



UNIVERSITY OF NAIROBI
SCHOOL OF COMPUTING AND INFORMATICS
MSC INFORMATION SYSTEMS RESEARCH PROJECT

**TITLE: CHILD PROTECTION, SURVEILLANCE AND DECISION SUPPORT
MANAGEMENT INFORMATION SYSTEM (CPSMIS) FOR NAIROBI
CHILDREN'S HOME**

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**Research Project Submitted in Partial Fulfillment of the Requirement for the award of the
Degree of Master of Science in Information Systems**

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By

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Declaration

I certify that this Research Project is my original work and has not been submitted for award of a degree in any other university.

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This Research Project has been submitted as part fulfilment of requirements for the award of Master of Science in Information Systems at the University of Nairobi with my approval as the University Supervisor

Signed.....Date.....

Dr. Christopher Chepken

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ABSTRACT

Nairobi Children Home (NCH) is the only Government Institution that protects and takes care of vulnerable children and orphans below six years in Nairobi County. To begin with, the motivation of carrying out the research project at the Home was to establish how data is captured and how the information is used at the Home, by partners and stakeholders. The intention was to establish how ICTs can be used to enhance the management processes and information sharing. However, as the research work progressed, it was established that there are so many (actors) that relate and should relate with the home as far as child protection data is concerned. NCH acts as a rescue center for categories of children such as lost, abandoned, children of imprisoned mothers, abused among others. All the management processes are manual and from the research findings, there are a lot of challenges in terms of data and information sharing that include and not limited to; lots of raw data that retrieval is tedious, lots of child data that is undetected among the many actors, tracing of lost children takes a long time because of over relying on press releases among others. The methodological processes in this research project were qualitative, and from the findings, an Online Child Protection and Surveillance with Decision Support Management Information System (CPSMIS) was developed. The system can capture all reported child incidences and several reports based on the data are generated. The members of the public can access the system to report lost/found incidences as well as search for the same. Individual case follow-ups can be tracked for the life span at the home. Though the system was accepted by the users, it was evident a proper framework should be developed to assist in integrating other child protection information subsystems for national portrait of child protection data and information and to assist in the surveillance aspect. In conclusion, high quality data are needed on the prevalence of child protection problems as well as on the risk and protective factors that influence child protection outcomes. To achieve this it is important to acknowledge that a national child protection system comprises a package of laws, policies, regulations and services in all social sectors especially social welfare, education, health, security and justice and coordination of these multiple services, and of the different kinds and levels of institutional responsibilities, constitutes a key element for a systemic approach to child protection and care services.

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LIST OF ABBREVIATIONS

NCH	- Nairobi Children Home
UNICEF	- United Nations Children's Fund
ACRWC	- African Charter on the Rights and Welfare of the Child
CRC	- Convention of the Rights of the Child
NGO	- Non- Governmental Organization
DBMS	- Database Management System
CBO	- Community Based Organizations
MBMS	- Model Database Management System
DSS	- Decision Support System
DOVVSU	- Domestic Violence and Victim Support Units
NCRSRVT	- National Commission of Reception and Social Rehabilitation of Children Victims of Trafficking

CHAPTER ONE

1.0 INTRODUCTION

According to a UN study (2006) there are various threats to social systems relating to children in Kenya that include and not limited to poverty, recurrent drought, food insecurity, ill health, broken families, HIV and AIDS. These threats have their impacts on all social institutions, including the family, community structures and essential social services, education principal among them. The government through the Ministry of Labour, Social Security and Services acknowledges the importance of care and protection of vulnerable children and orphans and thus has a department whose core function is offering Children Services. The Department draws its mandate from the Children Act, 2001 of the Constitution of Kenya of 2010. This is an Act of Parliament that makes provision for parental responsibility, fostering, adoption, custody, maintenance, guardianship, care and protection of children; it also makes provision for the administration of children's institutions; gives effect to the principles of the Convention of the Rights of the Child (CRC) and the African Charter on the Rights and Welfare of the Child (ACRWC) and other related purposes. It provides for the leadership in co-ordination, supervision and provision of services towards promoting the rights and welfare of all children in Kenya. For the departmental head to achieve the above mentioned responsibilities, decisions and strategies that are supported by data have to be made and shared/communicated to the various stakeholders and partners for implementation. This research project aimed to connect research data through development of a functional Child Protection and Surveillance with Decision Support Management Information System (CPSMIS) and its potential for application at NCH to prevent adverse childhood experiences and their consequences through policy and program leadership, community development, and direct practice.

