HM -- Representing Gauteng Department of Health) MPH
Dr MP Mathebula	(female)Deputy CEO: Steve Biko Academic Hospital; MBCHB, PDM, HM
Prof A Nienaber	(female) BA(Hons)(Wits); LLB; LLM; LLD(UP); PhD; Dipl.Datametrics(UNISA) -- Legal advisor
Mrs MC Nzeku	(female) BSc(NUL); MSc(Biochem)(UCL, UK) -- Community representative
Prof L M Ntlhe	MbChB (Natal) FCS (SA)
Snr Sr J Phatoli	(female) BCur(Eet.A); BTec(Oncology Nursing Science) -- Nursing representative
Dr R Reynders	MBChB (Pret), FCPaed (CMSA) MRCPCH (Lon) Cert Med. Ops (CMSA)
Dr T Rossouw	(female) MBChB (cum laude); M.Phil (Applied Ethics) (cum laude), MPH (Biostatistics and Epidemiology (cum laude), D.Phil
Dr L Schoeman	(female) B.Pharm, BA(Hons)(Psych), PhD -- Chairperson: Subcommittee for students' research
Mr Y Sikweyiya	MPH; SARETI Fellowship in Research Ethics; SARETI ERCTP; BSc(Health Promotion)Postgraduate Dip (Health Promotion) -- Community representative
Dr R Sommers	(female) MBChB; MMed(Int); MPharmMed -- Deputy Chairperson
Prof TJP Swart	BChD, MSc (Odont), MChD (Oral Path), PGCHE -- School of Dentistry representative

MS: dd 2011/06/28: C:\Documents and Settings\User\Desktop\grade belowe mait094,2011.DOC

Open Rubric

Appendix 7: Participant consent form used for the 'LISA' and 'history of health' maps.

PARTICIPANT'S INFORMATION & INFORMED CONSENT DOCUMENT FOR NURSES AND COMMUNITY HEALTHCARE WORKERS (CHWs)

STUDY TITLE: Understanding the role of maps in Community Oriented Primary Care (COPC): a case study of mapmaking in ward-based outreach teams in Mamelodi.

Principal Investigator: Nina Honiball
Institution: Department of Family Medicine, University of Pretoria

DAYTIME TELEPHONE NUMBER(S): 078 315 8394

DATE AND TIME OF FIRST INFORMED CONSENT DISCUSSION:

				:
dd	**mmm**	**ivy**		**Time**

Dear Mr. / Mrs / Ms .... date of consent procedure …....../…....../…......

1) INTRODUCTION

You are invited to participate in research work for a PhD study. This information leaflet is to help you to decide if you want to participate. Before you agree to take part in this study, you should fully understand what is involved. If you have any questions that are not fully explained in this leaflet, please do not hesitate to ask the researcher.

2) THE NATURE AND PURPOSE OF THIS STUDY

The aim of the PhD study is to explore what the role and use of maps, mapmaking and discussions around maps can be for healthcare team members delivering Community Oriented Primary Care (COPC). By doing the study, the researcher would like to learn more about:

- What you think about maps and, discuss what value the maps you currently work with in COPC have for you;

- Discuss and create a map together as a group about a health-related topic that is relevant to COPC;

- Engage in a focus group discussion to make sense of the map and evaluate the experience;

- Ask you to report on what the experience of the mapping session means to you.

For the purpose of the study, the term 'maps' refers to geographic maps of different wards of Mamelodi. These maps could be maps that people draw of a specific area in Mamelodi, or maps adapted from Google Earth that people use to add information to (for example stories or insights that you have about the area or community in which you live and work), or medical data maps generated by computer software that shows the information captured on the Aita Health system that COPC team members use when screening households.

3)   EXPLANATION OF PROCEDURES TO BE FOLLOWED

You will be asked to take part in a mapping project, focus group session, conduct individual reflection about your experience and join a presentation where the researcher shows you the insights and findings that has been generated from the process of working with you.

During the mapping project you will be asked to:
- Help create the map (by drawing or writing information onto a map);
- Collect any data needed to create the map (this might include talking to community members, recording these stories, taking photographs of your area, or reading through information supplied to you by the researcher);
- Talk about the map as a group (think about any new ideas that the group identified, or point out challenging ideas or thoughts that you or someone in the group had while making the map);
- Work with the researcher to analyse the map visually (this is based on a process called visual rhetoric that is used in visual culture studies). The researcher will guide you through this process by asking you a few questions to think about as a group;
- Reflect on your experience after the mapping project has been completed by answering specific questions and writing about this in a small journal supplied to you;
- Sit in on a presentation where the researcher shows and tells you about ideas and observations she has gathered from doing the mapping project with you and, ask you to offer any feedback or comments about what you have to say of this information that is presented to you.

Examples of questions that you might be asked during the mapping project are:
- What do you see when you look at the map?
- What do you feel when you work with the content of the map?
- How would this affect health? (What impact could this have on health?)
- Can you and how would you use the map?

Conversations and focus group discussions taking place during the mapping project will be audio recorded. As the researcher, I will transcribe (copy into writing) the recordings and read all written reflection work you submit. I will then describe and analyze all the recorded and written material.

4) RISK AND DISCOMFORT INVOLVED

There are no risks involved in participating in the study. However, taking part in the mapping project will take some of your time and might require of you to walk around in your area and/or gather information for the mapping project. During the mapping project itself, discussions with other people who have a different opinion to you may cause some disagreement. The researcher will make sure that all discussions are conducted in a fair and respectful way to minimise disagreement where possible.

If you feel uncomfortable to answer any of the questions asked to you during the mapping project, please know that you do not have to answer them should you not wish to.

The mapping project will take place over a one-month period. During this time the mapping session/map discussion will require of you to take part in one or two four-hour workshop sessions. In addition to this you need to be wiling to set aside some of your own time to help collect the information that is needed for the mapping project and complete the written reflection work afterwards.

The presentation delivered by the researcher at the end of the project will be two to three hour long – this will include enough time for you to comment on or give your feedback on the information being presented to you. Please note that the researcher will need and extra month to complete data analysis. The presentation will be given once this is completed.

Depending on tasks involved in generating the map, the researcher may need to meet with individuals in the group once or twice a week during the first two and a half weeks of the mapmaking process when participants are busy collecting information. If, however, the mapping project only uses a medical data map that is supplied to us by the Department of Family Medicine that is generated for the project from the Aita Health system, these extra contact sessions will not be needed. The time, duration and objectives of these contact sessions will need to be discussed between the researcher and the participants once the mapping project has started.

5)   POSSIBLE BENEFITS OF THIS STUDY

You will not benefit directly from taking part in the study. However, the results of the study will enable the researcher, the participants of the mapping project and the COPC management team to understand if the mapping project itself is of value and benefit to COPC

You may indirectly benefit from the study. By taking part in the mapping process, information gathering, group discussion, individual reflection or presentation you will gain a better understanding of the health profile or environmental and socio-economic characteristics of the area in which you work.

6)   WHAT YOUR RIGHTS ARE AS A PARTICIPANT?

Your participation in the study is entirely voluntary, so it is up to you to make this choice. You can also choose not to answer some of the questions that is asked to you or stop at any time during the mapping project without giving any reason. Your decision will not affect your participation in COPC or your employment in any way.

7)   HAS THE STUDY RECEIVED ETHICAL APPROVAL?

The research proposal for this study was submitted to the Faculty of Health Sciences Research Ethics Committee, University of Pretoria, telephone numbers 012 356 3084 / 012 356 3085 and written approval has been granted by that committee. A copy of the letter of approval is with the researcher facilitating the project if you would like to read it, please ask the researcher to show this to you.

8)   INFORMATION AND CONTACT PERSON

The contact person for the study is: Nina Honiball.
If you have any questions about the study please contact Nina directly on: 078 315 8394

9)   CONFIDENTIALITY

The information obtained from participants during the focus group discussion and individual written reflection work will be analysed by the researcher and treated with strictest confidentiality. As a participant of the group your name and photographs of the group participating in mapmaking sessions may be used in reports or publications with your permission.

10)   CONSENT TO PARTICIPATE IN THIS STUDY

I have read or had read to me in a language that I understand the above information. The content and meaning of this information have been explained to me. I have been given an opportunity to ask questions and I am satisfied that my questions have been answered. I understand that if I do not participate it will not alter my work or healthcare in any way.

Please circle "yes" or "no"

  A. I hereby voluntarily agree to take part in this study.
      Yes / No

  B. I give permission for you to audio-record conversations and group discussions that I participate in.
      Yes / No

  C. I give permission for you to identify me by name in research presentations and publications resulting from this study.
      Yes / No

  D. I give permission for you to use my picture in research presentations and publications resulting from this study.
      Yes / No

I have received a signed copy of this informed consent agreement.

Participant Name ....   Participant Signature ....

Date   ....

Researcher's name..   Researchers Signature ....

Date   ....

Witness Name ....   Witness Signature ....

Date   ....

Appendix 8: General public consent form used for the 'history of health' map

PARTICIPANT'S INFORMATION & INFORMED CONSENT DOCUMENT FOR COMMUNITY MEMBERS

STUDY TITLE: Understanding the role of maps in Community Oriented Primary Care (COPC): a case study of mapmaking in ward-based outreach teams in Mamelodi.

Principal Investigator: Nina Honiball
Institution: Department of Family Medicine, University of Pretoria

DAYTIME TELEPHONE NUMBER(S): 078 315 8394

DATE AND TIME OF FIRST INFORMED CONSENT DISCUSSION:

				:
date	**month**	**year**		**Time**

Dear Mr. / Mrs. .... date of consent procedure …....../…....../…......

1) INTRODUCTION

I would like to invite you to participate in a research project. This information leaflet is to help you to decide if you want to take part. Before you agree to take part in this project, you need to understand what will be expected of you. Please ask about anything that you do not understand or that you are unsure about.

2) THE NATURE AND PURPOSE OF THIS STUDY

The aim of this study is to map the impact of the 1980s on the health and healthcare of people living in your area. The objective is to use your responses to create a history of health map of Mamelodi of this period in time.

3) EXPLANATION OF PROCEDURES TO BE FOLLOWED

You will be interviewed by one of the ward-based outreach team members who are working in your area. He or she will interview you in your home. He or she will ask you questions that will cover the following topics:

- Your biography (e.g. When did you come to Mamelodi? Where did you live and where do you live now? Who were you living with?)
- Your experiences of living in your area during the 1980's. (e.g. What was it like? What could you do or not do? Where could you go or not go? What were your biggest fears?) Please explain by giving an example.
- Your knowledge of the health issues of the community at the time? (e.g. How would you describe the health of your community or neighbors during this period in time? What were the most common healthcare problems that people faced? Had you heard about AIDS? What about family planning issues?)
- Your recollection of available health services in the 1980s. (e.g. What health services did you use? How were they organised? What was their focus? How did you feel about using them?)
- Your knowledge and use of key healthcare services available in your area today? (e.g. What services are there, what do you use these healthcare services for? Can you show where they are on the map?).

You will be invited to come to the mapping workshop where your story will be shared by the team member who interviewed you.

4)   RISK AND DISCOMFORT INVOLVED

There are no risks to you in participating in this interview. The interview will take your time and some of the questions asked may cause some discomfort as they may stir up painful memories. The interviewer will make sure that the interview is carried out in a respectful way and will support you.

You can choose to not answer questions that make you feel uncomfortable. The interview will take between 30-45 minutes of your time.

5)   POSSIBLE BENEFITS OF THIS STUDY

You will not benefit directly from taking part in the study. However, the answers and stories that you share with us will help us to gain a deeper understanding of the history of this area, particularly in relation to health and healthcare.

You may indirectly benefit from the study as a participant in this study by sharing your own experiences and attending the workshop session where other stories and answers will be presented. The information generated will also be put together in a booklet or report that will be given to everyone who took part in the interviews to keep.

6)   WHAT YOUR RIGHTS ARE AS A PERSON TAKING PART IN THE INTERVIEW?

Taking part in this interview is entirely voluntary. You can choose not to answer any of the questions or stop at any time during the interview without giving any reason. Your decision will not affect your participation in Community Oriented Primary Care as a resident and community member of this area in any way.

7)   HAS THE STUDY RECEIVED ETHICAL APPROVAL?

This form was submitted to the Faculty of Health Sciences Research Ethics Committee, University of Pretoria, telephone numbers 012 356 3084 / 012 356 3085 and written consent has been granted by the committee to use this form and conduct the interview with you.

8) INFORMATION AND CONTACT PERSON

If you have any questions please contact Nina Honiball 078 315 8394 from the University of Pretoria. She is a graphic designer and student who is doing this research as part of her doctoral studies.

9) CONFIDENTIALITY

The information you share with us is about your personal history and what you know and remember about the 1980s period. In mapping your oral history it is important to identify people by name, because you are the real actors who took part in events and struggles of the time. With your permission, you will be identified and associated with your stories and answers on the map to show the people's account of health in Mamelodi during the 1980s. If you do not want to be identified, please let the researcher know so that your contribution and stories will be anonymised before being shared with the mapping participants and in any report or publication.

10) CONSENT TO PARTICIPATE IN THIS STUDY

I confirm that the person asking my consent to take part in this study has told me about the nature, process, risks, discomforts and benefits of the study. I have received, read and understood the above written information.

I agree to be identified by name and associated with the information I share during the interview, This includes my personal details. …………………………. (signature).

Or

I do not agree to be personally identified and associated with the information I share during the interview, including my personal details. I want the information I share to be shown without my name. ……………………………… (signature).

I am participating willingly. I have had time to ask questions and have no objections to participating in the study. I understand that I will not be penalised in any way should I wish to discontinue with the interview and my withdrawal will not affect my ability to be part of the Community Oriented Primary Care project in any way.

I have received a signed copy of this informed consent agreement.

....

Name of person being interviewed   Date

....
Signature of person being interviewed   Date

....
Name of interviewer   Date

....
Signature of interviewer   Date

....
Name and signature of witness   Date

VERBAL PATIENT INFORMED CONSENT   (applicable when patients cannot read or write)

I, the undersigned, …………………………………..…, have read and have explained fully to the person taking part in the interview, named ………….……. and/or his/her relative, the contents of this information leaflet, which has indicated the nature and purpose of the interview in which I have asked the person to take part. The explanation I have given has mentioned both the possible risks and benefits of the interview to the person to be interviewed. The person being interviewed indicated that he/she understands that he/she will be free to stop and withdraw from the interview at any time for any reason.

