

Dissertation proposal

Title:

Identifying inefficiencies in the South African primary
healthcare supply chain

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ABSTRACT

The primary objective of this study was to identify and investigate perceived inefficiencies within the primary healthcare supply chain. Taking into account the paramount role that primary healthcare facilities play in the South African healthcare industry, we deemed it a necessity to identify perceived inefficiencies and recommend the most effective course of action in order to correct these inefficiencies.

Through a literature study that was conducted, a general investigation into the theoretical supply chain of primary healthcare facilities was commenced. The end result of the literature study was a consolidated theoretical primary healthcare supply chain that would form the basis of the analysis to be conducted later in the study. Once the literature study was completed, our efforts shifted towards an empirical study aimed at measuring the actual supply chain. The empirical study was based on two primary healthcare clinics in the Johannesburg region, namely: Siphumlile Clinic situated in Soweto and the Rex Street Clinic situated in Roodepoort. To add substance to the empirical study, a three perspective analysis was conducted that took the form of a questionnaire completed by the patients at the respective clinics, semi structured interviews with employees of the clinics and finally participant observations conducted by the researcher. These perspectives ultimately resulted in a holistic perspective on the actual supply chain as perceived by the relevant role players within the supply chain. It's important to note that the statistical information obtained via the completed questionnaires were analysed by the Statistical Consultation Services of the North-West University (Potchefstroom campus). Once the reliability and validity of the questionnaire had been determined, an in depth statistical analysis was commenced to identify certain aspects that haltered the overall efficiencies of the primary healthcare supply chain. The respective semi structured interviews, along with the participant observations and information obtained via the statistical analyses formed a solid foundation to identify the inefficiencies as perceived in the existing primary healthcare supply chain. The substantial amount of accurate information supported the study and its primary and secondary objectives immensely.

The latter stages of the study focused efforts on the establishment of findings and viable recommendations that could resolve the perceived inefficiencies within the supply chain. The

study concluded by summarising these findings and recommendations and proposing an effective way forward from a primary healthcare supply chain perspective.

ABSTRAK

Die primêre doel van hierdie studie is om die waargenome oneffektiwiteite in die primêre gesondheidsorg waardeketting te identifiseer. Deur die belangrike rol wat die primêre gesondheidsorg fasiliteite in Sui-Afrika speel in ag te neem was ons genoop om die waargenome oneffektiwiteite te identifiseer en moontlike oplossing te bied wat hierdie oneffektiwiteite sal uitskakel.

'n Aanvanklike literatuurstudie was van staple gestuur met die hoofdoel om 'n teoretiese waardeketting vir primêre gesondheidsorg fasiliteite te identifiseer. Die eindresultaat van die literatuurstudie was 'n gekonsolideerde en teoretiese waardeketting vir primêre gesondheidsorg wat dan die basis sou vorm vir die res van die studie. Nadat die teoretiese studie voltooi is, het ons fokus verskuif na die implimentering van 'n empiriese studie basseer op 2 primêre gesondheidsorg klinieke in Johannesburg, naamlik Siphumlile kliniek en Rex Street kliniek. Om meer waarde toe te voeg tot die empiriese studie, sowel as ek hele verslag is 'n drie-perspektief analise gedoen wat basseer was op die pasiënte, werknemer (by die klinieke) en navorser se persepsie van die waardeketting. Hierdie perspektiewe het ons in staat gestel om volledige aannames te maak aangesien verskeie perspektiewe in ag geneem is. Die empiriese data is vervolgens deur die Statistiese Konsultasiediens van Noordwes Universiteit (Potchefstroomkampus) verwerk. Nadat die nodige statistiese toetse om die betroubaarheid van die data te bevestig is die fokus verskuif na die laaste twee komponente van die drie-perspektief analise, naamlik die werknemer-en navorser perspektief. Die semi gestruktureerde onderhoude met werknemers sowel as die holistiese navorser perspektief het daartoe gelei dat die nodige waardeketting inligting objektief vanuit alle moontlike perspektiewe beskikbaar is.

Die latere stadiums en hoofstukke van die studie was basseer op die skepping van insigte wat verband gehou het met oneffektiwiteite in die primêre gesondheidsorg waardeketting. Die nodige voorstelle wat geïmplimenteer kan word om die oneffektiwiteite te elimineer is vervolgens bespreek.

Keywords:

Supply chain, industry, service, Porter's generic supply chain, inefficiencies, Siphumlile Clinic, Rex Street Clinic, Department of Health, HST, SAHR.

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(a) Terminology and abbreviations

➤ National Health Insurance (NHI)

- Integrated healthcare program (private and public healthcare) that is administered by a country's government and solely financed from government taxes (World Health Organization, 2008).

➤ African National Congress (ANC)

- Oldest black (now multiracial) political party in South Africa. Founded in 1912 the political party mainly focused its efforts on opposing Apartheid. The political party has also been the ruling political party from 1994 after the first democratic elections held in South Africa (Oxford English Dictionary, 2011).

➤ Universal health system

- A unified system (private and government owned facilities) that provides all citizens with adequate healthcare at an affordable cost (World Health Organization, 2008).

➤ South African Health Review (SAHR)

- Healthcare related reports and information specific to the South African healthcare industry as published on a continuous basis by the Health Systems Trust (South African Health Review, 2011).

➤ Primary Healthcare

- Essential health care; based on practical, scientifically sound, and socially acceptable method and technology; universally accessible to all in the community through their full participation; at an affordable cost; and geared toward self-reliance and self-determination (World Health Organization, 2008).

➤ **Health Systems Trust (HST)**

- Organisation established in 1992 focusing on the development of a quality health system that suffices in the needs of all South African citizens, including previously disadvantaged citizens (Health Systems Trust, 2010).

Chapter 1 – Introduction and problem statement

1.1 Introduction

“Patients are dying unnecessarily because South Africa’s public healthcare institutions are overburdened, under-staffed and poorly managed”, Kerry Cullinan reported in a recent article published on the Health-e website.

At first, this statement seems gloomy, obtuse, uninformed and possibly evidential of a previous firsthand experience Cullinan might’ve encountered with regards to services rendered by a public primary healthcare institution. However, before we can dismiss this statement with sheer disdain, humor it, by seeking to identify the proverbial root of this (disturbing) disclosure. You do not have to seek far. By browsing through recent newspaper articles and press releases, one stumbles across headlines including words such as: “hospitals in crisis” (Cullinan, 2006), “parliament hears of poor state of public healthcare” (Mail & Guardian, 2009), “baby deaths” (Tshisela, 2010) and “mismanagement and corruption within the public healthcare industry” (Landman, Mouton & Nevhutalu, 2009). The list of dooming articles, including one where it’s reported that 8001 babies died (Tshisela, 2010) within the first 5 month of birth (in public hospitals) in 2010, ultimately leaves you wondering whether Miss Cullinan is inherently correct with her gloomy statement.

In a report published by the Ethics Institute of South Africa, public primary healthcare institutions are marred by many of the following issues: inadequate resources (staffing and facilities), lack of leadership, budget mismanagement and overall operational inefficiency from a patient management perspective (Landman, Mouton & Nevhutalu, 2009). This picture becomes even grimmer when looking at the statistics. The Health Systems Trust (HST) reported that only 16.4 per cent of South Africa’s population in 2010 had medical coverage. This means that the balance of 83.6 per cent of the population, or rather 41,792,726 citizens are dependent on public healthcare facilities such as government owned hospitals and primary healthcare clinics.

Taking into account negative media reports, heavily outweighing population statistics and growing legislative pressure relating to the implementation of National Health Insurance (NHI), one can easily elude to the opinion that the public healthcare industry is heavily stressed and possibly heading for a holistic collapse.

Although this is just pure speculation at this stage, this report will ultimately aim to provide substantiating evidence to prove or disprove the speculation.

1.2 Background of study

Before this study can officially commence, it's important to acknowledge the history and background of the various role players within the South African public healthcare industry. A theoretical background of the industry will enable us to obtain a more precise and objective view on the functioning of the industry from a South African perspective.

1.2.1 Structure of the public health sector

It's important to acknowledge the basic architecture of the South African public healthcare industry. It can easily be illustrated as follows:

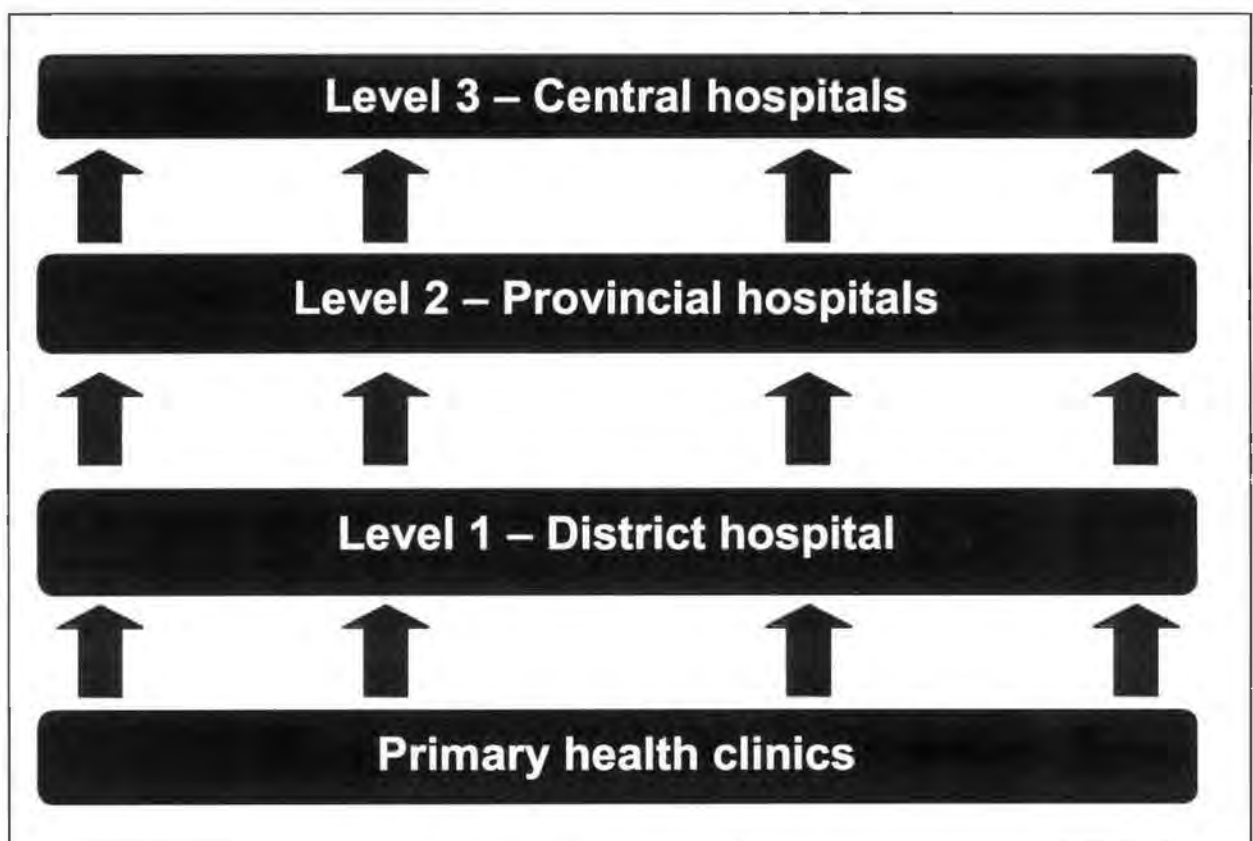


Figure 1 - South African Public Healthcare Structure (Adapted from: Department of Health official publications)

Theoretically, with reference to figure 1, the first point of entry is the primary health clinics responsible for initial examination and basic primary care (Department of Health, 2008). Patients should be referred upwards for more specialist and intensive clinical care than the level below it. In layman's terms: primary health clinics are responsible for initial diagnosis, treatment (if possible) and referral to the relevant provincial hospital(s) should more intensive healthcare be required. Primary health clinics are therefore the first (theoretical) point of contact for state patients entering the public healthcare system.

Unfortunately, in practice, this does not always happen. Weaknesses relating to the referral system and the lack of comprehensive hospital coverage mean that central and regional hospitals often accommodate patients that ought to be treated in hospitals at level below and above them (van Holdt & Murphy, 2006). We can therefore elude to the fact that primary healthcare clinics play a paramount role in the overall functioning of the public healthcare system as primary clinics are the entry level for state patients. It's therefore of major importance that primary health clinics function at the most efficient level as possible. Inefficiencies existing at this level will ultimately lead to a ripple effect that will impact all other public healthcare institutions negatively as gross patient imbalances will appear. The theoretical structure of the healthcare industry is as such, that the various segments within the industry receive and assist a balanced number of patients. Unfortunately, in instances where patients disregard the first point of contact (primary healthcare clinics) and rather access a state hospitals directly, gross imbalances will arise that will derail the proverbial healthcare train. Turning the table around and focusing on the patient's perspective, many patients deem primary healthcare clinics as operationally inefficient and overburdened (Landman, Mouton & Nevhutalu, 2009) hence the reason that they will rather access a facility such as a state hospital due to the state hospital's increased capacity for assisting patients. Unfortunately, this tips the scales and negatively impacts state hospitals and their ability to assist patients.

More details pertaining to the structure and operational inefficiencies of public healthcare and the existing referral system will be discussed in more details later in this report.

1.2.2 National Health Insurance

Although National Health Insurance (NHI) won't form the cornerstone of this study, it is important to recognise the basic details pertaining to the proposed implementation. NHI is not a new idea. First introduced in 1944, the structure of the NHI plan was similar to the model established and developed in European countries and the United States (Innovative Medicines of South Africa (IMSA), 2011). At that stage, it only remained a theoretical idea. With the first

democratic election in 1994, the African National Congress (ANC) renewed efforts to implement a revised, or rather restructured healthcare system that would eliminate perceived Apartheid inequalities and provide affordable and quality healthcare to all citizens in South Africa (World Health Organisation, 2011). In practise, the implementation of such a programme will result in the conglomeration of all public and private healthcare providers into one unified systems. Funding will solely originate from income taxes and subsidies from the South African government. In theory, a unified healthcare system holds its benefits from an equal care and affordability perspective.

Although the ultimate impact of NHI on public and private healthcare infrastructure is vague and unconfirmed to say the least, one thing is more certain than ever: the success of a unified healthcare system of this magnitude will depend on the (efficient) functioning of its comprising elements. These elements include public primary healthcare infrastructure.

1.2.3 Government effort(s)

Since the first democratic election in 1994, the South African government has consistently emphasized the importance of an efficiently functioning healthcare system (Mail & Guardian, 2009). Efforts to establish, maintain and develop an efficient system have led to several initiatives such as the implementation of the Office of Standards Compliance responsible for the management of all public healthcare institutions in South Africa. Furthermore, the Government has reverted to an action that most governments revert to, throwing money at the problem. The South African government expenditure relating to health services have incremented, on average, by 20 per cent over the past 5 years (Health Systems Trust, 2009). Although exuberant amounts of money have been invested into the development and overall upgrade of the healthcare industry, little tangible improvement has been noticed and the industry remains under severe pressure (Waters, 2009). Pressure relating to inadequate infrastructure (from a facilities perspective), excessive staff workloads (due to inadequate staffing) and increased pressure originating from the government's renewed efforts to distribute antiretroviral free of charge to all citizens has contributed to a healthcare industry on the brink of collapse (Waters, 2009).

1.3 Primary healthcare supply chain components

To add perspective to this report, our study will aim to isolate one of the most important aspects of any industry, namely the supply chain. Many years of research has been conducted in the field of supply chains. Although the generic components of a supply chain are applicable to all industries, certain industries will most likely have supply chain components unique to the

specific industry, whilst these unique components might not be applicable to another industry. In order to provide sufficient theoretical background to our study, the generic value chain as developed and published by Michael Porter will form the basis of our initial analysis. Although a more detailed supply chain containing industry specific components will be researched and confirmed at a later stage in this study, we will commence our initial study by focusing on 3 generic components in any supply chain. These components include: inbound logistics, operations and outbound logistics (Porter, 1985).

1.3.1 Inbound logistics

Inbound logistics relate to certain input components that will ultimately be transformed by the organisation or process to ultimately create a final product (outbound logistics) (Porter, 1985). If we apply this principle to our study, inbound logistics would in most cases relate to patients in need of medical care. Although this component is not limited to patients alone, we will expand our focus at a later stage in this report to include other component relevant to the healthcare industry as well.

1.3.2 Operations

Operations refer to the transformation activities required to transform the component received in the first phase (input logistics) into the final required product (output logistics) (Porter, 1985). Applying this principle to our study, the operations component will refer to all activities needed to transform the received input (patients in need of medical attention) into the required output (healthy/treated patients).

Activities related to transformation include:

- Admissions/reception
 - All activities relating to a patient entering the premises of a primary healthcare clinic.
- Diagnoses
 - All activities relating to a patient being diagnosed with a specific illness.

1.3.3 Outbound logistics

Outbound logistics relate to the final product produced after the completion of the transformation activities (Porter, 1985). Thus, if we base our study on this principle, the outbound logistics would in most cases relate to the net result of actions conducted in the preceding operations component.

Activities relating to outbound logistics include:

- Treatment
 - All activities relating to a patient being treated for the diagnosed illness as well as the dispensing of medicine.
- Care
 - All activities relating to maintenance of patients in terms of food, ablution, general supportive resources and activities focused on continuous care of patients should it be required.
- Dispensing of medicine
 - Activities focused on disbursing of medicine to the relevant patients to ensure an improved state of health in the medium to long term. This activity also forms part of "treatment".

1.3.4 Additional supply chain components

To add substance and objectivity to the study, we will not only be focusing on the core supply chain components as mentioned earlier. The study will also include various secondary supply chain components that support the primary supply chain activities (Bauernschmitt 2007 & Porter 1985).

These components include:

- Quality and standardisation measures
 - All measures relating to the standardisation of all activities as well as measures focused at maintain predefined minimum standards (Bauernschmitt, 2007).

- Infrastructure

- Facilities

- This component relates to the physical facilities required to support the primary supply chain components (Bauernschmitt, 2007). The facilities component includes: buildings, beds, machinery etc.
 - This component also includes commodities relating to the physical facilities required to support the primary supply chain components. The commodities include: bandages, linen, medicine etc.

- Human Resources

- This component relates to the all human resources required to support the primary supply chain components. The human resources component includes: nurses, cleaning services, kitchen staff etc.
 - This component includes skills development and training requirements.

- Technology

- This component relates to the information technology infrastructure needed to maintain the supply chain within the public primary healthcare clinic (Bauernschmitt, 2007). The technology component includes: business intelligence systems, patient management systems, medicine stock systems etc.

- Procurement

- Human Resources

- This component relates to the procurement of all human resources required to support the primary supply chain activities (Bauernschmitt, 2007). The human resources procurement component includes: salaries, incentives etc.

- Third party service/product providers

- This component related to the procurement of all third party service/product providers to support the primary supply chain activities.

The third party service/product provider procurement component includes: payments for the acquisition of commodities, utility payments, payments relating to services rendered etc.

1.4 Problem statement

This section of the report focuses on providing substantiating evidence to support the commencement of a theoretical and empirical study,

1.4.1 Focus area of study

It's quite easy to establish that a study of the public primary healthcare industry is quite a complex issue. Intertwined with political aspirations and ideals, the public healthcare industry is one industry that receives a lot of attention on a consistent basis.

To simplify our study and add focus to a specific segment, our research will be focused on (public) primary healthcare clinics. Although the debate rages on pertaining to state hospitals and the overall management thereof (Mail & Guardian, 2009), many oversee the importance of the primary healthcare clinics and what role they play in the industry. The hypothesis relating to primary healthcare facilities such as Siphumile and Rex Street, is quite simple to establish. If all primary healthcare facilities function efficiently, existing pressure on other state owned facilities such as state owned hospitals will be dramatically reduced resulting in a more efficiently functioning public healthcare industry. On the contrary, as mentioned earlier, an ineffective first point of contact (primary healthcare clinics) will have an adverse and negative ripple effect on other public healthcare industry components. Our primary healthcare clinic focus will therefore be to identify inefficiencies (from a supply chain perspective), seeking out the causes of the inefficiencies and ultimately identifying and implementing effective solutions.

1.4.2 Supply chain specific analysis

Now that we've limited our focus area to primary healthcare clinics, we need to establish the motivation behind focusing solely on the supply chain within public primary care institutions. Being an extremely complex industry with many role players, one might argue that various factors, or rather role players, influence the overall efficiency of the healthcare system differently making it even more difficult to focus only on one of those role players as basis of this study.

That being said, one major component that directly influences the efficiency of a healthcare system would be the supply chain (Bauernschmitt, 2007). To add substance to this statement,

we will inherently focus on three (proudly South African) disconcerting statistics to provide the necessary evidence in support of the area of research required, namely the supply chain. The first statistic: a research study recently commissioned by Discovery Health illustrated that the level of private health care in South Africa ranked closely with other developed countries, yet public sector levels were significantly lower (Broomberg, 2009). Private health care within South Africa ranked seventh in the world, whilst public healthcare ranked fifty eighth in the world. The second statistic: according to research conducted by the Medical Research Council, South Africa ranks 148th in the world (198 countries ranked) in terms of the mortality rate at birth (The Lancet, 2011). This is directly contributed to inadequate care by the various public primary care institutions in South Africa (The Lancet, 2011). The third and final statistic relates to the human resource factor within the public healthcare industry. According to the World Health Organisation (WHO), the ratio of nurses and patients is a whopping 40.80 to 1 compared to the 10.9 to one generally accepted ratio for the industry (World Health Organisation 2011). Thus, in layman's terms: 40.80 patients are dependent on one nurse for healthcare within the South African public healthcare industry.

There might be various other contributing factors that could ultimately lead to the mentioned statistics. However, the mentioned statistics all relate to one central aspect: the supply chain. By focusing solely on the supply chain within public primary healthcare, we will be able to establish the root cause(s) for the perceived inefficiencies.

1.4.2.1 Inbound logistics

As mentioned earlier in this study, inbound logistics relate to all activities focused on introducing the relevant inputs into the supply chain. Thus, if we apply this principle to our study field, inbound logistics could include the following components:

- Admission/reception resources
 - Staff
 - Facilities
 - Administrative systems
- Diagnostic resources
 - Doctors
 - Nurses

- Machinery

To add substance, the components related to inbound logistics will be expanded dramatically to ensure an objective study based on conclusive evidence. This component (inbound logistics) was identified as one of the main areas of concern. During October 2009, the Parliamentary portfolio committee was informed of the following areas of concern directly related to the inbound logistics existing in public primary healthcare:

- **A) Diagnostic resources**

Diagnostic resources relate to the actual staff (and machinery) needed to diagnose patients and either treat them or refer them to the relevant state hospital for further diagnoses. The medical professional/patient ratio within public healthcare industry is a staggering 0.58 per 1000 citizens (Mayozi, 2009). Inadequate diagnostic resources referring to the latter (onsite doctors and specialists) directly contributes to lag time relating to the diagnoses and submission of patients.

- **B) Facilities and infrastructure**

Tying in to the before mentioned diagnostic resources, facilities and infrastructure are also under pressure. Apart from the fact that acquiring and maintaining facilities and infrastructure is an extremely time consuming and expensive exercise, it's of utmost importance that these facilities and infrastructure are available and functional at all times. Taking into account the existing nurse/patient ratio, one can easily elude to the fact that existing facilities and infrastructure is overburdened due to the high demand by state patients in need of healthcare.

Our study will therefore emphasize an analysis of all components and aspects related to the inbound logistics of public hospitals.

1.4.2.2 Operations/transformation

The operational component of the public primary healthcare supply chain relates to all activities and resources required to transform the received input into the required output (Porter, 1985). In perspective, operational logistics will relate to the relevant resources needed to diagnose, treat and/or refer patients to a more relevant public hospital.

To add insult to injury, the Parliamentary portfolio committee was informed of the following concern relating to public healthcare facilities:

- **A) Human resources**

Apart from the gross imbalance with regards to doctor/patients ratios as confirmed earlier, the medical professional/patient ratio is even worse (40.80:1). Inadequate human resources within the operational component will dramatically impact the overall efficiency of the public healthcare system. Ideally, adequate operational resources will assist the efficient receipt, throughput and exist of all patients entering the clinic. This will result in the maximum number of patients being assisted in the shortest time available.

- **B) Commodities and equipment**

Commodities relating to the physical resources required by the doctors and nurses (human resources) can include material and equipment such as: bandages, medicine, radiology machinery and general facilities such as theaters and wards. Unfortunately, the overall management of these commodities and equipment is inadequate based on inefficiencies such as: limited medicine stock, inadequately maintained equipment and the lack of adequate commodities needed to treat patients (Stulting, 2009).

- **C) General patient maintenance**

The snowball effect preceding factors have on general patient maintenance is easy to identify. A lack of human resources, coinciding with inadequate commodities and equipment, preceded by inefficient inbound logistics will ultimately affect the holistic care of patients negatively. Inadequate care directly contributes to high mortality rates (van Holdt & Murphy 2006).

Our study of the operational component will therefore be closely linked to the inbound logistics section as these two components directly impact the overall success of the final product (outbound logistics).

1.4.2.3 Outbound logistics

The final main component (outbound logistics) is dependent on its two predecessors (inbound and operational logistics). The sole focus of this component would relate to the dispensing of medicine to patients and activities focused on the continuous care of patients. This includes acute and chronic medicines dispensed to patients. Although this component is not the cog of the public healthcare supply chains, it is required to focus upon the various aspects relating to the outbound logistics.

1.5 Objectives of the study

We will now proceed to identifying the various objective of the study. These objectives will be the driving force behind the efforts commenced in this study.

1.5.1 Primary objective

The primary objectives of the study include:

- Graphically illustrate and discuss the primary public healthcare supply chain from a theoretical perspective;
 - Research and illustrate the theoretical supply chain as published by Porter in 1985.
 - Expand and adapt Porter's supply chain model to cater for the primary public healthcare industry.
- Graphically illustrate and discuss the primary public healthcare supply chain from an observed/functional/actual perspective;
 - Research and illustrate the current primary public healthcare supply chain via the implementation of methodological research techniques.
- Identify inefficiencies within the primary public healthcare supply chain by comparing the theoretical healthcare supply chain with the observed/functional/actual supply chain existing within the primary healthcare industry.
 - Compare the amended theoretical supply chain version of Porter's model to the actual supply chain as derived from methodological research techniques.
 - Implement and analyse statistical data to identify additional perceived inefficiencies over and above the inefficiencies identified by the implementation of methodological research techniques such as participant observations and semi-structured interviews.

1.5.2 Secondary objectives

The secondary objectives of the study include:

- Make recommendations pertaining to the elimination of perceived inefficiencies within the supply chain as identified by comparing the theoretical supply chain with the observed/functional/actual supply chain;
 - Categorize the various inefficiencies as derived from the three perspective analysis to facility simplicity of corrective recommendations.
- Identify secondary/external factors that influence the existing primary healthcare supply chain negatively and make recommendations to eliminate these factors.
 - Take into account the South African context influencing the public primary healthcare industry from an internal and external perspective.

1.6 Scope of the study

In order to obtain the objectives as stated earlier, the scope of the study can be defined as follows:

1.6.1 Industry

- Public healthcare

1.6.2 Subject

- Operations and supply chain management within the public primary healthcare sector

1.6.3 Geographical demarcation

- Johannesburg, Gauteng

1.6.4 Organisations

It's important to disclose the studied clinic particulars in terms of location, demographic details and so forth. This will enable to reader to avail over additional information pertaining specifically to the clinics which will result in a more objective view of the holistic study.

1.6.4.1 Siphumlile Clinic – Soweto

Clinic details



Figure 2 - Google Earth Image of Siphumlile Clinic

2304 CBD (108th Street)
Doornkop
Dobsonville
Soweto
Region D Clinics

Core functions:

Baby wellness
Immunisation
Family planning
Sexually transmitted infections
HIV/Aids
Curative medicines (children)
Tuberculosis
Communicable diseases
Health education

Hours:

Monday to Friday
07:30 am to 16:00 pm

Visual tour



(Left) The entrance of Siphumlile Clinic situated in the heart of Soweto. **(Below)** The waiting area at Siphumlile Clinic where patients await medical attention for themselves or their dependents.

(Below) Patients awaiting medical assistance outside the relevant allocated procedural room.



(Below) The (rather small) emergency room at Siphumlile Clinic.



1.6.4.2 Rex Street Clinic – Roodepoort

Clinic details



Figure 3 - Google Earth Image of Rex Street Clinic

19 Rex Street
Roodepoort
Region C Clinics

Core functions:

Mother and child health
Sexually transmitted diseases
Curative services
Reproductive health services
Tuberculosis
Immunisation
HIV/Aids

Hours:

Monday to Thursday
08:00 am to 16:00 pm
Fridays
08:00 am to 12:00 pm
Every 3rd Tuesday of month: 16:00 pm to 18:00 pm

Visual tour



(Left) The entrance to the Rex Street Clinic in Roodepoort. (Below) An uncanny quite waiting room on a Friday afternoon where patients anxiously await medical attention.

(Below) The administration and reception area of Rex Street Clinic.



(Below) The "Right to Care" HIV assistance area.



1.7 Research method

In any study, various research methods should be implemented to obtain the required results and to reach the predefined research objectives. These methods will now be briefly discussed.

1.7.1 Literature study

Theoretical sources

For purposes of this study, the literature study will form the basis of the practical supply chain analysis. In order to analyse the practical supply chain we need to base our analysis on the existing theoretical supply chain. The following sources will therefore be utilised:

- ✓ General and healthcare specific supply chain structure(s)

Extensive research has been conducted in generating theoretical and generic supply chains. The study's aim will be to amend and redefine those supply chains to cater specifically for primary healthcare from a theoretical perspective.

- ✓ Publications

Healthcare specific publications published locally and internationally will be included in our theoretical study. These publications will add substance to the theoretical analysis.

1.7.2 Empirical study

The empirical study was commenced and concluded by implementing several data acquisition methods. The motivation behind the implementation of several different empirical methods is easily explicable. In order to commence and conclude a study that is characterized by objectivity, fairness and the inclusion of all related role players, several research methods was implemented to support this. A three perspective analysis will be implemented to facilitate the empirical study. The three perspective analysis can be illustrated as follows:

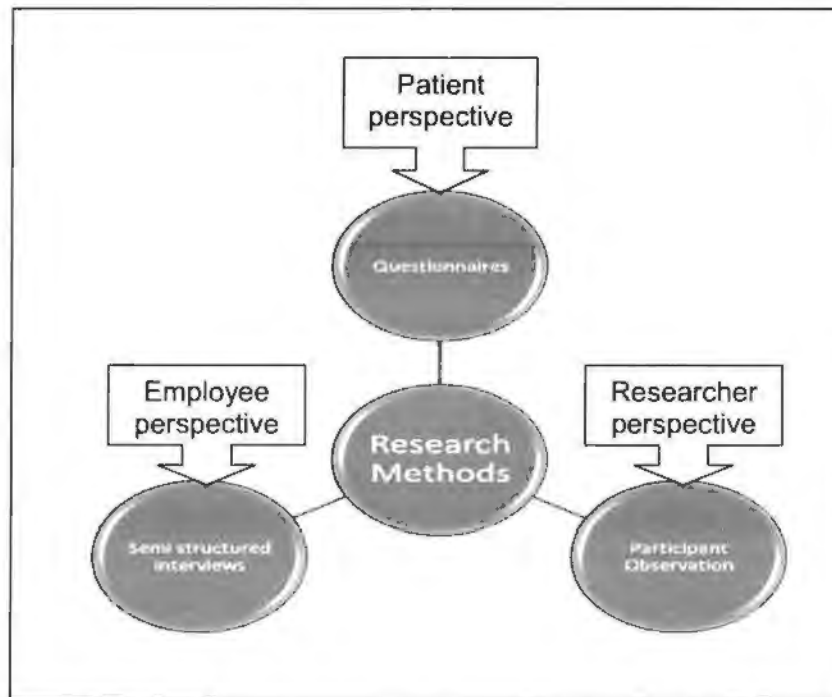


Figure 4 - Three perspective analysis

These data acquisition methods included:

- **Semi structured Interviews (Employee perspective)**
 - This form of interviewing relates to the researcher creating a list of themes to be covered during an interview. The structure of the interview may however vary based on the interviewer prerogative (Welman, Kruger & Mitchell 2005).
 - Semi structured interviews were conducted with the employees at the respective facilities to obtain the employee perspective of the existing supply chain.
- **Questionnaires (Patient perspective)**
 - A structured Likert scale questionnaire was implemented for statistical purposes. The Likert scale is one of the most widely used statistical methods based on the collection of statements relating to the attitudinal perspective of the individual completing the questionnaire (Welman, Kruger & Mitchell 2005). Structured Likert scale questionnaires were distributed to obtain statistical data pertaining to the following focus areas:
 - Demographical and personal information

- This section of the questionnaire related to obtaining basic personal and demographical information such as gender, age, family composition and so forth.
- Visit information
 - This segment focused on obtaining specific information relating to the frequency of visits, waiting time and effectiveness of diagnoses and patient throughput.
- Patient views and perceptions
 - The final segment focused on the actual patient perception of the facility in question. The statements/questions mainly revolved around resource availability, overall facility efficiency as well as patient specific views and perceptions.
- The statistical information was analysed by the Statistical Consultation Services of North-West University (Potchefstroom campus).
- **Participant observation (Researcher objective)**
 - This method of analysis related to the researcher taking part in the daily experiences of the members within the research environment (Welman, Kruger & Mitchell 2005).
 - This method was supportive of the evaluation of the following areas:
 - Inbound logistics
 - Operational logistics
 - Outbound logistics

1.8 Limitations of the study

Most studies will always include a degree of limitation due to the objectives and vastness of the study itself. Before we can officially commence the study, reference should be made to the various limitations of the study.