1.1 Problem Statement

The ACRWC and the CRC are the only international and regional human rights treaties that cover the whole spectrum of civil, political, economic, social and cultural rights of children. Some of the issues that ACRWC , CRC and Children's Act 2001 of Constitution of Kenya addresses are :the definition of a child, the rights of vulnerable children, harmful practices against the girl child, rights of children of imprisoned mothers, the African conception of communities' responsibilities and duties among others. Another key player in championing for

the rights of children is United Nations Children's Fund (UNICEF) which is a United Nations Program that works with governments and partners with focus to reach all children particularly the most vulnerable and disadvantaged. According to UNICEF's Global Strategy for Child Protection (2008), a good child protection and surveillance information system is not in itself an indicator of the level of child protection, but it is an indication of the place of children in a given society and in a country's policies. The Nairobi Children's Home (NCH) is the only government sponsored home in Nairobi County. It is the only Government Institution taking care of children in need of care and protection in their formative age i.e. 0-6 years. The NCH act as a rescue center for the following categories of children: Lost, abandoned, neglected, battered, orphaned, destitute, abused, children of terminally ill parents, children of imprisoned mothers, children with disputed parenthood and any other categories of children that require care and protection.

Several activities take place while the children are in custody of the Children's Home that include and not limited to; child guidance and counseling, home tracing and family reintegration , placement to other Charitable Children Organizations and referrals to hospital for medical care. Children's Court legally admits and exits the children from the home. From interviews with the Director Children Services, Nairobi County, Home Manager and the Deputy Home Manager, it was established that they have challenges related to information systems that include;

1. A lot of data but raw and manual which makes it difficult for retrieval and usage
2. There is disconnect of information flow to the various stakeholders and partners. Communication is through telephone calls, SMS, face to face, letters and memos, reports etc that sometimes lead to loss of important information on individual child case follow-ups.
3. The press release is done at an interval of once per two months for identification of lost and abandoned children. The press is not paid for this exercise. Thus not very effective since not all the media houses respond. Sometimes lost children take several years to be identified by their parents/guardians through the press release.
4. The naming of the children who have been abandoned or lost and don't know their names is haphazardly done.
5. The various stakeholders and partners are not making maximum use of the available data for decision making e.g. social-economic trends.

And therefore a Child Protection and Surveillance Management Information system could aid in improving data and information accessibility and making it usable for surveillance, evaluation, planning, programming and monitoring.

1.2 Project Objectives

The overall objective of this project was to review the current manual management processes, propose and develop a Child Protection and Surveillance Management Information System to support effective and efficient running of the Home. The specific objectives were;

1. To review the current management processes through data acquisition and
2. From the findings, develop, and test CPSMIS with a Decision Support Component.

1.3 Significance of the Research Project

Although children of high and low income families are born with similar abilities, high-income parents are increasingly investing more in their children. As a result, the gap between high and low income students in primary, secondary, college attendance and completion, and graduation rates is growing. In a time of rising inequality and low social mobility, improving the quality of and access to education has the potential to increase equality of opportunity for all Kenyans. Further, according to psychologists, individuals with poor family support, minimal contact with others, and limited involvement in community life are less likely to make healthy lifestyle choices and are more susceptible to early mortality and morbidity. The Director in the Department of Children Services is mandated to ensure the above mentioned categories of children are cared, protected and educated to mitigate the above psychologists' predictions and enjoy the benefits of education. In this regard, CPSMIS at the home will facilitate the stakeholders and partners to have information that is appropriate, consistent, reliable and relevant for informed decision making e.g.

- The lost, found and abandoned children are listed in a module that is proposed to be available for use at all the *Huduma Centers* (centralized core government services in every county headquarter). The search for such children will be accelerated at all the counties with the aim of reuniting/integrating with family members soonest time possible which is the main objective of the NCH.