I hereby certify that the participant has agreed to participate in this interview.

Name of person being interviewed   _____
            (Please print)

Signature of person being interviewed   _____   Date _____

Name of person conducting the interview   _____
            (Please print)

Signature of person conducting the interview_____   Date _____

Witness's Name _____ Witness's Signature _____ Date _____
     (Please print)

(Witness - sign that he/she has witnessed the process of informed consent)

Appendix 9: Adapted participant consent used for the 'community health' map

PARTICIPANT'S INFORMATION & INFORMED CONSENT DOCUMENT FOR NURSES AND COMMUNITY HEALTHCARE WORKERS (CHWs) AND REGISTRAR DOCTORS

STUDY TITLE: Understanding the role of maps in Community Oriented Primary Care (COPC): a case study of mapmaking in ward-based outreach teams in Mamelodi.

Principal Investigator: Nina Honiball
Institution: Department of Family Medicine, University of Pretoria

DAYTIME TELEPHONE NUMBER(S): 078 315 8394

DATE AND TIME OF FIRST INFORMED CONSENT DISCUSSION:

				:
date	**month**	**year**		**Time**

Dear Mr. / Mrs / Ms .... date of consent procedure …....../…....../….......

1)   INTRODUCTION

You are invited to participate in research work for a PhD study. This information leaflet is to help you to decide if you want to participate. Before you agree to take part in this study, you should fully understand what is involved. If you have any questions that are not fully explained in this leaflet, please do not hesitate to ask the researcher.

2)   THE NATURE AND PURPOSE OF THIS STUDY

The aim of the PhD study is to explore what the role and use of maps, mapmaking and discussions around maps can be for healthcare team members delivering Community Oriented Primary Care (COPC)*.* By doing the study, the researcher would like to learn more about:

- What you think about maps and, discuss what value the maps you currently work with in COPC have for you;

- Discuss and look at a series of maps about a health related topic that is relevant to COPC;

- Take part in an interview to discuss and make sense of these maps;

- Ask you to report on what the experience of the interview meant to you.

For the purpose of the study, the term 'maps' refers to geographic maps of different wards of Mamelodi. These maps could be maps that people draw of a specific area in Mamelodi, or maps adapted from Google Earth that people use to add information to (for example stories or insights that you have about the area or community in which you live and work), or medical data maps generated by computer software that shows the information captured on the Aita Health system that COPC team members use when screening households.

3)   EXPLANATION OF PROCEDURES TO BE FOLLOWED

You will be asked to take part in a mapping project, interview, conduct individual reflection about your experience and join a presentation where the researcher shows you the insights and findings that has been generated from the process of working with you.

During the mapping project you will be asked to:
- Look at a medical data maps of your team
- Participate in an interview where the researcher asks you questions about how you see these maps or ask you about thoughts that you have when looking at these maps;
- Work with the researcher to analyse the map visually (this is based on a process called visual rhetoric that is used in visual culture studies). The researcher will guide you through this process by asking you a few questions to think about;
- Reflect in writing on your experience after the mapping project has been completed by answering questions given to you;
- Sit in on a presentation where the researcher shows and tells you about ideas and observations she has gathered from doing the mapmaking project with you and, ask you to offer any feedback or comments about what you have to say of this information that is presented to you.

Examples of questions that you might be asked during the mapping project are:
- What do you see when you look at the map?
- What is the information on the map telling you?
- How would this affect health? (What impact could this have on health?)
- Can you and how would you use the map?

Conversations and group discussions taking place during the mapping project will be audio recorded. As the researcher, I will transcribe (copy into writing) the recordings and read all written reflection work you submit. I will then describe and analyze all the recorded and written material.

4)   RISK AND DISCOMFORT INVOLVED

There are no risks involved in participating in the study. However, taking part in the mapping project will take some of your time and might require of you to walk around in your area and/or gather information for the mapping project. During the mapping project itself, discussions with other people who have a different opinion to you might occur and cause some disagreement. The researcher will make sure that all discussions are conducted in a fair and respectful way to minimise disagreement where possible.

If you feel uncomfortable to answer any of the questions asked to you during the mapping project, please know that you do not have to answer them should you not wish to.

The mapping project will take place over a one-month period. During this time the mapping session/map discussion will require of you to take part in an introductions session (two-four hours long) and one or two, one hour long interviews. In addition to this you need to be willing to set aside a few minutes of your own time to complete the written reflection work afterwards.

The presentation delivered by the researcher at the end of the project will be two to three hour long – this will include enough time for you to comment on or give your feedback on the information being presented to you. Please note that the researcher will need two to three weeks to complete data analysis. The presentation will be given once this is completed.

Depending on tasks involved in generating the map, the researcher may need to meet with individuals in the group once or twice a week during the first two and a half weeks of the mapmaking process when participants are busy collecting information. If, however, the mapping project only uses a medical data map that is supplied to us by the Department of Family Medicine that is generated for the project from the Aita Health system, these extra contact sessions will not be needed. The time, duration and objectives of these contact sessions will need to be discussed between the researcher and the participants once the mapping project has started.

5) POSSIBLE BENEFITS OF THIS STUDY

You will not benefit directly from taking part in the study. However, the results of the study will enable the researcher, the participants of the mapping project and the COPC management team to understand if the mapping project itself is of value and benefit to COPC

You may indirectly benefit from the study. By taking part in the mapping process, information gathering, group discussion, individual reflection or presentation you will gain a better understanding of the health profile or environmental and socio-economic characteristics of the area in which you work.

6) WHAT YOUR RIGHTS ARE AS A PARTICIPANT?

Your participation in the study is entirely voluntary, so it is up to you to make this choice. You can also choose not to answer some of the questions that is asked to you or stop at any time during the mapping project without giving any reason. Your decision will not affect your participation in COPC or your employment in any way.

7) HAS THE STUDY RECEIVED ETHICAL APPROVAL?

The research proposal for this study was submitted to the Faculty of Health Sciences Research Ethics Committee, University of Pretoria, telephone numbers 012 356 3084 / 012 356 3085 and written approval has been granted by that committee. A copy of the letter of approval is with the researcher facilitating the project if you would like to read it, please ask the researcher to show this to you.

8) INFORMATION AND CONTACT PERSON

The contact person for the study is: Nina Honiball.
If you have any questions about the study please contact Nina directly on: 078 315 8394

9) CONFIDENTIALITY

The information obtained from participants during the focus group discussion and individual written reflection work will be analysed by the researcher and treated with strictest confidentiality. As a participant of the group your name and photographs of the group participating in the mapping project may be used in reports or publications with your permission.

10) CONSENT TO PARTICIPATE IN THIS STUDY

I have read or had read to me in a language that I understand the above information. The content and meaning of this information have been explained to me. I have been given an opportunity to ask questions and I am satisfied that my questions have been answered. I understand that if I do not participate it will not alter my work or healthcare in any way.

Please circle "yes" or "no"

E. I hereby voluntarily agree to take part in this study.
Yes / No

F. I give permission for you to audio-record conversations and group discussions that I participate in.
Yes / No

G. I give permission for you to identify me by name in research presentations and publications resulting from this study.
Yes / No

H. I give permission for you to use my picture in research presentations and publications resulting from this study.
Yes / No

I have received a signed copy of this informed consent agreement.

Participant Name ....   Participant Signature ....

Date   ....

Researcher's name..   Researchers Signature ....

Date   ....

Witness Name ....   Witness Signature ....

Date   ....

Appendix 10: 'LISA' tool

Addendum A

Community Oriented Primary Care Cycle (COPC)
Local Institutional Support Assessment
LISA CHECKLIST

We all want to live in a healthy community. We believe that it is possible if we work together with all the organisations that are active here as well as with the individuals and families we serve. Our vision is to support health for all. I have come to find out more about your organisation and if you would be interested in working with us in community oriented primary care (COPC).
COPC is an approach that brings service providers and service users together, for better health and well-being in the community. We work in ward based outreach teams using the best available information and resources.

I would like to ask you some questions about your organisation. The information you give me will be shared with other community partners. It may also be used for research purposes, although your organisation's name will only be mentioned in publications and reports with you permission.

A. Organisation Details

1	Name of your Organisation		9	Type of Organisation
				Not for profit (NPO)
2	Physical address			Community (CBO)
				Faith based (FBO)
3	Person / s in Charge			Private Business
				Government
			10	Number of People working in your organization
4	Telephone Number / s			Full Time
				Part time
				Volunteers
5	Email address / web address		11	Target population for your services
			11.1 *who?*	
6	Date of Establishment		11.2 *where?* (geographical coverage)	
7	Registration number		11.3 how many (number) currently supported?	individuals
				families
8	Main purpose of your organisation		11.4 how often?	daily
				weekly
				monthly

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B. Who are your main partners
(people/ organisations that you actively work with)

1.1 Name of Organisation	2.1 Name of Organisation	3.1 Name of Organisation
1.2 Person in Charge	2.2 Person in Charge	3.2 Person in Charge
1.3 Contact Number / s	2.3 Contact Number / s	3.3 Contact Number / s

C. Do you provide any of these services?

Prevention and Treatment Support	Y=yes N=No	Lifestyle Support	Y=yes N=No	Access to Care	Y=yes N=No
TB		Aftercare/education		Grant support	
HIV/AIDS		Violence and abuse		Child headed households	
Pre/post natal care		Substance/alcohol abuse		Oral and dental care	
Heart/stroke		Water/sanitation		Immunization	
Diabetes		Sports/dance/ recreation		Mental/physical disability	
Infant feeding		Family planning/safe sex		Home based care	
Child and adult Nutrition		Teen pregnancy		Health/disability Support groups	
Physical disability		Family health promotion & education		Other	
Mental disability		Infection and hazard prevention			
Other		Food and diet			
		Other			

Would you like to be involved the community oriented primary care WBOT initiative?

Yes! .... please contact me		Maybe .... please follow up		No	

Thank you for your time.

Appendix 11: 'LISA' map – workshop and group discussion questions

'LISA' map, day one - reflective writing questions:

Questions to answer in session at the end of day one:

1. What is your feeling about the work you did today?

2. What are the main insights that you would take from the work you did today?

Reflective writing questions to answer at home about your first mapmaking experience

1. If you think back to the first time when you created your own 'LISA' map... How did you go about making your map? (Please describe your process)

2. What was your experience like to make the map? (Please explain with an example) To you it felt like…

3. What advice would you give to someone new who needs to start with the process?

'LISA' map, day two - session evaluation and reflective writing questions:

Both sets of questions below to be answered at the end of day two:

Session evaluation questions:

1. How would you describe the session of today? To you it was like… (Please explain by giving an example)

2. Was there anything you liked or disliked about today's session itself? (Please explain by giving an example)

3. Was there anything that you were unsure of in today's session?

4. Did you enjoy working with others people (so your colleagues / fellow community health workers? (Please explain by giving an example)

Reflective writing questions about the mapmaking project:

5. If you think back to the mapmaking activity, would you use this in your practice as a COPC team member? Yes/No (if yes, please explain how)

6. Did you learn anything new from the mapmaking discussion we had during the focus group? Yes/No (please explain).

7. If you did learn anything new, please list some of these ideas as bullet points.

Appendix 12: 'LISA' map – mapmaking workshop session guide

Session Guide for Map 1 ('LISA' map)

Material needed for the workshop:

- Flip chart paper & five or six packs of coloured flip chart markers (markers to double up and be used for the first two drawing activities – "Whom and I" and "What is in my area" – if possible, a range of bright colours are needed)
- A1 base map of the ward (mounted on sturdy cardboard)
- Three A1 printouts of the base map to use for cutting up and making layers
- Several packs of coloured felt tip markers (to colour in organisations on the layers)
- Sticky notes
- Several pairs of scissors (1 for every two participants), a cutting blade and cutting mat (to cut out the layers)
- Press-stick/Blu Tac to stick the layers onto the map
- A4 paper and pens for reflective writing (one pen per participant and 2-3 sheets of A4 paper for every person)
- A3 cardboard folders – one per participant (used for the "Who am I" and "What is in my area" drawing activity and to hand in reflective writing at the end – use outside and inside of the folder for the drawing activities)
- Food for participants and something to drink during the tea break (e.g. a sandwich and fruit for everyone, biscuits, milk, coffee, sugar, tea, kettle, mugs etc.)

Mapmaking workshop Day1

Introductions (ice breaker activities) (08:15 – 08:30)

Starting the session: Prayer, song, introduce your name in 3's

Purpose of the workshop: Big Goal – bringing parts together (seeing bigger picture & how things connect), talking about what we see and reflecting on if and how the mapmaking work could be of value for you in service delivery.

Agenda for today (write on flip chart)

Elect a participant (scribe) to write the agenda on flip chart paper

--

Team agreement & roles (8:30- 9:00)

Whom am I (9:00-9:35) – includes 20 mins to present to the group (3 things about you)

What is in my area? (9:40 – 10:10 draw outside; 10:10 – 10:30 present inside) 3 Groups

Tea, toilet, and wash cup break 20 mins (10:30 – 10:50) {admin person > housekeeping}

Zooming out – from the micro to the macro (big picture) (11:00 – 11:20) – Groups of 4

Reflection of today – questions to answer (11:20 - 11:30)

Group photo & housekeeping (11:30-11:45)

Team contract (people to decide) – extra ideas…

Scribe to write this for us again…

1. *Join in the conversation* (the focus group is about your views, ideas and thoughts, so please share them – even if you are shy!);
2. *All answers are correct & I would love to hear your views* (there are no right or wrong answers and, it is healthy to debate, agree or disagree. So please ask for a turn to speak and make your views heard);
3. *This session will be recorded. Please speak clearly* (as the researcher, I need to record what we are all saying to be able to analyse this after the session and use this for academic research purposes).
4. *Keeping to time*
5. *Stay to the end*
6. *Listen when someone speaks*
7. *Being listened to*

Optional:

8. *Respecting others (some people laughed; how do we feel about that?)*

9. *Cell phones off;*

Assign Roles & allocate timekeeper

Time keeper (need a cell phone to time us)

Tea time assistant x2 (to co-ordinate tea, hot water, washing of cups)

Admin person (hand out permission forms & collect reflective writing in tea time)

Show manager (help take down and label flipcharts – write today's date, your ward number and the sheet number at the back)

Who am I? What is in my area? – 3 Groups

Let's begin by talking about you:

Each person to draw themselves on folder write a few lines to describe themselves.