➤ Provincial demarcation

- The study was limited to Johannesburg only. Focusing on only one of the nine provinces within South Africa, creating an objective conclusion of the South African healthcare system and more specifically supply chains within private and provincial hospitals, is quite a daunting task. Therefore, healthcare in the eight other respective provinces might differ vastly from the Gauteng healthcare industry perspective.

➤ Number of institutions studied

- The study was focused on two state owned primary healthcare clinics. Due to the extent of the complexities within the healthcare industry, focusing on only two clinics does not provide a holistic picture applicable to all provincial and private clinics in Gauteng, nor South Africa.

➤ Disclosure of information

- Due to the complexity and magnitude of this study, sensitive information might be divulged that could offend certain role players. Such notions could contribute to the limitation of the type of information permitted to be disclosed by related parties. The mentioned limit will therefore impact the objectivity of the commenced study.

➤ Language barriers and educational limitations

- Most patients dependent on the studied primary healthcare clinics are illiterate and communication with regards to the completion of the questionnaire was not commenced in their mother tongue. This will have an impact on the accuracy with regards to the statistical data obtained in the study.

1.9 Layout of the study

The layout of the study can be structured as follows:

➤ Chapter 1 – Introduction and problem statement

This section commences by providing a thorough background pertaining to the history of public healthcare within South Africa. Current (perceived) issues are also mentioned whilst the overall impact of certain factors, such as National Health Insurance is discussed. Chapter 1 focuses mainly on providing general and industry specific information to support the problem statement. Study specific information pertaining to research methodologies and study limitations are included to provide the reader with sufficient knowledge prior to the commencement of the study.

➤ Chapter 2 – Literature study

Chapter 2 aims to develop a primary public healthcare supply chain from a theoretical perspective. The theoretical supply chain will form the basis of our overall public healthcare supply chain analysis as confirmed in chapter 1. In order to create the proposed theoretical supply chain, generic components pertaining to general and primary healthcare supply chains (respectively) are discussed. The latter part of chapter 2 confirms and illustrates the theoretical public primary healthcare supply chain whilst taking into account the generic components as discussed earlier.

➤ Chapter 3 – Empirical study and results

Chapter 3 forms an integral part of the study in its entirety. This chapter will focus on the actual research conducted via the various methodologies. The first section of the chapter will discuss and convey particulars relating to the methods of research whilst the latter part of the chapter will convey the actual research results obtained via the implementation of the actual methodologies.

➤ Chapter 4 – Findings and recommendations

The chapter will be segmented into findings and recommendations based on the literature review (chapter 2) and the results of the empirical study (chapter 3) respectively. The concluding segment of the chapter will focus on recommendations focused specifically on the literature review and holistic recommendations based on the result of the empirical study.

➤ . Chapter 5 – Conclusions

During this chapter the focus will be on summarizing the information obtained in the study as well as evaluating whether the proposed objectives were reached. This chapter will furnish the reader with a holistic oversight of the entire study as well as a personal perspective and final thought from the researcher's perspective not only on the study but also on the entire public healthcare industry in South Africa.

Chapter 2 – Literature study

2.1 Introduction to the literature study

The preceding chapter 1 introduction refers to the generic building blocks of any supply chain (inbound logistics, operations and outbound logistics). For the commenced study to be successful, a thorough elaboration of the generic building blocks should be conducted.

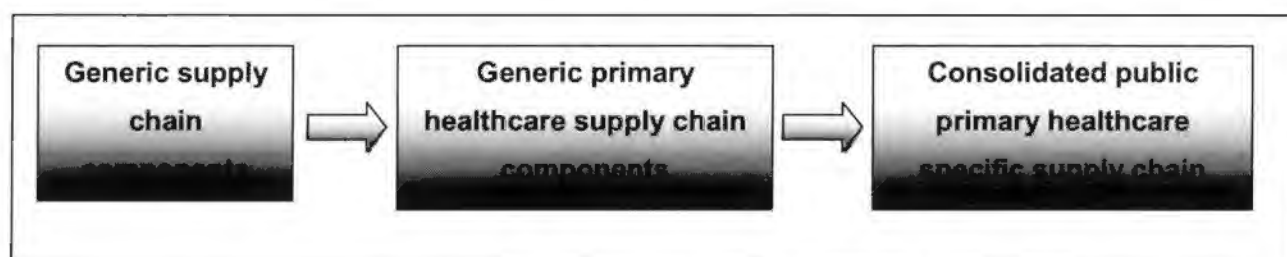


Figure 5 - Literature Study Process

In addition to that, the generic building blocks should be expanded to facilitate the creation of a theoretical supply chain for public primary healthcare facilities. To create such a supply chain, we will follow a three step process as illustrated in Figure 5: firstly the focus will be on the generic general supply chain components, better known as Porter's value chain as briefly mentioned in chapter 1. The second step will build on Porter's supply chain by evaluating the generic components of a private primary healthcare supply chain. The third and final step in creating a public primary healthcare supply chain is to consolidate all related components as identified and discussed in the preceding two steps and to add specific components and information relevant to the public primary healthcare industry as observed on site visits.

2.2 The generic supply chain

2.2.1 Introduction to the generic supply chain

As mentioned in chapter one, many supply chains have generic similarities in terms of basic comprising principles (Porter, 1985). The public primary healthcare supply chain is no different. In an effort to develop a public primary healthcare supply chain it's necessary to establish the generic building blocks as basis of our supply chain. As we progress through this study, additional industry specific components will be added to create a supply chain inclusive of all aspects relevant to the industry itself. To assist in the initial identification of the basic principles, we will revert to Porter's value chain.

2.2.2 Porter's value chain

Michael Porter developed and published the generic value/supply chain in his award winning book "Competitive advantage: Creating and sustaining superior performance". The publication transformed the entire supply chain industry and formed the basis of many supply chain related research.

A quarter of a century later, the principles of Porter's supply chain is still as relevant as ever. In our efforts to create a public primary healthcare supply chain, we need to start with the basic principles of a supply chain. Following suit with regards to earlier research studies, the principles of a supply chain will be extracted from Porter's value chain.

Porter's value chain can be illustrated as follows:

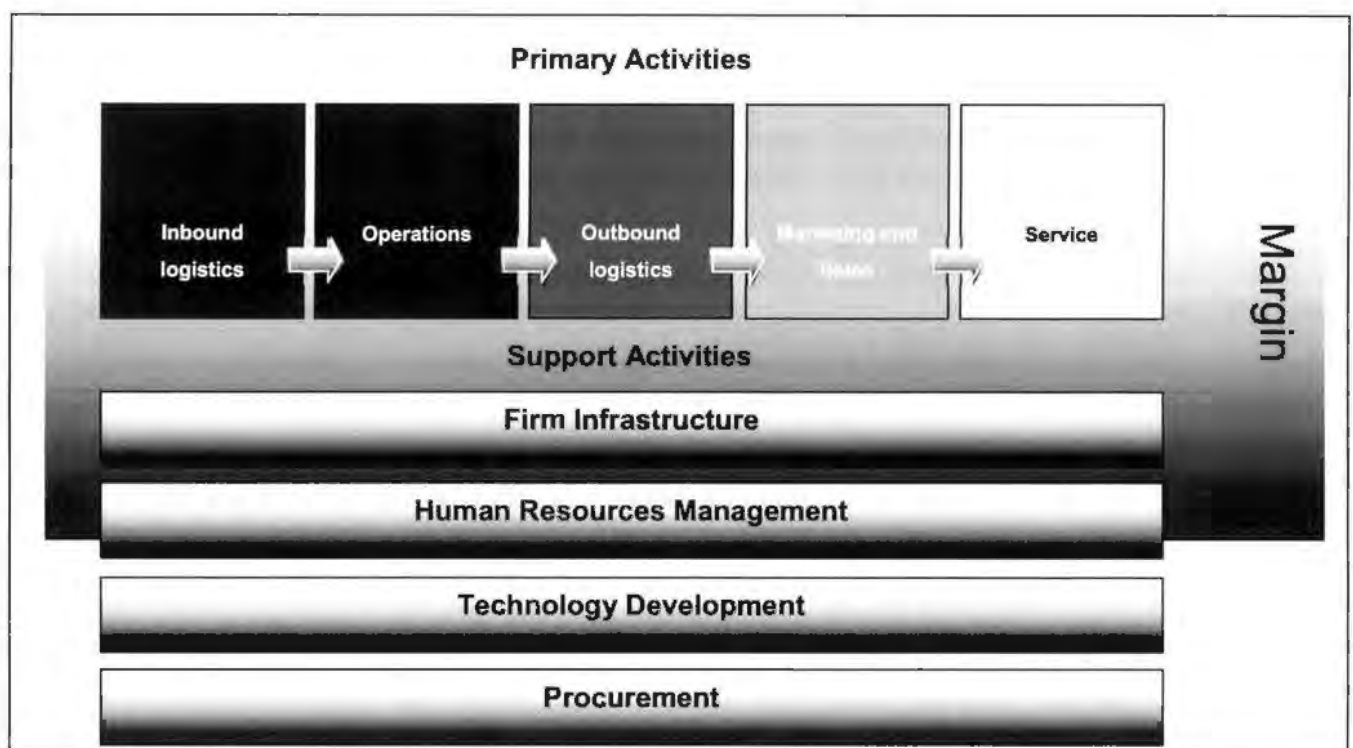


Figure 6 - Porter's Generic Supply Chain (Adapted from: "Competitive advantage")

Porter's value chain was based on the premise that an efficient supply chain will ultimately result in increased profit margin and a sustainable competitive advantage over direct competitors (Porter, 1985). Taking that into account, we can elude to the fact that Porter's value chain was supportive of organisations aiming to increase efficiency and profit. This being said, our efforts at this stage is focused on the creation of generic supply chain components that would ultimately lead to increased supply chain efficiency. To identify these components, we need to

identify and retain the aspects relevant to primary public healthcare industry and eliminate those aspects not relevant to our study. Practically this means that Porter's value chain should be amended (if required) to include only primary healthcare related components.

2.2.2.1 The revised Porter supply chain model

In order to eliminate irrelevant components within Porter's value chain, it's important to recognise one (or more) defining criteria that will ultimately identify components relevant and irrelevant to our generic supply chain. The main differentiating characteristics or rather, criteria, is that fact that public primary healthcare institutions, or for practicality's sake, public clinics are government owned and deemed as nonprofit organisations. In layman's terms, public clinics receive all operational resources (including funding and facilities) from government coffers in order to support the citizens of South Africa in the provision of free/low cost quality healthcare. Thus, a public primary healthcare clinic is not profit driven. Based on that statement, certain profit driven components within Porter's value chain can be disregarded. These components include:

Marketing and sales

Marketing and sales relate to efforts focused on anticipating consumer demand and providing the relevant product(s) to meet consumer requirement(s) by stimulating, or supporting the creation of a perceived need (APM, 2010) to ultimately increase profit and market share. The mentioned relates to proactive efforts supporting profit sustainability and increment. In contrast, public primary healthcare clinics are reactively driven. Reactively in the sense that consumer demand, or rather patient demand cannot be stimulated or influenced by the public primary healthcare clinic's efforts. A practical example would be that a patient will only visit a public clinic when in need of treatment and not because the public hospital used innovative methods to create or stimulate an intangible/perceived need within the patient to visit the public hospital for treatment (when it is not required). Based on this information, we can disregard the "marketing and sales" component included in Porter's model.

Service

Taking into account the information conveyed in the "marketing and sales" component, profit driven institutions will aim to sustain and increase profit by means of marketing and sales efforts. These efforts will be focused in the intangible creation of a perceived need (Silbiger, 2009). The service component in this case, relates to "after sale" service which in turn supports the creation of an intangible need. For profit driven organisations, this would be any supportive efforts to

maintain consumers and to build customer loyalty. Applying this concept to our generic healthcare supply chain, "after treatment" service will not exist as patients leaving the clinic are deemed cured (or dead). Although a patient might be required to have a follow up consultation after being treated, this can be deemed as a reactive activity and not due to a patient's sheer need to obtain medical care. We can therefore also disregard the "service" component included in Porter's model.

Margin

Theoretically speaking, margin relates to the difference between a product's/service's selling price and the cost involved with producing and selling the products/services (Silbiger, 2009). A higher margin will ultimately mean more profitability. Therefore, profitability driven organisations will aim to increase margins by either increasing selling price (and quantities) as well as decreasing production costs by reaching economies of scope. In perspective, although production costs are important and should be limited, public hospitals are not profit driven as sole funding originates from Government. In conclusion, we can also disregard the "margin" component as included in Porter's model.

Now that we've identified and eliminated certain components irrelevant to Porter's model, we can continue in illustrating the revised model.

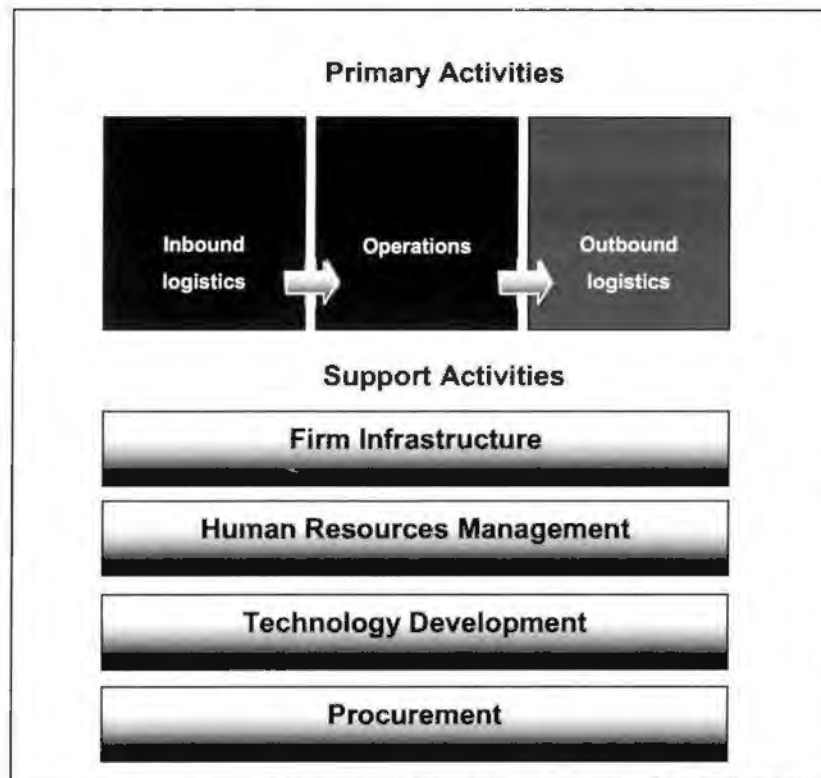


Figure 7 - Porter's Revised Generic Healthcare Supply Chain

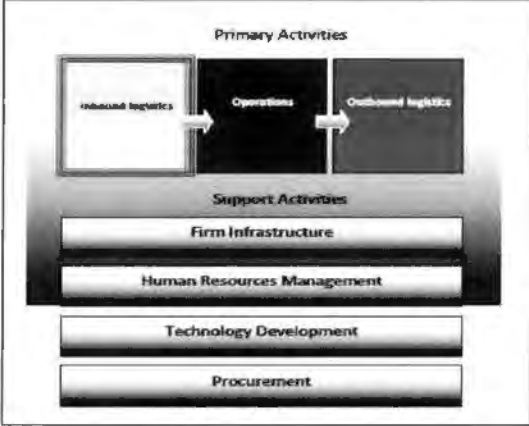
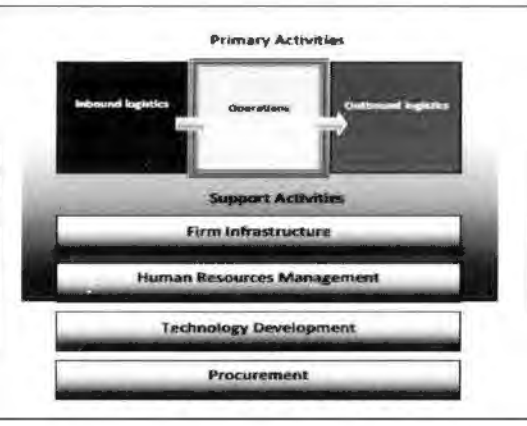
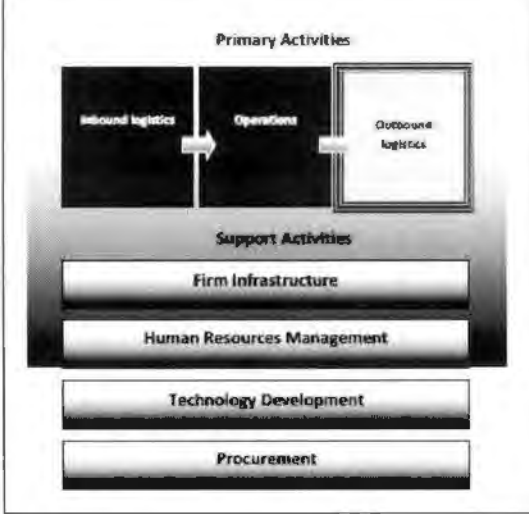
2.2.2.2 The revised supply chain explained

As discussed earlier, we've identified that many supply chains consist out of the basic generic components. Our initial focus will be to obtain in depth knowledge of these generic components and generic primary healthcare supply chain components as this will form the basis of our theoretical public primary healthcare supply chain. At this stage, the generic supply chain components will not focus on any industry specific components or detail. Our aim, for now is to keep it basic and define the general components applicable to all supply chains in any industries. The various sections discussed at a later stage will include and ultimately conglomerate industry specific components in conjunction with the generic supply chain components.

Primary Activities

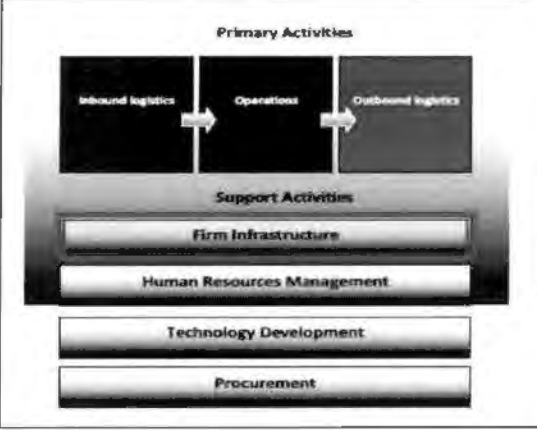
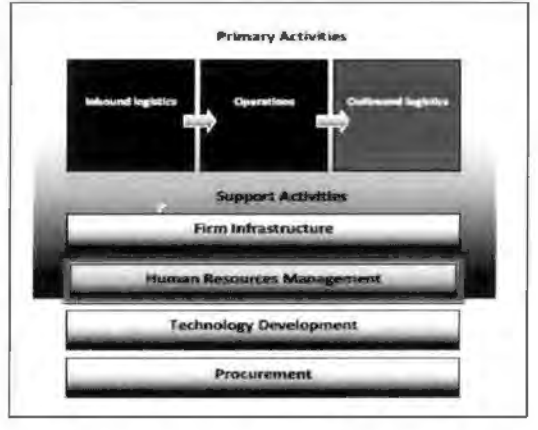
Primary activities within the Porter value chain model form the proverbial cog in the wheel of value chain operations. Primary activities focuses on the main activities involved within a supply chain (Porter 1985). For simplicity purposes, generic supply chain components will be discussed in table form.

Table 1 - Generic Supply Chain Primary Activities

INBOUND LOGISTICS	OPERATIONS
 The diagram for Inbound Logistics shows a flow from 'Inbound logistics' to 'Operations' to 'Outbound logistics'. 'Inbound logistics' is highlighted with a white background and a black border. Below this, the 'Support Activities' are listed in a stack: 'Firm Infrastructure', 'Human Resources Management', 'Technology Development', and 'Procurement'.	 The diagram for Operations shows a flow from 'Inbound logistics' to 'Operations' to 'Outbound logistics'. 'Operations' is highlighted with a white background and a black border. Below this, the 'Support Activities' are listed in a stack: 'Firm Infrastructure', 'Human Resources Management', 'Technology Development', and 'Procurement'.
Theoretically, inbound logistics relate to all activities (and relationships) involved with receiving, storing and disseminating inputs (Institute for Manufacturing - University of Cambridge 2007). Inbound logistics can also involve the receipt of any other resource(s) related to the operational functionality of the organisation.	The operations component relates the all activities involved with transforming the received input (inbound logistics) into the final product (Silbiger, 2007). This component also includes all related functionality and activities required to transform the received input.
OUTBOUND LOGISTICS	
 The diagram for Outbound Logistics shows a flow from 'Inbound logistics' to 'Operations' to 'Outbound logistics'. 'Outbound logistics' is highlighted with a white background and a black border. Below this, the 'Support Activities' are listed in a stack: 'Firm Infrastructure', 'Human Resources Management', 'Technology Development', and 'Procurement'.	The outbound logistics component focuses mainly on distributing the final product (created via the preceding 2 components) to the final consumer. In product driven environments, this would relate to packaging and distribution to platforms where consumers can access and purchase the final goods.

Support activities

Support activities relate to any additional activities and resources required to support the completion of primary activities (as stated in figure 7). The respective support activities can be defined as follows:

FIRM INFRASTRUCTURE	HUMAN RESOURCE MANAGEMENT
 The diagram for Firm Infrastructure shows a flow of Primary Activities: Inbound logistics → Operations → Outbound logistics. Below this, the Support Activities are listed in a vertical stack: Firm Infrastructure, Human Resources Management, Technology Development, and Procurement.	 The diagram for Human Resource Management shows a flow of Primary Activities: Inbound logistics → Operations → Outbound logistics. Below this, the Support Activities are listed in a vertical stack: Firm Infrastructure, Human Resources Management, Technology Development, and Procurement.
Infrastructure relates to the physical and financial resources required to support the primary activities (Silbiger, 2007). Examples of firm infrastructure includes: buildings, transportation, financing, legal, quality management etc. Infrastructure can therefore relate to tangible and intangible assets. In most cases, firm infrastructure relates to the physical facilities/buildings and related resources required to complete primary and secondary activities within the generic supply chain.	Human resource management specifically relates to the recruitment, development and compensation of all employees employed by the organisation. This includes contract base employees and third party service providers. Human resources in this instance can relate to person(s) responsible for the completion primary and secondary activities as requested in the overall generic supply chain.

TECHNOLOGY DEVELOPMENT	PROCUREMENT
The diagram for Technology Development shows a flow from Inbound logistics to Operations to Outbound logistics. Below this, four support activities are listed: Firm Infrastructure, Human Resources Management, Technology Development, and Procurement. The Technology Development support activity is highlighted with a darker background.	The diagram for Procurement shows a flow from Inbound logistics to Operations to Outbound logistics. Below this, four support activities are listed: Firm Infrastructure, Human Resources Management, Technology Development, and Procurement. The Procurement support activity is highlighted with a darker background.
Technological development forms an integral part of any organisation and includes all technological related activities that support the primary components as discussed earlier. Technological development activities include the following: research and development, process automation and any other related technology driven activities (Silbiger, 2007).	Procurement activities can be defined as all supportive activities relating to the acquisition of raw and other materials needed to enable the primary activities to be completed successfully (Silbiger, 2007). This includes all supportive materials used in inbound, operational and outbound activities as stipulated earlier.

Table 2 - Generic Supply Chain Secondary Activities

2.3 The generic primary healthcare specific supply chain

Now that we’ve identified and defined the generic components of any supply chain (Porter), we will subsequently expand our analysis by analyzing the generic supply chain component for the primary healthcare industry. To refresh your memory, the generic primary healthcare specific supply chain is the second step in the Literature Study Process.

Taking these generic primary healthcare supply chain components into consideration along with Porter’s generic supply chain components, we will obtain substantial knowledge pertaining building blocks of a primary healthcare supply chain.

The generic primary healthcare supply chain components

The Swedish logistics company Swisslog specializes in the development, implementation and maintenance of supply chains in various industries. One of their industries of specialization is the healthcare industry. The generic primary healthcare supply chain as developed and implemented by the Swiss based company will form the basis of our discussion relating to the generic primary healthcare supply chain components.

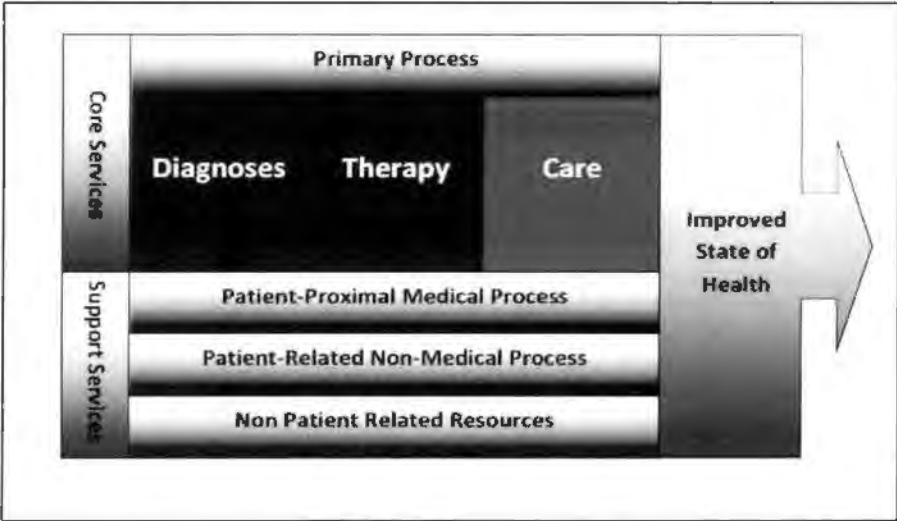
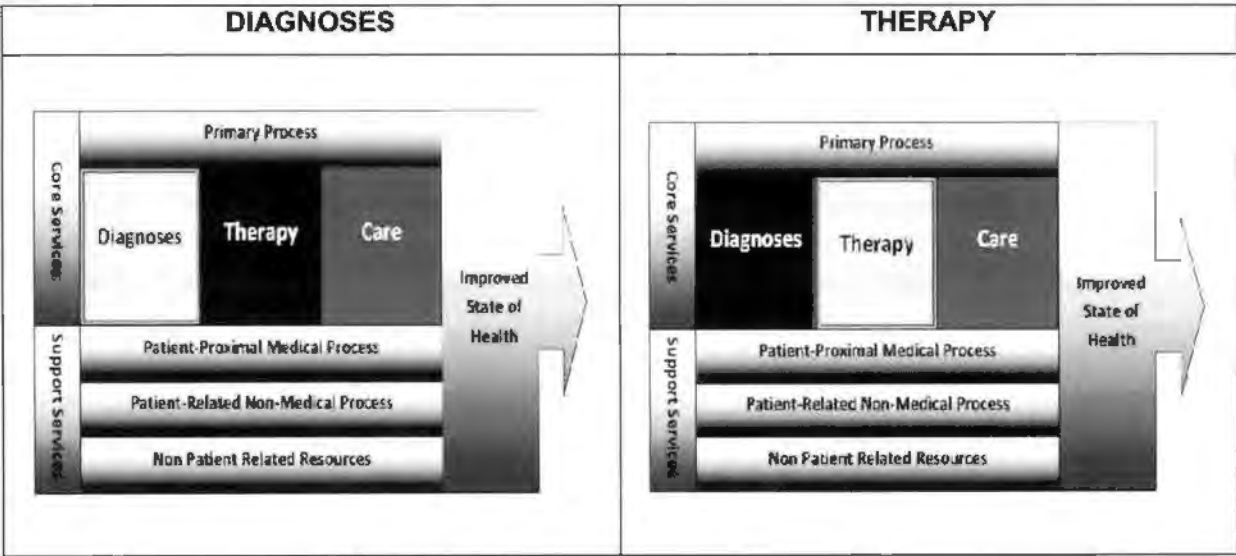


Figure 8 - Healthcare Generic Supply Chain (Adapted from: Swisslog)

2.3.1 Core Service

Similar to the primary activities as identified and discussed in the generic supply chain analysis, core services focus on the primary activities that need to be completed by the primary healthcare institution. The comprising elements will be discussed in the following paragraphs.



Diagnoses relates to activities commenced in order to identify the cause of a symptoms (World Health Organization, 2009). When we apply this theoretical principle to our study, we can practically confirm that a diagnoses relates to the examination of all possible causes/contributing factors to the current state of a patient's health.	Therapy activities link closely to the preceding diagnostic activity and relates to the course of action to be taken based on the diagnoses. This course of action could include the requirement of further diagnoses by a more specialized entity such as specialist or prescribing the required medicine for treatment to be administered onsite (via hospital admission) or offsite (via prescribed medicines being dispensed by the hospital pharmacy).
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CARE	
The diagram illustrates the CARE model. It features a central box with two main sections. The top section, labeled 'Primary Process', contains three sub-sections: 'Diagnoses', 'Therapy', and 'Care'. The bottom section, labeled 'Support Services', contains three sub-sections: 'Patient-Proximal Medical Process', 'Patient-Related Non-Medical Process', and 'Non Patient Related Resources'. An arrow points from the central box to the right, labeled 'Improved State of Health'.	Based on the preceding activities relating to diagnosis and therapy, care relates to the physical and continuous treatment of the diagnosed illness. As mentioned, this could be done onsite via administered medicines, or offsite via prescribed medicines as dispensed by the clinic. Of course, the decision to treat the illness onsite or offsite will be based on the seriousness of the illness.

Table 3 - Healthcare Specific Supply Chain Primary Activities

2.3.2 Support Services

This section, as with the section based on Porter's generic supply chain will focus on the support or rather secondary activities focused at supporting the primary activities as discussed earlier.