- From the CPSMIS, various reports can be generated e.g. routine, exception, requested, special etc. for immediate decision making.
- Each child case can be tracked from the time of admission at the home until exit.
- Various stakeholders and partners are linked; data information flow and sharing enhanced.
- The data from the CPSMIS can be used as evidence for budgeting of government sponsored rescue centers, bursaries and tokens to the CCIs.
- Further, the enormous amount of data at Nairobi Children’s Home can be used for data mining with a view of analysis and interpretation for such data and for the extraction of interesting knowledge especially on social-economic trends and impacts in the country.

CHAPTER TWO

2.0 LITERATURE REVIEW

Management information systems (MIS) are distinct from other information systems in that they are used to analyze and facilitate strategic and operational activities. In this review the best definition of management information systems is established in relation to child protection information systems. Further MIS being people-oriented with an emphasis on service, the various subsections in this chapter explores on how it have been implemented in various countries inclusive of Kenya and its use in decision making regard to child protection and surveillance.

2.1 What is Management Information System (MIS)?

There are so many definitions of MIS. For the purpose of this research project, MIS can be defined as a system providing management with accurate and timely information necessary to facilitate the decision-making process and enable the organizations planning, control, and operational functions to be carried out effectively. MIS provide information that organizations require to analyze and facilitate strategic and operational activities. Examples of the broad scope and varied contexts of MISs are: Decision Support Systems, Enterprise Resource Planning (ERP), Supply Chain Management, Customer Relationship Management (CRM), Project Management, Executive Information Systems (EIS), among others.

2.2 Information as an Aid to Decision Making

Adebayo (2007) describes the process of decision making as comprising four steps: intelligence, design, choice, and review. The intelligence stage encompasses collection, classification, processing, and presentation of data relating to the organization and its environment. This is necessary to identify situations calling for decision. During the design stage, the decision maker outlines alternative solutions, each of which involves a set of actions to be taken. The data gathered during the intelligence stage are now used by statistical and other models to forecast possible outcomes for each alternative. Each alternative can also be examined for technological, behavioral, and economic feasibility. In the choice stage, the decision maker must select one of the alternatives that will best contribute to the goals of the organization. Past choices can be

subjected to review during implementation and monitoring to enable the manager to learn from mistakes. Information plays an important role in all four stages of the decision process. Figure 1 below indicates the information requirement at each stage, along with the functions performed at each stage and the feedback loops between stages.