Questions to ask:

Describe yourself in a few words?

What do you enjoy doing the most in your job as a healthcare professional delivering COPC? How would you describe your own health? (is it good, medium, or less well) (draw a smiley, neutral or frowning face)

Add this to the wall! & share 3 things with the group from this activity

What is in your area?

Draw your area (together); draw the people in your area; draw assets that people have

(do people have TV's and cars? if many > draw lots; if few > draw few)

Are there any other assets in the area that you can think of? veggies, bicycles, fruit trees? etc.)

Present this to the group…

Start by saying your name & one interesting thing about you

Zooming out – from the micro to the macro (big picture):

Was more a getting used to activity…

All to sit around the big map – discuss this in relation to the area drawing you did

What do you feel when you look at the map? (difference)

Find your area and label it with a sticky note (use press stick) (10 mins)

Reflection of today in – Groups of 4 (things you have learnt):

Two questions to take home with you:

1. What is your feeling about the work you did today?
2. What are the main insights that you would take from the work you did today?

Reflections about your first mapmaking experience (to also complete at home)

1. If you think back to the first time when you created your own 'LISA' map... How did you go about making your map? (Please describe your process)
2. What was your experience like to make the map? (Please explain with an example) To you it felt like…
3. What advice would you give to someone new who needs to start with the process?

Mapmaking workshop Day 2

Admin:

1. Do a recap of what we did yesterday

2. Big Goal – bringing parts together (seeing bigger picture & how things connect)

Milestone – visualize willingness to be involved & form a partnership with organisations (create an action plan for them)

Opening: Create agenda & reminder of ground rules and roles

Agenda for today (write on flip chart)

Ask same person as yesterday to write this down

Welcome & open with recap of yesterday/ask if people leant anything (8:15 – 08:30)

Review ground rules & Agenda for today (08:30 - 09:00)

Mapmaking activity (9:00 – 10:45) – cut and colour two layers

Early tea, toilet and wash cup break 20 mins (09:50– 10:10)

Continue mapmaking (last layer) & Action planning (sticky notes) (10:15 – 10:45)

Mapmaking Discussion & sticking of the layers (10:45 – 11:20) – everyone

Feedback & Handing out of forms – to collect tomorrow (11:20 – 11:40)

Closing of the session & reminder August – sharing my findings

* Intention focus group, people to have the option to speak in their own language

Mapmaking activity – work in 2's

Work in groups of 4, but concentrate on your own area

Explain activity & agree on colours

Cutting out your section x 3 (10 mins)

- Add your organisations & create a big map (10 mins)
- Indicate availability (10 mins)
- Indicate follow ups / engagement you have had (10 mins)

Action planning – work in 2's

Use your LISA forms

Take two sticky notes

- 1st sticky note - list your organisations (make a cross / a tick to indicate follow up)
- Take and A3 sheet – choose 3 organisations and answer the following for each one:
    1. What have I done? (list actions taken to date)
    2. Potential partner y/n (if yes, are they suitable for a steering group)
    3. My action plan for this organisation: I would like to meet/check in with them every…… (Indicate months, weeks) to do…… (e.g. health promotion, giving information or follow up visits to inform them about WBOT progress)
- 2nd sticky note – write your action plan by answering 3 questions:
  Write – action taken y/n (if yes what); date of next visit? objective for visit?

Tea, toilet, wash cup break!

About listening…

Remind people of team contract (Research assistant to help us to keep to rules)

Scribe to go through what we wrote on flip chart

Optional – researcher to read the following before starting with the group discussion…

Listening means that we pause (we stop and we wait before we respond) …

Pausing creates space… space to hear what the other person has said - to receive the words of another and to take the time to understand what that person has said

Mapmaking Conversation – work in 2's

Make circle small – otherwise laptop can't pick up sound

Put chairs in the circle shape and have a small table for recording equipment

Put base map on the wall; participants to take turns to build each layer

Explain protocol – stick on a layer, then discuss (at the end – sit down and discuss the remaining questions) – Research assistant needs to take notes & do a summary of what was said at the end. Researcher to ask questions, writing down key themes that come up while people speak and playing these back to participants before moving on to a next question. Also, where needed, ask probing questions to further explore an answers or comments made or to ask participants to clarify what was said.

Engagement and exploring questions

1. Layer 1: What do you see when you look at this layer?
   (Engagement question*); Or… backup More tangible – what kind of shapes do you see? What are the predominant colours you see? What does the shape* of the map's outline look like?
   * Researcher to log keywords & play back what you hear*

Now let's look a level deeper at the map…

2. Layer 1: What is this layer telling us?
   * Researcher to log keywords & play back what you hear*

3. Layer 2: What do you see when you look at this layer? (Engagement question);
   What are the predominant colours that you see?
   * Researcher to log keywords & play back what you hear*

Now let's look a level deeper at the map…

4. Layer 2: What is this layer telling us?
   * Researcher to log keywords & play back what you hear*

5. Layer 3: What do you see when you look at this layer? (Engagement question);
   What are the predominant colours you see?
   * Researcher to log keywords & play back what you hear*

Now let's look a level deeper at the map…

6. Layer 3: What is this layer telling us?
   * Researcher to log keywords & play back what you hear*

   Optional - probe what are the layers showing us together?
   Prompting: Lets go through each one again….
   * Researcher to log keywords & play back what you hear*

7. What can you use from the map in the work you do? Please explain with an example.
   * Researcher to log keywords & play back what you hear*

Debrief & questions for reflective homework:

Exit questions:
Moderator/research assistant to do a summary of themes
Scribe to add keywords to flipchart

Let's summarise what we learnt today…

8. Do you agree / disagree with what people are saying? Please explain
    * Researcher to log keywords & play back what you hear

9. Was anything missed in this discussion?
    * Researcher to log keywords & play back what you hear

10. Have you learnt anything from making the map? If yes, please explain with an example

11. *Optional Further probing* - Have you learnt from talking about the map as a group?

12. *Optional*: How would you describe your experience of today?
    Prompts: would you say this was a positive or negative experience? Please explain by giving an example (explorative question)
    * Researcher to log keywords & play back what you hear

Surface the learning… (before moving on to reflective writing)
Researcher to do a summary of the activities done over the last two days, what the purpose of each activity was as well as highlight insights and findings that we uncovered and shared as a group. Scribe to write these down as bullets on flip chart sheets. Once completed participants need to move on to do reflective writing about their experience and give feedback about the session.

Reflective writing questions:
Feedback questions about the session:
1. How would you describe the session of today? To you it was like… (Please explain by giving an example)
2. Was there anything you liked or disliked about today's session itself? (Please explain by giving an example)

3. Was there anything that you were unsure of in today's session?
4. Did you enjoy working with others people (so your colleagues / fellow community health workers? (Please explain by giving an example)

Reflections on the mapmaking process of today

5. If you think back to the mapmaking activity, would you use this in your practice as a COPC team member? Yes/No (if yes, please explain how)
6. Did you learn anything new from the mapmaking discussion we had during the focus group? Yes/No (please explain).
7. If you did learn anything new, please list some of these ideas as bullet points.

Appendix 13: 'LISA' map – group discussion question adaptations

Below is a record of how the questions asked per ward (or participant group) during the mapmaking discussion evolved.

Ward 18	Ward 15	Ward 93 East & Ward 16
Engagement and exploring questions 1. What do you see when you look at the map? (Engagement question);	**Engagement and exploring questions** 1. What do you feel when you look at the content of the map? (Engagement question);	**Engagement and exploring questions** *1.* Layer1: What do you see when you look at this layer? (Engagement question*); Or… backup More tangible – what kind of shapes do you see? What are the predominant colours you see? What does the shape* of the map's outline look like?
1. What do you feel when you look at the content of the map? (Engagement question);	2. What do you see when you look at the map? (Engagement question); Prompt –tangible things – so what shapes do you see? What are the predominant colours you see? What does the shape of the map's outline look like?	2. Layer1: Now let's look a level deeper at the map… What is this layer telling us? Prompting: Lets go through them layer by layer….
2. Name all the visual elements and features that you see in the map? (i.e. colour, shape, form and texture) (Exploration& visual rhetorical question to uncover *presented elements*); > Suggestion for improvement: Describe what you see when you look at the map?	3. Now let's look a level deeper at the map…What is the map telling us? Think of the individual layers and of all the layers that we put together. Prompt: Lets go through them layer by layer….	3. Layer2: What do you see when you look at this layer? (Engagement question); What are the predominant colours you see?
3. Now let's look a level deeper at the map… What are the ideas, themes, insights and/ concepts that you can formulate by looking at the map (Exploration& visual rhetorical question to uncover *suggested elements*) Let's list them: Ideas… Themes… Insights…	*4.* Have you learnt anything new from making the map? If yes, please explain with an example / What have you learnt from making the map? & What have you leant from discussing the map?	4. Layer2: Now let's look a level deeper at the map… What is this layer telling us?

Concepts… > Suggestion for improvement; What is the map telling us? Think of the individual layers and of all the layers that we put together.		
Would you say this was a positive or negative experience? Please explain by giving an example (explorative question) *Log keywords* *Play back what I hear* > Suggestion for improvement: How would you describe your experience of today? (prompts – was it a good experience or did you not enjoy the session – please explain)	5. Would you be able to use the map we made or ideas from the map discussing this in the work you do? Please explain / What can you use from the map in the work you do? What can you use from the map discussion we just had in your role as a CHW?	5. Layer3: What do you see when you look at this layer? (Engagement question); What are the predominant colours you see?
4. How would this affect the work you do? Please explain > Suggestion for improvement: Have you learnt anything new from making the map? If yes, please explain with an example / What have you learnt from making the map? & What have you leant from discussing the map? > Follow up question (to include): Would you be able to use the map we made or ideas from the map discussing this in the work you do? Please explain / What can you use from the map in the work you do? What can you use from the map discussion we just had in your role as a CHW?	**Exit questions:** 6. Would you agree / disagree with these findings? Please explain	6. Layer3: Now let's look a level deeper at the map… What is this layer telling us?
Exit question: 7. Was anything missed in this discussion? (this question will be followed by a closing activity to list and rank the main findings generated by the group during the session)	7. Was anything missed in this discussion? (this question will be followed by a closing activity to list and rank the main findings generated by the group during the session)	8. *Optional* - probe what are the layers showing us together? Prompting: Lets go through each one again (lift up the layers and look for correlations between the information mapped) ….
	8. How would you describe your experience of today? Prompts: would you say this was a positive or negative experience? Please explain by giving	9. What can you use from the map in the work you do? Please explain with an example.

	an example (explorative question)	
		Exit questions: *10.* Do you agree / disagree with what people are saying? Please explain
		11. Was anything missed in this discussion?
		12. Have you learnt anything from making the map? If yes, please explain with an example
		13. *Optional Further probing* - Have you learnt from talking about the map as a group?
		14. *Optional*: How would you describe your experience of today? Prompts: would you say this was a positive or negative experience? Please explain by giving an example (explorative question)

Appendix 14: 'LISA' map – data analysis presentation question adaptations

Below is a record of how the questions asked during the two data analysis presentations evolved.

Data analysis presentation 1: Ward 18 & Ward 15	Data analysis presentation 2: Ward 93 East and Ward 16
Questions about the accuracy of the data presented *(Individual and table activity)* 1. What was your experience of the presentation like?	**Questions about the accuracy of the data presented** *(To start make a group of 3 / 4 people and go sit in a small circle close to a wall.)* 1. Answer the following question on the A4 lined paper supplied to you (individual work). What was your experience of today's presentation like? To you it was like… (Please explain your answer)
2. Do you agree with what the researcher is presenting to you? Y/n please explain your answer by giving an example.	2. Now review the presentation findings printed on the A4 sheet supplied to you. What is your feeling about these findings? (Please explain your answer) Note, if you are referring to a specific point in your answer, please tell me which ones these are by writing them down
3. Please review the presentation findings together as a table. Is there anything else you could add to the results? y/n please explain your answer by writing down your comment, and the reason for this on a sticky note supplied to you.	3. Next, summarise your answer for Question 2 (above) on a sticky note (write your name and ward number on the back of the sticky). *As a group, stick all your sticky notes onto an A3 paper on the wall Please share your answer with each other by allowing each person to present their answer for 2/3 minutes.* *Now choose 1 person from your group to share some of your answers with everyone – 3mins per person when sharing to the whole group*

Individual reflective writing questions about the mapmaking process
(Work in pairs – one group will need to be three people)
 	
4.   Has today's presentation changed your definition or a map in any way? y/n please explain your answer.
 	
    a.   Has today's presentation changed your view of the function or value of a map? y/n please explain by giving an example.
    b. After today's presentation, is there anything new you could add	

to your answer of question 5 in your reflective writing? y/n (if yes, please write your extra ideas/answers on a clean sheet of paper with the date, your name. ** Share this with your partner (2/3 minutes each)* ** Select one / two people from your table to present your answers to the everyone* ** While other people are sharing their ideas, note down things that you would like to remember*	
7. After listening to other people present the answers from the question above, did you learn anything new by listening to them? y/n please explain by giving examples.	