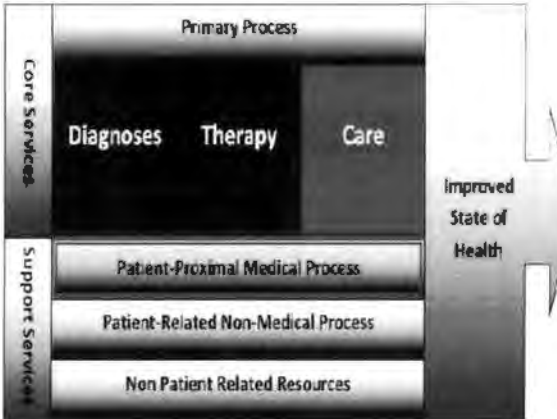
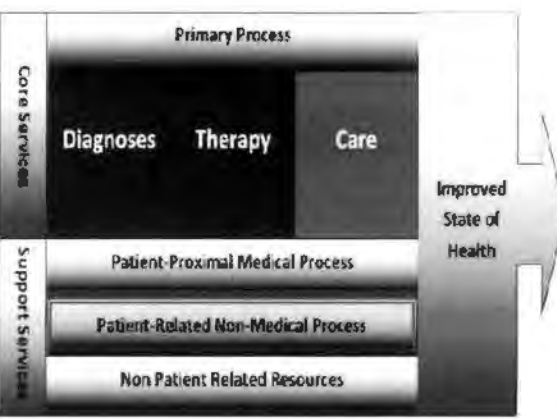
PATIENT-PROXIMAL MEDICAL PROCESS	PATIENT-RELATED NON-MEDICAL PROCESS
 The diagram for the Patient-Proximal Medical Process shows a central box labeled 'Primary Process' containing 'Diagnoses', 'Therapy', and 'Care'. To the left, a vertical bar labeled 'Core Services' spans the height of the primary process. Below the primary process, a vertical bar labeled 'Support Services' contains three stacked boxes: 'Patient-Proximal Medical Process', 'Patient-Related Non-Medical Process', and 'Non Patient Related Resources'. A large arrow on the right points from the support services towards the primary process, labeled 'Improved State of Health'.	 The diagram for the Patient-Related Non-Medical Process is identical in structure to the Patient-Proximal Medical Process diagram. It features a 'Primary Process' box with 'Diagnoses', 'Therapy', and 'Care', a 'Core Services' bar on the left, and a 'Support Services' bar at the bottom containing 'Patient-Proximal Medical Process', 'Patient-Related Non-Medical Process', and 'Non Patient Related Resources'. A large arrow on the right points from the support services towards the primary process, labeled 'Improved State of Health'.
Patient-Proximal Medical Processes relates to the following patient focused activities: drug/medicine management (ordering and administering of medicine), laboratory facilities, equipment (sterile goods and machinery) and procedural facilities such as theaters and radiology (Swisslog, 2009).	Patient-Related Non-Medical Processes relate to all activities involved with the general and overall maintenance of patients being treated on hospital premises. These activities include: management of food, linen, beds, ablution facilities and so forth (Swisslog, 2009).
NON PATIENT RELATED RESOURCES	
 The diagram for Non Patient Related Resources shows a central box labeled 'Primary Process' containing 'Diagnoses', 'Therapy', and 'Care'. To the left, a vertical bar labeled 'Core Services' spans the height of the primary process. Below the primary process, a vertical bar labeled 'Support Services' contains three stacked boxes: 'Patient-Proximal Medical Process', 'Patient-Related Non-Medical Process', and 'Non Patient Related Resources'. A large arrow on the right points from the support services towards the primary process, labeled 'Improved State of Health'.	The concluding aspect of support activities relates to the broad scope of activities not directly related to patients. These activities and resources include: waiting rooms, storage facilities, parking, transport, cleaning service providers, waste disposal functions and holistic procurement and remuneration activities relating to hospital employees and third party service providers (Swisslog, 2009).

Table 4 - Healthcare Specific Supply Chain Secondary Activities

Now that we've established the generic components relating the all supply chains (see Porter's generic supply chain) and generic primary healthcare specific supply chains, we can continue in our quest of creating a unified theoretical public primary healthcare supply.

2.4 The consolidated theoretical public primary healthcare supply chain

The groundwork has been done by the identification and discussions relating to generic components of healthcare specific and general supply chains. Theoretically, we have identified the building blocks of a generic primary healthcare supply chain. The preceding information therefore relate to the first two steps of the literature study process as confirmed earlier. We will now focus our efforts on expanding the generic supply chain by including all components relevant to a public hospital supply chain. The final product should therefore be a consolidated theoretical public primary healthcare supply chain that we can use as basis of our study.

To retain consistency in our study we will commence our supply chain consolidation efforts by basing our developmental activities on the previously discussed generic components. These components are: inbound logistic, operations and outbound logistics (Porter, 1985). For simplicity purposes, we will discuss each comprising component in depth and confirm the final consolidated supply chain graphically at the end of our discussions. We will also implement the effective use of graphic illustrations to simply our study and to confirm the comprising elements of each supply chain section. The study will reference and illustrate several process flows to assist in the efficient analysis and stipulation of all activities. It's important to identify and define the various elements of process flows to ensure that the correct information is conveyed by means of the graphical illustration.

2.4.1 Inbound Logistics for a public primary healthcare facility

As mentioned in preceding paragraphs, inbound logistics relate to all incoming components needed to commence and conclude the operational component successfully (Porter, 1985). The inbound logistics component of a public primary healthcare facility can be illustrated as follows:



Figure 9 - Consolidate Supply Chain Inbound Logistics

2.4.1.1 Patient Reception and Administration

Patient reception and administration activities relate directly to all activities involved with receiving patients and other non patient related material efficiently on the clinic premises (Swisslog, 2009).

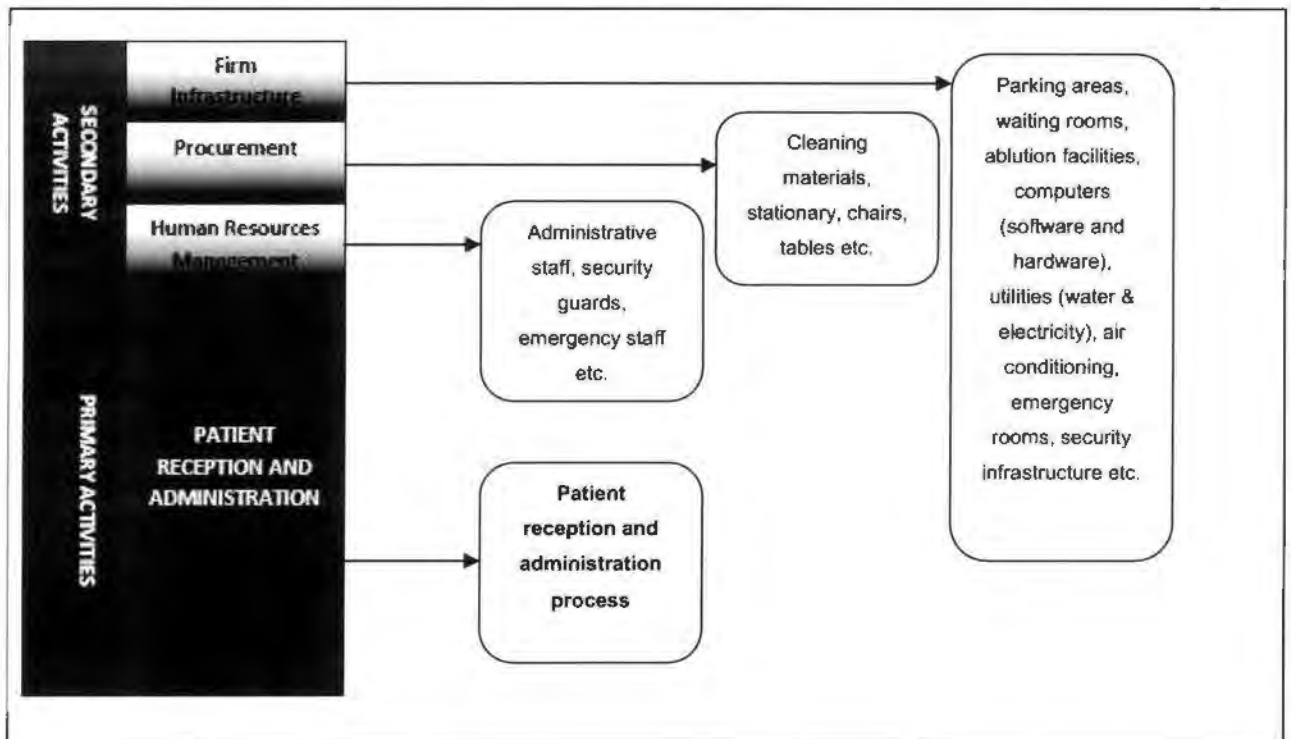


Figure 10 - Consolidated Supply Chain Inbound Logistics Components

Our primary focus (taking into account the relevant secondary activities) will be on the process of patient reception and administration. The patient reception and administration process as stipulated in figure 11 can be illustrated as follows:

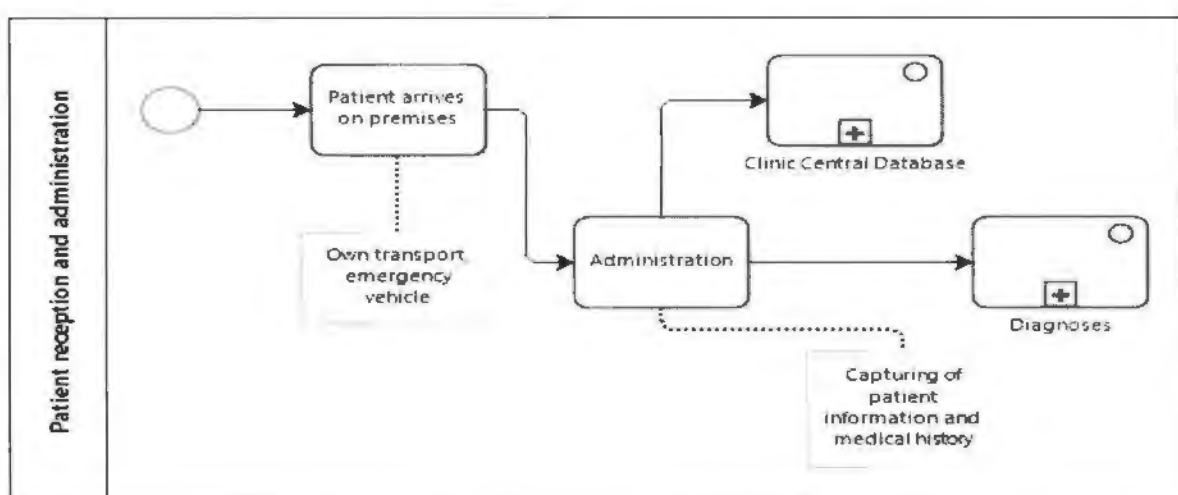


Figure 11 - Consolidated Supply Chain Inbound Logistics Process Flow

Patient arrives on premises

Persons in need of medical attention will seek assistance voluntary or involuntary. Voluntary refers to instances where persons in need of medical attention will seek the services of a clinic via a voluntary decision in reaction to a medical situation or illness.

The second form of seeking medical attention will be in cases of emergency. In most cases, patients without medical insurance will automatically be taken to public primary healthcare institutions. This form of seeking medical attention is in this instance involuntary.

Administration

Once a patient has entered the premises of a primary healthcare clinic, general patient administration should be conducted. General patient administration includes the completion of documentation pertaining directly to the patient and closest relatives. Information obtained during this phase includes the following informational fields (Douglas Williams Executive Health Programs, 2009):

- Patient personal details (first name, last name, ID number etc)
- Patient contact details
- Next of kin information
- Basic medical history (most recent surgeries, current medication etc.)
- Social lifestyle details

The structure of the patient administration form can vary from institution to institution. The completed form is captured onto a central database for current and future reference.

2.4.2 Operations for a public primary healthcare facility

The operational component of a primary healthcare facility relates to the actual diagnoses of a patient (Swisslog, 2009). During this process, the actual underlying medical condition is identified by the medical professional, taking into account the patient's existing condition and medical history. The operational component of a public healthcare facility can be depicted as follows:



Figure 12 - Consolidated Supply Chain Operations

2.4.1.2 Diagnoses

The diagnostic component within the inbound logistics component includes the following aspects:

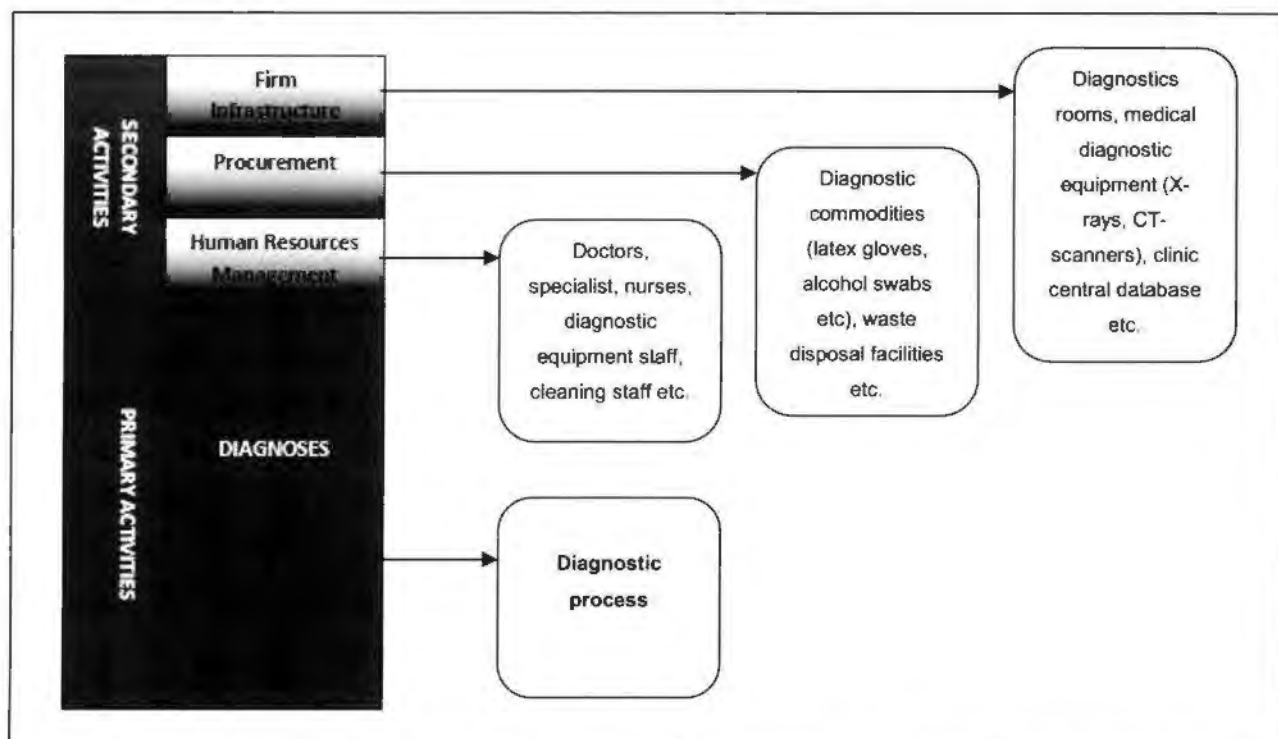


Figure 13 - Consolidated Supply Chain Operations Components

The process of diagnosis forms the cog in the proverbial wheel of this supply chain component. The diagnostic process can be depicted as follows:

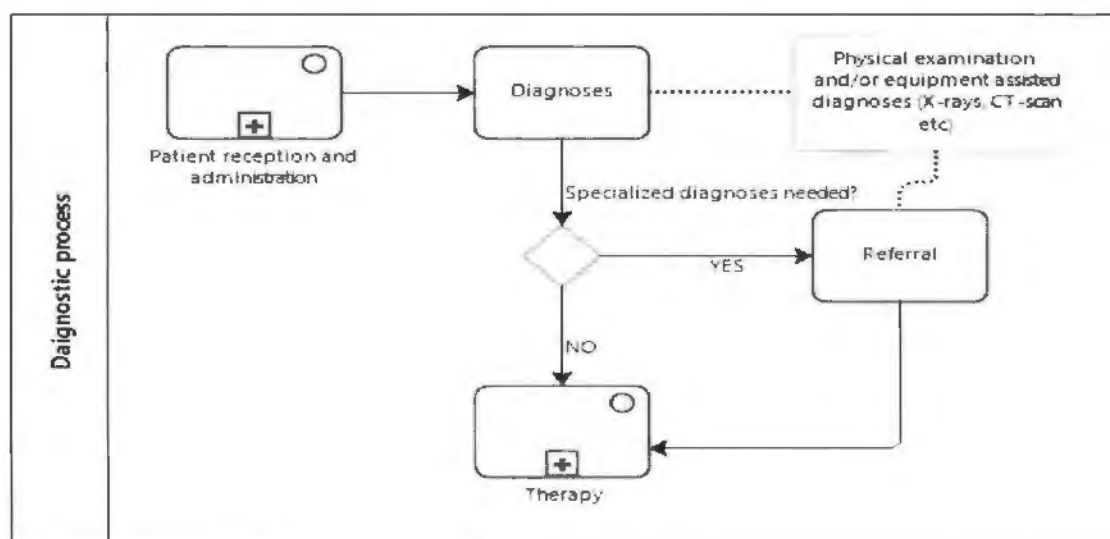


Figure 14 - Consolidated Supply Chain Operations Process Flow

Diagnoses

The diagnostic process refers to determining the nature of a diseased condition (Oxford English Dictionary, 2011). In this instance, a diagnosis refers to the actual process of defining a patient's medical condition. The diagnosis itself is conducted by the relevant medical professional situated at the clinic in conjunction with medical diagnostic equipment.

Referral

In instances where patients require more specialist medical assistance, patients will be referred to another healthcare facility such as a provincial/state hospital. The motivation behind this is quite simple, as hospitals avail of more specialist personnel, diagnostic equipment and the capacity to diagnose and treat patients more effectively due to the increased medical resources.

2.4.3 Outbound logistics for a primary healthcare clinic

The final component within the theoretical primary healthcare clinic supply chain can be illustrated as follows:

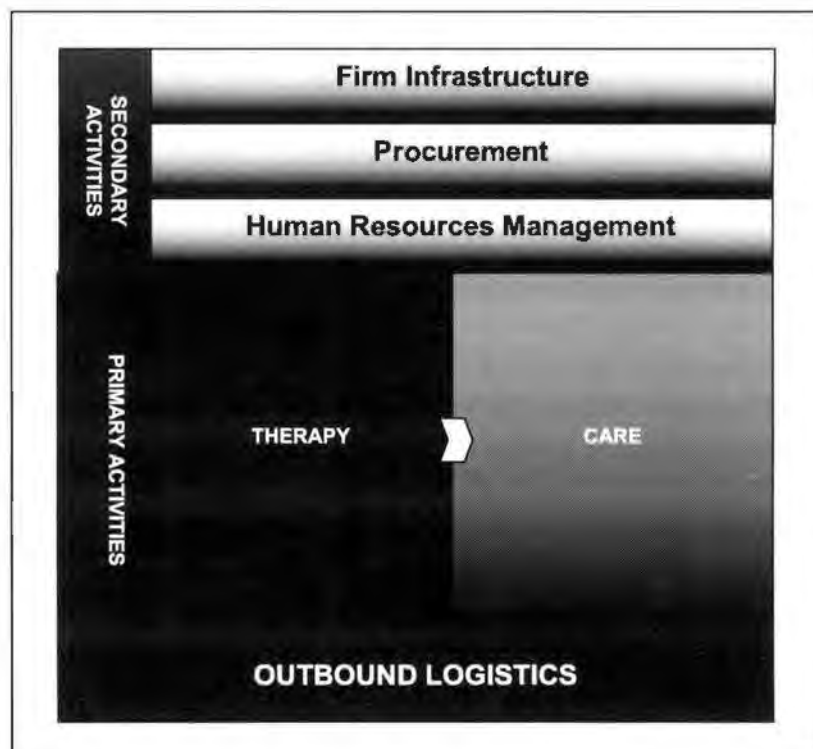


Figure 15 - Consolidated Supply Chain Outbound Logistics

2.4.3.1 Therapy

The pin ultimate component within the outbound logistics section focuses on the activity of therapy. Therapy relates to the process or treating a disease or illness (Oxford English Dictionary, 2011). Although this activity closely relates to the preceding activity (diagnoses), for informational and accuracy purposes of this study, the therapy section will be discussed separately due to the logistical implication of commencing and concluding the activity efficiently. Primary and secondary activities relating to therapy can be depicted as follows:

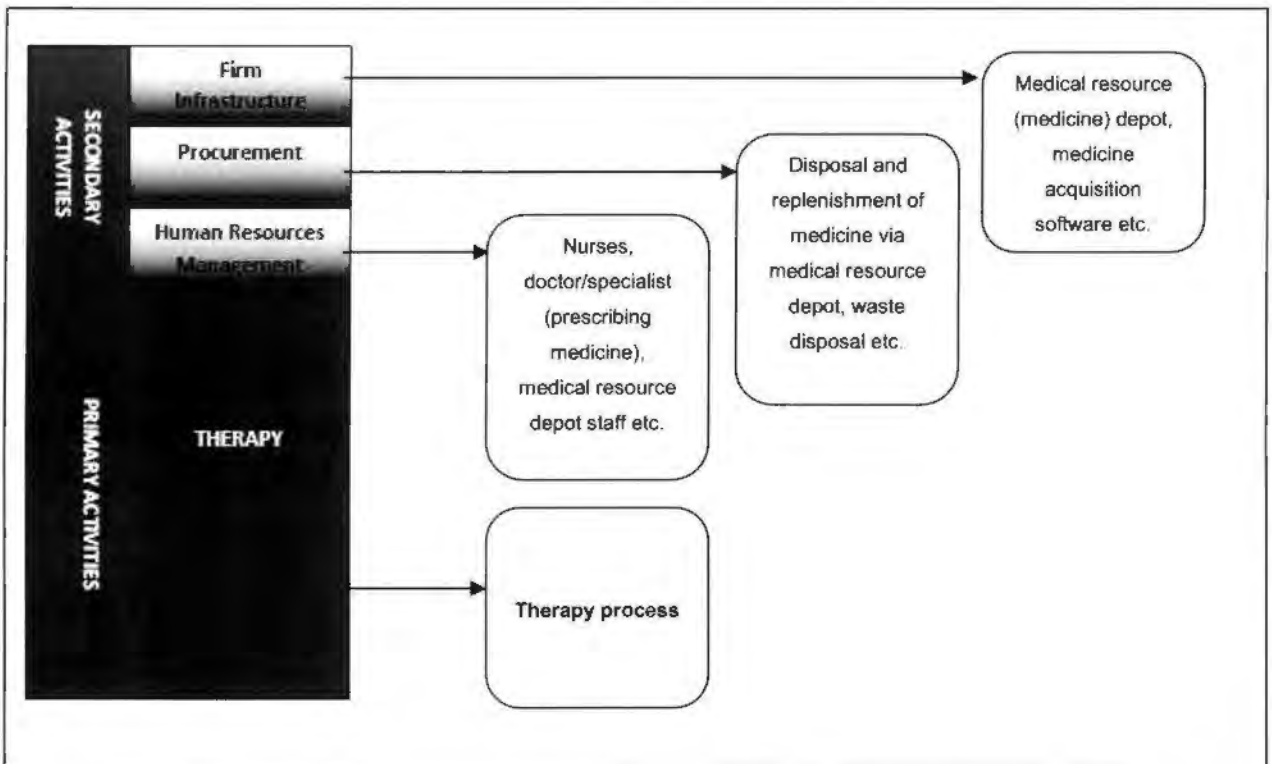


Figure 16 - Consolidated Supply Chain Outgoing Logistics Components (Therapy)

The process of therapy is inherently a direct result of diagnoses. For study and accuracy purposes, this process mainly focuses on the prescription of medicine (via doctor/specialist/nurse) and the disposal thereof to the patient based on the preceding diagnoses. The process therefore includes activities relating to the requisition and distribution of medicine as prescribed by the doctor/specialist/nurse. The process can be illustrated as follows:

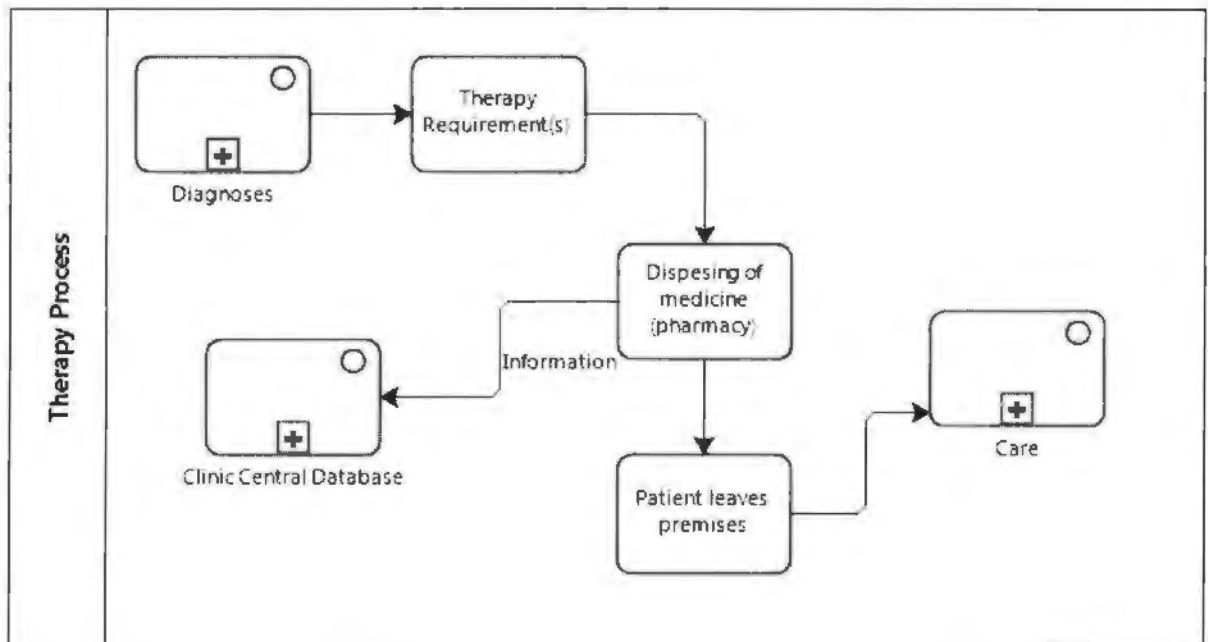


Figure 17 - Consolidated Supply Chain Outbound Logistics Process Flow (Therapy)

Therapy requirements

As mentioned in preceding paragraphs, therapy requirements relate(s) to the process of initiating the correct course of treatment based on the diagnostic activity (Swisslog, 2009). The correct medicine and dosage of medicine required will be confirmed in this instance.

Dispensing of medicine (pharmacy)

Once the correct course of action has been identified, the required medicine should be dispensed by the clinic pharmacy. The process of medicine dispensing will be thoroughly discussed in the "Clinic Central Database" section.

2.4.3.2 Care

Care activities are therefore dependent on the course of action as decided by the diagnostic person(s) in preceding activities (refer to Diagnosis and Therapy). In layman's terms, care relates to the continuous process of satisfying a patient's medical needs based on the preceding diagnoses and course of therapy. An example would be where a patient has been diagnosed with HIV-Aids, care would relate to the continuous process of requiring the patient to return the clinic on a monthly basis to revise the medical condition of the patient and the administering of

medicine/antiretroviral. The care component is therefore focused on the continuous therapy that takes place once the patient has exited the clinic. Furthermore, depending on the nature and severity of the illness, the actual care component would not be applicable to all patients.

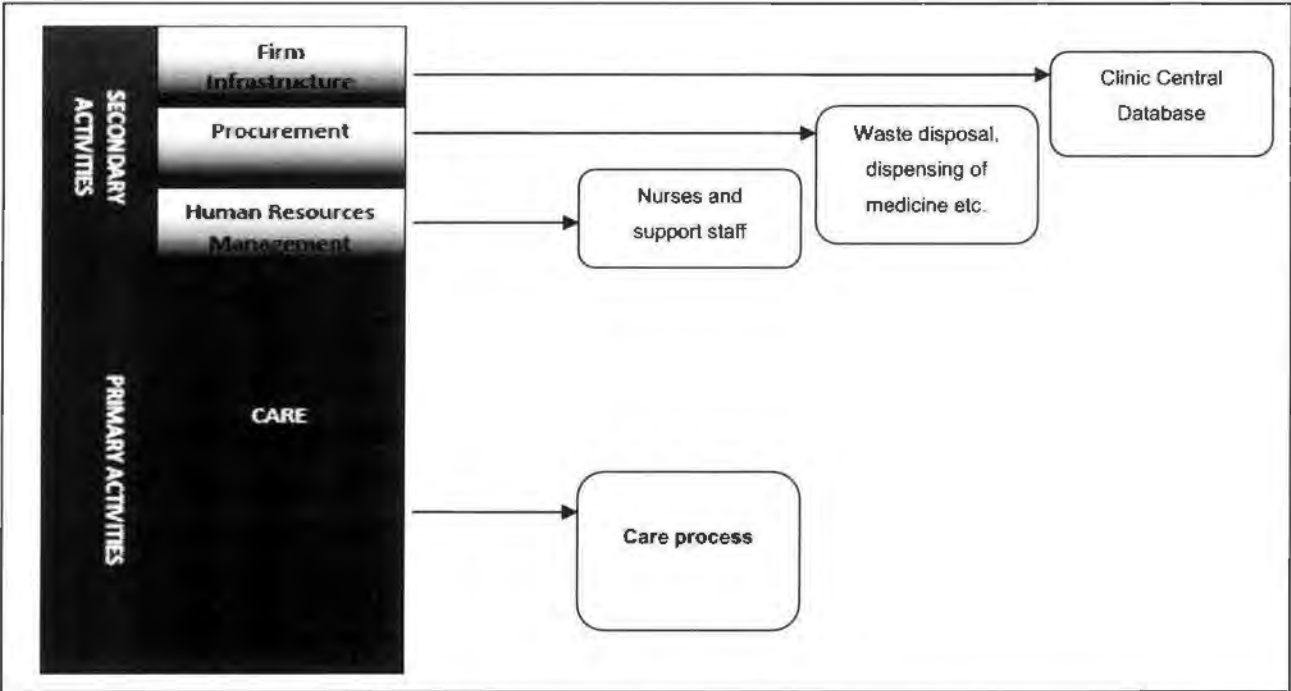


Figure 18 - Consolidated Supply Chain Outbound Logistics Components (Care)

Now that we've briefly confirmed the comprising components relating to the operations component, we will not focus our attention on the process of care.

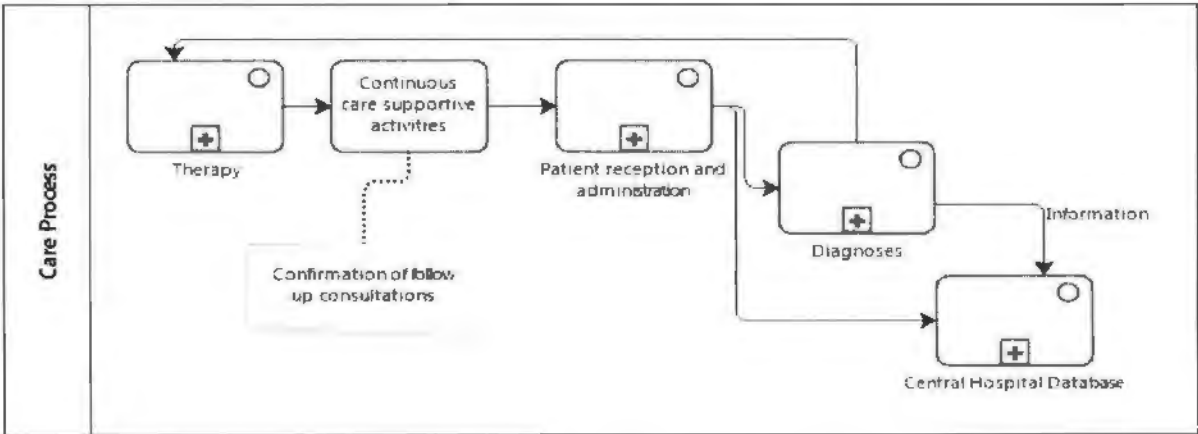


Figure 19 - Consolidated Supply Chain Outbound Logistics Process Flow (Care)

Continuous care supportive activities

Continuous care supportive activities relate to the consistent administering of medicine and the continuation of any supportive medically related activities to ensure an improved state of medical health. These supportive activities include routine nurse visits to check patient vitals and administering of medicine. In effect, the entire preceding supply chain is repeated.