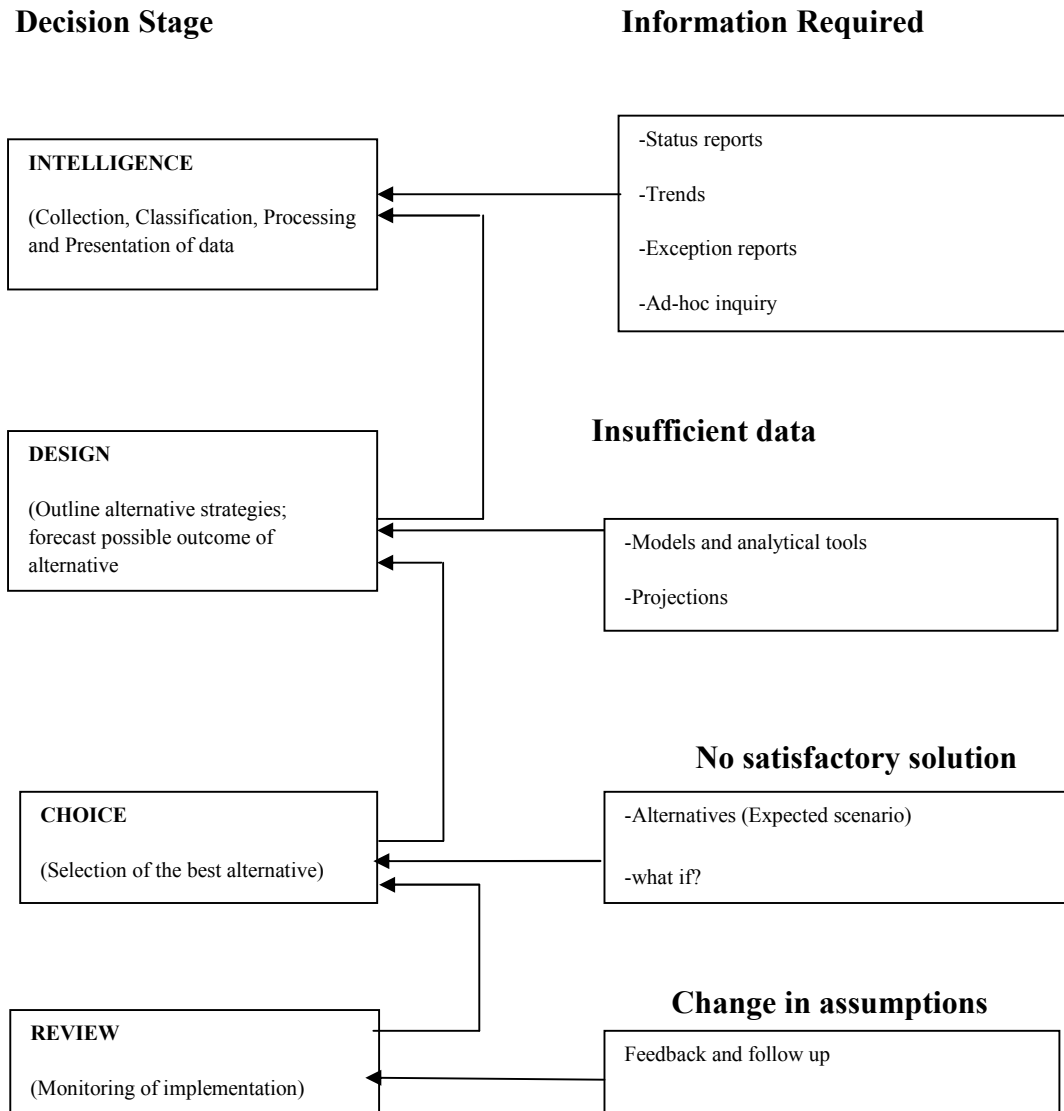


Figure 1: Role of Information in Decision Process according to Adebayo (2006)

2.3 Management Information Systems on Child Protection and Surveillance

The documentation and monitoring of vulnerable children are essential components in the development of effective prevention and protection policies. According to a UN Study (2006), States are responsible for improving data collection and information systems in order to identify vulnerable sub-groups, to influence policy and to measure progress in the prevention of violence against children. This view is also held by UNICEF (2008) and it recommends that it should be one of every Government strategic priorities. Information systems on child protection are necessary in order to clarify the magnitude, characteristics and trends of child protection problems, and are essential to appropriately allocate budgets and to design effective programs for preventing and responding to child protection concerns. High quality data are thus needed on the prevalence of child protection problems as well as on the risk and protective factors that influence child protection outcomes. Information on the functioning of a child protection information system and the children who are in contact with it is also essential. Such data are vital for monitoring and evaluating the effectiveness of ongoing interventions and services. These data include the following information:

- Characteristics of children in direct contact with the child protection information system, separable by categories such as age, sex, ethnicity, and other vulnerability factors;
- All placements of children outside the home, in institutions, and all forms of alternative care and detention;
- The outcomes of interventions; and
- The effectiveness of strategies and programs to prevent and respond to child protection problem.

A functional information system requires organizational and staff capacity for data collection and analysis. It also requires timely dissemination of information to those who can undertake effective prevention and response activities. In order to support evidence-based advocacy and decision making for the care and protection of children, as well as the possibility of measuring the impact of various interventions and being more results-oriented, there is a recognized need to develop a comprehensive information system on the child and family welfare. In other words, the higher -level function of management information system is to protect children from violence,

abuse, exploitation and neglect. Another example where a child protection information system is important is in the use of the data to estimate social and economic costs of child abuse and neglect that are difficult to calculate. Some costs are straightforward and directly related to maltreatment, such as hospital costs for medical treatment of injuries sustained as a result of physical abuse and foster care costs resulting from the removal of children when they cannot remain safely with their families. Other costs, less directly tied to the incidence of abuse, include lower academic achievement, adult criminality, and lifelong mental health problems. Both direct and indirect costs impact our society and economy and such data generated by a management information system is useful in cost estimation and measuring impacts. During the workshop UNICEF (2008) Child Protection Systems Components were identified as below;