Appendix 15: 'LISA' map – data analysis thematic index used to code data in NVivo

02/02/18 'LISA' map - index of themes

1. Uses of the map (yellow)

1.1 Distance (how far to go?)

1.2 Direction (how to get somewhere)

> "Shortcuts" (quickest route to get somewhere)

2. Visualise the data (green) / visualizing data

2.1 Making the information easier to understand (aid comprehension)

2.2 Identify (recognize > first meaning) (pinpointing and seeing all the organisations of an area)

"Location" = another word used here

* Consider if it's not better to call this theme "locate" – it's the local idiom expressed

2.3 Unify (bringing organisations together)

2.4 Quantify (counting amounts)

2.5 Evaluate

> Assess willingness to work with COPC/WBOT

> Assess productivity (seeing amount of work done)

> Satisfaction / Pride (when work is done well)

> Measuring progress over time

> "Checking in" (seeing what has changed in an area)

> Types of organisations (what do we have to little or too much of)

> Cross-check (make sure all the information is on the map)

2.6 Generate information (e.g. combining data sets/layering information)

3. Mapmaking technique (purple)

3.1 Colour coding - using colour make things clear and easier to see

3.2 Layering (to make connections between the data sets identified).

4. Take action - acting in response to what the map shows (blue)

4.1 Identify who to partner with (distinguish)

4.2 Prioritise (what to focus on first)

4.3 Build relationships (skeptical about this - it's an intention but has no plan)

4.4. Thinking of ideas to resolve a challenge

4.5 See what to do / situation to act on – "shows where we should focus"

4.6 Plan (how to go about doing the task)

5. Take part in the activity

5.1 Interact with the organisations (Doing the LISA form part of the activity)

5.2 Participate (Take part in the activity) - drawing "opens you up" [think we can leave out this bit]

5.3 Contribute local knowledge (adding "colour" to the map; the knowledge that you bring)

5.4 Group work

5.5 Communicate

5.6 Makes the map easier to understand (so the mapmaking activity)

5.7 Have a fun & enjoy the activity

6. Learn

6.1 Individual learning

> Ontological authenticity (in reflecting on the process you look for – the *extent to which a participant has matured, expanded and elaborated, in that they now possess more information and have become more sophisticated in its use*)

6.2 Peer learning (learning with and from others)

> Educative authenticity (broadening ability of participants to learn from observing each other's views and opinions)

7. New Knowledge / Insights generated by participants

7.1 Geographic comprehension/Become familiar with an area (understanding an area better)

7.2 Learning new information (Learning new things about an area)

7.3 Create new knowledge (through the map and mapmaking data)

> Make links (organisations visualized and local knowledge) e.g. too many spaza shops is connected to junk food and unhealthy eating)

> Identify gaps (what do we have too many or too few of)

> Raise concerns (because of links and gaps)

8. Give voice / Voice concerns [this is also a sub theme of mapmaking]

8.1 Lack of support (bigger WBOT system not in place)

"our job is restricted"

8.2 Handicapped (team leaders not following through on concerns raised)

8.3 Lack awareness about WBOT

> Project launched needed

8.4 Lack trust from community

> don't understand WBOT

> No formal identification or uniforms

8.5 Job too much / job is hard to do

8.6 Failure of government service/departments to respond

9. Participant concerns [or needs?] about the mapmaking activity

9.1 Process not directly benefitting community

9.2 Request for a certificate (reward for taking part)

9.3 Timing of the activity too late (should have been done at the start)

9.4 Too little time allocated for the activity

9.5 Request team leader's attendance (to enable action to be taken)

Data analysis presentation:

10. Member checking (participant feedback and engagement on themes mentioned by researcher)

11. Miscellaneous

11.1 Unexpected

11.2 Positive comment

> Request to do more mapmaking

> Recommend to others

11.3 Negative comment

11.4 COPC principle 1 (doing a LISA)

11.5 COPC principle (Practice with Science)

11.6 Metaphor

11.7 Research Question

11.8 Capability approach to learning (shows struggle and then succeeding)

Appendix 16: 'LISA' map – theme map one (depicting theme index above)
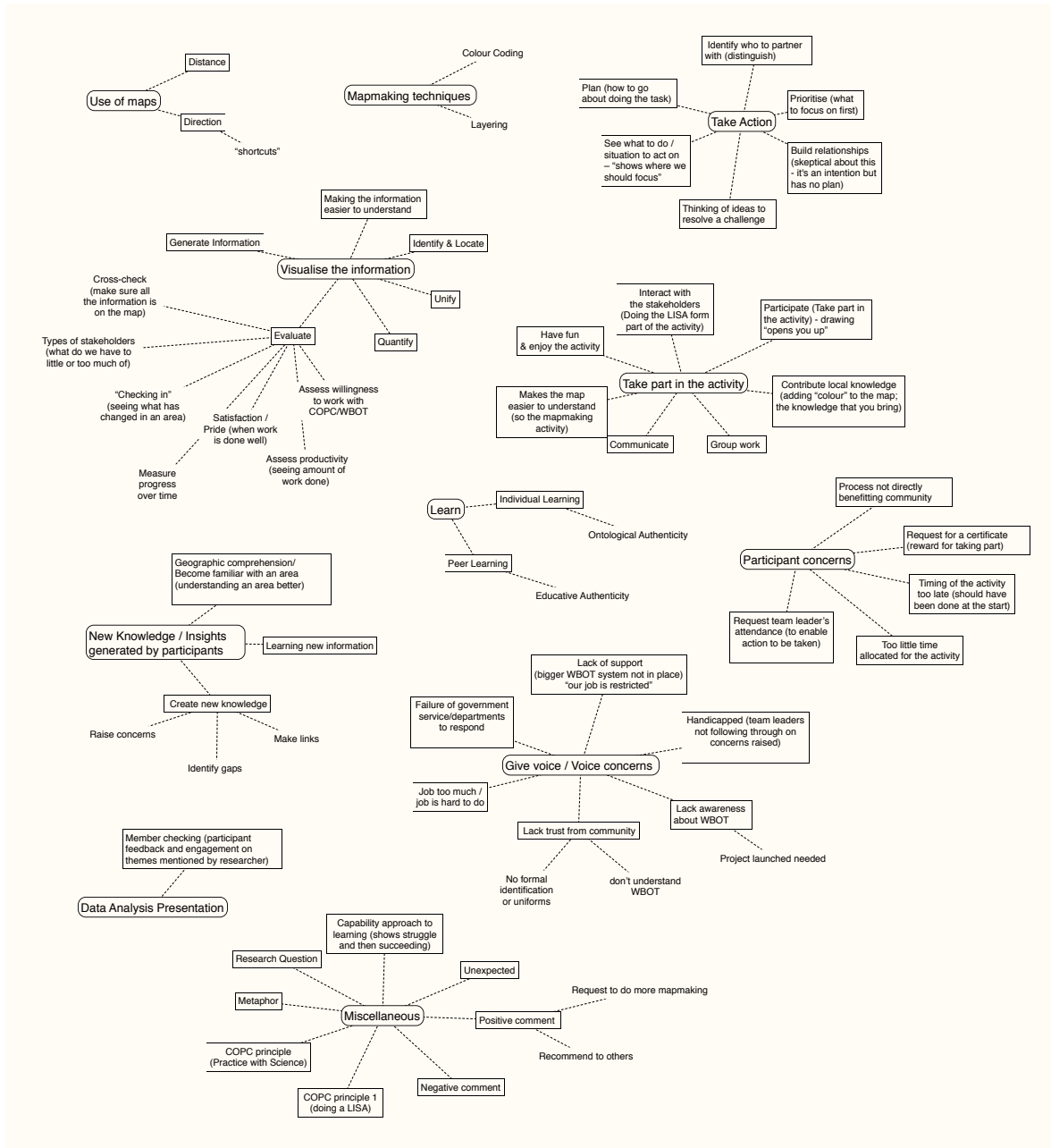
Appendix 17: 'LISA' map – theme map two (first iteration of the theme reduction process)
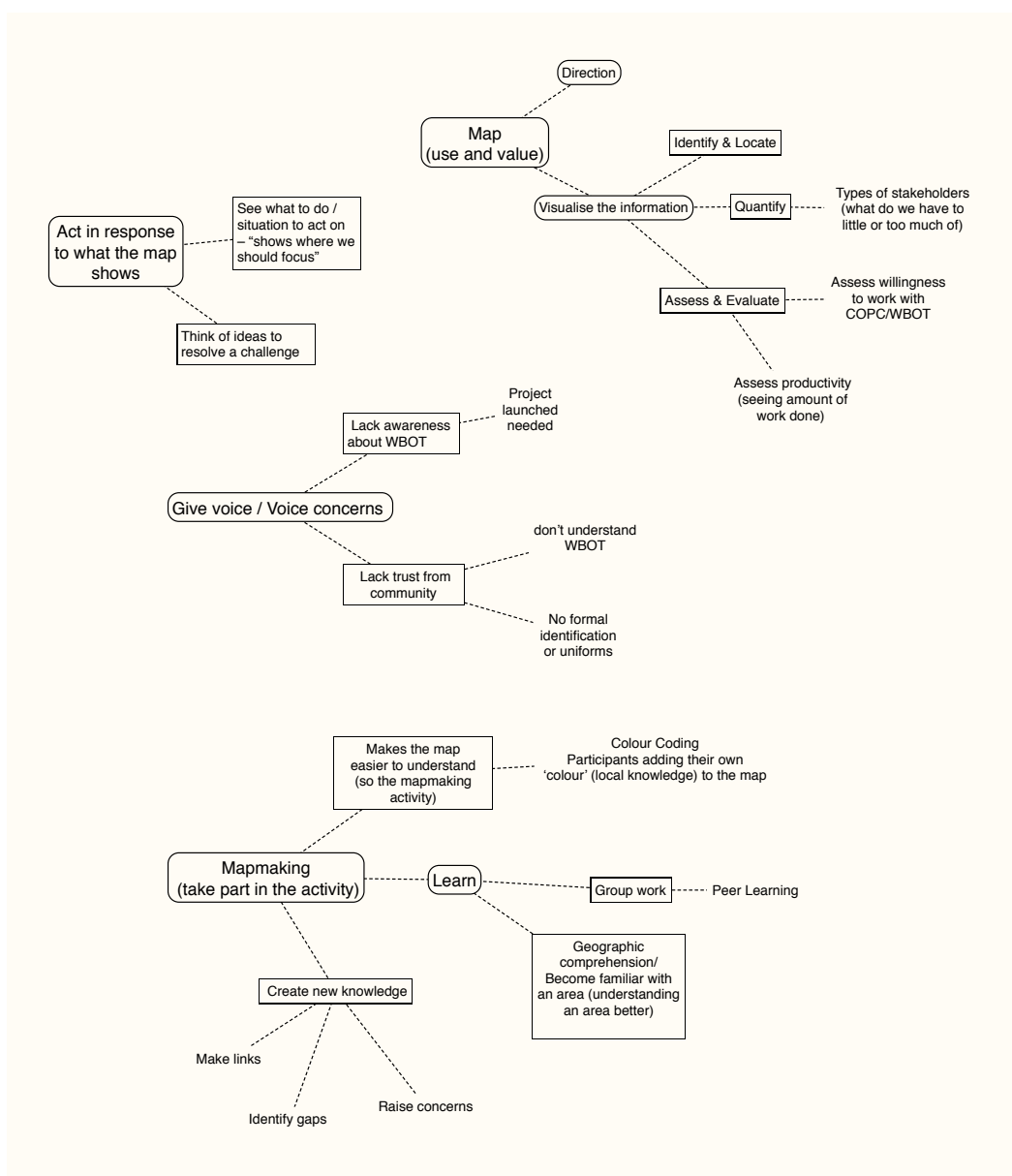
Appendix 18: 'LISA' map – theme map three (final iteration of themes)
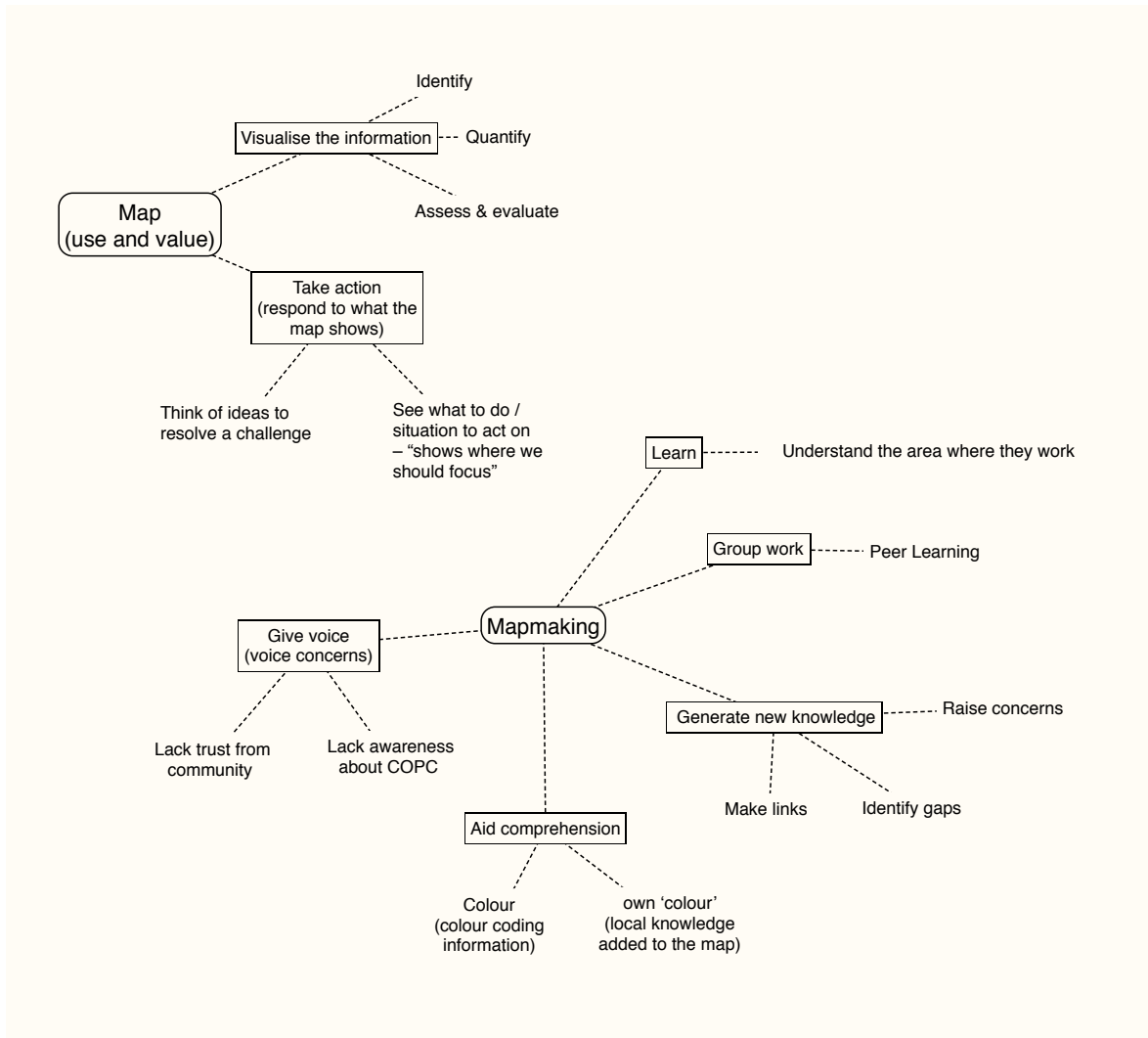
Appendix 19: 'History of health' map – evolving project objectives

Purpose of the project :

The purpose of the map was to see what team leaders could learn from the past and to explore whether a history map, based on their recollection of historical events and experiences, could be of value to them in service delivery today.