2.4.4 Central Clinic Database and Software

Included in preceding paragraphs and illustrations reference was made to the Clinic Central Database, or Clinic Management Systems (CMS). Although the hardware and software architecture is extremely complex, it's important to include a broad overview of the structure and functionality of the Clinic Maintenance System as it plays an integral role in the efficiency and operational functionality of primary healthcare clinic.

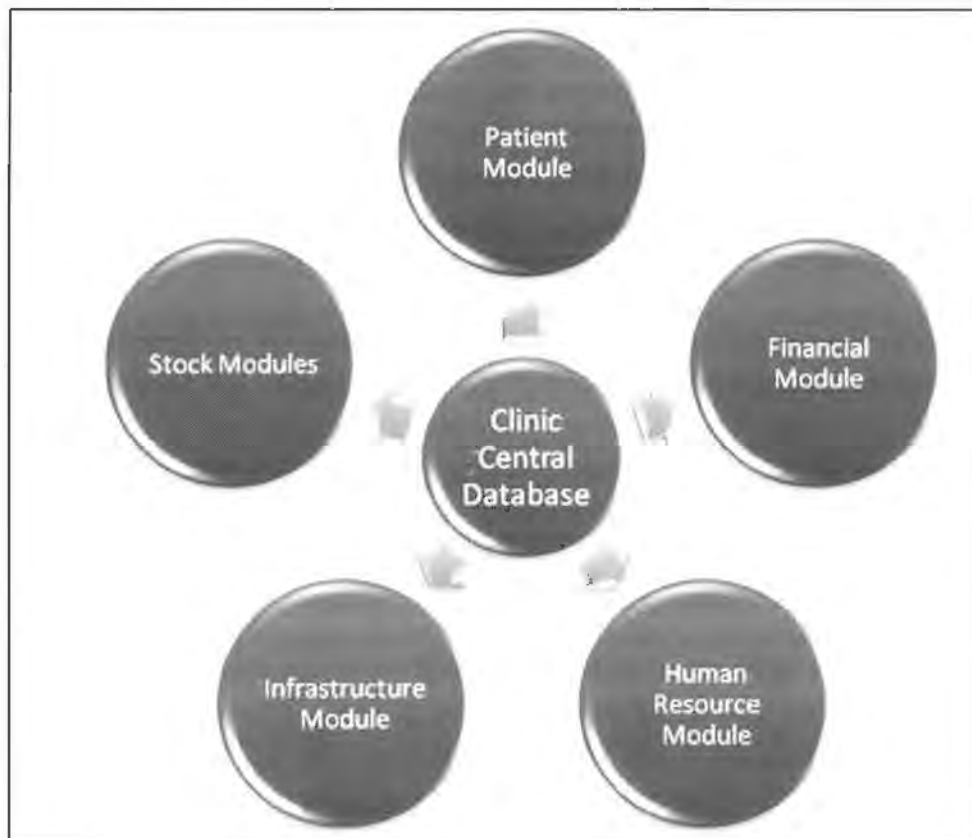


Figure 20 - Clinic Central Database Architecture

The various modules and informational fields contained in each model interlinks and (in)directly relates to various other modules via direct and indirect relationships. The following table

summarizes the informational fields contained in each module and the interrelationship(s) between the various modules.

MODULE NAME	DESCRIPTION	INFORMATIONAL FIELDS
Patient records	Includes patient specific personal and medical information.	- First name - Last name - ID number - Address details - Contact details - Medical history - Admission history - Patient Number (Unique identifier)
Human Resource Module	Relates to information pertaining to all full time and part time/contract staff employed by the hospital.	- Employee name, surname - Employee ID number - Employee Number (Unique identifier) - Date of employment - Contact details - Specialization/qualifications
Stock Module	Module responsible for real time management of all medical and non medical stock levels.	- Stock name - Stock type (medical / non medical) - Stock ID (Unique identifier) - Stock provider - Replenishment history - Stock requisition details
Infrastructure module	Modules responsible for the management of all fixed and current assets as well as real time capacity management capabilities.	- Medical equipment name - Medical equipment ID number (unique identifier) - Medical equipment service provider - Current asset (Beds) - Bed Utilization Rates - Bed availability - Ward capacity

Financial module	Module responsible for all financial (and capital) inflow and outflow due to investment and normal operational activities.	- General ledgers - Financial statements - Requisition requests
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Table 5 - Clinic Central Database Modules

2.4.5 Consolidated Theoretical Public Primary Healthcare Supply Chain

Now that we’ve established and discussed the comprising generic and specific public primary healthcare supply chain components, we can illustrate the conglomerated supply chain as follows.

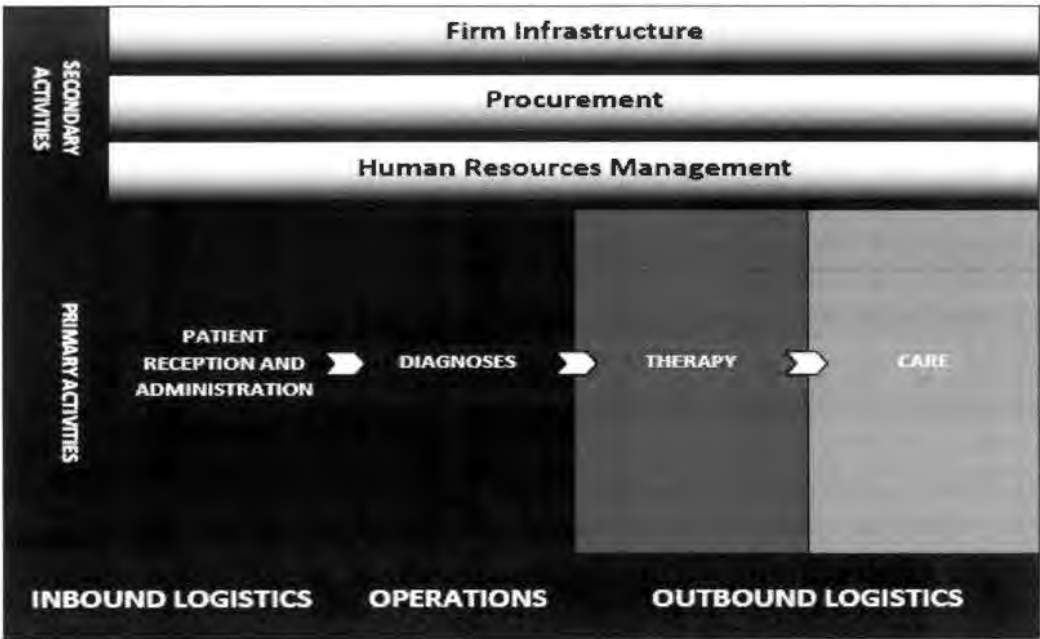


Figure 21 - Consolidated Primary Healthcare Supply Chain

The conglomerated supply chain we’ve developed will form the basis of the practical analysis in this study. We will aim to reach the proposed primary and secondary objectives as stipulated in chapter one by implementing the theoretical supply chain as measurement criteria to analyse the overall effectiveness of the existing public primary healthcare supply chain and to facilitate the identification of issues existing in the current supply chain.

Chapter 3 – Empirical study and results

3.1 Introduction

Now that the theoretical ground word has been concluded, we can proceed to conducting the actual research at the mentioned public primary healthcare clinics. This chapter focuses specifically on the research method(s) conducted as well as the actual information obtained via the research. It's important to note that the research results will only be conveyed in this chapter. The dilution, recommendations and findings based on the research will be discussed in chapter 4.

In any study, the research conducted in a specific study field must be commenced and concluded by the implementation of accurate and relevant methodologies. Once the relevant and accurate methodologies have been implemented, efforts should be made to inform the reader of the reasons behind the implementation of the various methodologies. To add substance to the research conducted in this study, a three perspective analysis was implemented. The three implemented research methods and perspectives can be illustrated as follows:

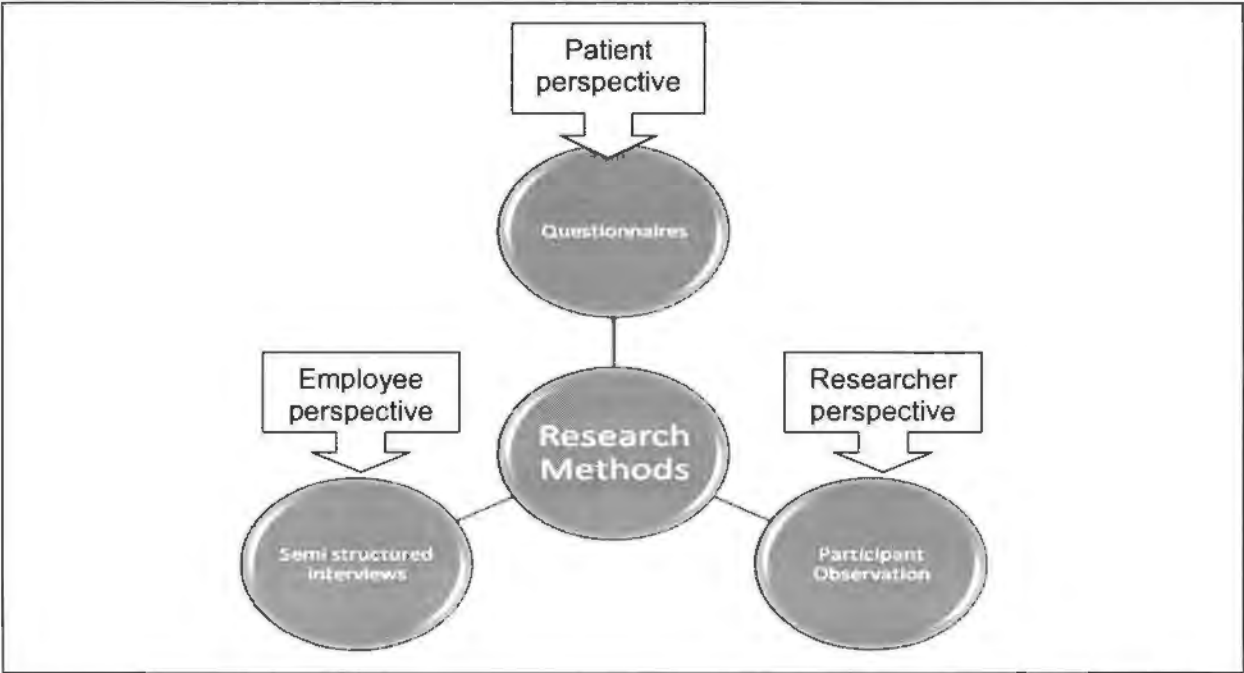


Figure 22 – Three perspective analysis

3.1.1 Patient Perspective

This segment of the three perspective analysis focuses specifically on the actual completion of the questionnaire by the patients that seek medical attention at the respective clinics. In order to ensure that we're all on the same page in terms of this study, we will briefly discuss the implemented questionnaire.

Questionnaires were completed by the patients that visited the respective clinics itself. In total, two hundred patients (one hundred from each clinic) completed the questionnaire verbally whilst the actual questionnaire was filled in and completed by researcher, based on the verbally conveyed information. The reasons for the method of completion is due to language barriers where the patients' mother tongue were not English, but rather one of the official languages in South Africa and the fact that many of the patients were illiterate and the only method of communication and completion of the questionnaire was to be on a verbal basis where each question was asked by the researcher and the actual response was captured by the researcher. The questionnaire comprised out of three elements/sections: demographical and personal information, clinic visit information and patient views and perceptions.

A:	PATIENT INFORMATION				
A1	GENDER			M	F
A2	YEAR OF BIRTH				
A3	SUBURB OF RESIDENCE				
A4	DO YOU HAVE CHILDREN?	N	Y	If yes, how many?	
A4.1	If yes, do you bring them to the clinic as well?			N	Y
A5	ARE YOU EMPLOYED?			N	Y
A6	MARITAL STATUS		M	S	D W
B:	VISIT INFORMATION				
B1	How many times per month do you visit the clinic?				
B2	How long do you normally wait to be assisted (in hours)				
B3	Have you ever been turned away and had to return the following day?			N	Y
B4	Have you ever been misdiagnosed and had to return for additional treatment?			N	Y
B5	Do the healthcare professional assist you in your home language?			N	Y
C:	PATIENT PERCEPTION				
C1	Do you think the clinic has:				
C1.1	A sufficient staff compliment?			N	Y
C1.2	Sufficient machinery?			N	Y
C1.3	Sufficiently trained staff?			N	Y
C2	Do you think the clinic can improve?			N	Y
	If yes, how?				
C3	Do you think there's enough clinics in the region?			N	Y
C4	Quality of care	1 - Poor	2 - Average	3 - Excellent	
C5	Overall perception of clinic	1 - Poor	2 - Average	3 - Excellent	
C6	Level of staff efficiency	1 - Poor	2 - Average	3 - Excellent	
C7	Level of services rendered	1 - Poor	2 - Average	3 - Excellent	
C8	Hours of operation	1 - Poor	2 - Average	3 - Excellent	
C9	Friendliness of staff	1 - Poor	2 - Average	3 - Excellent	
C10	Level of access to clinic? Entering	1 - Difficult	2 - Moderate	3 - Easy	
C11	Level of access to clinic?	1 - Difficult	2 - Moderate	3 - Easy	
C12	Level of access to clinic? Exiting	1 - Difficult	2 - Moderate	3 - Easy	
C13	Level of access to medicine?	1 - Difficult	2 - Moderate	3 - Easy	
C14	Level of access to doctors and machinery?	1 - Difficult	2 - Moderate	3 - Easy	

Section A:

Demographic and personal information

Section B:

Clinic visit information

Section C:

Patient views and perception(s)

Figure 23 - Research questionnaire components

a) Section A: Demographical and personal information

Questions included in this segment focused specifically on the actual demographical details of patients such as age, gender and so forth. This is quite valuable as it furnishes the reader with basic demographical details of patients visiting the clinic.

b) Section B: Clinic visit information

Extending the demographical information obtained in the first section, the clinic visit information will add specific details relating to the frequency of visits to the clinics, as well as details pertaining to the actual diagnosis.

c) Section C: Patient views and perceptions

The final section concludes the questionnaire by focusing specifically on the patient perceptions from a resource, quality of care and overall efficiency perspective. The majority of questions included in the section took the form of Likert scale questions. The reasoning behind this form of questioning can easily be justified. The goal of the Likert scale questions was to derive the patients' perception of the clinic itself by selecting one of the three options (poor, average and excellent) when answering each question. The selected answers will furnish the reader and researcher with valuable information relating to the overall patient perceptions. This was also identified as the most efficient and effective way of questioning

3.1.2 Employee Perspective

This second segment of the three perspective analysis focuses on furnishing the reader with information from an employee perspective. The information was specifically obtained by semi structured interviews with clinic staff members including nurses, admin staff and so forth. This method of obtaining information will furnish the reader with information relating to the facility limitations from an employee perspective.

3.1.3 Researcher Perspective

The final perspective in the three perspective analysis takes the form of the researcher perspective. Information was obtained by the researcher implementing specifically participant observations to provide a solely objective perspective in terms of study field. By combining the three perspectives as mentioned earlier, the study will furnish the reader with a holistic view of the studied fields, namely primary public healthcare in South Africa. Our efforts will now be shifted to focus on the actual research sample and the provision of additional information relating to the implemented research methods.

3.2 Accuracy and reliability of statistical information

In any study the accuracy and reliability of information should be scrutinized to ensure that the conveyed information is reliable and in turn, will lead to reliable recommendations and findings.

With reference to the three perspective analysis (patient, employee and researcher perspective) discussed earlier, the patient perspective analysis included the use of a questionnaire. As mentioned earlier, the questionnaire comprised out of three sections. In order to confirm accuracy and reliability of the statistical information obtained in the overall questionnaire, it is important to include certain measures to ensure and support accuracy and reliability.

3.2.1 Sections A and B of the questionnaire: Demographical, personal and visit information

Accuracy and reliability of statistical information will be ensured by conveying the statistical mean and standard deviation. This will furnish the reader with an accurate idea of the statistical information obtained from the patients itself without being too complex.

3.2.2 Section C: Patient views and perceptions

The final section of the questionnaire relates to the more complex questions relating to the perceptions and views of patients visiting the clinics. The majority of questions included in this section took the form of Likert scale type questions.

Before we can continue, it's important to spend time on accessing the reliability of the questionnaire, or be it questions itself. Specific emphasize will fall on the Likert scale type questions (C4 to C14) as this will form the bulk majority of statistical analysis. According to Anastasi and Urbina (1997:84) the reliability of a test (questionnaire) refers to the consistency of scores obtained on different occasions by the same person when he or she is re-examined with the same test, with different sets of equivalent items, or under other variable examining conditions.

Although that's quite a mouth full, the statement basically refers to whether the test (questionnaire) actually measures what it is suppose to measure by analyzing the responses obtained via the completion of the questionnaire. With that out of the way, the following methods were implemented to determine the reliability and validity of the Likert scale questions (questions C4 to C14):

- Cronbach's Alpha coefficients to determine reliability (3.2.2.1)

- Confirmatory factor analysis by including Kaiser's measure of sample adequacy (3.2.2.2) and variation in communalities (3.2.2.3)

3.2.2.1 Chronbach's Alpha Coefficient

The Chronbach Alpha coefficient focuses on internal consistency between items of the measuring instrument (Reynaldo & Santos, 1999). The coefficient is based on the average correlation of variables within the test itself (SAS Institute 2005:295). According to Nunnally (1978:295), an overall score for each participant can be obtained by summing interrelated items. The reliability of this type of scale can be estimated through the calculation of Chronbach's Alpha coefficient by determining the internal consistency of the test or through average correlation of items included in the test.

In layman's terms, the Chronbach Alpha coefficient aims to calculate how closely related a set of items are as a group. The higher the Chronbach Alpha coefficient, the more reliable the scale/response. Field identified several generally acceptable Chronbach Alpha coefficient values for specific scales/questionnaires. These values are illustrated in the table below:

GENERALLY ACCEPTABLE CHRONBACH ALPHA COEFFICIENT VALUES	TYPE OF TEST/QUESTIONNAIRE
0.80	Cognitive tests/questionnaires
0.70	Ability tests/questionnaires
< 0.70	Psychological tests/questionnaires

Table 6 - Generally acceptable Chronbach Alpha Coefficients

The questionnaire implemented in this study falls within the psychological test/questionnaires as the responses originate from a personal/psychological perspective and the responses cannot be deemed correct or incorrect as it is opinion/situational based. To humor ourselves and for formality purposes, we can introduce a minimum acceptable Chronbach Alpha coefficient value applicable only to this study to identify unreliability. In this study, Chronbach Alpha coefficient values less than 0.50 will identify unreliability. One last comment that needs to be made to ensure that we remain true to our continuous simplistic approach in this study relates to the grouping of questions (C4 to C14) into two major constructs. This will simplify our analysis from a reliability perspective. The two constructs can be confirmed as follows:

QUESTION GROUPINGS	CONSTRUCTS
C4 – C9	Perceived level of quality and efficiency of clinic
C10 – C14	Perceived level of access to resources

Table 7 - Questionnaire constructs

Now that we've identified the constructs applicable to our Likert scale questions (C4 to C14), we can confirm the Chronbach Alpha coefficients to identify unreliability. The Chronbach Alpha coefficients for the two constructs are illustrated in the following table:

QUESTION GROUP	CONSTRUCT NAME	CHRONBACH'S ALPHA COEFFICIENT
C4 – C9	Perceived level of quality and efficiency of clinic	0.715
C10 – C14	Perceived level of access to resources	0.652

Table 8 - Chronbach's Alpha Coefficients

Based on the conveyed information as well as the minimum Chronbach Alpha coefficient value identifying unreliability (<0.50) we can deem the two constructs, therefore questions C4 to C9 and C10 to C14 as reliable.

3.2.2.2 Kaiser's measure of sample adequacy (MSA)

The second method that we will implement to identify reliability relates to Kaiser's measure of sample adequacy (MSA). The main focus of this test is to identify inter-correlations among variable. It can be used to determine whether a factor analysis is appropriate (Tabachnick & Fidell, 2001:589). The MSA index ranges from 0 to 1 and reaches 1 when each variable is perfectly predicted by other variables. According to Field (2005:640), this measure can be interpreted by making use of the following guidelines:

MSA VALUE	RELIABILITY SCALE
≥ 0.80	Meritorious
0.70	Middling
0.60	Mediocre
0.50	Miserable
< 0.50	Unacceptable

Table 9 - Kaiser's MSA reliability scale

The Kaiser's Measure of Sample Adequacy (MSA) is calculated as 0.767 (middling to meritorious) for all Likert scale questions (C4 to C14) which indicates that the sample is adequate and therefore reliable.

3.2.2.3 Variation in communalities

The final component relating to reliability and validity relates to testing the percentage of variance in an observed variable that is accounted for by the retained components/factors (Field 2005:653). A certain variable will display a large communality if it weighs heavily on at least one of the study's retained components. The communalities of the constructs studies within the study, varied between the lowest and highest values as indicated below:

QUESTION	LOWEST	HIGHEST
C4	0.436	0.678
C5	0.283	0.318
C6	0.302	0.377
C7	0.292	0.336
C8	0.124	0.201
C9	0.216	0.261
C10	0.252	0.697
C11	0.237	0.451
C12	0.283	0.332
C13	0.248	0.289
C14	0.435	0.845

Table 10 - Commuality variation

Within the questionnaire, the question (C8) with the lowest contribution (0.124) to a construct was in the first construct (perceived level of quality and efficiency of clinic) whilst the question with the highest contribution (0.697) was in the second construct (perceived level of access to resources).

3.2.3 Conclusion of reliability and validity

We've reached a stage where we've discussed the implemented questionnaire in terms of construction and reliability/validity, specifically with regards to the Likert scale type questions included in questions C4 to C14. We have identified that certain components of the questionnaire focus solely on the acquisition of demographical, personal and visitation statistical whilst the latter part of the questionnaire relates to the actual perception of the clinics respectively. Taking all tests and disclosures into account we can proceed in discussing the actual statistical information obtained by implementing the questionnaire.

3.3 Questionnaire feedback

Practicing what we preach, we will disclose the statistical information in the most effective and simplest form possible. The first section (Descriptive Statistical Analysis) of the questionnaire feedback will relate to descriptive statistics where the statistical information will be conveyed by implementing graphic aids such as frequency tables, histograms, pie charts and so forth. The second segment (Relational Analysis) of conveying the statistical feedback will relate to more complex realizations such as statistical relationships to identify trends within the statistical information.

3.3.1 Descriptive Statistical Analysis

Due to the nature and vastness of the questionnaire implemented, we will identify and emphasize only the most important facets from a statistical perspective. This will ensure that the reader is not inundated with numerous graphs that carry little statistical value. The focus will therefore rather be on certain components that contribute substantially and statistically to the overall study. One last comment before we commence the descriptive segment of the statistical analysis relates to reliability and validity. It's important for the reader to acknowledge the fact that both the mean value ($\bar{T}$) as well as the standard deviation will be conveyed to ensure the validity and reliability of the descriptive statistical information. In order to simplify the method of conveying the information, a statistical summary of the information included in the relevant section of the questionnaire will be conveyed in table form. This statistical summary will also refer to certain descriptive graphs for easy reference.

Section A: Demographical and Personal Information

The first section of our descriptive statistics refers to section A of the questionnaire that mainly focuses on conveying the demographical and personal information of patients included in the

PATIENT INFORMATION									
A1	Gender								
A2	Year of Birth								
A3	Marital Status								
A4	Do you have children?								
A4.1	If yes, how many?								
A5	Are you employed?								
A6	Marital Status								
PATIENT PERCEPTION									
B1	How satisfied are you with the service?								
B2	How satisfied are you with the staff?								
B3	How satisfied are you with the facilities?								
B4	How satisfied are you with the cost?								
B5	How satisfied are you with the location?								
C1	How satisfied are you with the overall experience?								
C1.1	How satisfied are you with the overall experience?								
C1.2	How satisfied are you with the overall experience?								
C1.3	How satisfied are you with the overall experience?								
C1.4	How satisfied are you with the overall experience?								
C1.5	How satisfied are you with the overall experience?								
C1.6	How satisfied are you with the overall experience?								
C1.7	How satisfied are you with the overall experience?								
C1.8	How satisfied are you with the overall experience?								
C1.9	How satisfied are you with the overall experience?								
C1.10	How satisfied are you with the overall experience?								
C1.11	How satisfied are you with the overall experience?								
C1.12	How satisfied are you with the overall experience?								
C1.13	How satisfied are you with the overall experience?								
C1.14	How satisfied are you with the overall experience?								
C1.15	How satisfied are you with the overall experience?								
C1.16	How satisfied are you with the overall experience?								
C1.17	How satisfied are you with the overall experience?								
C1.18	How satisfied are you with the overall experience?								
C1.19	How satisfied are you with the overall experience?								
C1.20	How satisfied are you with the overall experience?								
C1.21	How satisfied are you with the overall experience?								
C1.22	How satisfied are you with the overall experience?								
C1.23	How satisfied are you with the overall experience?								
C1.24	How satisfied are you with the overall experience?								
C1.25	How satisfied are you with the overall experience?								
C1.26	How satisfied are you with the overall experience?								
C1.27	How satisfied are you with the overall experience?								
C1.28	How satisfied are you with the overall experience?								
C1.29	How satisfied are you with the overall experience?								
C1.30	How satisfied are you with the overall experience?								
C1.31	How satisfied are you with the overall experience?								
C1.32	How satisfied are you with the overall experience?								
C1.33	How satisfied are you with the overall experience?								
C1.34	How satisfied are you with the overall experience?								
C1.35	How satisfied are you with the overall experience?								
C1.36	How satisfied are you with the overall experience?								
C1.37	How satisfied are you with the overall experience?								
C1.38	How satisfied are you with the overall experience?								
C1.39	How satisfied are you with the overall experience?								
C1.40	How satisfied are you with the overall experience?								
C1.41	How satisfied are you with the overall experience?								
C1.42	How satisfied are you with the overall experience?								
C1.43	How satisfied are you with the overall experience?								
C1.44	How satisfied are you with the overall experience?								
C1.45	How satisfied are you with the overall experience?								
C1.46	How satisfied are you with the overall experience?								
C1.47	How satisfied are you with the overall experience?								
C1.48	How satisfied are you with the overall experience?								
C1.49	How satisfied are you with the overall experience?								
C1.50	How satisfied are you with the overall experience?								
C1.51	How satisfied are you with the overall experience?								
C1.52	How satisfied are you with the overall experience?								
C1.53	How satisfied are you with the overall experience?								
C1.54	How satisfied are you with the overall experience?								
C1.55	How satisfied are you with the overall experience?								
C1.56	How satisfied are you with the overall experience?								
C1.57	How satisfied are you with the overall experience?								
C1.58	How satisfied are you with the overall experience?								
C1.59	How satisfied are you with the overall experience?								
C1.60	How satisfied are you with the overall experience?								
C1.61	How satisfied are you with the overall experience?								
C1.62	How satisfied are you with the overall experience?								
C1.63	How satisfied are you with the overall experience?								
C1.64	How satisfied are you with the overall experience?								
C1.65	How satisfied are you with the overall experience?								
C1.66	How satisfied are you with the overall experience?								
C1.67	How satisfied are you with the overall experience?								
C1.68	How satisfied are you with the overall experience?								
C1.69	How satisfied are you with the overall experience?								
C1.70	How satisfied are you with the overall experience?								
C1.71	How satisfied are you with the overall experience?								
C1.72	How satisfied are you with the overall experience?								
C1.73	How satisfied are you with the overall experience?								
C1.74	How satisfied are you with the overall experience?								
C1.75	How satisfied are you with the overall experience?								
C1.76	How satisfied are you with the overall experience?								
C1.77	How satisfied are you with the overall experience?								
C1.78	How satisfied are you with the overall experience?								
C1.79	How satisfied are you with the overall experience?								
C1.80	How satisfied are you with the overall experience?								
C1.81	How satisfied are you with the overall experience?								
C1.82	How satisfied are you with the overall experience?								
C1.83	How satisfied are you with the overall experience?								
C1.84	How satisfied are you with the overall experience?								
C1.85	How satisfied are you with the overall experience?								
C1.86	How satisfied are you with the overall experience?								
C1.87	How satisfied are you with the overall experience?								
C1.88	How satisfied are you with the overall experience?								
C1.89	How satisfied are you with the overall experience?								
C1.90	How satisfied are you with the overall experience?								
C1.91	How satisfied are you with the overall experience?								
C1.92	How satisfied are you with the overall experience?								
C1.93	How satisfied are you with the overall experience?								
C1.94	How satisfied are you with the overall experience?								
C1.95	How satisfied are you with the overall experience?								
C1.96	How satisfied are you with the overall experience?								
C1.97	How satisfied are you with the overall experience?								
C1.98	How satisfied are you with the overall experience?								
C1.99	How satisfied are you with the overall experience?								
C1.100	How satisfied are you with the overall experience?								

research. This section is quite important as it provides important information relating to the patients' personal circumstance.

Thus, included in section A are questions A1 to A6. As mentioned earlier, the mean along with the standard deviation will be included to

support the statistical reliability and validity of the questionnaire.

Statistical Summary – Demographical and Personal Information

QUESTION NUMBER	QUESTION	MEAN ($\bar{T}$)	STANDARD DEVIATION	DESCRIPTION OF STATISTICAL INFORMATION	FIGURE
A1	Gender	N/A	N/A	The majority of patients visiting the clinic are female (76.50%).	-
A2	Year of birth (Age)	43.36	15.28	The average of patients visiting the clinic is (43.36)	24
A4	Do you have children?	N/A	N/A	91% of all respondents have children.	-
A4	If Yes, how many?	2.68	1.701	The average patient visiting the clinic has 2 to 3 children.	25
A4.1	If Yes, do you bring them to the clinic as well?	1.67	0.636	75.5% of patients bring their children to the clinic as well for medical attention.	26
A5	Are you employed?	N/A	N/A	73% of respondents that completed the questionnaire are unemployed.	-

Table 11 (above) - Demographical and Personal information

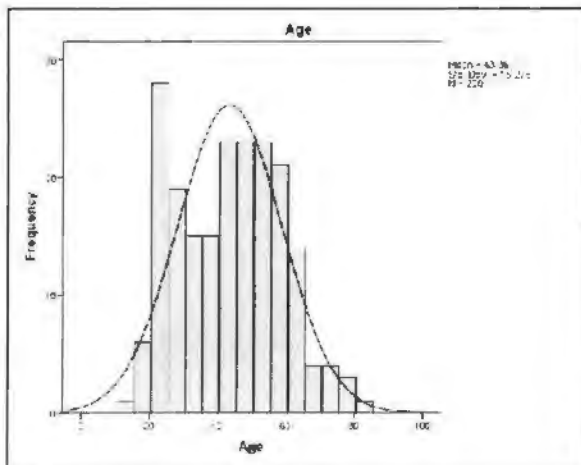


Figure 24 - Average Age

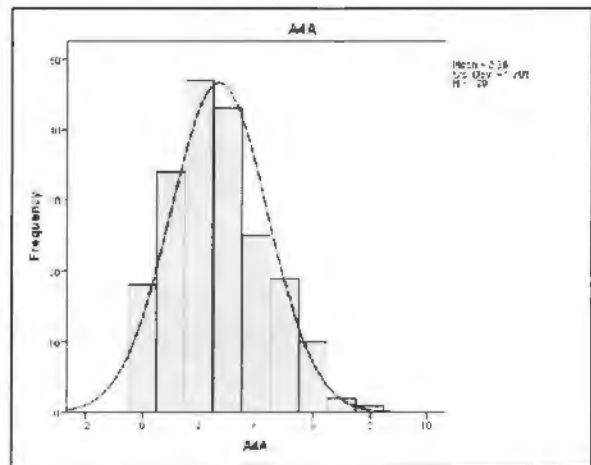


Figure 25 - How many children do you have?