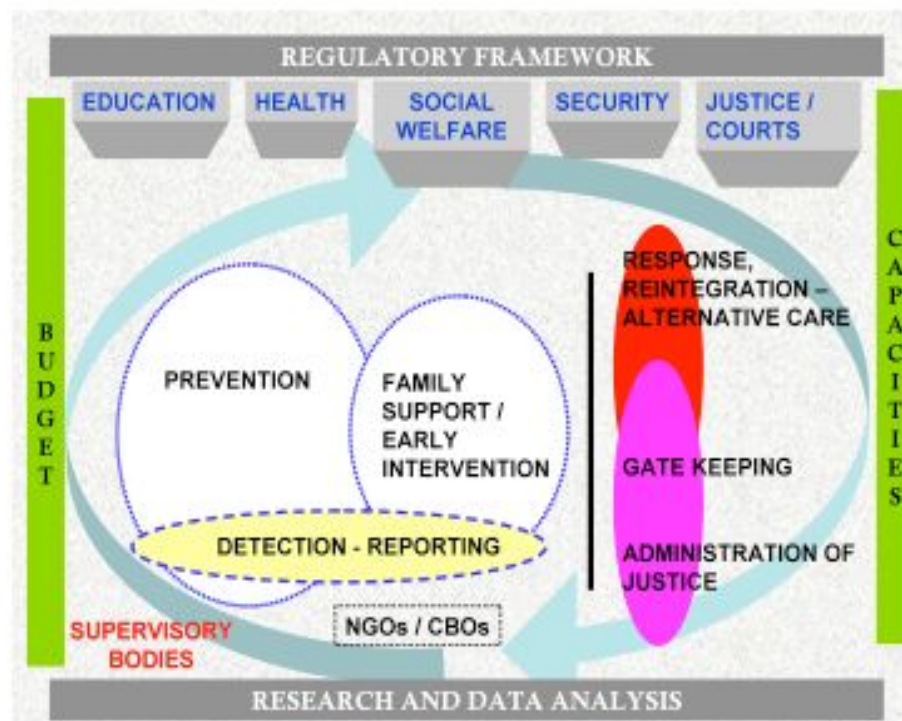


Figure 2: Child Protection Systems Components according to UNICEF (2008)

2.4 Similar Areas of Research

According to UNICEF (2009), a large number of initiatives have been undertaken by governments in West and Central Africa, with the support of UNICEF and other child protection partners, in order to improve information and monitoring related to child protection. In Sierra Leone, in the absence of a national system of data collection, the Ministry in charge of child protection (Ministry of Social Affairs, Gender and Children) uses different sources according to the protection theme: the Police Family Units for domestic violence and sexual violence, and the judiciary for children in conflict with the law. Benin, Chad, Côte d'Ivoire and Guinea launched a process to develop a permanent national system for routine monitoring and data management related to child protection. Benin and Guinea have made the most progress in this domain, while the other two countries are completing the stage of devising the institutional organization and tools for a national system that is not yet operational according to UNICEF (2010). The Domestic Violence and Victim Support Units (DOVVSU) in Ghana consist of a network of police units that respond to domestic violence and provide victim support. The current DOVVSU network consists of eleven regional units and 75 local units spread across the entire country. For Togo and Gambia an integrated monitoring and information management system has been set up in Togo. The system monitors child trafficking and coordinated by the National Commission of Reception and Social Rehabilitation of Children Victims of Trafficking (NCRSEVT), which relies on monitoring activities of neighborhood watch groups and public services (police, social services). Child protection information systems in Liberia and Niger, although very different in their organization and mechanisms, do share the common characteristic of flexibility, with the short-term objective being the organization of an information flow from existing information systems while waiting for the development of more elaborate information systems .

In Indonesia as per a Universitas Indonesia and UNICEF (2010) report, there is currently no lead actor for child protection at the national level, and neither is there a single system to collect child protection data. Each ministry gathers data relevant to its own policies and budgeting, with Bappenas acting as an overall coordinating body. There are no routine or regularly scheduled meetings or forums where information on child protection is systematically shared, reviewed, or analyzed. From the various surveys and reports, it can be concluded that the developing countries child information systems are in such a way that there is haphazard recording of cases, non-

systematic alerting of social services, and irregular circulation of information and as such all limit the effectiveness of these systems in terms of producing reliable information. For developed countries, more advanced and integrated Child Protection Information Systems exist e.g. USA. However these systems operate within the regulatory legal framework that is in these countries in conjunction with international laws.