1. **Initial project objectives identified in protocol:**
   1.1. Record history of health during 1980s period
   1.2. Assess the impact of history on health during this period
   1.3. Look at the implications that this history had on health during this time
      - Geographically
      - Experientially

2. **Project objectives adapted after the meeting two with team leaders:**
   2.1. To look at a person's origin (When did you come from? Where did you live during the Apartheid period and where are you living now?)
   2.2. To share experiences of growing up during Apartheid - memories of strengths and resilience demonstrated by yourself, your family and community in relation to health and wellbeing (both in the home and in the workplace)
   2.3. To share knowledge about health issues, access to healthcare and the use of healthcare services during the 1980s period (Where did people go? What treatment was offered? etc.)

3. **Objectives developed into questions and used for interviews and autobiographies:**
   3.1. Your biography (e.g. When did you come to Mamelodi? Where did you liveand where do you live now? Who were you living with?) (origin)
   3.2. Your experiences of living in your area during the 1980's.
      (What was it like? What could you do or not do? Where could you go or not go? What were your biggest fears? Please explain by giving an example.
      (access to healthcare facilities)
   3.3. Your knowledge of the health issues of the community at the time?
      (How would you describe the health of your community or neighbours
      during this period in time? What were the most common healthcare problems that people faced? Had you heard about AIDS? What about family planning issues?) (types of diseases)
   3.4. Your recollection of available health services in the 1980s.
      (What health services did you use? How were they organised?
      What was their focus? How did you feel about using them?) (Availability of healthcare facilities)

3.5. Your knowledge and use of healthcare services available in your area today? (What services are there? What do you use these healthcare services for? Can you show where they are on the map?) (Current availability and use of healthcare services)

4. **Objectives redefined during the participatory mapping project:**
How the objectives were translated into a participatory mapping project when the theme shifted from mapping historical facts collected in the interviews to personal narratives of the team leaders (what group one wanted to map):
4.1. Map landmarks significant to health
4.2. Map healthcare givers (people who were significant – Doctors, Nurses etc.)
4.3. Map common diseases and illnesses found
4.4. Write down stories or memories of experiences related all three topics above (optional)

Appendix 20: 'History of health' map – mapmaking workshop session guide

Session Guide ('history of health' map)

Mapping workshop Day One:

Introductions

Starting the session: Prayer & song (as an ice breaker activity)

Purpose of the workshop: big goal - to map the history of health during struggle period

Objective of the mapping project:

a) Produce a record of history of health during 1980s period

b) Assess the impact of history on health during this period

c) Look at the implications that this history had on health during this time

(geographically & experientially)

Agenda for today (on flip chart)

Team contract & roles (15 mins)

About me… (25 mins - 15 min to draw, 2 min each to share)

What is in my ward? (35 mins - 12 min to draw, 3 min each to share)

Break (20 mins)

Maps and their value in COPC (20 mins)

A patchwork of portraits – discussing your interviews (45 mins)

Session evaluation and reflective writing (30 mins)

Team contract – add extra ideas…

Write this on a flipchart paper (also needed for day two

8. *Join in the conversation* (the focus group is about your views, ideas, and thoughts, so please share them – even if you are shy!);

9. *All answers are correct & I would love to hear your views* (there are no right or wrong answers and, it is healthy to debate, agree or disagree. So please ask for a turn to speak and make your views heard);

10. *This session is being recorded on a tape recorder please speak clearly* (as the researcher, I need to record what we are all saying to be able to analyse this after the session and use this for academic research purposes).

Agree on rules when managing a conversation – this is important for conversation manager during mapping….

1. Speak one at a time…

2. Listen when someone speaks

3. To be listened to etc…

--

Intentions

11. Keeping to time

12. Cell phones off;

13. Listen when someone speaks

14. Respecting others

Assign Roles to participants & allocate timekeeper

Time keeper (need a cell phone to time us)

Scribe (to write the agenda, questions and answers given on flip chart paper)

Admin person (hand out permission forms & collect reflective writing in tea time)

Communication person (to disseminate messages about session changes / times)

Conversation manager (to manage conversation during focus group discussions – someone who is firm and patient)

Who am I? (15 min to draw and write, 2 min each to share)

Let us begin by talking about you:

> Draw the shape of your hand on your folder

> Describe yourself in a few words? (*write this inside the hand*)

> What do you enjoy most about doing your job as a team leader delivering COPC? > How would you describe your own health? (is it good, medium, or less well) (draw a smiley, neutral or frowning face) *(write this around the edges of your hand)*

Share the answer of the last question with the group…

What is in my area? (12 mins to draw, 3 mins to share)

> Draw the shape of your ward; draw the people in your area; draw assets that people have (do people have tv's and cars? if many assets draw lots; if few assets draw few)

> Are there any other assets in the area that you can think of? (vegetables, bicycles, fruit trees? etc.)

Present this to the group – 3 min each

Maps and their value in COPC (15 mins for writing, 15 minutes for sharing, 5 mins to reflect)

Let's look at the maps I've put up on the wall… (participants to look at examples of different archive maps of Mamelodi in the 1980s period).

If you think of a map, what words come to mind? To you it is like…
Take a sticky note and write your answer on it – write in big letters. Make a word circle and place your answer on the circle.

Go one by one and explain your answer. Then write down a word (theme) that summarises your answer. Next, connect your answer with similar themes mentioned others in your group.

Would you say maps have a value in COPC? Yes / No? Please explain your answer with an example *(research assistant to note down and add any additional interpretations of a map to the group's word circle)*

Researcher to summarise what was said and discussed & play this back to the group

A patchwork of portraits - discussing our interviews….
(42 mins – 5 mins per card, 3 mins to share, 5 mins for your own card)

Let us move on and work with the answers you received from the interviews you conducted…

To start, explain the metaphor of a "patchwork of portraits" (everyone's information coming together like a quilt);

The value of the activity - we are breaking down the information of the interview into smaller parts so that we can use it to inform the 'history of health' map.
How this works…

1. Take 2 or more interview cards (one for each person you interviewed).
   Write your name and group number on the back, then on the front write the name of the person you interviewed & their job or role in the community.
   On the front, leave the top half of the page for a drawing, image or quote that represent this person. Turn your card over and answer the following questions…

2. What was your experience like to interview each person?

   (Write this at the back of the card on the top half: my experience was like…)

3. What was the reason you chose this person?

   (Also add this to the front of the card below the image)

4. Now, turn card around - list three memorable things from the conversation you had on the front of your card?

> *Stick all your cards on a flip chart sheet (write your name on the back and the address where you conducted the interview)*
> *Share one of your interview cards with the group*
> *Go through the 4 objectives; is there anything else you can remember?*

Reflection of today (7 mins)

Please take a reflection sheet for day1 and answer the following questions…

1. What is your feeling about the work we did today?

2. What are the main insights that you would take from the work we did today?

Do a debrief with research assistant

Mapping workshop Day Two

Agenda for today (on flip chart) – 5mins

Reviewing workshop goal, team contract & roles (20 min)

Identity landmarks (35 min) - locate and discuss

List important people (15 min) & share with the group (35 min)

Break (15 min)

List health issues (15 min to list issues; 15 mins to list causes) & share answers with the group (25 mins)

List healthcare facilities used Uses (15 min)

Write story cards (30 min) & each participant to (25 min)

Wrap up for the day – surfacing the learning (15 min)

Session evaluation and reflective writing (30 mins)

Mapping activity

To start – let us add our A4 pages to the wall to create our "patchwork or portraits"

Now we are going to work with your own knowledge/experience and the information that you collected during your interviews.

Identifying our audience (5 mins)

Before we map, we need to agree on the following…

Who is our audience for the map?

What do we want people to learn from the map?

Some suggestions I have…

a) Understand what it was like

b) Use the map as a record of information about the 4 topics we identified

c) Create an object that people would enjoy to read (make it memorable, clear, and visually attractive – which is why we need images. A think piece to share with the City of Tshwane and your local council to frame/keep for younger generations)

Moving on to the mapping activity - how this works:

1. Landmarks: (30mins)

Identify key landmarks of the time (both healthcare related and any other landmarks significant landmarks in Mamelodi at that time). Please locate them on the map. Do you have any memories associated to any of these landmarks? If yes, please share them with the group.

2. Memorable people (30mins)

List the key figures in both healthcare and the community in general of that time. What made them so significant? Do you have any memories to share about them? Where did they work? Write down the name of this person on a sticky note and your reason for choosing them (at the back add your name) and stick this onto the map. Next, please take turns to share and discuss your answers with your group.

3. Where did you live?

Let us write an inventory of everyone's names on the side of the map & indicated where you lived at this point in time. If you were staying in Mamelodi - Please locate your house on the map for us.

4. Health Issues & Healthcare services Used: (15mins list issues, 30 mins to discuss the insights through use causes; 15 mins use)

Now, let us map information related to the answers from the questions you were asked to answer when you wrote your autobiography and conducted the interviews with community members.

4.1. What were the health issues of the community during that time?
> As a group write your answers on the map or on some sticky notes and place them around the map and discuss them with each other.

4.2 What were the causes of the different diseases mentioned?
> As a group write your answers on the map or on some sticky notes and place them around the map and discuss them with each other.

4.3 What healthcare services were available during in the 1980s? What health services did you use? How were they organised? What was their focus? How did you feel about using them?
> As a group write your answers on the map or on some sticky notes and place them around the map and discuss them with each other.

What was the implication of the types of services available to you on health?
> As a group write your answers on the map or on some sticky notes and place them around the map and discuss them with each other.

5. Story cards (30 minutes to make; 30mins to share)

Moving one, write down any stories or memories that you associate with some of the themes mentioned so far.

How to make your story card:

On the back write down your name and our group

On the front write down the story / a quote from the interview you did

Then write keyword (or theme) that the main idea of the story represents for you

Work with both your own experiences and the ones shared by others.

Next, please add your story cards to the map & select volunteers to share some of their stories with the group

6. Exit questions

Research assistant to do a summary of what participants have spoken about.

Is there anything else you would like to say or add to the map?

Surface the learning… (before moving on to reflective writing)

Researcher to do a summary of the activities done during the session, what the purpose of each activity was as well as highlight insights and findings that we uncovered and shared as a group. Scribe to write these down as bullets on flip chart sheets. Once completed participants need to move on to do reflective writing about their experience and give feedback about the session.

Reflective writing questions:

Feedback questions about the session:

4. How would you describe the session of today? To you it was like… (Please explain by giving an example)
5. Was there anything you liked or disliked about today's session itself? (Please explain by giving an example)
6. Was there anything that you were unsure of in today's session?
7. Did you enjoy working with others people (so your colleagues / fellow Community Healthcare workers? (Please explain by giving an example)

Reflections on the mapping process of today

8. If you think back to the mapmaking activity, would you use this in your practice as a COPC team member? Yes/No (if yes, please explain how)

9. Did you learn anything new from the mapping discussion we had during the focus group? Yes/No (please explain).
{additional way to ask this, based on protocol evaluation criteria}
*After taking part in the map discussion, did you learn anything new from the views / answers given by your collea*gues. Yes/No. *Please explain by giving and example / examples*
10. If you did learn anything new, please list some of these ideas as bullet points.

Reflections about your first mapping experience
11. If you think back to the first time when you created your own 'LISA' map... How did you go about making your map? (Please describe your process)
12. What was your experience like to make the map? (Please explain with an example) To you it felt like…
13. What advice would you give to someone new who needs to start with the process?

Appendix 21: Interview card template

Name and surname of person Interviewed:

_____

Job / role in Community: _____

Add an image / drawing / memorable quote to represent your interviewee:

1. What was your experience like to interview this person? `

2. What was the reason you chose this person?

3. list three memorable things from the conversation you had?

Appendix 22: 'History of health' map – focus group discussion guide

Focus Group Discussion Guide ('history of health' map)

Agenda for today (write on flip chart paper)
1. Focus group discussion (45 min)
2. Break (30 min)
3. Create a profile card & wrapping up for the day (20 min)

Focus Group discussion (mapping conversation)

Work in pairs. Researcher to hand out several copies of the draft unified map for people to read and take a look at. Researcher to log comments that people say and play them back to participants at the end. Research assistant to take pictures and help with note taking and facilitating the discussion

Principles of a group discussion
1. *Join in the conversation* (the group discussion is about your views, ideas, and thoughts, so please share them – even if you are shy!);
2. *All answers are correct & I would love to hear your views* (there are no right or wrong answers and, it is healthy to debate, agree or disagree. So please ask for a turn to speak and make your views heard);
3. *This session is being recorded on a tape recorder, please speak clearly* (I need to record what we are all saying to be able to analyse this after the session and use this for academic research purposes).

Group Discussion Questions

Review the "principles of a group discussion" (listed in the session guide of the 'LISA' map).

To start: I would like you to take a few minutes and just look at the map in front of you. Imagine that this map was a picture on a wall in your home. Have a look at the colours, images and other elements on the map…

Now, let begin by describing what we see together…

Engagement and exploring questions:

13. What do you see when you look at the map?

    1.1 What colours can you see?

    1.2 What do you think about the placement of the elements on the map?

    1.3 How would you describe what the map looks like to a colleague/friend?

    * Log keywords & play back what you hear

Next, let's go a level deeper. Now read the information on the map…

So take a few minutes look at the headings and words listed below them. Read both the middle part of the map and the information around this.