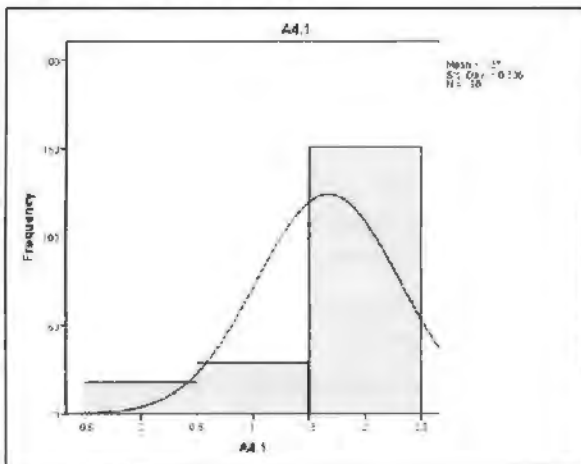


Figure 26 (left) - Do you bring your children to the clinic as well?

We can therefore safely summarize the obtained information relating to the demographical and personal information of patients as follows: The majority of patients have children. The parents and their children are dependent of the clinic for medical attention. The majority of patients are unemployed hence the reason that they cannot

afford private healthcare.

Section B: Clinic Visit information

The second segment of the questionnaire relates to the visitation and diagnostic information of

PATIENT INFORMATION			
Q1	Age		
Q2	Gender		
Q3	Marital Status		
Q4	Number of Children		
Q5	Do you bring your children to the clinic as well?		
VISIT INFORMATION			
Q6	How many times per month do you visit the clinic?		
Q7	How long do you normally wait to be attended (in hours)?		
Q8	Have you ever been turned away and had to return the following day?		
Q9	Have you ever been misdiagnosed and had to return for additional treatment?		
Q10	Do the health care professionals listen to your concerns?		
Q11	Do you think the clinic has...		
Q12	...a good reputation?		
Q13	...a good location?		
Q14	...a good staff?		
Q15	...a good service?		
Q16	...a good price?		
Q17	...a good environment?		
Q18	...a good overall experience?		

previous visits to the clinic. This information will be quite important as it will furnish the reader with historic information pertaining to diagnosis as well as providing the reader with valuable visitation information per average patient.

Statistical Summary – Clinic Visit Information

Table 12 (below) - Clinic Visit Information

QUESTION NUMBER	QUESTION	MEAN ($\bar{X}$)	STANDARD DEVIATION	DESCRIPTION OF STATISTICAL INFORMATION	FIGURE
B1	How many times per month do you visit the clinic?	2.08	1.61	On average, patients completing the questionnaire visit the clinic at least twice per month.	27
B2	How long do you normally wait to be assisted (in hours)	2.49	1.21	On average, patients wait approximately 2.5 hours before they are assisted.	28
B3	Have you ever been turned away and had to return the following day?	N/A	N/A	72% of patients have been turned away and requested to return the following day for medical assistance.	-
B4	Have you ever been misdiagnosed and had to return for additional treatment?	N/A	N/A	64.50% of patients have been misdiagnosed at some stage and had to return for additional treatment.	-

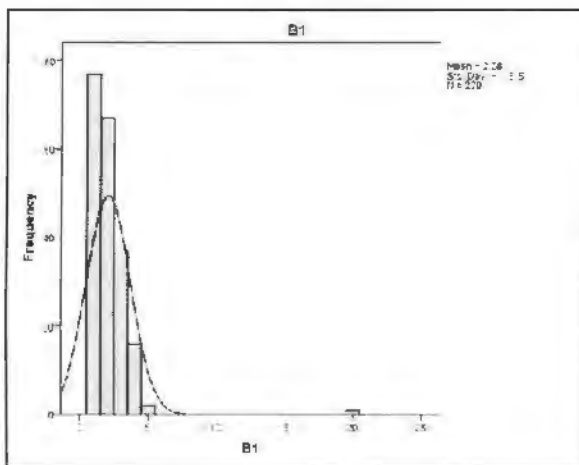


Figure 27 - Average visits per month

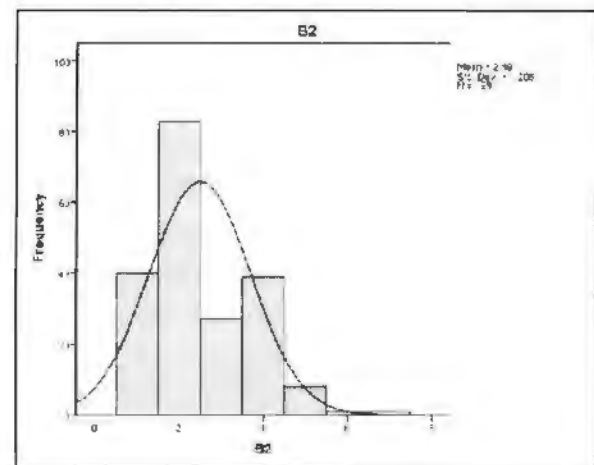


Figure 28 - Average waiting time

What statistical assumptions can we make based on the conveyed information? Patients visit the clinic on average twice per month, whilst the average waiting time is 2.5 hours. At some stage of their visits they have either been requested to return the following day due to the clinic's inability to assist and/or had to return due to misdiagnosis.

Section C: Patient views and perceptions

The final section of questionnaire relates to the patient views and perceptions of the clinic itself. The line of questioning focused specifically on tangible resources such as staffing, time, equipments and so forth.

The image shows a printed questionnaire form. The top section is for patient identification (Name, Age, Sex, etc.). Below that is a section for clinical history (Date of birth, Date of admission, etc.). The main part of the form is titled 'PATIENT PERCEPTION' and contains several questions with rating scales (1-5) and checkboxes. The questions are: C1.1 (Do you think the clinic has a sufficient staff compliment?), C1.2 (Do you think the clinic has sufficient machinery?), C1.3 (Do you think the clinic has sufficiently trained staff?), C2 (Do you think the clinic can improve? If yes, how?), C3 (Do you think there are enough clinics in the region?), C4 (How would you rate the quality of care?), C5 (How would you rate the overall perception of the clinic?), C6 (How would you rate the level of staff efficiency?), C7 (How would you rate the level of services rendered by the clinic?), and C8 (How would you rate the hours of operation?).

The line of questioning is quite important as it is a continuation of questioning that took place in Section A and B. We have established the patients' demographical and personal background, along with obtaining the visitation and diagnostic information. Section C aims to identify potential reasons and correlations between the

information conveyed in the first two sections and the information stipulated in section C.

Statistical Summary – Patient views and Perceptions

Table 13 (below) - Patient view and perceptions

QUESTION NUMBER	QUESTION	MEAN ($\bar{X}$)	STANDARD DEVIATION	DESCRIPTION OF STATISTICAL INFORMATION	FIGURE
C1.1	Do you think the clinic has a sufficient staff compliment?	N/A	N/A	81.50% of respondents feel that the clinics avail of an insufficient staff compliment.	29
C1.2	Do you think the clinic has sufficient machinery?	N/A	N/A	83% of respondents felt that the clinics availed of insufficient machinery.	30
C1.3	Do you think the clinic has sufficiently trained staff?	N/A	N/A	71% of respondents confirmed that the staff currently employed by the respective clinics is sufficiently trained.	-
C2	Do you think the clinic can improve? If yes, how?	N/A	N/A	89% of respondents believed that the clinic can improve. The various initiatives of improvement are illustrated in figure 30.	31
C3	Do you think there are enough clinics in the region?	N/A	N/A	86% of respondents felt that there were not enough clinics in the region.	-
C4	How would you rate the quality of care?	2.39	0.639	47% of respondents perceived the quality of care as excellent.	Table 14 – Frequency tables
C5	How would you rate the overall perception of the clinic?	2.20	0.616	58.5% of respondents deemed the clinic as average from a holistic perspective.	
C6	How would you rate the level of staff efficiency?	2.26	0.667	49% of respondents perceived the level of staff efficiency as average.	
C7	How would you rate the level of services rendered by the clinic?	2.38	0.683	49% of respondent believed that the services rendered by the clinic were excellent.	
C8	How would you rate the hours of operation?	1.38	0.622	70% of all respondents deemed the hours of operation as inadequate/poor.	

C9	How would you rate the friendliness of staff?	2.28	0.681	46% of respondents perceived the staff as friendly	
C10	Level of access entering the clinic?	2.66	0.613	73.50% of respondents had little trouble locating and entering the clinic.	
C11	Level of access moving around in the clinic?	1.86	0.719	80.50% of respondents felt that it was extremely difficult to move around within the confines of the clinic.	
C12	Level of access exiting the clinic?	2.59	0.644	67% of respondents had little trouble exiting the clinic once medical attention was received.	
C13	Level of access to medicine?	2.32	0.713	46% of respondents believed that the level of access to medicine was average.	
C14	Level of access to doctors and machinery?	2.25	0.663	50% of respondents perceived the level of access to doctors and machinery as average.	



Figure 29 - Staff compliment

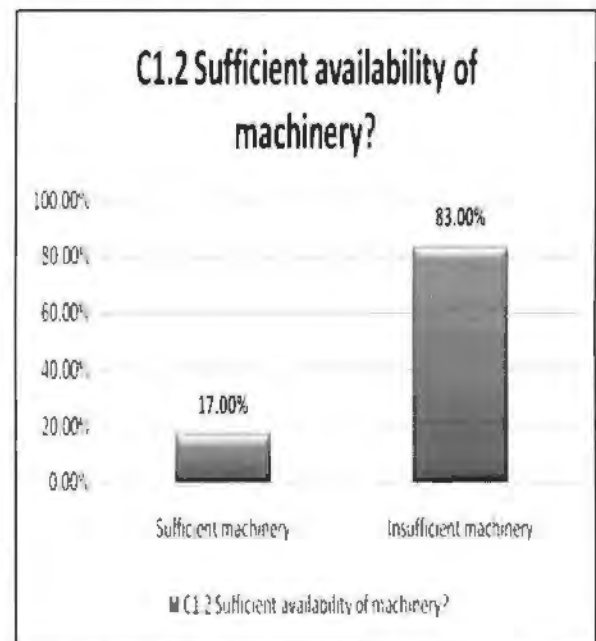


Figure 30 - Availability of machinery?

To add substance to the patient views and perceptions, the relevant frequency tables (see table 14) will be included. This will furnish the reader with frequency data relating to the selections made by the respondents specific to questions C4 to C14.

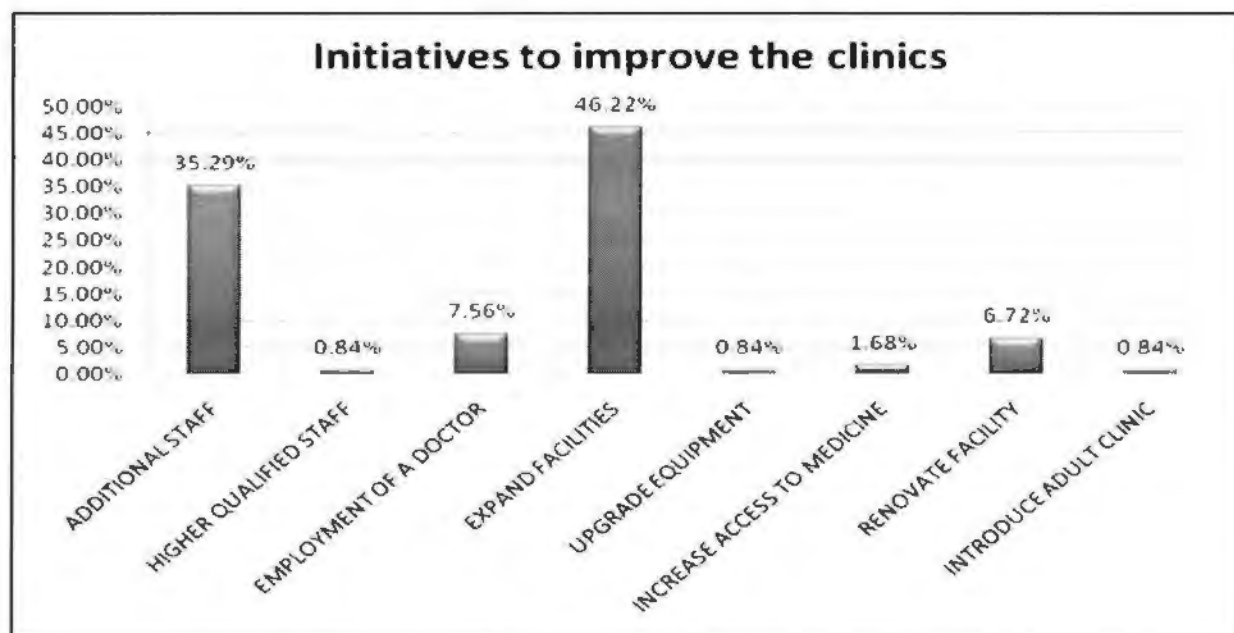


Figure 31 (above) - Initiatives to improve the clinics

Table 14 (below) - Frequency tables questions C4 to C14

C4 - Quality of care

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1 – Poor	17	8.5	8.5	8.5
2 – Average	89	44.5	44.5	53.0
3 – Excellent	94	47.0	47.0	100.0
Total	200	100.0	100.0	

C5 - Overall perception of the clinic

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1 – Poor	22	11.0	11.0	11.0
2 – Average	117	58.5	58.5	69.5
3 – Excellent	61	30.5	30.5	100.0
Total	200	100.0	100.0	

C6 - Level of staff efficiency

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1 – Poor	25	12.5	12.5	12.5
2 – Average	98	49.0	49.0	61.5
3 – Excellent	77	38.5	38.5	100.0
Total	200	100.0	100.0	

C7 - Level of services rendered (by the clinic)

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1 – Poor	23	11.5	11.5	11.5
2 – Average	79	39.5	39.5	51.0
3 – Excellent	98	49.0	49.0	100.0
Total	200	100.0	100.0	

C8 - Hours of operation (business hours of facility)

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1 – Poor	140	70.0	70.0	70.0
2 – Average	45	22.5	22.5	92.5
3 – Excellent	15	7.5	7.5	100.0
Total	200	100.0	100.0	

C9 - Friendliness of staff

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1 – Poor	26	13.0	13.0	13.0
2 – Average	92	46.0	46.0	59.0
3 – Excellent	82	41.0	41.0	100.0
Total	200	100.0	100.0	

C10 - Level of access to the clinic (Entering)

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1 – Poor	15	7.5	7.5	7.5
2 – Average	38	19.0	19.0	26.5
3 – Excellent	147	73.5	73.5	100.0
Total	200	100.0	100.0	

C11 - Level of access in the clinic (relating directly to facility layout)

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1 – Poor	68	34.0	34.0	34.0
2 – Average	93	46.5	46.5	80.5
3 – Excellent	39	19.5	19.5	100.0
Total	200	100.0	100.0	

C12 - Level of access to the clinic (Exiting)

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1 – Poor	17	8.5	8.5	8.5
2 – Average	49	24.5	24.5	33.0
3 – Excellent	134	67.0	67.0	100.0
Total	200	100.0	100.0	

C13 - Level of access to medicine

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1 – Poor	29	14.5	14.5	14.5
2 – Average	79	39.5	39.5	54.0
3 – Excellent	92	46.0	46.0	100.0
Total	200	100.0	100.0	

C14 - Level of access to nurses and equipment

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1 – Poor	25	12.5	12.5	12.5
2 – Average	100	50.0	50.0	62.5
3 – Excellent	75	37.5	37.5	100.0
Total	200	100.0	100.0	

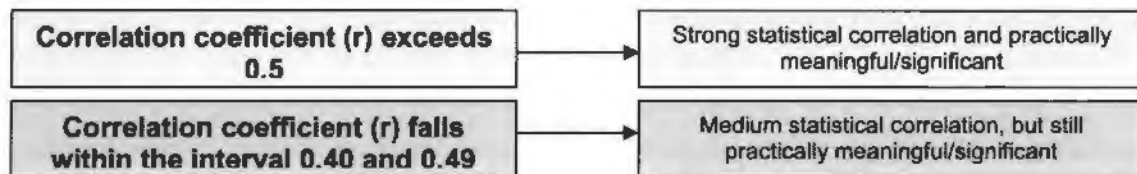
3.3.2 Statistical correlations and direct comparisons

To add a bit more details to the statistical analysis, we will aim to identify statistical correlations between certain questions included in the questionnaire as well as identifying potential direct comparisons between the two clinics. Although our main focus of the study is not to compare the two clinics with one another, it could prove valuable for the respective clinics should we be able to identify any components that could be compared directly.

Statistical correlations

A very effective tool of identifying correlations between statistical data relates to the implementation of Spearman's rank correlation coefficient (Archabault, 2000). The direct correlations will enable us to identify potential reasons for the responses by the respective patients that completed the questionnaire. Before we commence in identifying statistical correlations between various responses, it's important to note that due to this study's sample not being random, the p-value which is normally used to identify correlation cannot be used solely to create assumptions relating to the sample population (Lewicki, 2007). We will therefore focus on the correlation coefficient (r) itself as main driver behind the identification of statistical correlations, but include the relevant p-value for the sake of impetus. In all correlation instances as discussed in this section, the p value was 0.00.

We implemented a 2 minimum value approach to identify statistically viable correlations. The 2 minimum values are as follows:



For the sake of simplicity and practicality we will disregard the first correlation between age (A2) and number of children (A4A) as the correlation is self explicable and not relevant for this study.

Spearman's Correlation Coefficient

Table 15 - Spearman's Correlation Coefficient (A2 to C6)

		A2	A4A	B1	B2	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
A2	r	1.000	.681	-.003	.044	.070	.071	.075	-.022	-.204**	.051	-.136	-.096	-.131	-.114	-.066
	p	.	.000	.968	.539	.328	.315	.294	.757	.004	.469	.055	.177	.064	.109	.352
	N	200	199	200	199	200	200	200	200	200	200	200	200	200	200	200
A4A	r	.681**	1.000	.029	.067	.081	-.046	.064	.016	-.123	.013	-.096	-.119	-.134	-.153*	.013
	p	.000	.	.687	.345	.253	.523	.370	.817	.085	.854	.179	.095	.060	.031	.855
	N	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199
B1	r	-.003	.029	1.000	-.298**	.094	-.005	.040	.094	.000	.205	-.176*	.011	.026	-.094	.102
	p	.968	.687	.	.000	.187	.942	.570	.186	.997	.004	.013	.877	.720	.184	.150
	N	200	199	200	199	200	200	200	200	200	200	200	200	200	200	200

B2	r	.044	.067	.298**	1.000	.327**	-.122	.280**	.269**	.228**	.285**	-.021	.336**	.238**	-.042	.236**
	p	.539	.345	.000	.	.000	.087	.000	.000	.001	.000	.772	.000	.001	.552	.001
	N	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199
C4	r	.070	.081	.094	-.327**	1.000	.420**	.505**	.438**	.056	.306	.156	.150	.176	.210	.429**
	p	.328	.253	.187	.000	.	.000	.000	.000	.433	.000	.027	.034	.012	.003	.000
	N	200	199	200	199	200	200	200	200	200	200	200	200	200	200	200
C5	r	.071	-.046	-.005	-.122	.420**	1.000	.231	.329	.225	.185	.236	.246	.143	.162	.257
	p	.315	.523	.942	.087	.000	.	.001	.000	.001	.009	.001	.000	.044	.022	.000
	N	200	199	200	199	200	200	200	200	200	200	200	200	200	200	200
C6	r	.075	.064	.040	-.280**	.505**	.231	1.000	.281**	.131	.337	.110	.157	.139	.220	.288**
	p	.294	.370	.570	.000	.000	.001	.	.000	.064	.000	.122	.027	.049	.002	.000
	N	200	199	200	199	200	200	200	200	200	200	200	200	200	200	200

Spearman's correlation coefficient (continued)

Table 16 - Spearman's Correlation Coefficient (continued – C7 to C14)

		A2	A4A	B1	B2	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
C7	r	-.022	.016	.094	-.269**	.438**	.329	.281	1.000	.091	.286	.203	.131	.184	.134	.393**
	p	.757	.817	.186	.000	.000	.000	.000	.	.201	.000	.004	.065	.009	.059	.000
	N	200	199	200	199	200	200	200	200	200	200	200	200	200	200	200
C8	r	-.204**	.123	.000	-.228**	.056	.225	.131	.091	1.000	.136	.128	.256**	.127	.105	.106
	p	.004	.085	.997	.001	.433	.001	.064	.201	.	.055	.071	.000	.072	.139	.137
	N	200	199	200	199	200	200	200	200	200	200	200	200	200	200	200
C9	r	.051	.013	.205	-.285**	.306	.185	.337	.286	.136	1.000	-.017	.221	.171	.211	.305**
	p	.469	.854	.004	.000	.000	.009	.000	.000	.055	.	.808	.002	.015	.003	.000
	N	200	199	200	199	200	200	200	200	200	200	200	200	200	200	200
C10	r	-.136	.096	.176	-.021	.156	.236	.110	.203	.128	-.017	1.000	.204	.424**	.067	.277
	p	.055	.179	.013	.772	.027	.001	.122	.004	.071	.808	.	.004	.000	.348	.000
	N	200	199	200	199	200	200	200	200	200	200	200	200	200	200	200
C11	r	-.096	.119	.011	-.336**	.150	.246	.157	.131	.256	.221	.204	1.000	.325	.202	.285
	p	.177	.095	.877	.000	.034	.000	.027	.065	.000	.002	.004	.	.000	.004	.000
	N	200	199	200	199	200	200	200	200	200	200	200	200	200	200	200
C12	r	-.131	.134	.026	-.238**	.176	.143	.139	.184	.127	.171	.424	.325	1.000	.134	.310
	p	.064	.060	.720	.001	.012	.044	.049	.009	.072	.015	.000	.000	.	.058	.000

	N	200	199	200	199	200	200	200	200	200	200	200	200	200	200	200
C13	r	-.114	-.153*	-.094	-.042	.210**	.162	.220	.134	.105	.211	.067	.202**	.134	1.000	.449**
	p	.109	.031	.184	.552	.003	.022	.002	.059	.139	.003	.348	.004	.058	.	.000
	N	200	199	200	199	200	200	200	200	200	200	200	200	200	200	200
C14	r	-.066	.013	.102	-.236**	.429**	.257**	.288**	.393**	.106	.305**	.277**	.285**	.310**	.449**	1.000
	p	.352	.855	.150	.001	.000	.000	.000	.000	.137	.000	.000	.000	.000	.000	.
	N	200	199	200	199	200	200	200	200	200	200	200	200	200	200	200

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Correlation 1: Quality of care (C4) and Overall perception of clinic (C5) – Medium correlation

As with many aspects in modern day life, the overall perception of a facility/service relates directly to the service rendered by the relevant organisation in question. If the bring this into context it's quite easy to elude to the fact that the overall perception of the clinic, as perceived by its patients related correlates directly with the quality of care received as confirmed by the correlation coefficient (r) value of 0.42.

Correlation 2: Quality of care (C4) and Level of staff efficiency (C6) – Strong correlation

The second correlation relates to the quality of care and the human resources efficiency. A strong correlation ($r=0.505$) confirms that the quality of care rendered by the respective clinics relate directly to the level of staff efficiency. This is quite contrasting as 71% of all respondents believed that the staff at the various clinics is well trained, but their level of efficiency is limited. This could be linked to the imbalanced patient/nurse ratios that will be discussed at a later stage.

Correlation 3: Quality of care (C4) and Level of services rendered (C7) – Medium correlation

The third correlation related to the quality of care and the level of services rendered. Again, the level of services rendered comprises out of element such as human resources and other tangible resources available at the clinic. In this case, a medium correlation ($r=0.438$) exists between the level of services rendered and the quality of care.

Correlation 4: Quality of care (C4) and Level of access to doctors and machinery (C14) – Medium correlation

The forth correlation supports the pattern that has been discussed earlier relating to the quality of care. With reference to the resource availability as discussed in earlier correlations, a medium correlation ($r=0.429$) exists between the quality of care and the level of access to doctors and machinery.

Correlation 5: Level of access to clinic – entering (C10) and Level of access to clinic – exiting (C12) - Medium correlation

Questions C10, C11 and C12 relate directly to the actual flow of patients and information at the facility itself. A medium correlation ($r=0.424$) exists between the level of access entering and exiting the clinic. This is quite interesting as the physical facility layout of both clinics are exactly the same. Thus, this poses an interesting question: is the facility layout of such a nature that it stimulates the efficient flow of patients in information through the entire clinic? That question will be answered a bit later.

Correlation 6: Level of access to medicine (C13) and Level of access to doctors and machinery (C14) – Medium correlation

Once again, the gremlin relating to resource availability and access appears. A medium correlation ($r=0.449$) exists between the level of access to medicine and the level of access to doctors and machinery. This adds fuel to an existing fire relating to resource availability.

Correlation 7: Level of services rendered (C7) and Level of access to doctors and machinery (C14) – Medium correlation

Although the correlation is theoretically less than the minimum levels as discussed earlier ($r=0.393$), it is worthwhile including the correlation to the existing list of correlations. In repetitive manner, the level of services rendered correlated with the level of access to doctors and machinery.

Conclusion: Statistical Correlations

You do not have to be a rocket scientist to identify the core obstacles included in the correlations. We can summarize and illustrate the issues/aspects identified in the correlations as follows:



Figure 32 - Quality of care components/constraints

Elaboration with regards to the illustrated aspects will be discussed in Chapter 4 (Findings and Recommendations).

Direct comparisons

Comparing the two clinics was never identified as a primary or secondary objective in this study. Let's humor ourselves in identifying any aspects that differ dramatically between the two clinics. The aim is not to criticize or rate one clinic over the other. This exercise is merely for information purposes and to assist the clinics in identifying certain underlying aspects that could potentially halt the efficiency of the facility.

Theoretically, testing and identifying statistical differences between two sets of data, in this case, two different clinics does not sound too difficult (at first). We will be implementing the ANOVA test to identify meaningful differences in responses from a statistical perspective. Before we can implement the ANOVA test, we need to ensure that the data used for this test is normalized (Lewicki, 2007). The following tests were conducted to ensure that the data implemented is normalized.

- **Test 1: Kolmogorov-Smirnoff and Shapiro-Wilk tests**

Theoretically, larger p-values state that data is normalized. Our initial test results stated that the p-values in both tests were minimal, stating the obvious that the data in the study is not normalized. This did not perturb our efforts as both the Kolmogorov-Smirnoff and Shapiro-Wilk tests are extremely sensitive. Fortunately, this is not enough to go by as we need to test the severity of deviations from the normalized data (Lewicki, 2007). This led us to the QQ Plots.

- **Test 2: QQ Plots**

As mentioned earlier, the initial tests conducted indicated that the data included in the study was not normalized. We continued in implementing QQ-Plots in order to test the severity of the deviations from the theoretical normality. The QQ-Plots indicated that no severe deviations existed between the actual data and the theoretical normalized data.

We can therefore accept the hypothesis that the data to be used in the ANOVA test is normalized as confirmed by the above mentioned tests.

ANOVA Test

Some of us might not be statisticians, so before we commence the ANOVA test, let's just focus on how we identify meaningful statistical differences between the two groups/sets of information (the two groups/sets refer to the 2 clinics investigated in the study). Theoretically, a meaningful difference is present when the p-value exceeds the F-value. With reference to the ANOVA test table below, we've highlighted the instances (in yellow) where the p-value exceeds the F-value.

Table 17 (below) - ANOVA Test

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig. (p value)
C4	Between Groups	3.982	2	1.991	5.070	.007
	Within Groups	77.373	197	.393		
	Total	81.355	199			
C5	Between Groups	.138	2	.069	.181	.834
	Within Groups	75.257	197	.382		
	Total	75.395	199			
C6	Between Groups	3.940	2	1.970	4.590	.011
	Within Groups	84.540	197	.429		
	Total	88.480	199			
C7	Between Groups	2.869	2	1.434	3.140	.045
	Within Groups	90.006	197	.457		
	Total	92.875	199			
C8	Between Groups	3.125	2	1.563	4.174	.017
	Within Groups	73.750	197	.374		
	Total	76.875	199			
C9	Between Groups	5.446	2	2.723	6.175	.003
	Within Groups	86.874	197	.441		
	Total	92.320	199			
C10	Between Groups	.197	2	.099	.260	.771
	Within Groups	74.683	197	.379		
	Total	74.880	199			
C11	Between Groups	6.896	2	3.448	7.083	.001
	Within Groups	95.899	197	.487		
	Total	102.795	199			

C12	Between Groups	2.724	2	1.362	3.361	.037
	Within Groups	79.831	197	.405		
	Total	82.555	199			
C13	Between Groups	.254	2	.127	.248	.781
	Within Groups	100.901	197	.512		
	Total	101.155	199			
C14	Between Groups	7.353	2	3.677	9.037	.000
	Within Groups	80.147	197	.407		
	Total	87.500	199			

Three instances were identified:

- Question C5: Overall perception of the clinic
- Question C10: Level of access to clinic (Entering)
- Question C13: Level of access to medicine

To add a bit more substance, we've calculated the mean and standard deviation for both clinics based on the three questions stipulated above. The values are as follows:

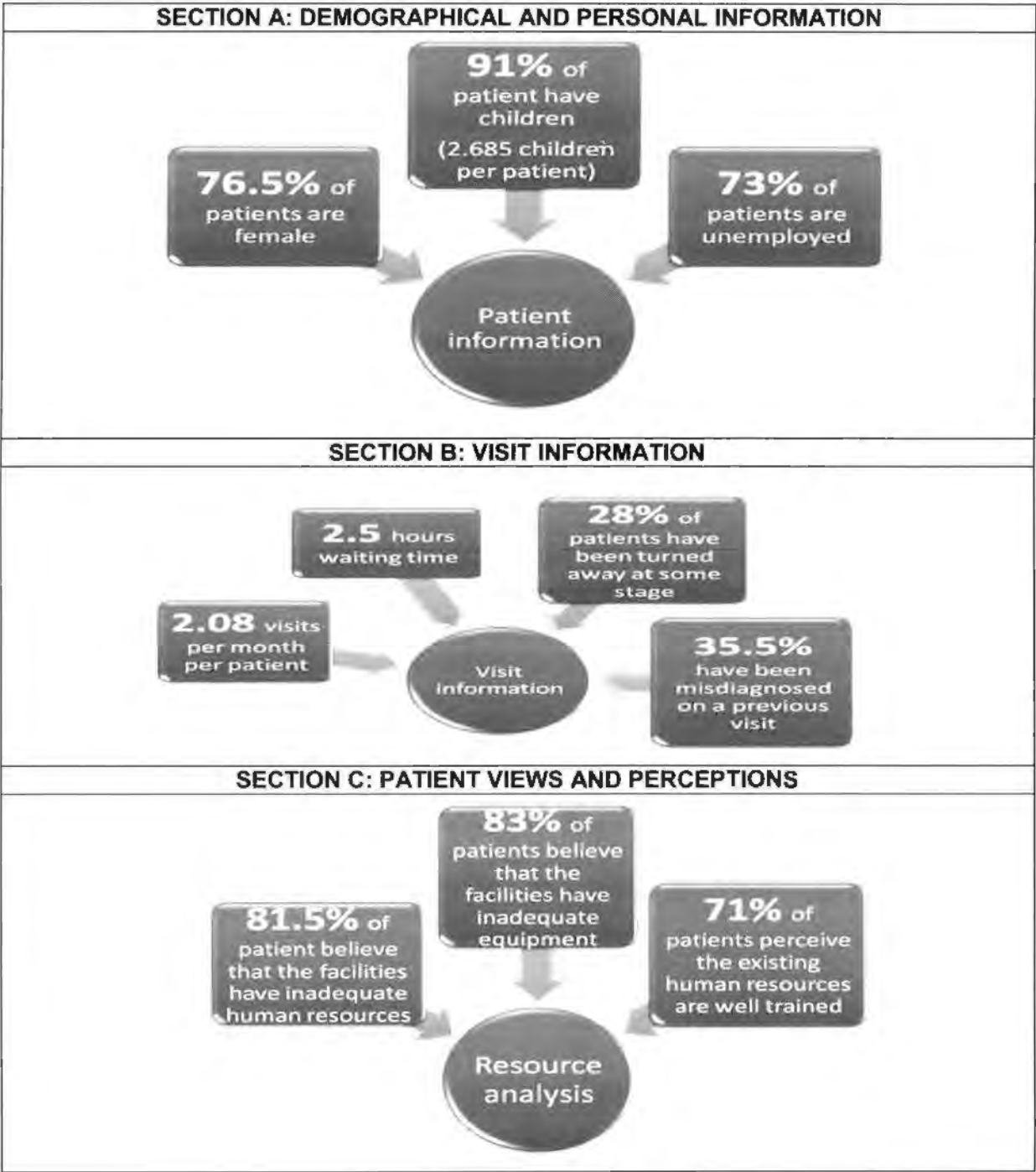
Table 18 - Standard Deviations and Mean values of questions C5, C10 and C13

QUESTION	SIPHUMLILE CLINIC		REX STREET CLINIC	
	Mean	Standard Deviation	Mean	Standard Deviation
C5	2.20	0.66	2.19	0.56
C10	2.63	0.71	2.69	0.51
C13	2.28	0.75	2.35	0.67

In all three cases, Rex Street Clinic received a more favourable response from its patients compared to its counterpart. We will leave the reasons behind this, as is for now. The latter stages of Chapter 4 (Findings and Recommendations) will focus more specifically on the potential differences leading to the differential perceptions.