14. What is the map telling us?

    Prompt – read the key on the map and think about the way that colour is used in the map…What is this telling us? List any thoughts you have on your own and let's share them with the group one by one.

    * Log keywords & play back what you hear

15. Let's look again, what else is the map telling us? Think about the way that everybody's information is coming together. List any thoughts you have when you think about this and share it with the group.

    * Log keywords & play back what you hear

Next, participants are each given a handout with a collection of quotes selected by the researcher from the interviews that they conducted and their own autobiographies.

16. Let's focus on some of the stories or experiences selected from the interviews conducted. Take a moment and briefly read through the following collection of quotes. While you are reading put a cross next to any quotes that stand out to you.

    4.1 What ideas come to mind when you read the people's experiences and stories? Write them down and let's share your thoughts with the group one by one.

    4.2 {optional} What are these quotes telling us? What about the themes identified that they have been grouped under, what is this telling us?

    * Log keywords & play back what you hear

17. Would you be able to use this map as a team leader with your CHWs? (Yes, or Now – please explain your answer)

    * Log keywords & play back what you hear

Exit questions:

Let's summarise what we learnt today…

Researcher to do a summary of themes logged…

18. Do you agree / disagree with these findings? Please explain
    * *Log keywords & play back what you hear*

19. Was anything missed in this discussion? (this question will be followed by a closing activity to list and rank the main findings generated by the group during the session)
    * *Log keywords & play back what you hear*

Closing activity and final question… (Optional if time allows for this)

20. As a group let's write down our keywords and rank them according to the most and least relevant to you

Appendix 23: 'History of health' map – data analysis presentation reflective writing questions

'history of health' map, data analysis presentation Feedback sheet

Name: _____

Ward Number: _____

Date: _____

Please answer the questions below to make sure that your views and opinions are voiced, noted down and taken into account in response to the findings presented to you.

About the accuracy of the data presented (45 min)

Begin by answering following questions on the A4 paper supplied to you (individual work).

What was your experience of today's presentation like?

(Please explain your answer) *(5min)*

On your own, please review the facts & findings of the presentation printed on the A4 sheet supplied to you. *(15 min)*

What is your feeling about the facts and findings presented to you?

(Please explain)

Are there any facts or findings you strongly agree or disagree with?

(Please explain your answer with examples)

Has anything been missed? (If yes, please explain)

Summarise your answer for Question 2.1 (above) on a sticky note (write your name and ward number on the back of the sticky).

Next, form a small group with 2 to 3 other people. As a group, paste all your sticky notes onto an A3 paper. Take turns and share your answer with each other – make sure to allow each person to present their answer for 2 or 3 minutes. (20 min activity)

After everyone has presented, reflect on what has been shared. Have you learnt anything new from the discussion? (If yes, please explain your answer briefly by listing your thoughts as bullet points on your A4 sheet) (10 min)

Appendix 24: 'History of health' unified map

Please download the PDF document *NinaHoniball_HOH_CompositeMap.pdf* for a high-resolution version of the map to read. The document has been uploaded together with this thesis on UP Space.

Appendix 25: 'History of health' map – data analysis thematic index used to code data in NVivo

04/04/18 'history of health' map- index of themes

1. Map

1.1 Direction

1.2 Location

1.3 Identification

> Landmarks

> Mayor

> Healthcare facilities

> Prominent people in healthcare

> Colour

> Street names

> Schools

> Health issues

> Struggle fighters

1.4 Demarcation & Boundaries

1.5 Assessment & evaluation

> Disease profiles

> "Situational analysis" (Local Institutional Support Analysis which comes after doing a LISA –

Local Institutional Support Assessment)

> Health services available

1.6 Collect and combines information

2. Map + Mapping

2.1 Learning information (because of talking about/discussing the map > mapping as a learning

tool)

> Historical facts

> Related to prominent people

> About the area & community

> Related to health issues

2.2 Create knowledge (generate insights through the map and mapping data)

> Make links (e.g. connecting socio economic conditions to healthcare)

> Identify challenges (contrast and compare information mapped)

3. Mapping

3.1 Individual learning

> Ontological authenticity ("shift" made & understanding of a topic has been expanded & elaborated) (the *extent to which a participant has matured, expanded and elaborated, in that they now possess more information about an idea or construct*).

> No shift made (understanding of topic has not been expanded or elaborated after mapping activity)

3.2 Peer learning ("sharing ideas")

> Learning from each other

> Learning with others

> Educative authenticity (broadening the ability of participants to learn from observing each other's views and opinions)

3.3 Group work

3.4 Fun and enjoyable

3.5 Remember (memories)

3.6 Comparing past to present (through discussing and talking)

> Positive changes (things that are better now)

> Negative changes (things that used to be better)

3.7 Measure progress

3.8 Present day challenges faced (unexpected theme)

3.9 Idea generation (coming up with ideas in response to doing the mapping project)

3.10 Participate (to take part)

3.11 Co-create (to make something together)

3.12 Reflection (to think back*)*

3.13 Analyse (examine the area)

3.14 Participatory research

3.15 Plan

> Budget for future services (strong theme in data analysis feedback)

> Involve organisations in healthcare delivery

4. Design of the map

4.1 Presented elements (e.g. mention different colours)

4.2 Suggested elements (e.g. explain the meaning of colours or meaning created from facts listed)

> Prominent theme

> Unexpected people contributing to health in the community (teachers & mayor)

> Lack of healthcare education (unique to 'history of health' map > challenges that comes up)

> Cultural beliefs

> Scarcity of resources

> Lack of services

> Distance

4.3 Suggested meaning of map design not clear or understood

4.4 Legibility (using design to make the information visible and easy to read)

5. Member checking

5.1 Checking accuracy of a fact (spelling of words or the description of a fact)

5.2 Checking accreditation of a fact (making sure that if a group said a fact, the colour on the map show this)

5.2 Adding extra or missing information

6. Team leaders

6.1 Shift curative to preventative health (shift from clinic to community)

7. Themes that answer research question (RQ)

7.1 Definition of value and use of maps at start of project

7.2 Value of 'history of health' map for COPC

> Educating CHWs

> Know where you come from (origin)

> Location & direction

7.3 Value of maps and mapping for COP in general (logging quotes that answer this)

Appendix 26: 'History of health' map – theme map one (depicting theme index above)
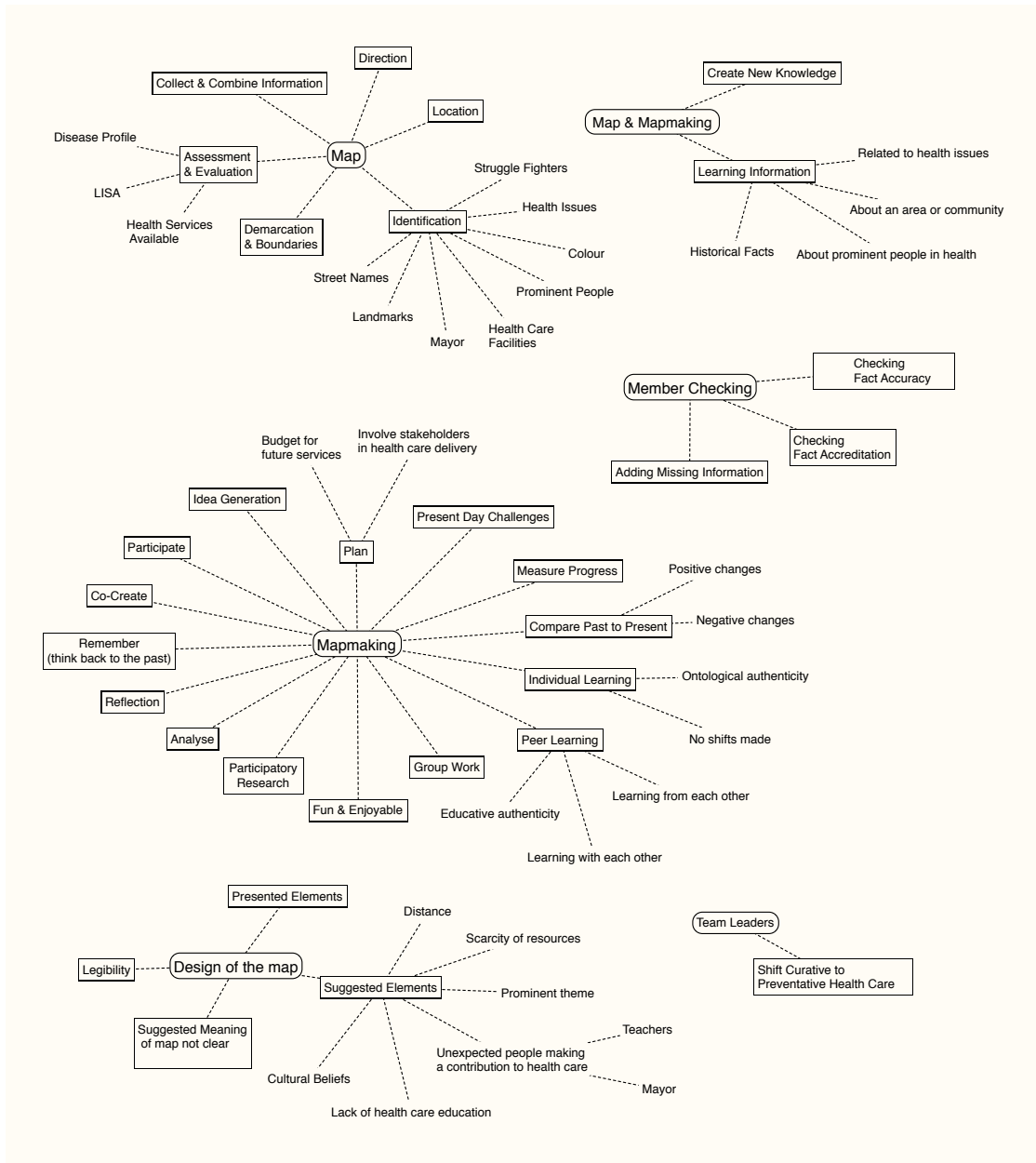
Appendix 27: 'History of health' map – theme map two (first iteration of the theme reduction process)
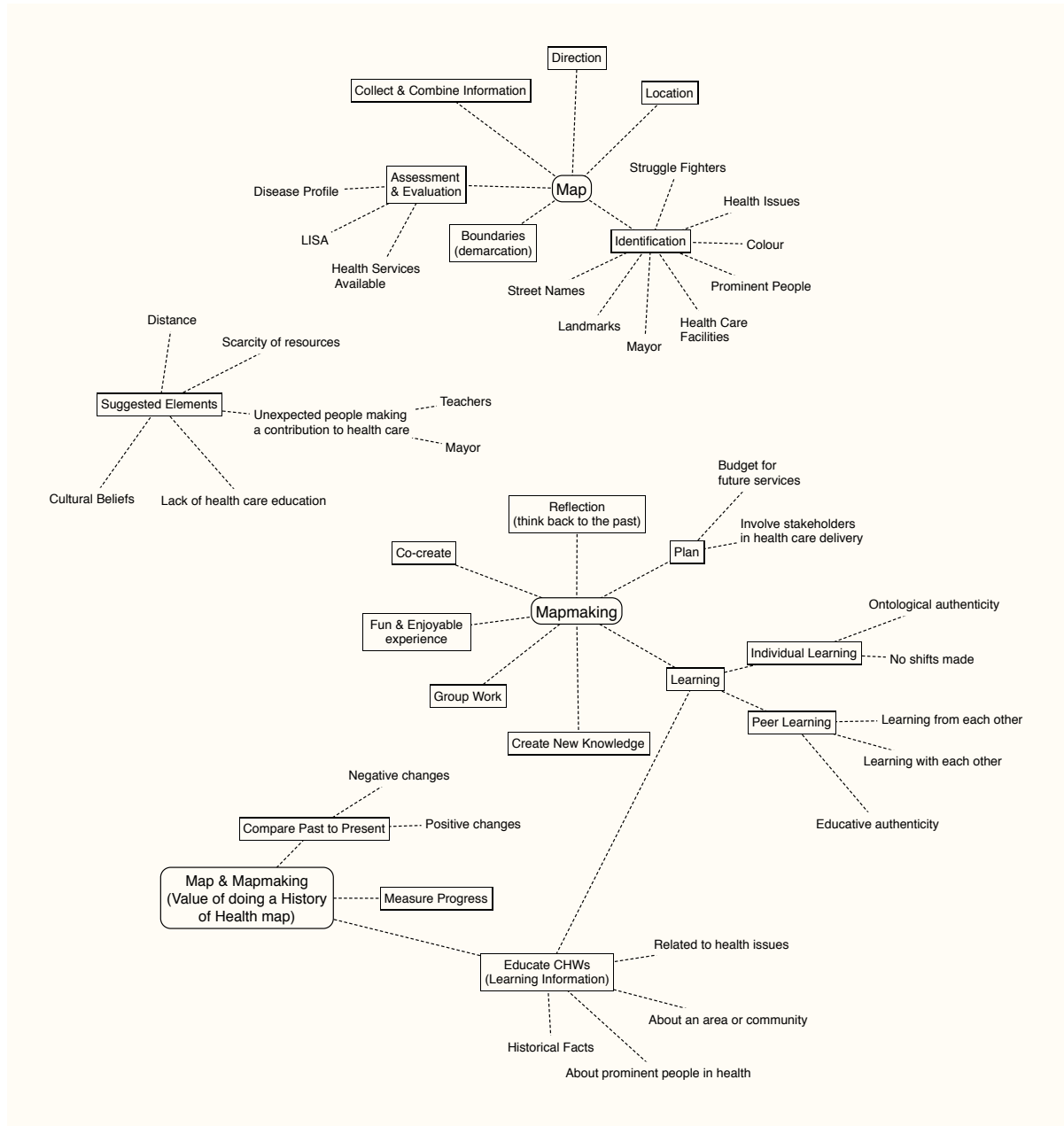
Appendix 28: 'History of health' map – theme map three (second and final iteration of themes)
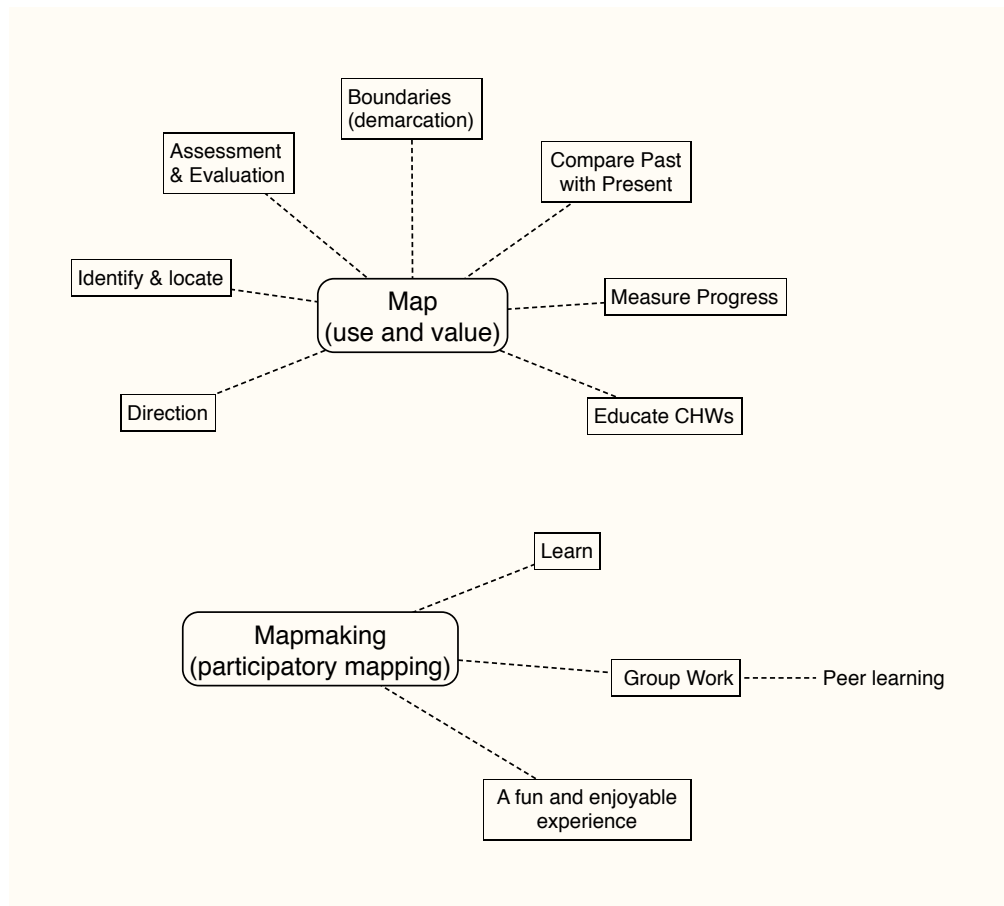
Appendix 29: 'Community health' map – interview guide