3.3.3 Summary of descriptive statistics

Before we can proceed to discussing the other two components of the three perspective analysis, it's important to spend some time on summarizing the statistical information obtained thus far in a simple and descriptive manner. The statistical information as obtained via the implementation of the questionnaire can be summarized as follows:



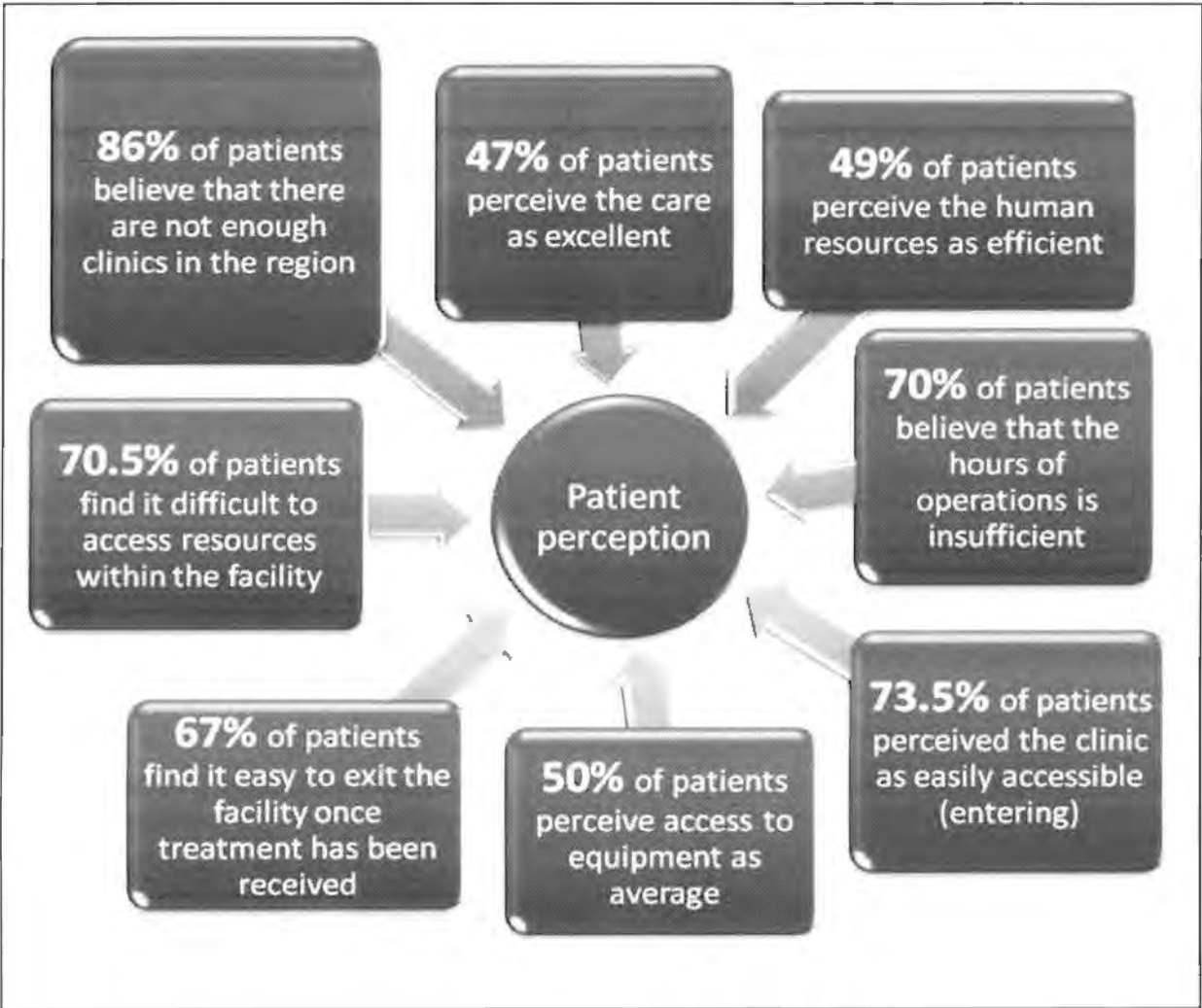
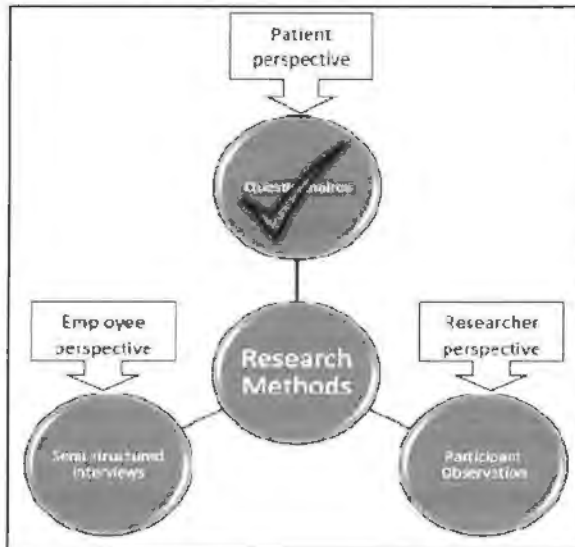


Table 19 – Questionnaire Statistical Summary

By the implementation of easy to understand descriptive statistics, the reader should have a fair and holistic perception of what the perception is of the clinics from a patient perspective.

3.4 Employee perspective

To maintain consistency in this study and to ensure that the reader is well informed, we will recap the progress made thus far from an empirical study perspective. A three perspective



analysis was conducted to provide a holistic view on the overall supply chain and its effectiveness. These components, as illustrated below are as follows: patient perspective, employee perspective and researcher perspective. The patient perspective component has already been discussed in the preceding paragraphs. Our focus will now be shifted towards the employee perspective. Semi structured interviews were conducted with the relevant staff members of the respective clinics to obtain their specific perspective on the

effectiveness and functionality of their clinics. These interviews were specifically conducted with questions focused on the same components as covered in the questionnaires. These components are: patient information, visit information and overall perception. The aim with the interviews was to focus on the same areas to enable us to create links between patient and employee opinions. These links will prove to be invaluable in drawing final conclusions and making recommendations relating to the various clinics. To retain consistency in terms of simplicity throughout this report, the conducted interviews will be summarized in tabular form for ease of reference and understanding.

3.4.1 Semi Structured interviews

The information obtained via the semi structured interview conducted at the respective clinics can be summarized as follows:

INTERVIEWEES	
Siphumlile clinic	Rex Street clinic
- Nthabiseng Tsotetsi - o Designation: General Manager - Hazel Moosa - o Designation: Enrolled Nurse	- Agineth Birekoe - o Designation: Enrolled Nurse - Faith Mointwedi - o Designation: Administration manager (Right to Care) - Nomsa Mgogui - o Designation: Enrolled Nurse (Right to Care)

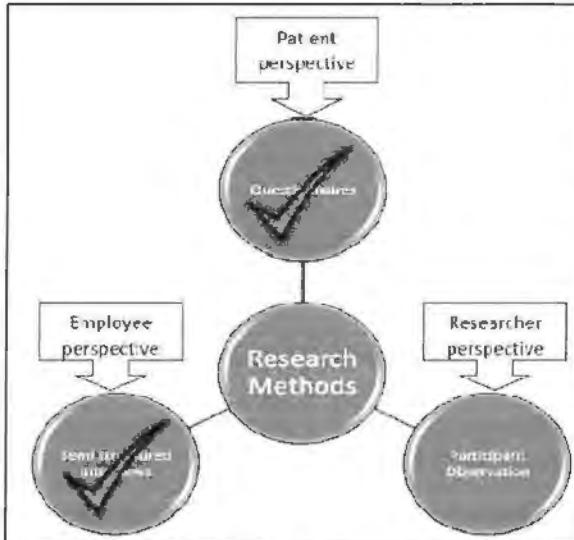
PATIENT INFORMATION	
<u>General Remarks:</u>	➤ The majority of patients are females (with babies) ➤ Most of the patients are unemployed and unable to afford private medical care ➤ The majority of treatment relates to the immunization of babies and primary healthcare of patients with acute or chronic conditions.
VISIT INFORMATION	
<u>Siphumile Clinic</u>	➤ Approximately 5000 patients from 8 regions in Soweto are dependent on the clinic. ➤ Due to the sheer volume of patients dependent on the clinic, an "unofficial" daily admittance deadline (twelve 'o clock) is adhered to, to ensure that the patients already waiting for medical assistance is assisted during the available office hours. This approach results in patients not being assisted and requested to return on another day. Furthermore, the unofficial deadline also results in many patients sleeping at the premises itself to ensure that they receive medical attention the following day and to eliminate the risk of the unofficial daily admission deadline.
<u>Rex Street Clinic</u>	➤ Approximately 3000 patients from regions in Roodepoort are dependent on the clinic. ➤ The days of the week are categorized in terms of the type of treatment available: ○ Monday to Thursday and Saturday: General care (including preventative, acute and chronic care) ○ Friday: Anti natal care ➤ The clinic has been inundated with demand for anti-retroviral medicines as the clinic is the only distributor in a vast demographical area.
<u>General Remarks:</u>	➤ Most of the patients visit the clinic more than once every month ➤ Patients can be categorized into three categories: ○ Preventative care ▪ This category of care relates directly to the prevention of certain diseases. Example: Immunization of babies based on the minimum immunization schedule ○ Acute care ▪ This type of care is also known as reactive care where patients seek medical attention in reactive to a medical condition they currently have that did not existed previously. Example: Patients obtaining antibiotics for measles. ○ Chronic care ▪ This category of care relates to the frequent (normally monthly) care of a certain illness. It also goes hand in hand with the dispensing of monthly medicines. ➤ Both clinics assist in the distribution of ARV's (Anti Retroviral) and offer family planning and counseling facilities.

PATIENT PERCEPTION (AND RESOURCE AVAILABILITY)	
<u>Siphumile Clinic</u>	➤ Staff compliment: ○ 2 Enrolled nurses ○ 2 Administrative person ○ 1 Nursing assistant ○ 1 Health promoter (offsite) ○ 2 General staff ➤ The facility was originally only intended for immunization purposes. Currently, it services the entire array of medical assistance required by primary healthcare facilities.
<u>Rex Street Clinic</u>	➤ Staff compliment: ○ 5 Enrolled nurses ○ 2 Nursing assistants ○ 2 Administrative person ○ 1 Enrolled nurse (Right to Care) ➤ The clinic comprises out of 2 sections, namely a primary healthcare clinic and a specialized HIV segment known as "Right to Care"
<u>General Remarks:</u>	➤ All the personnel interviewed shared the same views with regards to: ○ Human resources ▪ Inadequate staffing resources in terms of enrolled nurses. ▪ No onsite doctor is available at either of the clinics. ▪ Study leave is granted to trainee nurses. These trainee nurses are not replaced by temporary nurses whilst on study leave. ○ Equipment ▪ The available diagnostic and treatment equipment is dilapidated and not serviced regularly. ▪ Diagnostic and treatment equipment is not sufficient to service the sheer number of patients. ○ Facility ▪ The overall feeling in both clinics was that the actual size of the facility was inadequate to service the number of patients. ○ Procurement ▪ The method of dispensing and ordering medicine is done without automated computer technology. ▪ Shortages of medicine are often encountered. ▪ Both clinics are responsible for the distribution of ARV's, yet they often have to refer patients to other clinics due to the unavailability of ARV's medicine. ○ Record Keeping ▪ Medical records for primary healthcare patients are kept on paper and not automated computer system is available to facilitate record keeping.

Figure 33 - Employee perspective (Siphumile and Rex Street Clinics)

3.5 Participant Observation

The final component in our 3 perspective analysis relates to the participant observation conducted by the researcher himself. This component was conducted after the questionnaire



(patient perspective) and semi structured interviews (employee perspective). The motivation for this sequence is quite simple: by conducting and completing the preceding 2 analysis, the researcher would obtain invaluable information from the different perspectives that will enable the researcher to conduct the participant observation from an informed perspective taking the already obtained information into account. Thus, the participant observation is not only an “outsider” view on the entire study, but it also includes and verifies

certain information that has been obtained via the other two perspectives. The end result would therefore be a unified effort that conducted research and obtained information from various perspectives to create the most accurate and objective result.

3.5.1 Supply Chain Approach

After much deliberation relating to the approach to be followed, the researcher decided on conducting the actual research by using the theoretical primary healthcare supply chain as a reference. In layman’s terms, the participant observation was conducted by observing activities within the supply chain in the theoretical sequence it was illustrated in earlier in this study. Not only will this provide consistency throughout the study, but it would also enable the researcher to experience the entire supply chain first hand.

To ensure that everyone is on the same page, let’s refresh our memories with the theoretical primary healthcare supply chain as it was illustrated in the literature study (chapter 1).

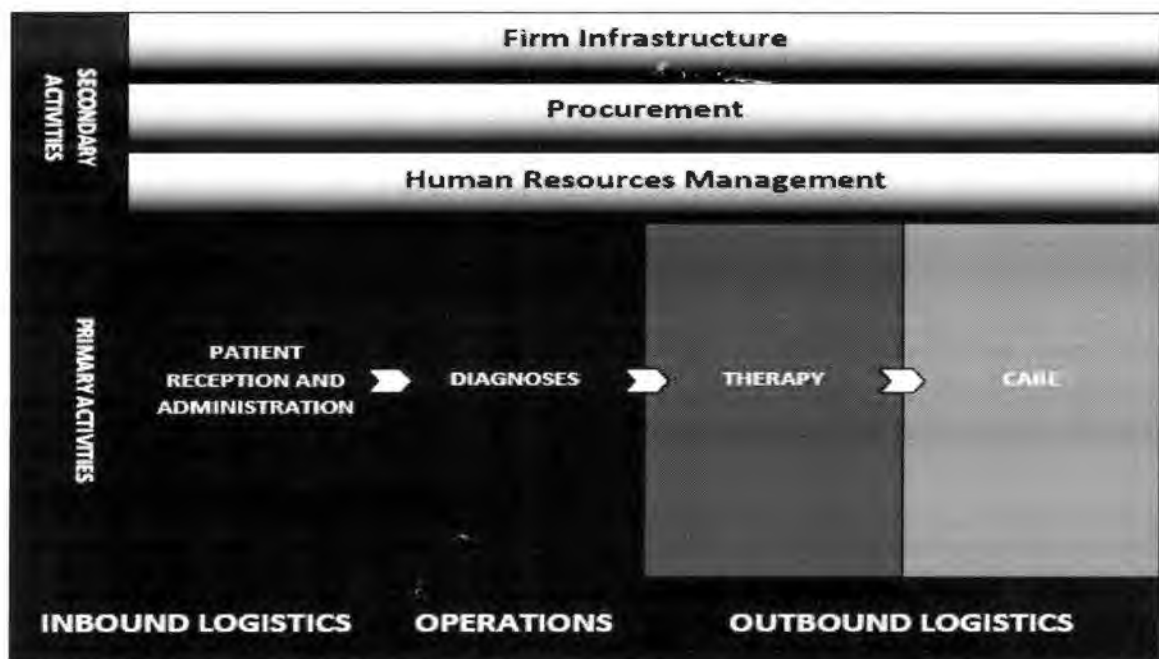


Figure 34 - Theoretical Primary Healthcare Supply Chain

Without reinventing the wheel or spending too much time on what has already been discussed in the literature study, it's important for the reader to take note of the actual flow of information and variables (patients) as illustrated in Figure 35. This sequence of information and variable will form the basis of the participant observation that will now be discussed.

3.5.2 The supply chain and facility structure

Taking into account the information that was obtained in the preceding text, it's important to map the actual facility structure as this will form the basis of the flow of information and variables within the clinics that were researched. Both facilities researched had the same facility structure resulting in the same (theoretical) flow of information and variable throughout the facility.

Facility structure

To simplify the discussions relating to the flow of information and variables, the general facility structure is illustrated in Figure 35. Before we can continue to discuss the actual flow of information and variables, it's important to discuss the comprising elements within the presented facility illustration.

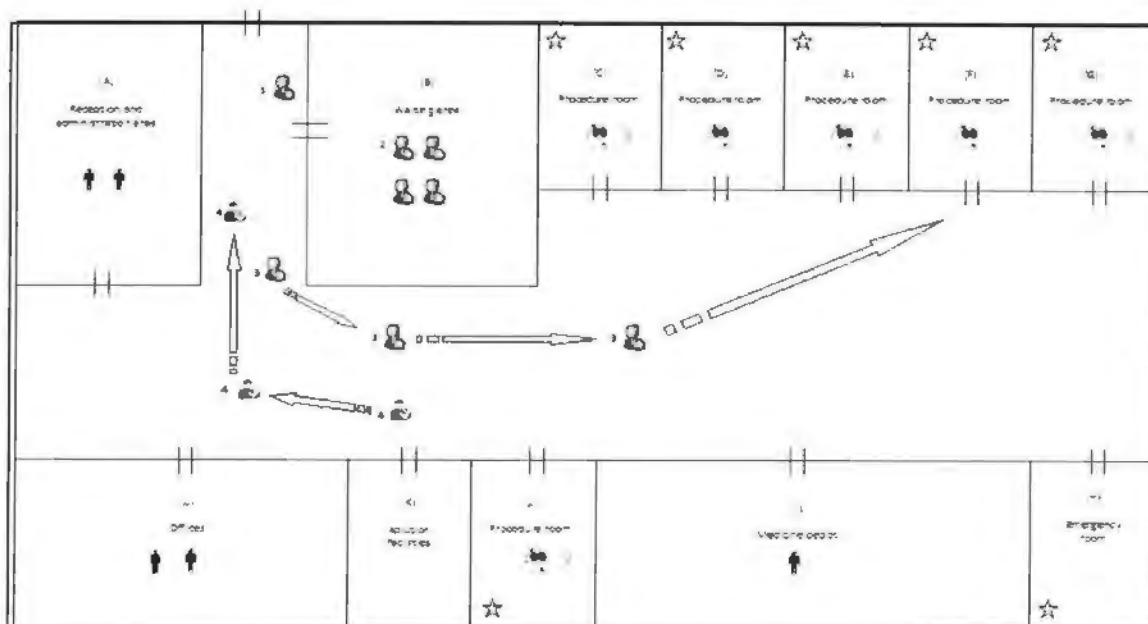


Figure 35 - Facility structure and layout

Supply Chain Components

COMPONENT NAME	COMPONENT ICON	DESCRIPTION
General Employee		Employed to assist in daily administrative and management activities.
Untreated patient		Patient in need of medical assistance
Enrolled Nurse		Nurse in charge of diagnosis and treatment of patients
Assistant nurse		Nurse in charge of supporting the enrolled nurse with diagnosis and treatment of patients
Treated patient		Patient that received the required medical assistance
Information and variable flow indicator		Indicates the direction of information and variables
Medicine dispenser		Unit used to store and dispense medicine

Table 20 - Supply Chain Components

Facility Components

COMPONENT NAME	DESCRIPTION
(A) Reception and administration area	Area designated for the retaining of patient records and the provision of general administrative activities.
(B) Waiting area	Designated area where untreated patients await medical attention.
(C) – (G), (J) Procedure room	Allocated rooms to treat certain medical conditions. Examples of allocated treatment rooms include: - Primary healthcare - Immunization - Tuberculosis - Family planning - HIV treatment and medicine disbursement - General counseling - IMCI (Integrated Management of Childhood Illness)
(H) Emergency room	Designated room and equipment to facilitate emergency medical treatment
(I) Medicine depot	Centralised location for the storage of medicine. The medicine dispensers in the various treatment rooms are replenished by the distribution of medicine from the depot.
(K) Ablution facilities	Area designation for general patient ablution
(L) Office	Area and equipment designated to facilitate the daily administrative and management activities

Table 21 - Facility components

Informational and variable flow description

PROCESS NUMBER	DESCRIPTION
1	Untreated patient enters facility and conduct general administrative activities at the reception and administration area (A). The patient obtains and updates patient file whilst he/she is allocated to a certain procedure room allocated for specific illness.
2	Patient enters waiting area and awaits the relevant (and allocated) procedure room to become available.
3	When the relevant allocated procedure room becomes available, the patient will enter the relevant room to receive medical assistance.
4	Once the required medical assistance has been provided, the treated patient will exit the premises of the clinic.

Table 22 - Process flow explanation

To conclude this chapter we trust that the relevant basis have been covered to furnish the reader with the most accurate and factual image possible. We will now continue to draw conclusions and make recommendations based on the research to assist in highlighting inefficiencies as identifying potential and viable solutions to improve the overall functionality of primary healthcare clinics.

Chapter 4 – Findings and Recommendations

4.1 Introduction

Like an athlete moving into the home straight, we will be moving towards the business end of this report. Substantial facts, figures and thoughts have been conveyed in preceding chapters. Facts, figures and thoughts that made the eyebrows raise and in some instances sent a shiver down the spine. Without getting ahead of ourselves, one thing we can all elude to is this: reality is not what the future can be. We'll get to this somewhat poetic statement a bit later, but for now the focus must be on what to do with the facts, the figures and the thoughts.

4.2 Communicating the findings and recommendations

Throughout this report a great deal of effort has been invested in consistency and simplicity. This chapter will not be any different. We will remain consistent in focusing on the various analytical perspectives as identified and communicated during the literature and empirical study, whilst ensuring that the findings and recommendations conveyed in this chapter remains simple and viable. Keeping the idea of simplicity and viability in mind, we will conquer the proverbial beast by implementing the same approach we used in our empirical study. With reference to the illustration you've grown accustomed to by now, we will implement the same strategy by focusing on the various perspectives (patient, employee and researcher) whilst taking into account information and core concepts obtained during the literature and empirical study.

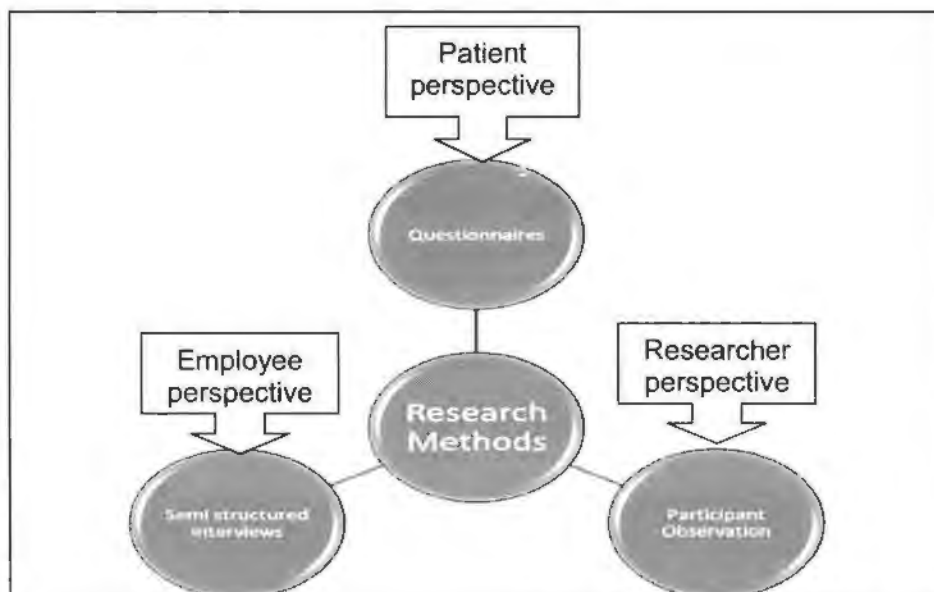


Figure 36 - Three perspective approach

We will add one dimension to the mentioned perspectives that will furnish us with the sequential steps to firstly identify certain findings and secondly, communicate viable recommendations. These sequential steps refer back to our literature study and relates to the main reason why this study was commenced, namely, identifying inefficiencies within the primary healthcare supply chain. Thus, the supply chain itself, will form the basis of our findings and recommendations whilst taking into account the various perspectives identified throughout this report. Our three perspective approach can therefore be altered accordingly and can be illustrated as follows:

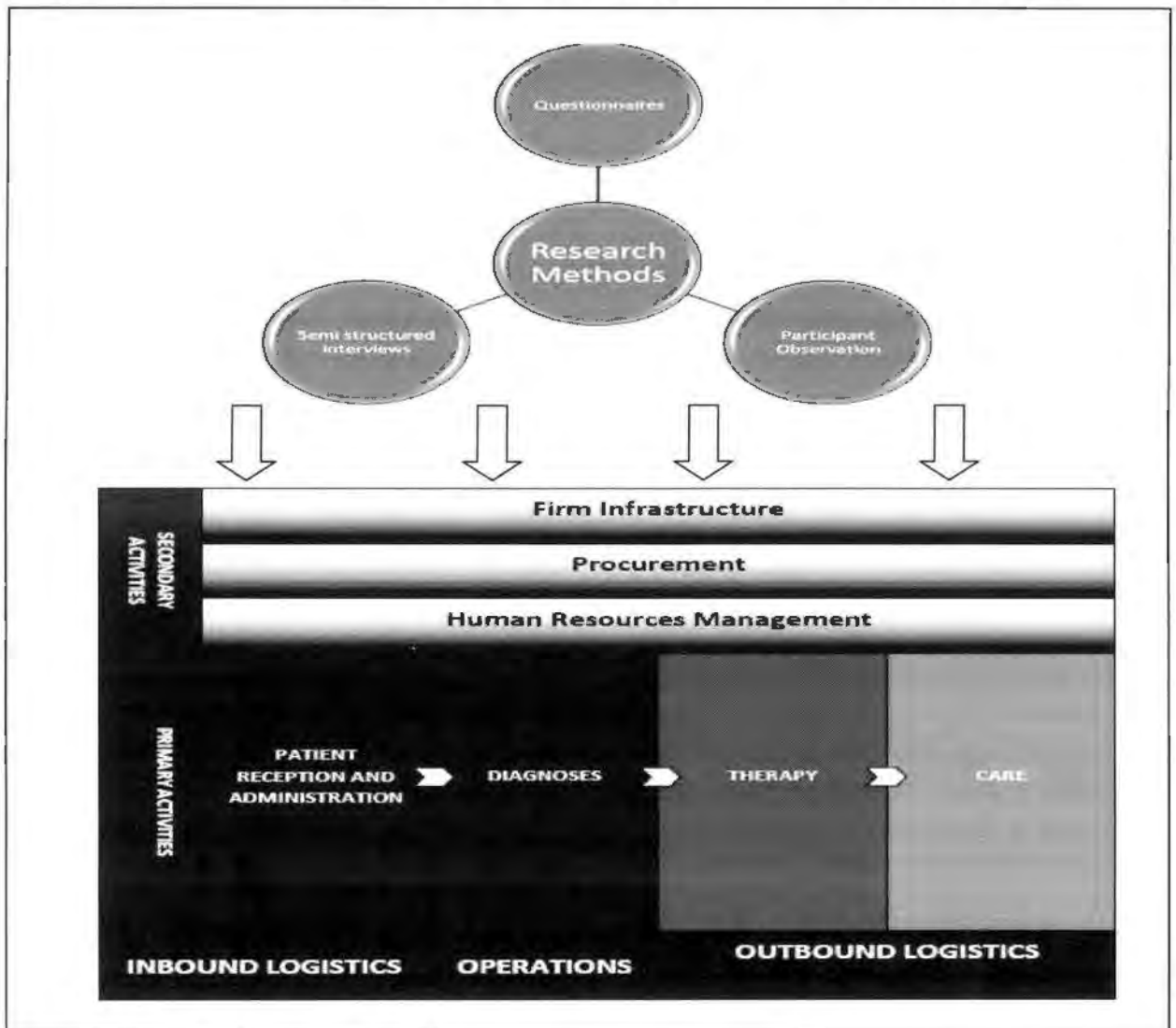


Figure 37 - Findings and recommendations roadmap

In layman's terms we will implement the actual consolidated theoretical supply chain by taking the various research perspectives into account to ultimately create findings and make recommendations to improve the specific segment of the supply chain. Before we officially

commence and keeping in mind the simplicity and consistency approach we've preached throughout this report, the sole idea is not to bombard the reader with recommendations that promise the world, but only deliver a suburb. Our main focus, specifically with regards to the recommendations will revolve around viability and realism. Furthermore, the findings and recommendations will be made from a holistic perspective, taking both researched facilities into account. The idea is not to furnish Siphumlile Clinic and Rex Street Clinic with a long list of findings and recommendations, but rather to create general findings and recommendations that are applicable to both the clinics and potentially applicable to many other clinics within the South African border. Although the sky is the limit in terms of what can be done, we need to take into account what can be done, with what we as a country have. So let the games begin.

4.3 Bridging the divide by identifying general concerns

So here goes! Throughout this study we firstly focused on the theoretical supply chain (chapter 2) and on that basis we focused on the various perspectives of role player (chapter 3 and the three perspective approach). The three perspective approach identified certain perceived inefficiencies, be it from the various perspectives. Before we continue divulging the long awaited findings and recommendations, it important to firstly identify the perceived inefficiencies (per perspective) and secondly, identified inefficiencies common to all three perspectives and those remaining inefficiencies unique to the relevant perspective. Once again, simplicity is of the essence. So let's shoot the breeze and identify the perceived problems per perspective as conveyed in the three perspective analysis.

4.3.1 Patient perspective

One very useful exercise in the patient perspective analysis related to the identification of potential correlations in questions C4 to C14 which referred to the overall patient views and perceptions of the respective clinics.

These correlations mostly related to quality of care as well as the level of access to medicine, doctors as well as the facility layout (entering and exiting) itself. We can therefore illustrate the correlations as well as categorize the relevant correlations/inefficiencies into general categories which will assist in the creation of findings and recommendation.