Interview guide ('Community health' map)

Introduction (5 min)
Welcome
Thank you for coming today and being willing to take part in this interview

What is your name?
What is the name of your team?

Purpose of the interview:
To look at and discuss maps created from AitaHealth™ data. The theme of the maps are household size and TB. I am going to show and then ask you a few questions about the maps.

1. First question:
[name], so what can you tell me about your experiences with mapping in COPC so far?

Follow up: Can you tell me more about that? What else can you remember?

So, you just told me that… / that's very insightful…

Let's move on to our look at our first data m

Household size map (8 min)
Let's give Leroux a few minutes to generate the map for us map

Let's start by looking at this map. It shows the amount of people per household in your area.

Here is a card that explains to you what the colours and sizes of the dots mean.

2. Second question: When you look at this map in front of you, what do you see?

Prompt - what else do you see? Can you explain this a bit more? Can you clarify this with an example?

What else would you like to see?

Prompt: could you explain this to me?

To make this map, Leroux's computer uses the data that you capture on your gadget and shows you what this looks like when you plot the data on a map.   Next question…

Do you think seeing your data on the map makes it easier for you to understand?

Prompt: Can you explain this a bit more? Can you clarify this with an example?

Moving on, let's look at a series of maps about TB.

TB maps - (12 min)

Let's give Leroux a few minutes to generate the map for us map

The first TB map.

This map shows you a household where there is a person who is diagnosed with TB (this includes both cases where people are on treatment and not on treatment).

Here is a card that explains what the colour of the dots mean.

3. Third question

What do you see when you look at this map?

Prompt: anything else that you can see?

What is this map telling you?

Prompt: Can you give an example? What did you mean by saying this? Is there anything else that comes to mind?

What else would you like to see?

Prompt: could you explain this to me?

Now I want us to move onto our second TB map.

Let's give Leroux a few minutes to generate the map for us map

The second TB map shows you only households where someone has been diagnosed with TB but is not on treatment. Here is a card that explains what the colour of the dots mean.

Let's talk about it….

4. Fourth question
What do you see when you look at this map?
Prompt: can you give more detail? Can you explain this with an example?

What does the map tell you?
Prompt: can you give more detail? Can you explain this with an example?   Could the map help in your work? How would you use it?

Now let's move on to our third TB maps

Let's give Leroux a few minutes to generate the map for us map

The third TB map.

This last map, shows the same households where there are patients who have TB and are not taking mediation, but where the dots have turned orange, the households also has one or more members who are symptomatic and may have TB but has not yet been tested/diagnosed.

Here is a card that explains what the colours of the dots mean

5. Fifth question
What comes to mind when you look at this map?

What does the map tell you?
Prompt: can you give more detail? Can you explain this with an example?

How could you use the map in your work?
Prompt: Is there anything else that comes to mind? What did you mean by saying this?

If there is anything else you would like to look at in more detail, Leroux can zoom in on this

Prompts: What are you seeing here? What is this telling you?

I would like us to draw this interview to a close…

Exit questions - playing back what I hear… (7 min)
Remember to clarify any contradictions I heard by asking the interviewee to explain them
So, let me just play back to you what I heard…
This is to make sure that I have it written down correctly…

6. Is there anything that you feel that I might have missed?
If new things are added… follow up if unsure about what was said
Probe: can you give more detail? Or what did you mean?

Ending: Thank you for taking part in this interview. Your answers are really valuable to help me see if and how these maps can be used in delivering COPC.

Appendix 30: 'Community health' map – group discussion agendas and list of maps shown participant groups

Group discussion session guide ('Community health' map)

The below mentioned lists the focus (or agenda) identified for each group discussion session.
The agenda was set in response to issues or challenges mentioned by participants of a team in their individual interviews. In addition to the agenda, a list of maps was also identified for each group to be shown that supports the agenda. The type of map also indicates if the map should show data for the whole ward (this might include data for more than one team), show data for the team only or show data for the CHWs 200 households. In addition to the maps listed, participants were also free to request additional maps to be shown.

Key to identify the type of maps listed:

- Blue dots = household size map
- Green dots = a map that shows all TB diagnosed households
  (this includes households where someone is taking their treatment as well as households where someone is not taking their treatment)
- Orange = a map showing households diagnosed with TB symptoms
- Red = a map showing households where one or more person in the home has been diagnosed with TB and is not taking their medication

Ward name	Agenda	Maps Identified
Ward 17	• To revisit and reflect on the challenges that participants experience in their area • To listen to the CHW's explain her action plan • To come up with an action plan around reinfection demotivation for taking TB medication	1. Blue dots a) Ward level b) Team level 2. Green dots (team level) 3. Green + Red dots (team level) 4. Orange dots (optional) (team level) 5. Green, Red and Orange dots (team level) * Optional - CHW maps as per requested
Ward 23	• To reflect on what the mapping interview was like for each participant • To identifying the uses and values of the maps for COPC • To list ideas and challenges around using the maps in practice.	1. Blue dots a) Ward level b) Team level 2. Green + Red (CHWs only) 3. Green + Red dot (team level)
Ward 28	• To ask the Doctor to explain his unique role in COPC (the Doctor affiliated to this group is was the Registrar Doctor in Mamelodi at that point in time who did weekly household visits to patients and worked at the clinic) • To listen to the CHW explain her action plan • To listen to the team leader report on the outcome follow up	1. Blue dots a) Ward b) Team 2. Green dots a) Team b) CHW 3. Red and orange dots a) Team b) CHW

	visits done in response to households flagged up in her interview (Which households were identified? What happened when you visited them again to follow up?) • To do planning together around issues or challenges that the team leader and CHW experience.	
Ward 40 (both teams)	• To talk challenging environmental and socio-economic conditions in the ward and make the Doctor aware of them • To listen to the CHW explain her action plan • To come up with a plan around TB education or introducing WBOT to the community	1. Blue dots (team) 2. Green + Red (CHW) 3. Red and orange (CHW) 4. Green + Orange (Optional: Add Red) (team) 5. Prepare old green + orange map (team)
Ward 86 (both teams)	• To look at and celebrate the work done by the CHW • To listen to the CHW explain her action plan • To about any challenges that the CHW and team leader experience around related TB symptoms and getting a person to go to clinic.	1. Green dots a) ward b) team c) CHW 2. Blue dots a) Team b) CHW 3. Red dot map (CHW) 4. Red and orange a) CHW b) Team level

Appendix 31: 'Community health' map – interview reflective writing and session evaluation questions.

1. Reflective writing questions after Individual interviews ('community health' map)

How would you describe your experience of looking at the maps in the interview? To you this was like? Please explain your answer.

Was there anything you liked or disliked about the looking at the maps? Please explain.

Did you learn anything new from looking at the maps of your team? Yes / No

If you did learn anything new, please list some of your ideas below.

Would you use these types of maps (medical data maps) in the work that you do? Yes / No

If you answered yes above, how could you use these types of maps in the work that you

do? Please provide an example/examples.

Are there any other types of data maps that you would like to see? Yes / No - if yes, please list your suggestions below.

2. Session Evaluation questions after individual interviews:

Did you enjoy the experience? Yes /No (please explain):

What could be better about the interview?

Please **circle** or **underline** the option in brackets:
1. Length of the interview - very good, good, ok, poor
2. Venue - very good, good, ok, poor
3. General way in which the interview was run - very good, good, ok, poor

Do you have any other comments about the above?

3. Reflective writing questions - group discussions

14. What is your feeling about the work we did today?
15. What insights did you get from the work we have done today? (Please explain your answer)

Appendix 32: 'Community health' map – data analysis presentation reflective writing questions

'Community health' map data analysis presentation reflective writing questions

Below is a record of how the reflective writing questions for the 'community health' map and how they evolved between the team leader and CHW Data Analysis presentations.

Reflective writing questions asked to team leaders:

1. What is your feeling about the information presented to you? (Please explain)
2. What are the main insights that you would take from the presentation?
3. Did you enjoy listening to the quotes / insights from your colleagues?

   Yes / no (Please explain your answer)
4. Has anything been missed? (If yes, please explain)

Questions adapted for CHW and Registrars sessions:

1. How do you feel about these findings?
2. What is clear for you?
3. What are you uncertain about?
4. What do you need to go and do?

Appendix 33: 'Community health' map – data analysis thematic index used to code data in NVivo

02/06/2018 'community health' map- index of themes

1. Map

1.1 Planning

> Prioritisation {we also left this out & it can also be on its own if we use Phil's structure}

> Milestone or goal

1.2 Locate and identify

> Distribution and Prevalence

> * Demarcation

> Direction

> Take Action

> Healthcare education

> Follow ups

  - Find out the reason for not going to the clinic or taking medication

  - Check if it is actually a TB patient

  - Then get status checked - refer & encourage patient to go to the clinic

> Support and encourage people to take medication

> Intervene/Know when to step in

> Catalytic authenticity

> Tactical authenticity`

1.6 Quantification

1.7 New information (generated by making data visual or combining two or more data sets)

2. Map & discussing

2.1 Motivation

> Celebrate work done (progress made > how much work we have done)

> Give recognition (work tough - so to collect so much data)

> Idea generation and problem solving with team encourages CHWs

> Goal to achieve

2.2 Idea generation & problem solving

> Relationship

  - Registrars or team leaders to link with local clinic

  - WBOTs to partner with clinic around Data

  - Partner with the ward councillors (mentioned by registrar)

> General ideas to improve service delivery (ideas that come out of the conversations)

  - Communicate with the clinic on the amount of resources they would need

  - Match or compare clinic data with our data

- Ideas to integrate maps into AitaHealth™ system

3. Discussing

3.1 Monitor and Evaluate

> Measure progress

    - Progress made to date

    - Change over time

> Data validation (accuracy of the data)

    - Disconnect map and reality experienced

    - Clarify or understand why data is plotted in some areas but not in others

    - Data accuracy issues

    >> Incorrect location (GPS coordinate) used for uploading of data

    >> CHWs unsure how to log data into AitaHealth™

    >> Incorrect data – household status differs from what was entered into the gadget

> Performance validation (checking up on how work is done)

    - Gaps > Areas that that CHWs still need to register

    - Review and check up on work done and respond to what is needed {could also be with take action}

> Assumption validation (validate an insight or idea you have from looking at the map by asking the CHWs / Team leaders)

3.2 Give voice

> Challenges

    - Difficult environmental conditions & social problems in the community

    >> Poverty

    - Difficult household and living conditions

    - Difficult socio-economic

    - Issues with the patients themselves

    - Issues at the clinic

    - Operational challenges {could make this one with lack of resources – most of the quotes apply to both themes}

    - Lack healthcare resources

    - Limitations current version of AitaHealth™ System

    - Hopelessness – just taking data without being able to help families

> Frustrations

    - Clinic or people don't understand COPC (disconnect)

    - Reluctance to give personal data (community members unclear what for?)