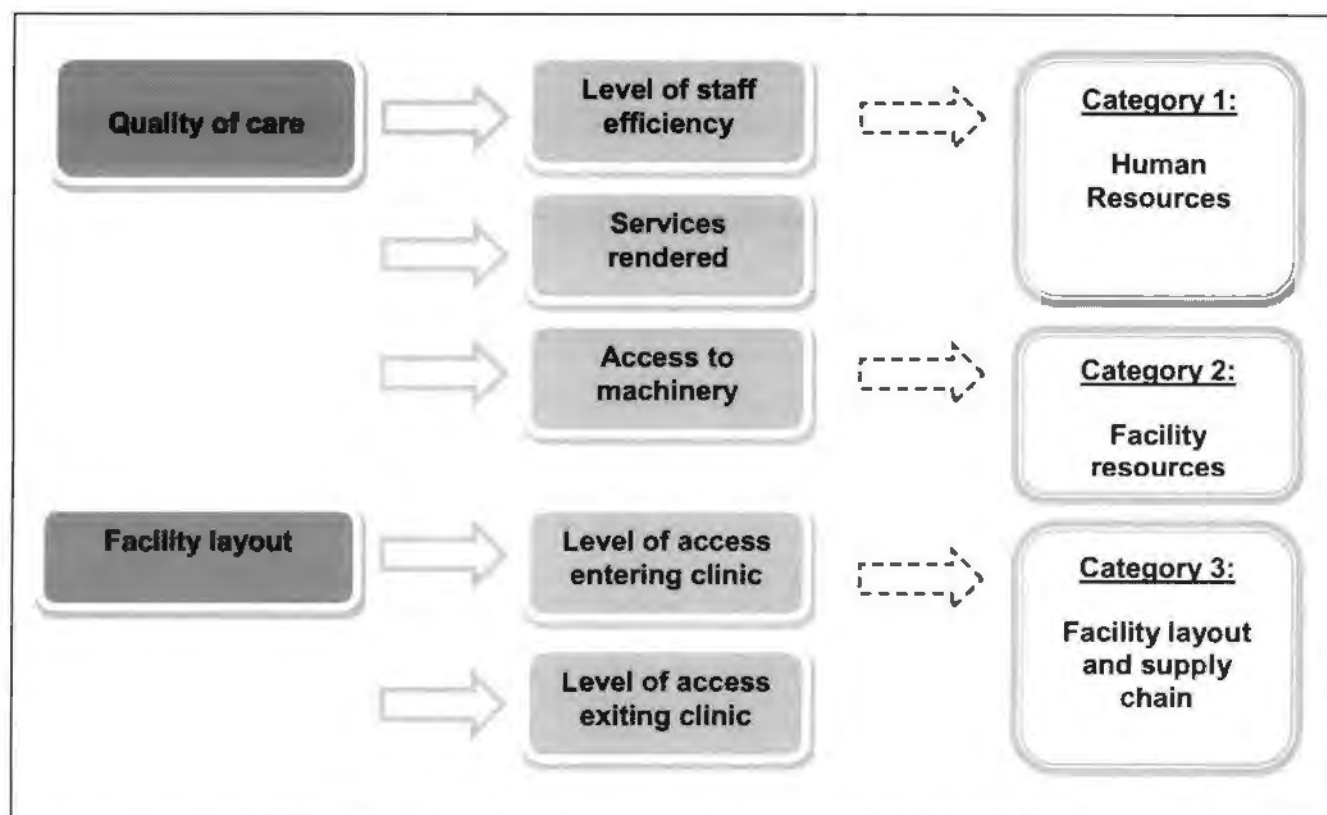


Figure 38 - Patient perspective perceived inefficiencies and generalisations

You might wonder why specific reference was not made to section A (demographical and personal information) and section B (visit information) of the questionnaire. The reason is quite simple: statistical information as summarized in table 19 is theoretically already included in the three main categories as illustrated in figure 38. For instance: 83% of respondents believed that clinics had inadequate facilities and equipment whilst 81.5% believed that the respective facilities availed of inadequate human resources. Both these statistics have therefore already been included in category 1 and 2 hence the reason that we did not make specific reference to these statistics. To add more substance to our generalization of categories, we will now move on to the second perspective of the three perspective analysis, namely the employee perspective.

4.3.2 Employee perspective

Just to keep you in the loop as well, the employee perspective related to semi structured interviews conducted with the staff of the two clinics. Again the same approach as illustrated in the preceding paragraph will be followed in the sense that we will aim to identify and generalize the perceived inadequacies. Well, what do you know? The generalized categories (figure 39) are also exactly the same as the categories stipulated in figure 38 (patient perspective).

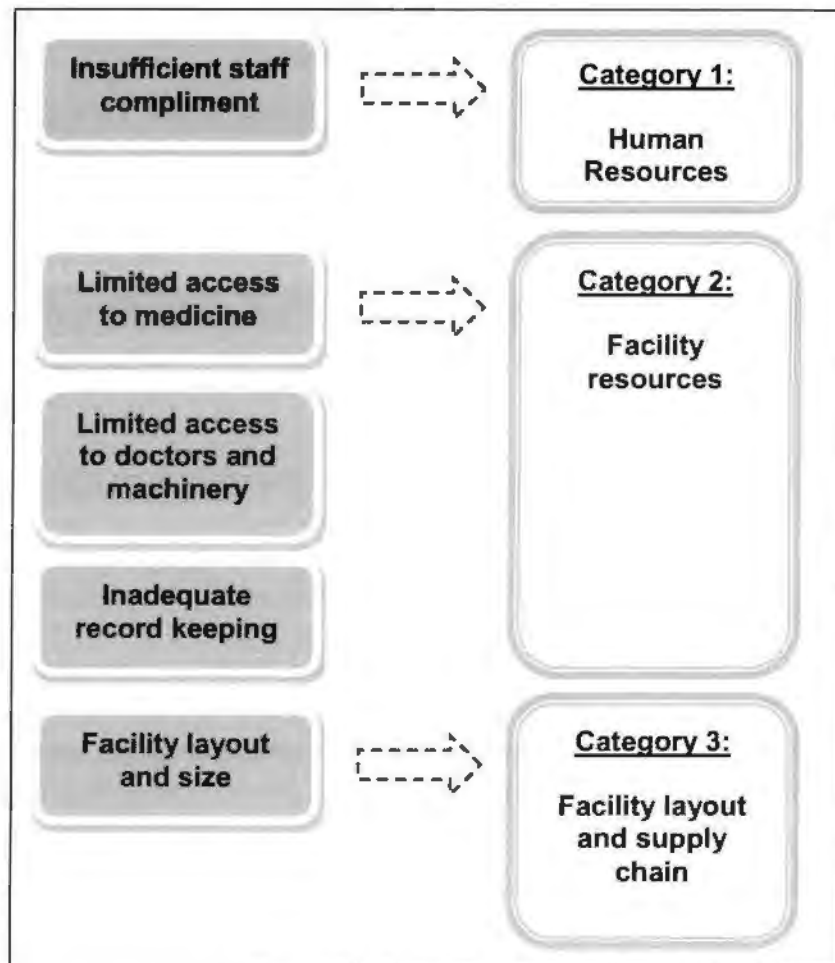


Figure 39 - Employee perspective perceived inefficiencies and generalisations

Judging by figure 39, it is as if we're experiencing dejavu. Again, the same generalizations of common categories make their appearance. It makes you wonder whether the third and final perspective, namely the researcher perspective will reap the same reward.

4.3.3 Researcher perspective

As you know, the researcher perspective related to participant observations conducted by the researcher himself. This concluded the three perspective analysis as the researcher was able to obtain a holistic view of the entire facility. The perceived inefficiencies as generalizations are illustrated as follows:

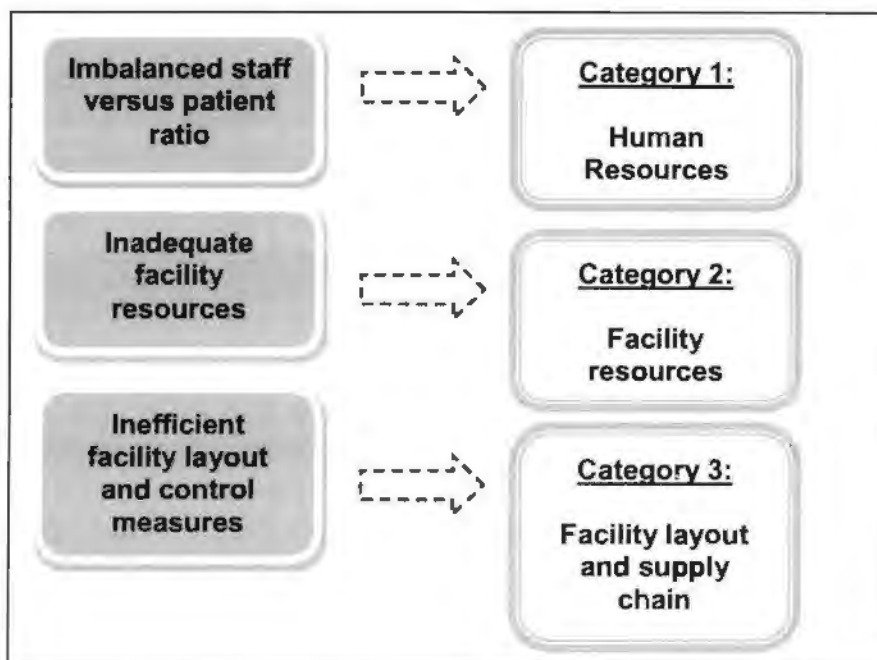


Figure 40 - Researcher perspective perceived inefficiencies and generalisations

And we have a winner, or be it, three winners. The three generalized categories will form the core component of the recommendations. As mentioned, our purpose is not to reinvent the wheel and also not to inundate the various persons reading this report with numerous (and some invalid) recommendations. Rome was not built in a day and we believe that the primary healthcare industry cannot be fixed in one day, hence the reason for the simplistic approach of focusing on three general perceived inefficiencies.

4.3.4 Conveying the findings and the recommendations

Simplicity is the name of the game and also the claim to fame! Throughout the report our main focus was on simplicity. The relevant findings and recommendations will be no different. The structure of the discussions from now on will therefore focus on 2 components. Firstly, the finding(s) which relates to the perceived inefficiency and secondly, the recommendation to resolve the issue at hand will be discussed respectively. There will be clearly differentiated between the mentioned two components by making use of the following formatted headings:

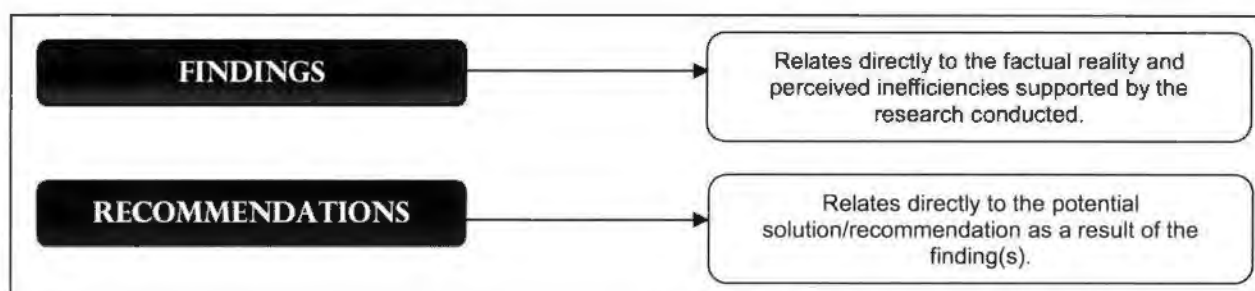


Figure 41 - Findings and recommendation icons

Now that we know how to identify the respective findings and recommendations that we will be discussing, we can proceed to actually focusing on the main generalized categories as identified earlier.

4.4 Recommendations and findings - Category 1: Human Resources

What went wrong? And why did it go wrong? Hopefully we will be able to identify the core reason for the perceived inefficiencies.

FINDINGS With reference to the various reports published by the Health Systems Trust (HST), the gross imbalance in terms of doctor/nurse versus patient ratio (40.80:1) is imminent when focusing on the clinics. In both Siphumlile's and Rex Street's case, a staff compliment of less than 10 enrolled nurses (respectively) were responsible for servicing more than 3000 patients. You do not have to have a degree to identify the problem. Too many patients, too few qualified medical professionals in the public primary healthcare industry. Why is that? One of the best and common known reasons relate to many medical professional applying their trade abroad (Health Systems Trust 2009). As for the healthcare professionals remaining in South Africa: most of them prefer to seek employment in the private healthcare industry as the general working environment and salary package is more attractive than in the public primary healthcare industry. Apart from the golden monetary carrot (money for those of you not catching my drift) present in private and international healthcare industries, what other factors relate to the diminishing number of healthcare professionals entering and remaining in the public healthcare industry? It's quite easy to identify the other factors simply by reverting to news and press publications. Exponential media publications relating to inadequate public healthcare repeats itself to infinity. We can acknowledge the fact that there's a generalized problem in the industry, but can we really quantify the effect this has on potential new (and young) citizens wanting to enter the public healthcare industry? It's nearly impossible to quantify the effect recent media publications have on potential new healthcare professionals. We can elude to one major and generalized intangible effect media reports have on young potential

entrants and that related to negative sentiment. In this day and age of unlimited access to information, many young individuals at the brink of selecting the direction of their potential further studies will think twice before selecting to become a healthcare professional due to the exuberant negative sentiment surround public healthcare. Those individuals entering the healthcare profession, the majority of them will seek either private employment or employment abroad. So, how do we not only keep medical healthcare professionals in South African, but also motivate them to remain in the public healthcare industry?

RECOMMENDATIONS

The recommendations are many, but are they viable? The most viable recommendation would relate to working environment. Efforts should be made to train and maintain qualified medical professionals. This can be done by implementing the following two initiatives:

1. Reintroduce training academies

In the years prior to the democratic election, many training academies existed that identified, trained and introduced medical professionals, specifically nurses to the primary healthcare industry. What changed since then? The training academies were consolidated to fewer facilities scattered along the boundaries of South Africa. This limited the entry of new personnel into the system (Moosa, 2011). Therefore, we propose that efforts should be made to attract young talent to enter the training academies. This can be done by the introduction of academic subsidies (the costs of academic institutions are exuberant) to support individuals with financial constraints as well as awareness campaigns focused specifically on attracting individuals and dampening the negative sentiment currently in the media. Furthermore, with the unemployment rate at a whopping 24% (Statistics South Africa, 2011), the potential is there to train new personnel and offer them the opportunity not only to earn an income, but to also make a difference in the lives of many.

2. Introduce incentives and review salary structures

The golden monetary carrot attracting medical professionals to seek their income abroad will always be there. Efforts should be made to create a remuneration structure that will enable healthcare professionals to seek employment domestically and remain in those positions on the long term. The focus should not solely be on increasing or bettering the gross salary of an individual, but rather on other components such as medical aid and housing subsidies as this can be deemed as a perk to being employed as a healthcare professional in the public healthcare industry.

4.5 Recommendations and findings - Category 2: Facility Resources

In line with the human resource constraint, the respective facilities also experience some resource constraints apart from human resources.

FINDINGS

One major finding was the fact that both clinics were small facilities responsible for providing medical care to exuberant numbers of patients. This had a ripple effect, not only on the human resources, but also on the tangible resources such as diagnostic equipment. It was identified that many of the diagnostic equipment was purchased, rolled out and never maintained (Tsotetsi, 2011). Reactively the respective clinics requested maintenance work to be commenced, but the required maintenance was never done or it took extremely long to be completed (Girekoe, 2011). The lack of sufficient diagnostic equipment will result in the inadequate diagnosis as confirmed by 64.50% of patients that have been misdiagnosed. A misdiagnosis will in turn result in the patient either returning to the clinic to seek additional/correctional medical treatment or short circuiting the entire point of entry system and going directly to a state hospital. The latter places additional and unneeded pressure on an already unstable infrastructure (Waters, 2009). Apart from diagnostic equipment, both clinics lack basic administrative equipments such as fax machines, printers and computers which haltered the administrative efficiency of the respective clinics.

RECOMMENDATIONS

The implementation of basic administrative resources will assist the various clinics in completing daily administrative tasks (such as patient reception and administration) more efficiently. Furthermore, efforts should be focused on dedicated maintenance resources that service all facility equipment in an efficient manner. This will ensure that equipment lasts longer and that fewer breakdowns are experienced. More accurate diagnoses will be made leading to fewer patients having to return to the clinic due to misdiagnoses.

4.6 Recommendations and findings - Category 3: Facility layout and supply chain

Our focus will now be shifted towards the actual supply chain and the layout of the facilities. Do you recall the consolidated theoretical supply chain based on Porter's generic supply chain? Well, we sincerely hope that you do. Two major activity categories can be found in Porter's supply chain, namely primary and secondary activities. Let's start off with the secondary, or rather support activities.

4.6.1 Secondary activities

Many of you might wonder why we commence our findings and recommendation from a secondary supportive activity perspective and not the primary supply chain activities as illustrated on the consolidated supply chain. The motivation behind this is simple: supportive activities relate to firm infrastructure, procurement and human resource management. These activities support the principle activities and provide the relevant secondary resources needed to facilitate efficient functioning. This means that secondary activity resources are present in all the primary activities (inbound logistics, operations and outbound logistics). To keep our approach simple, we will firstly discuss the findings and recommendations from a secondary activity perspective as this will support all primary activities we will discuss at a later stage in this report.

Firm infrastructure

FINDINGS

What do we know thus far? Both clinics service an exuberant amount of patients. Both clinics use a relatively small facility to conduct "business". Both clinics offer a wide range of medical assistance to a wide range of age groups. What is the net result of these aspects we mentioned? The end result is patients having to wait on average 2.5 hours before receiving medical assistance and 28% of patients having been turned away at some stage and requested to return on another day. What is the solution? Expansion and segmentation. These core concepts will now be discussed.

Expansion and segmentation

RECOMMENDATIONS

In both facilities we acknowledge a general problem in terms of facility size and capacity. Because the clinics offer a wide variety of medical assistance ranging from immunizations to chronic adult medicine and HIV treatment patient and employee alike share the same idea that the facility size is insufficient. The rule of thumb remain that medical assistance should be centralized and conducted from one location to ensure that patients receive the required medical assistance without going to several different geographical locations. The idea of expansion and segmentation can be easily illustrated.

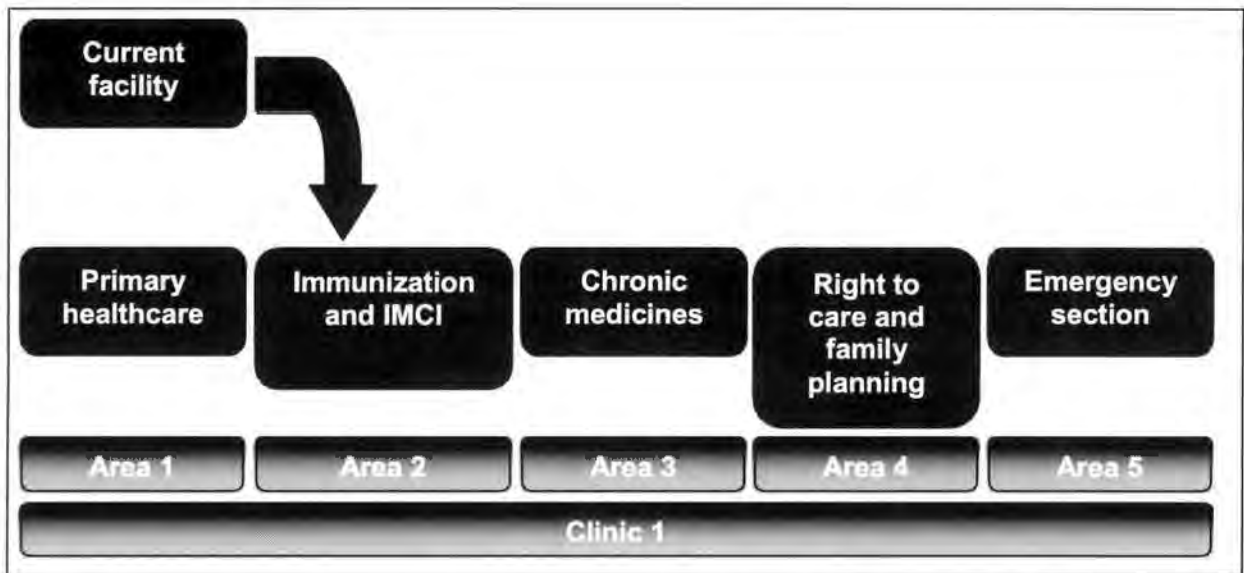


Figure 42 - Expansion and segmentation

The idea behind expansion and segmentation is therefore to expand the actual size of the facility to facilitate segmenting the services offered. This will in turn mean that certain areas/rooms/buildings will be allocated only to rendering a certain service rather than the existing situation where all patients arrive at **one** (small) premises to receive a wide range of medical assistance.

Let's take the primary healthcare segment (area 1 in the above illustration) as an example. The primary healthcare segment will therefore function independently from the other segments within the holistic facility. It will consist of its own reception area, its own staff, its own pharmacy and so forth.

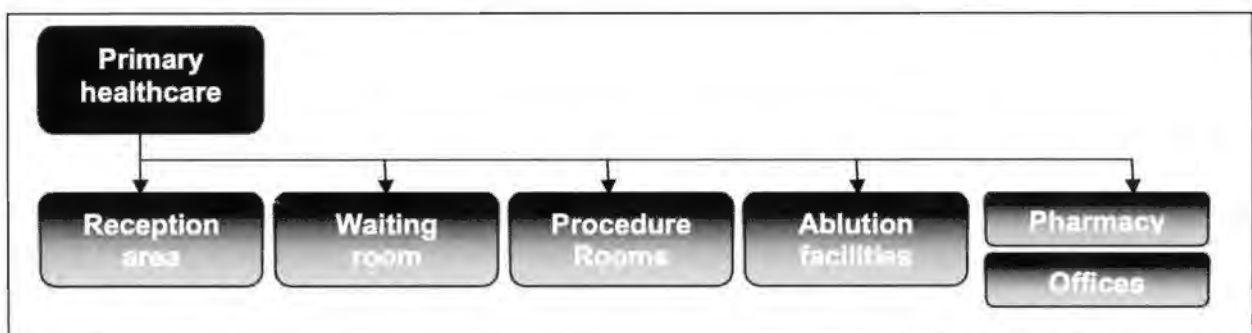


Figure 43 - Expansion and Segmentation

The reasoning behind this might result in an initial capital expenditure, but the overall efficiency of the entire primary healthcare supply chain will improve as the comprising segments within the facilities will be able to specialize in a specific treatment that will in turn result in the more efficient assistance of patients.

Procurement

FINDINGS

Adding fuel to the existing fire relating to segmentation, one major concern is the method of procuring actual goods/medicines as well as the management and sharing of information. At this stage, informational sharing and procurement of medicines/goods are done by using a legacy system that has been around for many centuries. This system is called paper. All procurement activities relating to the dispensing of medicines and sharing of information (specifically from a patient record perspective) is done via paper records. Not only does this carry a risk should anything happen to these records, but it also results in incremental costs as the paper expenditure will only increase.

RECOMMENDATIONS

The recommendation therefore relates to the introduction and enrollment of a unified clinic database and management system as illustrated in figure 44. All activities relating to patient records, dispensing of medicine and sharing of information will be linked to one general and centralized system. This will increase the overall efficiency of informational sharing and decrease the risk involved with legacy systems such as retaining information in hard copy/paper form.

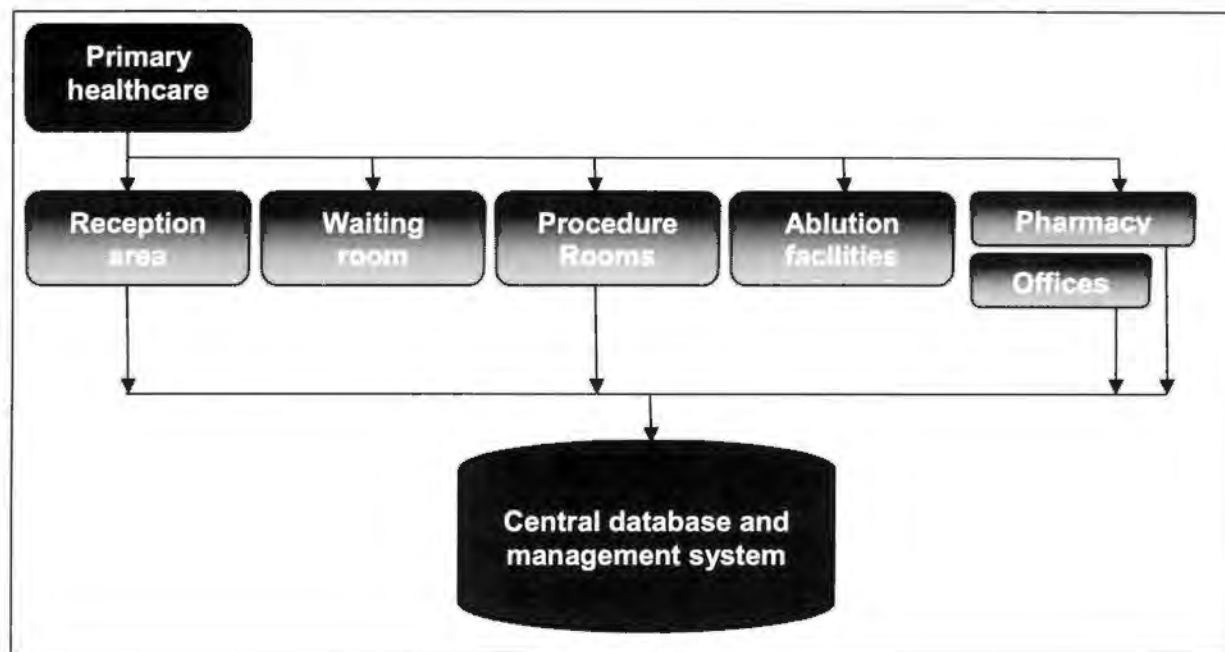


Figure 44 - Procurement structure

In layman's terms, all activities relating to information and flow of goods will be linked to on central database and management systems. And the same concept will apply to the other segments forming part of the facility. The respective segments as mentioned Figure 44 will therefore be linked via one central database and management system.

Human Resource Management

FINDINGS

As discussed earlier in category 1 of generalized perceived inefficiencies relating to human resources, we will aim to add a bit more substance to the argument as human resources also forms part of a supportive activity in Porter's supply chain. Thus, the final component in the secondary activity section of the supply chain will in reaction to the 2 preceding secondary activities (firm infrastructure and procurement). Due to the increase physical size of the facilities and the condition that a facility will be expanded and segmented, a higher human resource compliment will be required. This is also in line with the 81.5% of patients believing that the researched facilities comprise of inadequate human resources.

RECOMMENDATIONS

In line with interview conducted with employees, it's important to employ a full time doctor. At this day and age, doctors are quite scarce, but the staggering 35.5% of patients having been misdiagnosed at

some stage provide sufficient evidence that a full time doctor is needed per facility, or at least a roaming doctor allocated to several facilities. Please refer to category 1 of the generalized inefficiencies for additional information relating to human resource constraints.

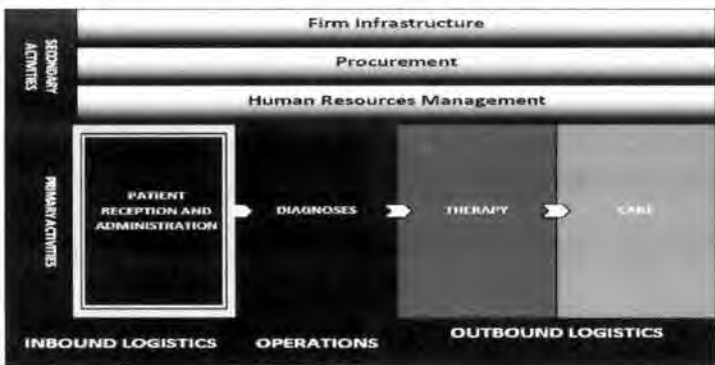
4.6.2 Primary activities

Now that the supportive activities included in the supply chain have been done and dusted, we can refer our focus to the primary supply chain activities. A more in depth analysis relating to the actual findings and recommendation relating to primary activities within the supply chain will commence in this section. Reasoning behind this is the fact that primary activities are daily activities that need to be fine tuned to ensure the efficient functioning of the entire supply chain. With the preceding discussion relating to secondary support activities, many of the activities such as expansion and segmentation is a once off activity that will support the primary activities for the foreseeable future. For example: the expansion of each facility to comprise out of independent segments will have a substantial capital expenditure at first when implemented, but will not be something that is repeated often due to the nature of the activity, whilst primary supply chain activities such as patient reception and so forth occur on a daily basis and should be managed consistently and effectively to ensure overall efficiency.

Inbound logistics

The first of three main components we'll be focusing on is inbound logistics. Just to refresh the memory, inbound logistics refers to the actual receipt and administration of patients. Activities are therefore focused on receiving patients and introducing them effectively into the clinic's facilities.

A) Patient reception and administration



FINDINGS

A few aspects we have realized thus far are the fact that both clinics deal with an exuberant amount of patients. It is therefore essential that these patients enter the facility

(and the primary healthcare industry) effectively and that information is managed in the most effective way possible. To assist with identifying the existing inefficiencies and make viable recommendations, we will consistently refer to the actual supply chain as illustrated in the

participant observation. By following this route, we will proactively identify actual inefficiencies and be able to recommend the most viable solution(s).

With reference to the actual supply chain as illustrated in the participant observation, one major finding relates to patient administration. In both facilities, patient administration was done by the implementation of a legacy system which in turn results in a negative ripple effect due to its time consuming nature. All patient files containing patient details, medical history and so forth are done on paper. In some instances, specific to Siphumlife Clinic, patients are allowed to take their personal patient files with them off site and return with the file at a later stage when they return to the clinic. Not only does this pose a big problem with regards to informational confidentiality, but also the inability to retain records and information should the information become irrecoverable.

Let's focus on the actual precession of the flow of information once a patient enters the facility. We will use figure 45 ("the actual supply chain") for easy reference. There are currently 3 bottle necks/inefficiencies (indicated with red circles) within the patient reception and administration component.

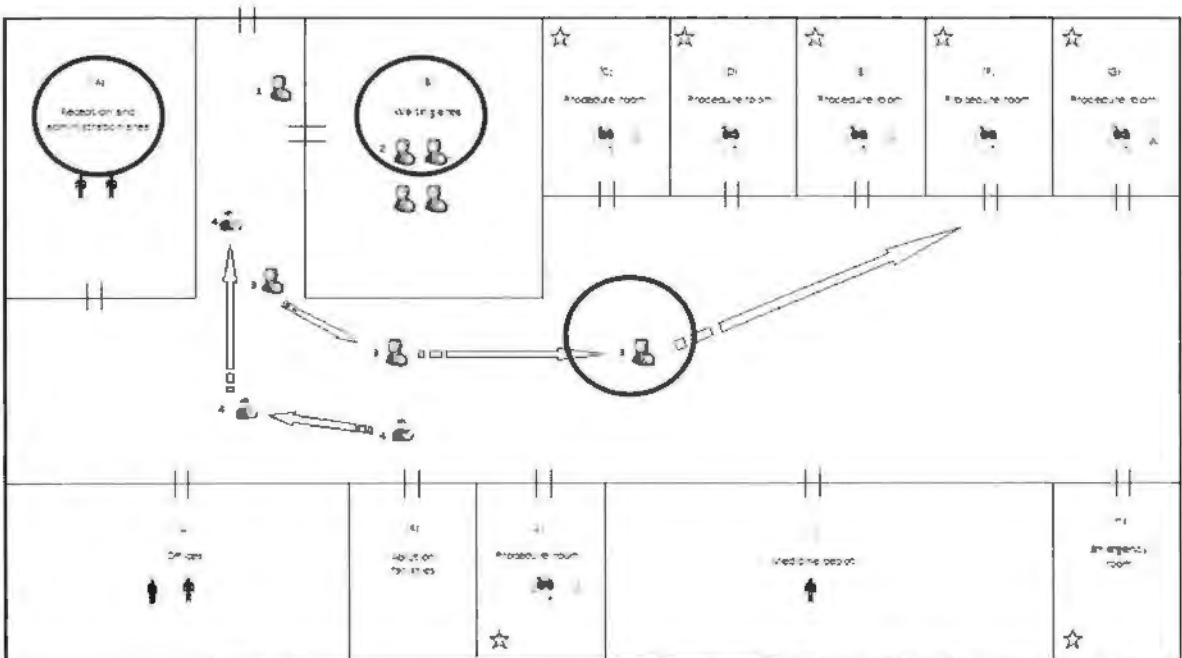


Figure 45 - The actual supply chain

The illustrated inefficiencies will be discussed in the table below to keep the findings versus recommendations arguments as simple and effective as possible.