    - Focus on data collection only but not taking any action

    - Frustration clinic doesn't feel COPC is helping them

> Real issues of an area surfacing {also communication}

3.3 Learning and comprehension (session taught them something new) (CHWs, registrars)

> Individual learning

   - Ontological authenticity *("shift" made & understanding of a topic has been expanded & elaborated) (the extent to which a participant has matured, expanded and elaborated, in that they now possess more information about an idea or construct).*

   - No shift made (understanding of topic has not been expanded or elaborated after mapping activity)

> Peer learning

Themes unique to the joint discussions:

3.4 Communication

> Discuss problems / challenges experienced

   - Household specific issues or challenges

> Give advice to improve practice

> Get to know an area better (i.e. The "personality of an area")

3.5 Team work / group work

4. Unexpected insights / discrepancies

{Just to mark this as a theme on its own}

5. Research question, objectives, and visual rhetoric (themes that answer these)

4.1 Definition of value and use of maps at start of project (Objective One)

4.2 Value of data map for COPC (Objective two)

4.3 Understand the role of maps and mapmaking in healthcare delivery (Study Aim)

4.4. Visual Rhetoric

6. Map improvements & map comprehension

Indirectly some of themes below show how much people would like to use the maps in their work – so it proves that the sessions and data maps are valuable)

5.1 Information to add

> Team boundaries

> Health related landmarks

> LISA information

5.2 Wishlist of extra maps

5.3 Suggestion for future improvements and uses of the maps

5.3.1 Use live data that is current – if data is backdated, making sure it is still valid to work with

5.3.2 Ideas - ways to incorporate data into AitaHealth™ system

5.4 Map did not live up to expectations – mostly for Registrars and it's because TB as a topic is not a good one to spot patterns with

7. Participatory research

7.1 Member checking

8. Roles

8.1.1 Role of the registrars

8.1.2 Role of CHW

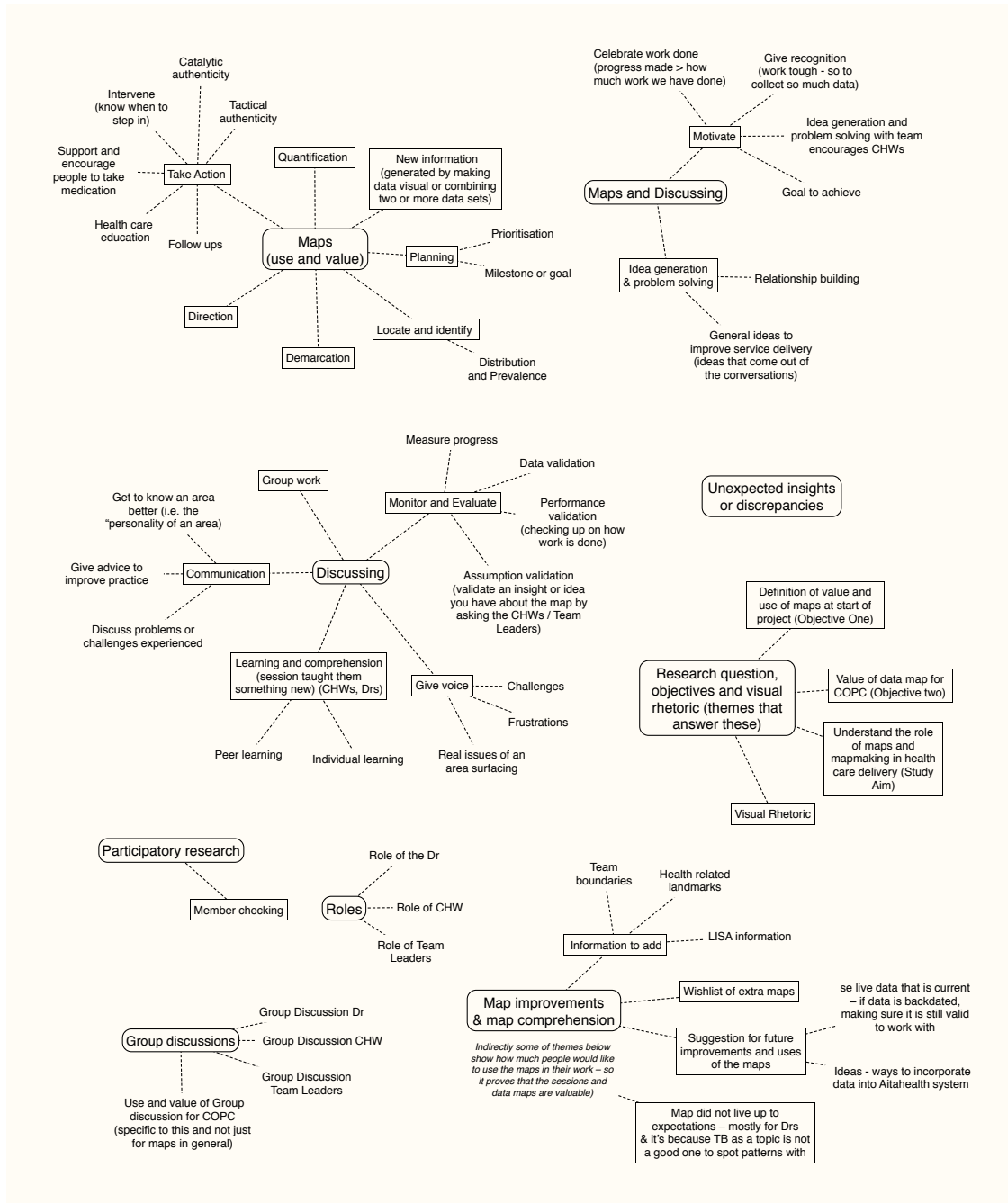8.1.3 Role of team leaders

9. Group discussions

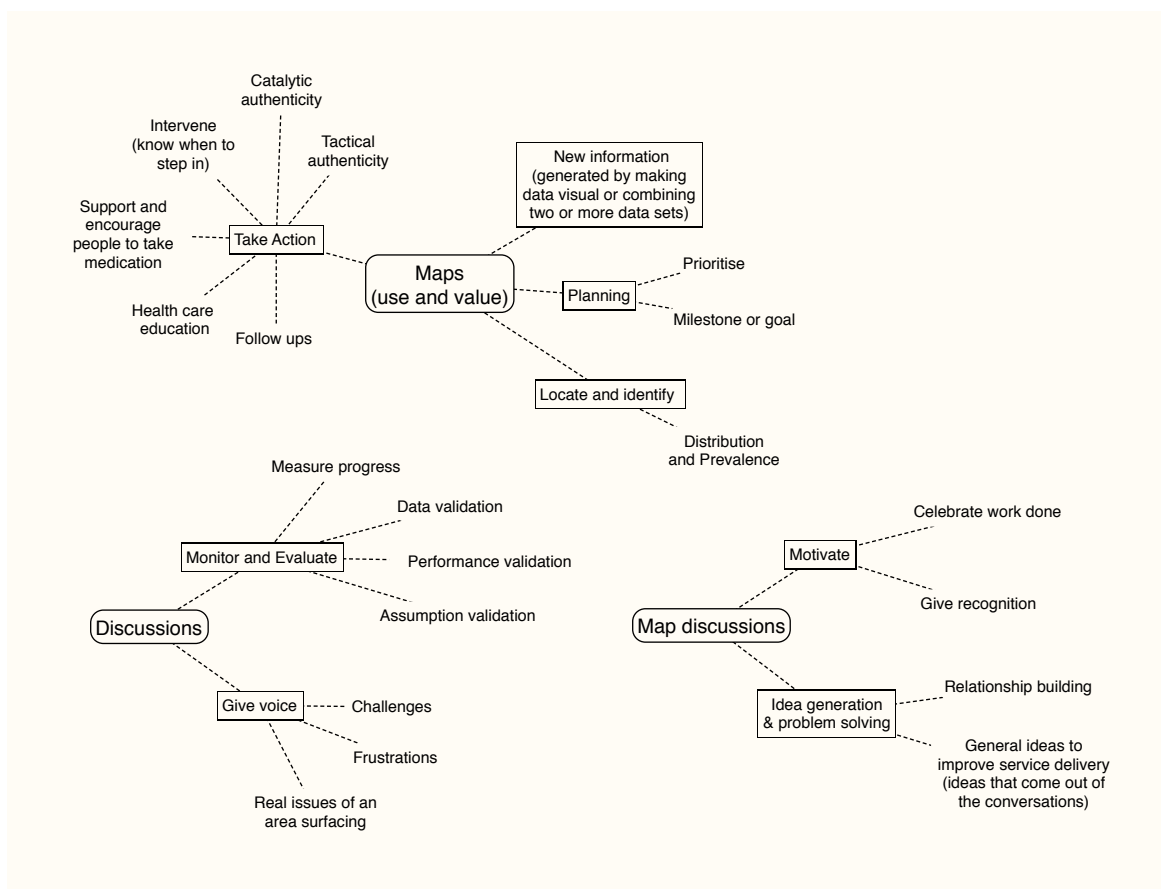9.1 Group discussion registrars

9.2 Group discussion CHW

9.3 Group discussion team leaders

9.4 Use and value of Group discussion for COPC (specific to this and not just for maps in general)
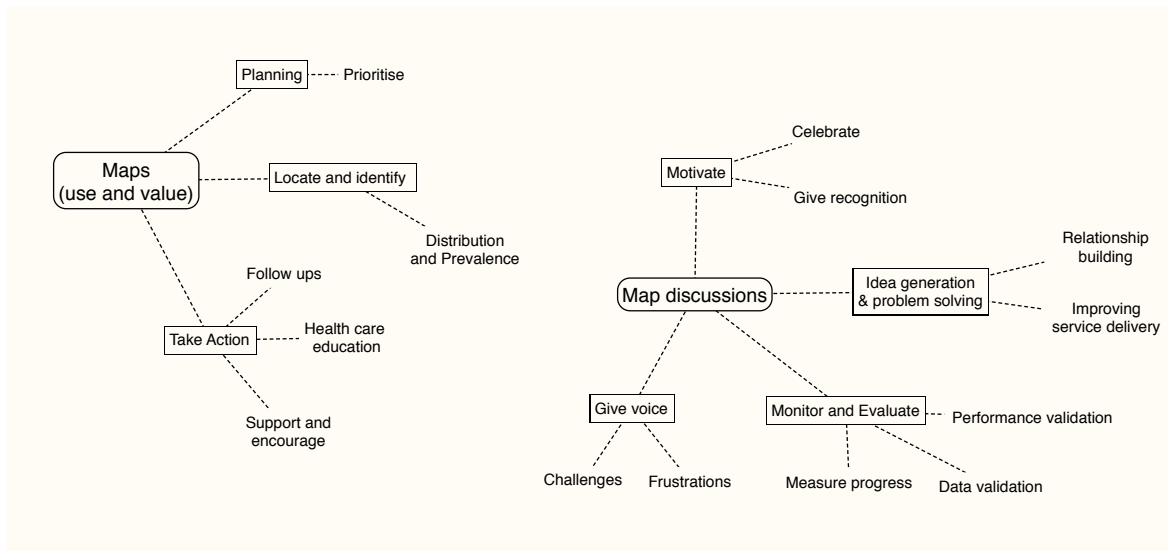
Appendix 34: 'Community health' map – theme map one (depicting theme index above)

Catalytic authenticity

Intervene (know when to step in)

Tactical authenticity

Support and encourage people to take medication

Take Action

Quantification

New information (generated by making data visual or combining two or more data sets)

Health care education

Follow ups

Maps (use and value)

Planning

Prioritisation

Milestone or goal

Direction

Locate and identify

Demarcation

Distribution and Prevalence

Celebrate work done (progress made > how much work we have done)

Give recognition (work tough - so to collect so much data)

Idea generation and problem solving with team encourages CHWs

Motivate

Maps and Discussing

Goal to achieve

Idea generation & problem solving

Relationship building

General ideas to improve service delivery (ideas that come out of the conversations)

Measure progress

Group work

Data validation

Monitor and Evaluate

Performance validation (checking up on how work is done)

Get to know an area better (i.e. the "personality of an area)

Give advice to improve practice

Communication

Discussing

Assumption validation (validate an insight or idea you have about the map by asking the CHWs / Team Leaders)

Discuss problems or challenges experienced

Unexpected insights or discrepancies

Learning and comprehension (session taught them something new) (CHWs, Drs)

Give voice

Challenges

Frustrations

Peer learning

Individual learning

Real issues of an area surfacing

Definition of value and use of maps at start of project (Objective One)

Research question, objectives and visual rhetoric (themes that answer these)

Value of data map for COPC (Objective two)

Understand the role of maps and mapmaking in health care delivery (Study Aim)

Visual Rhetoric

Participatory research

Role of the Dr

Member checking

Roles

Role of CHW

Role of Team Leaders

Team boundaries

Health related landmarks

Information to add

LISA information

Map improvements & map comprehension

Wishlist of extra maps

se live data that is current – if data is backdated, making sure it is still valid to work with

Group Discussion Dr

Group Discussion CHW

Group discussions

Indirectly some of themes below show how much people would like to use the maps in their work – so it proves that the sessions and data maps are valuable)

Suggestion for future improvements and uses of the maps

Ideas - ways to incorporate data into Aitahealth system

Group Discussion Team Leaders

Use and value of Group discussion for COPC (specific to this and not just for maps in general)

Map did not live up to expectations – mostly for Drs & it's because TB as a topic is not a good one to spot patterns with

Appendix 35: 'Community health' map – theme map two (first iteration of the theme reduction process)

Appendix 36: 'Community health' map – theme map three (final iteration of themes)

Appendix 37: Comparison of themes identified in the study's systematic literature review with themes of the 'community health' map

Systematic Literature Review Themes	'Community health'– map Themes
Monitoring & Evaluation:	*Monitoring & Evaluation (measure progress, data validation, performance validation)*
Using GIS to understand and investigate the environmental factors impacting on health	Map discussions revealed environmental and social conditions that have an impact on healthcare delivery
Using GIS to assess healthcare needs	Locate and identify
Omnibus theme: • Calculating inadequacies related to access of care • Assessing the health status of a community • Evaluating the effectiveness of care offered	Only one overlap - the mapmaking project as a whole assessed the health status of the community
Planning & Implementation	
Assess patterns of use in of the utilisation of healthcare resources by community members	Slight overlap –in the map discussions, participants from all three mapmaking projects identified the use of and access to healthcare facilities and healthcare related resources
Planning healthcare interventions	Idea generation and problem solving (relationship building, ideas to improve service delivery)
Enabling Community Members to Participate in Primary Healthcare Delivery	
Enabling community-initiated health interventions	Overlap, but was not used in this way in the study
Contributing local knowledge as qualitative data	No overlap
Utilizing a Community Based Participatory Action Research (CBPR) approach to health research (Research Design)	No overlap