INEFFICIENCY NAME	DESCRIPTION
Reception and administration	- Existing patients: Once an existing patient enters the facility his/her medical file should be obtained. Due to the current legacy system, human resources are allocated just to obtain the patient file from the patient file cabinet. This results in inefficient time usage as there's not automated electronic system to facilitate the acquisition of patient files - New patients: New patients are required to complete the patient information documentation that will result in the manual creation of a patient file. This process is time consuming and ineffective.
Waiting area	- Siphumile Clinic: Patients are seated in rows and once a certain number of patients have exited the premises of the facility (once they've receive medical assistance) the entire row will be requested to move into the second waiting area within the facility and just outside the relevant procedure room. This results in a vast amount of people in a very small confined area. To worsen the circumstance, many patients just enter yet another waiting area depending on the processing time of the procedure room.

Table 23 - Findings (Patient reception and administration)

So now you have the slightly bleak picture and reality of the patient reception and administration. What is the recommendation then to solve these perceived inefficiencies?

RECOMMENDATIONS

We touched earlier on the procurement activities mentioned in the procurement segment of the secondary support activities. The centralized database and management system will play an important role in the patient reception and administration activities. As mentioned and discussed in depth during the preceding literature review, the clinic central database comprises out of various modules. One of these modules is patient administration. The patient administration module includes all the information contained in the patient file, only difference is that the file is electronic. The process flow with regards to patient reception and administration by implementing a clinic central database can be illustrated as follows:

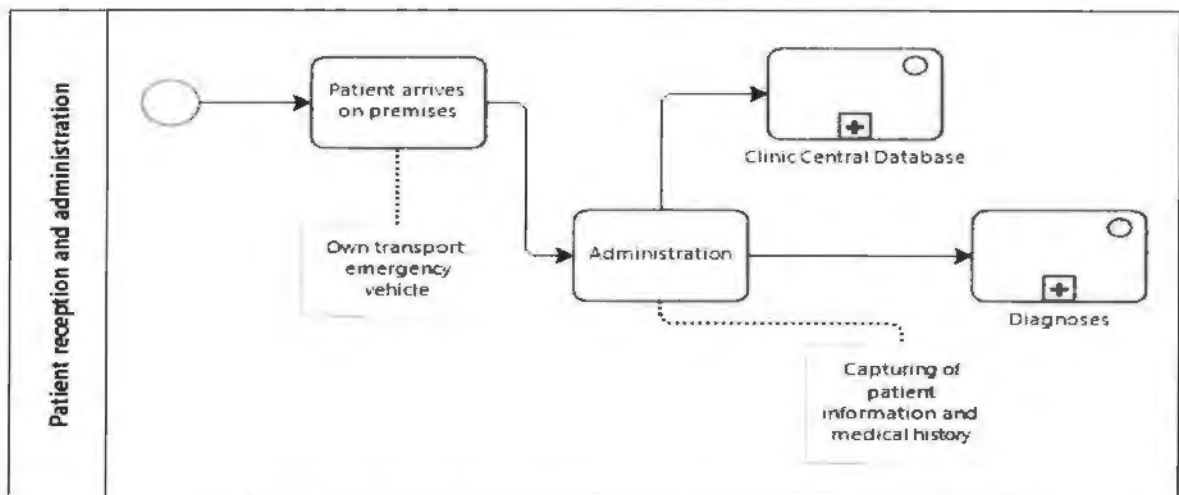


Figure 46 - Patient reception and administration

The illustrated process flow can be briefly discussed as follows:

Existing patients

- a. Patient arrives on premises of clinic and presents his/her proof of identification
- b. The patient's ID/passport number is entered into the system
- c. The system updates retrieves the patient file and contact information is confirmed and updated (if needed)
- d. The system allocates the patient to the next available procedure room
- e. The system then prints a visitation slip containing the bar coded patient details, allocated procedure room and sequential queuing number.
- f. The patient will now enter the waiting room and await the sequential number to appear on a dedicated screen prompting the patient to go to the allocated procedure room.

New patients

- a. Patient arrives at the premises and completes a new patient file containing all patient details.
- b. The information is entered into the clinic database and a new patient file is opened.

- c. The system allocates the patient to the next available procedure room
- d. The system then prints a visitation slip containing the bar coded patient details, allocated procedure room and sequential queuing number.
- e. The patient will now enter the waiting room and await the sequential number to appear on a dedicated screen prompting the patient to go to the allocated procedure room.

Not only will the clinic database and management system assist in the retention and accurate safekeeping of patient records, but it will also enable clinic management to track the overall efficiency of staff with reference to the processing time of the procedure room a staff member is allocated to.

Operations

The second segment of primary activities relate to the actual diagnoses of patients. Although the actual activity relates to the effectiveness of the diagnostic resource, in this case the enrolled nurse or doctor, the overall administrative process should be revised to ensure efficient throughput of patients through the relevant procedure rooms.

A) Diagnoses

As mentioned, the enrolled nurse or doctor plays an integral role in the diagnoses of patients.



FINDINGS

Fortunately, the quality of nurses is not the main issue at this stage as 71% of all patients included in the research believe that the nurses currently employed by the clinics are well trained. Although this

percentage can be improved by continuous training, it is also directly impacted by the current circumstance and patient to nurse ratios currently existing. Once component we should include in the diagnostic process is the actual diagnostic equipment. The majority of patients (83%) currently believe that the clinics have inadequate diagnostic resources. Again a ripple effect occurs where inadequate diagnosis will result in the inadequate therapy and care of a patient that will ultimately result in the patient not receiving the required medical assistance that will lead to him/her returning to the clinic for additional medical attention as 35.5% of patient indicated. In the current situation, diagnosis and dispensing of medicine is done in the

procedural room. This is not ideal as the enrolled nurse should not be responsible for the dispensing of medicine as well. The main focus therefore and in this case relates to the administrative components of the diagnostic process.

RECOMMENDATIONS

It is therefore recommended that each procedural room be well equipped with the relevant diagnostic equipment to facilitate an accurate diagnosis. The diagnostic process can be illustrated as follows and will be discussed briefly.

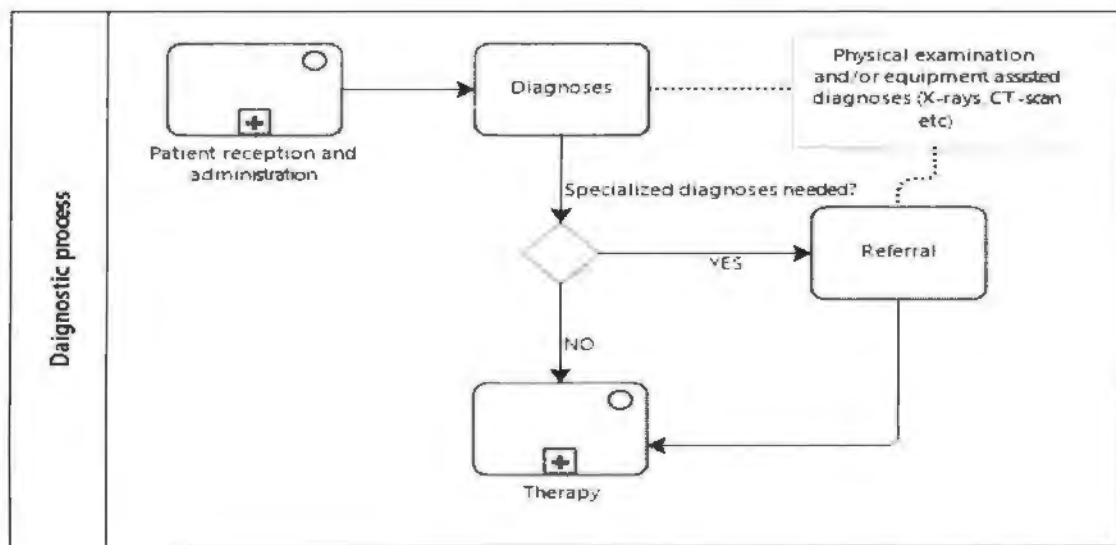


Figure 47 - Diagnostic Process

Diagnostic process

- Patient enters procedure room and presents the bar code printed patient slip (that was received in the patient reception and administration section).
- The bar code slip is scanned by a bar code reader and the patient file is retrieved and can be viewed by the enrolled nurse / doctor.
- The relevant diagnostic procedures are commenced by the implementation/support of diagnostic equipment.
- Once a diagnosis is made, the diagnosis is entered into the clinic central database and printed on the patient slip.

- e. The patient slip is returned to the patient and the patient exits the procedure room and proceeds to the pharmacy to commence the therapy activity. Simultaneously the queuing system is updated and the next patient number appears in the queuing screen in the waiting area prompting the next patient to enter the relevant procedural room.

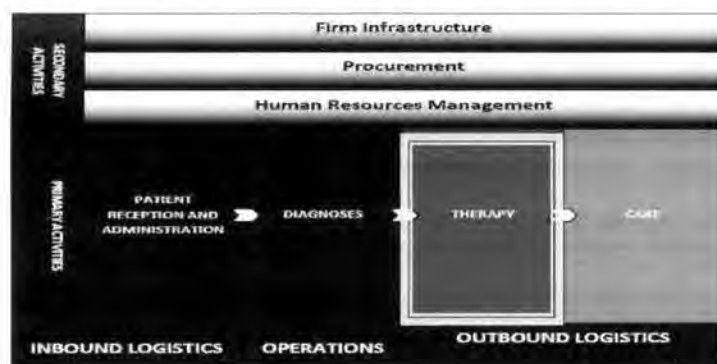
The mentioned automated system will assist in calculating patient throughput as well as the efficiency of the relevant human resource(s). Furthermore, the risk involved with dispensing medicine in the procedure room is reduced as nurses will no longer dispense medicine.

Outbound logistics

The last primary activity in the consolidated supply chain relates to the therapy and care components of primary healthcare. The findings and recommendations will now be discussed.

A) Therapy

The therapy component relates directly to the preceding diagnostic activity and is as of a result thereof.



FINDINGS

The actual findings relating to the distribution of medicine is concerning to say the least. Apart from the fact that enrolled nurses work under severe stress due to the exuberant

patient versus enrolled nurse ratio, nurses are also designated to dispense medicine. In addition to the dispensing of medicine, the records keeping of the dispensed medicine is in line with the existing patient reception and administration system. It's a legacy system that is managed on paper. Before we continue with the somewhat grim picture, let's focused on the actual supply chain firstly by referring to the illustration below and the perceived inefficiencies as indicated with the red circle.

Table 24 - Findings (Therapy inefficiencies)

INEFFICIENCY NAME	DESCRIPTION
Dispensing of medicine	Currently, enrolled nurses dispense medicine in accordance with the diagnoses made. A direct risk is immediately available as the enrolled nurse is now completing a function which he/she is not formally qualified for. Taking into account the existing burden on nurses with regards to patient versus enrolled nurses, the pressure on enrolled nurses will only

	increment leading to increased stress and potentially fatal mistakes.
Medicine dispensers	Each procedure room avails of a medicine dispenser that contains the relevant medicine that the enrolled nurse dispenses. Apart from the monetary risk involved with keeping medicines in an unsecured area, a more direct risk relates to the fact that these medicines are kept in close vicinity of ill patients that could increase the risk of transmitted diseases.
Replenishment of medicine dispensers and medicine depot	In line with the existing administration system, medicine dispensers are replenished via manual paper requests while the medicine depot stock register is completed (manually) when stock is received and/or dispensed to individual dispensers. It's important to note that the stock register is also a non electronic system that increases the risk of human errors.
Exiting of premises	Once a patient has left the procedure room with the dispensed medicine, he/she uses the same area/door that was used when entering the premises. This results in an inefficiency with regards to the usage of space and impacts the reception and administration process of patient entering the premises negatively.

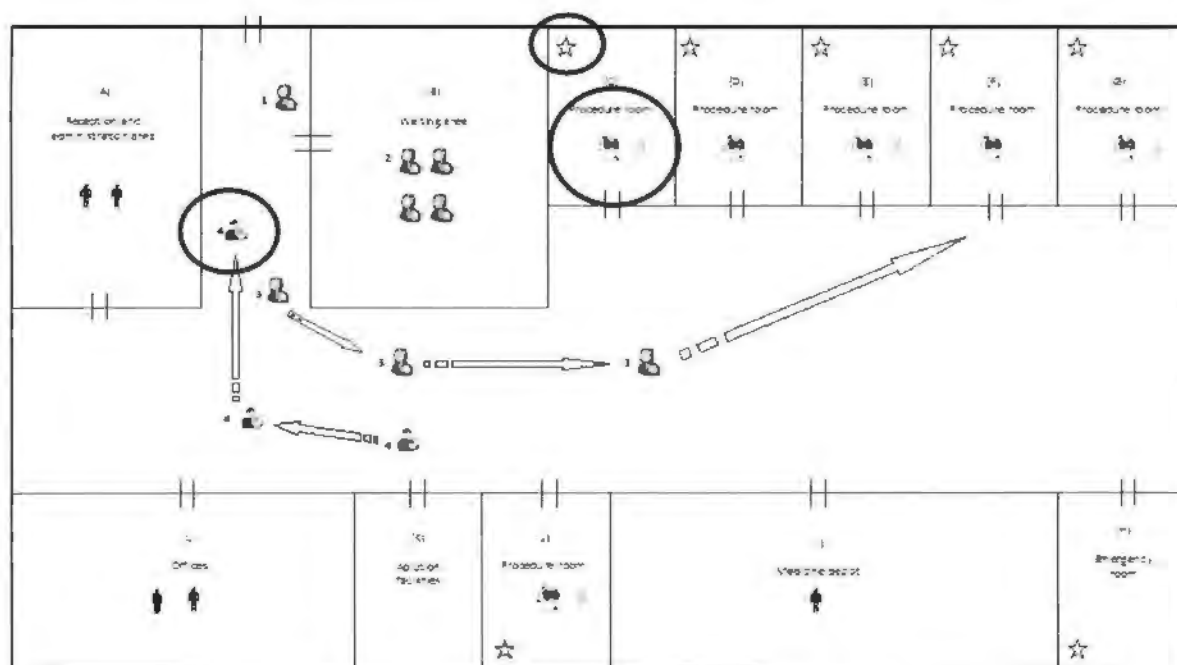


Figure 48 - The actual supply chain

RECOMMENDATIONS

Based on the information that was conveyed in the preceding paragraphs, it's quite easy to identify the risk as well as potential solutions. To ensure consistency, the potential solutions slots in perfectly with the proposed electronic clinic central database and management system. The essence of the potential solutions relates to the segmentation and specialization of the dispensing of medicine. Not only with this allow the various enrolled nurses and assistant nurses to focus solely on the treatment and diagnoses of the patient, but also reduce any risks involved with the dispensing of medicines. All medicine will be kept in a secure location and dispensed by a specialized human resource employed only to fulfill the role of dispensing medicine and retaining medicinal stock.

The recommended process can be briefly described as follows:

- Once the patient exists the procedure room in possession of his/her bar code printed patient slip he/she proceeds to the pharmacy.
- The pharmacist scans the patient slip to obtain the proposed course of therapy.
- The relevant medicine is dispensed to the patient, the clinic central database updated with the dispensing transaction and the patient exits the facility at a designated exit area. The flow of patient(s) and goods are therefore in one directly.
- From a stock management perspective, the integrated system maintains real time stock management to assist in the proactive replenishment of stock levels.

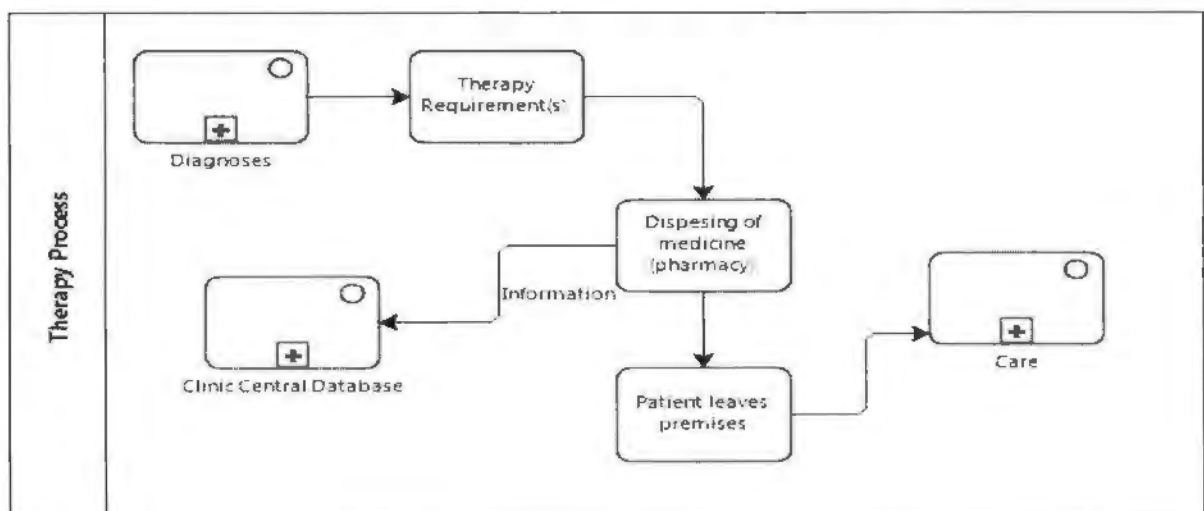


Figure 49 - Therapy process

4.6.3.2 Care



The final component of the primary activities included in the consolidated supply chain relates to the care activity. The care activity takes place after the relevant proposed course of therapy. Although it is not that important or well monitored with

regards to acute medical conditions, the core focus in this case will be with regards to the management of chronic diseases, immunization and HIV related activities. The 3 mentioned components (chronic diseases, immunization and HIV related activities) differ from acute conditions in the sense that the latter (acute conditions) are treated when it occurs/sporadically. For instance, when a patient has flu (an acute condition) he/she will visit the clinic for treatment. The relevant medicine is dispensed, administered and in a short period of time, the patient is healed from the illness. Therefore, the sole difference is that the treatment of an acute condition is not something that takes place on a consistent basis. The opposite applies to the consistent/continuous treatment of certain conditions such as blood pressure, diabetes and HIV Aids. Treatment of these conditions should take place on a consistent and regular basis to ensure that the conditions are monitored and under control.

FINDINGS

Theoretically, as mentioned above the treatment of chronic conditions should be monitored and treated throughout. Currently, this is not the case. For simplicity purposes we will focus on 3 conditions/occurrences that require continuous/regular treatment.

- Chronic diseases
 - Monthly medicine is dispensed to patients suffering from chronic diseases such as high blood pressure, diabetes and so forth.
 - At this stage, patients should remind themselves to revisit the clinic based on one component: the amount of chronic medicine remaining in their possession. This proves to be risky as many patients do not proactively make provision for revisiting the clinic to obtain the required medicines.

- Immunizations
 - One of the most important factors in any young adolescent's life is the regular and correct administering of immunizations to limit/remove the risk involved with adolescent illness.
- HIV Aids
 - The Right to Care campaign focuses on the efficient management of HIV positive patients as well as the distribution of anti-retroviral medicine.
 - At this stage, patients take it upon themselves to visit the clinic regularly and to ensure that anti-retroviral medicine is replenished.

RECOMMENDATIONS

When it comes to the conditions listed earlier, one major aspect arises, namely, control. The implementation of a unified clinic centralized database and management system will enable facilities to remind all patients of certain recurring events such as the replenishment of medicines. This could be done via SMS service to enable facilities to proactively manage chronic diseases and scheduled immunizations. Furthermore, clinics will be able to proactively allocate resources efficiently based on the predicted number of patients that will seek medical attention on a specific day or time period.

4.7 Chapter conclusion

Several viable recommendations were made based on the findings obtained in the empirical study. We will now proceed to the final conclusions of this report.

Chapter 5 – Conclusion

5.1 Introduction

We've come a long way and conveyed a substantial amount of information. Some information might've been deemed positively, whilst some of it might've been deemed negatively. Truth be told, reality is imperfect. And a lot of work remains to be done for an unstable system to be converted into a stable and efficiently functional system. It is important to recognize the fact that correcting the entire system is not something that can be done over night. Furthermore, any turnaround strategy takes time and will have the stock standard teething pains. But the fact of the matter is simple: there are operational and supply chain problems in the industry and a lot needs to be done to rectify these perceived inefficiencies. Fortunately, positive reviews pertaining to the strategic leadership provided by the Minister of Health, Dr Aaron Motsoaledi along with the availability and willingness of the South African government to invest funds in the public healthcare industry ultimately positions the industry in such a way that development and improvement is possible. As a result of the before mentioned, it's important to summarise and emphasize the various aspects that need to be prioritized in order to improve the entire system.

5.2 Aspects the Department of Health should focus on

The main goal of the concluding chapter of any form of research should be focused on recapping the information studied and the recommendations as stipulated in the recommendations and findings chapter. As a researcher and author of this study, my focus in this concluding chapter will not be on repeating the information, or be it, recommendations we've already conveyed in preceding chapters, but rather summarizing and confirming the main focus areas that require urgent analyses and improvement.

Building on the consistent emphasize of simplicity and the illustrated generic models as confirmed in previous chapters, the three main areas as diluted from the three perspective analysis used throughout the study can be confirmed/illustrated as follows:

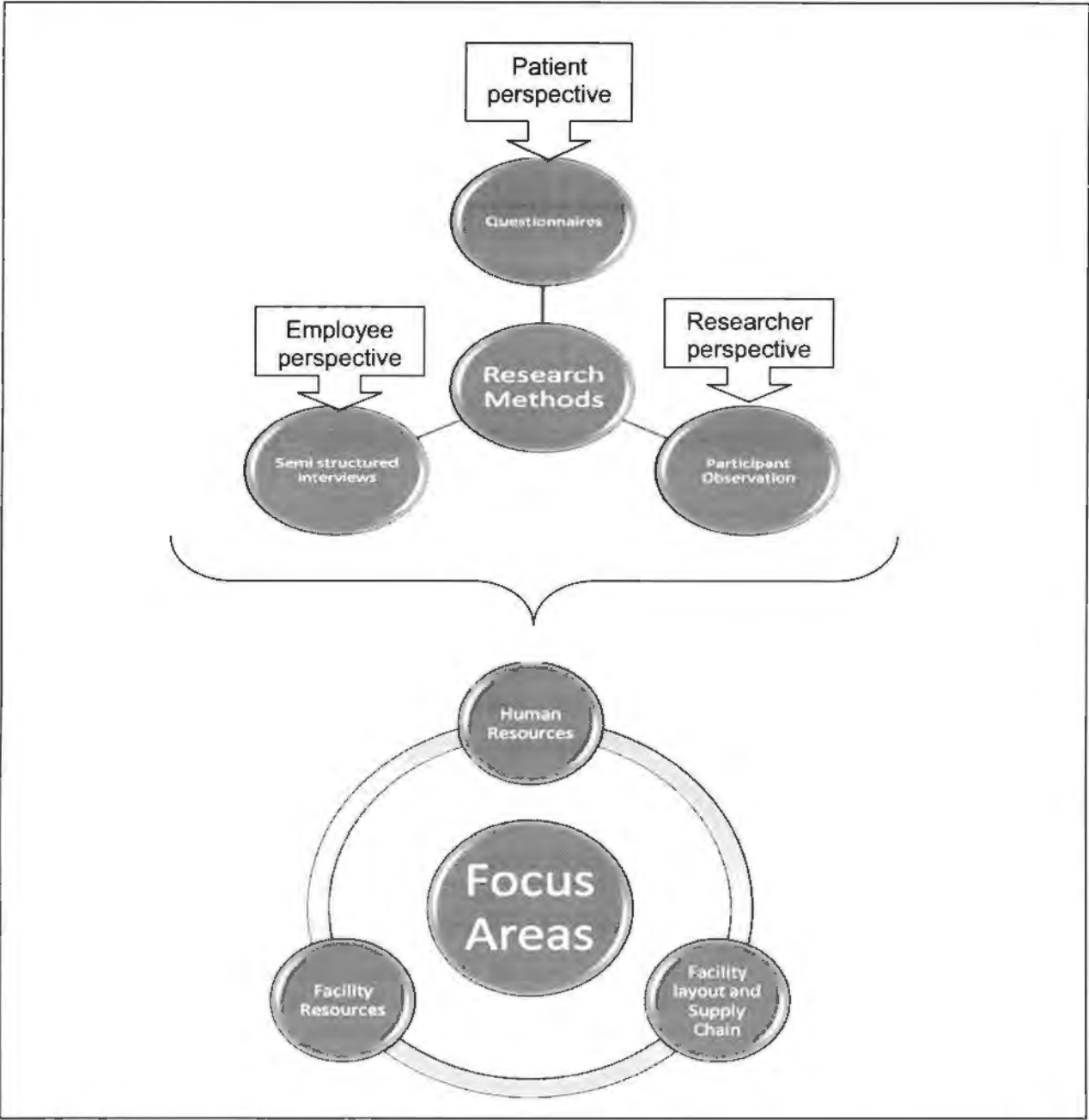


Figure 50 - Focus Areas based on Three Perspective Analysis

In our consistent effort not to become redundant or to repeat what has already been said, the illustrated focus areas can be elaborated upon in figure 51 which will ultimately furnish the reader with a concise summary and reconfirmation of the areas of concern within the public primary healthcare industry in South Africa.

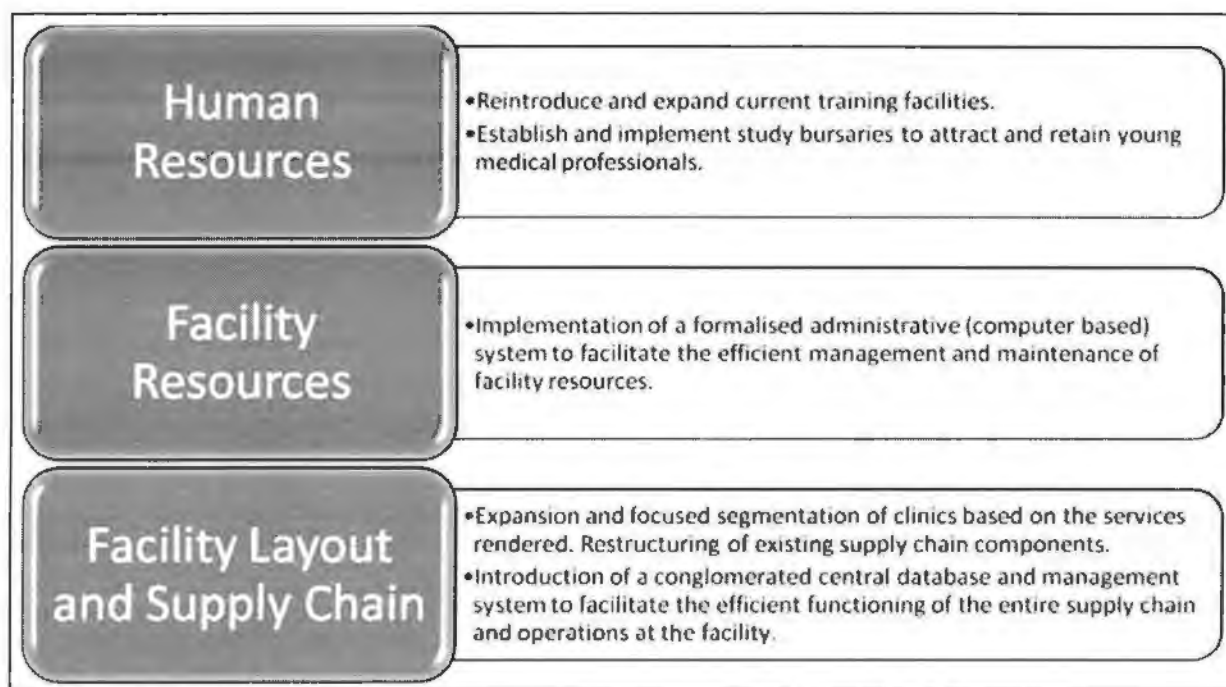


Figure 51 - Focus Areas that need to be addressed

One might look at figure 51 and assume that correcting these three major aspects is a task that will not require exuberant resources. You will however be incorrect if you make this assumption. Unfortunately, like most things in South Africa, things are a bit more complex as they seem at face value. Why, you might ask? In a country hampered by political ideals, hidden agendas and the “democratic obsession”, any leadership corps will find it difficult to prioritize the relevant areas of concern and the required resources to correct these aspects. Thus, as mentioned earlier, correcting the areas of concern and the entire public healthcare industry is not something that will happen overnight. More information relating to this statement will be divulged in the “researcher’s conclusion”. For now, let’s move on to the next segment focusing on whether we’ve accomplished the primary and secondary objectives of the study.

5.3 Have we met our primary and secondary objectives?

As mentioned in first chapter of this study, our quest was commenced by the identification of several primary and secondary objectives. Before we can conclude this report, it's important to evaluate whether these objectives were indeed reached.

PRIMARY OBJECTIVES	REACHED?
➤ Graphically illustrate and discuss the primary public healthcare supply chain from a theoretical perspective;	
➤ Graphically illustrate and discuss the primary public healthcare supply chain from an observed/functional/actual perspective;	
➤ Identify inefficiencies within the primary public healthcare supply chain by comparing the theoretical healthcare supply chain with the actual/practical supply chain existing within the primary healthcare industry.	
SECONDARY OBJECTIVES	REACHED?
➤ Make recommendations pertaining to the elimination of perceived inefficiencies within the supply chain;	
➤ Identify secondary/external factors that influence the existing primary healthcare supply chain negatively and make recommendations to eliminate these factors.	

Table 25 - Primary and secondary objectives

5.4 Researcher's conclusion

Although the public healthcare industry of South Africa has gone through ebbs and flows and much is still to be done in terms of improving the holistic system, reference should be made to the immense potential the industry has. Already progress has been made thanks to the strategic and visionary leadership lead by Dr Aaron Motsaledi, the Minister of Health. Visionary leadership, combined with passion as lived and breathed by nurses such as Hazel Moosa and Nthabiseng Tsotetsi will ultimately lead not only to an improved healthcare industry, but also an improved South Africa.

There are many glimmers of light in the dark and gloomy proverbial fish pond. Many positive and constructive reports of improvement. Unfortunately, to be realistic and utterly objective, we have to refer to the dark and gloomy components within the fish pond. These components will need to be overcome before any corrective implementation and sustainable advantage can be achieved. Without becoming too pragmatic or obtuse, deconstructive actions such as corruption,

mismanagement and hidden political ideals and agendas need to be eliminated within the ranks of Government. The part and parcel definition of democracy relates to representing the needs and requirements of the people that elected one in the position of authority. It is therefore of utmost importance that true and fair democracy, along with ethical and moral standards form the basis from which the industry and South Africa is managed.

That being said, much has been achieved thus far, but the road to achieving an optimum efficient primary healthcare supply chain is still long and winding. It is however important to remain consistent and constructive throughout the rebuilding and reengineering phases of the primary healthcare industry.

Although this report is just the tip of the iceberg, my personal hopes and aspirations not only as a researcher but also as a proudly South African citizen will be focused on improving and developing the primary healthcare industry that will in turn guarantee a better South Africa for each and everyone. Therefore, I will not lose hope but remain positive and focused. I sincerely hope, trust and pray that this report contributes to an improved South Africa.

Keep faith, keep focused and keep on doing what you do best. Nkosi sikelel' iafrika!

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Appendixes

Appendix 1 – Process Flow Components

ELEMENT	ELEMENT NAME	DEFINITION / DESCRIPTION
	Start of process	Element confirms the commencement of a specific process/activity.
	Conclusion of process	Element confirms the end of a specific process/activity.
	Task/Activity	The element depicts a comprising task/activity within the specific process.
	Condition	The element depicts a condition within a process that can either be TRUE ("Yes") or FALSE ("No").
	Activity flow	The element depicts the directional flow of activities/tasks and/or information.
 Therapy	Process	The element confirms a process consisting out of comprising elements in the form of tasks/activities, conditions and process flows.
	Task information	The element confirms additional information relating to a specific task/activity.