2.5 Kenya Scenario on Child Protection and Surveillance Information System

Child protection ranking puts Kenya on top among African countries, showing that it has performed well in laying legal and policy foundations for the protection of children. Kenya has domesticated the Convention on Children's Rights and the African Charter on the Rights of the Child through the Children's Act. In the new Constitution of Kenya 2010, children have the right to a name and nationality, free and compulsory basic education, basic nutrition, shelter and health care. They also have a right to be protected from abuse, neglect, harmful cultural practices, violence, inhuman treatment and punishment, and hazardous or exploitative labour. The new law also gives them a right to parental care and protection, not to be detained, except as a measure of last resort, and when detained, to be held for the shortest appropriate period. The Department of Children's Services is the lead Government agency that coordinates and supervises services and facilities designed to advance the wellbeing of children and their families. The sections under this department are;

1. Family Care Services section- deals with adoption, foster care, guardianship and children in orphanages. Adopted and fostered children are protected against abuse or exploitation. NCH is under this section
2. The Institutional Care Services section - deals with remand and rehabilitation, and works with county commissioners to place children under proper care. It ensures that children in conflict with the law are remanded, rehabilitated and re-integrated. Together with the National Council for Children's Services, the section has defined guidelines for charitable children institutions.

The department also runs the cash transfer programme for orphaned and vulnerable children and has established a free child help line 116 – where Kenyans can report cases of child abuse or violence. However despite advances in the basic legal framework for child protection concerns, the existing legal structure does not provide a clear mandate for development of a comprehensive

child protection information system. As a result there is absence of regular consultations between different child protection services and the lack of a predefined framework of collecting, processing and managing information on vulnerable children. Information about individual cases remains localized in the original notes books or registers at the level of the service or institution in charge. The information collected is scattered and unsystematic and flows upwards in a vertical and compartmentalized fashion in the form of monthly, bi-annual or annual reports within the sector hierarchy. When the information is shared, it circulates sporadically and the availability of data is irregular. In most cases, the data that go to the central level are insufficiently disaggregated.

2.6 Decision Support Systems

Decision support systems are interactive, computer-based systems that aid users in judgment and access and retrieval functions with support for model building and model-based reasoning. They provide powerful tools for supporting complex decisions with techniques developed in information science, and are gaining an increased popularity in many domains. They are especially valuable in situations in which the amount of available information is prohibitive for the intuition of an unaided human decision maker and in which precision and optimality are of importance. Decision support systems aid human cognitive deficiencies by integrating various sources of information, providing intelligent access to relevant knowledge, aiding the process of structuring, and optimizing decisions.

One way to improve the quality of decisions is to decompose a decision problem into simpler components that are well defined and well understood. Studying a complex system built out of such components can be subsequently aided by a formal, theoretically sound technique. The process of decomposing and formalizing a problem is often called modeling. Modeling amounts to finding an abstract representation of a real-world system that simplifies and assumes as much as possible about the system, and while retaining the system's essential relationships, omits unnecessary detail. Building a model of a decision problem, as opposed to reasoning about a problem in a holistic way, allows for applying scientific knowledge that can be transferred across

problems and often across domains. It allows for analyzing, explaining, and arguing about a decision problem. There are three fundamental components of Decision Support Systems:

1. Database management system (DBMS),
2. Model-base management system (MBMS),
3. User interfaces

The Database management system serves as a data bank for the DSS. It stores large quantities of data that are relevant to the class of problems for which the DSS has been designed and provides logical data structures with which the users interact. A DBMS separates the users from the physical aspects of the database structure and processing. It should also be capable of informing the user of the types of data that are available and how to gain access to them. The purpose of the a Model-base management system (MBMS) is to transform data from the DBMS into information that is useful in decision making. Since many problems that the user of a DSS will cope with may be unstructured, the MBMS should also be capable of assisting the user in model building.

2.7 Literature Review Summary

In summary, data from a child protection management information system according to UNICEF (2008) may be used to:

- Trigger interventions to prevent neglect, abuse and exploitation of children;
- Measure trends over time;
- Measure risk factors for children to initiate prevention activities;
- Provide an evidence base for intervention programs and budget allocation during planning;
- Monitor effectiveness and evaluate the impact of prevention measures, intervention strategies, and policy changes;
- Identify high - risk groups or geographic areas to target interventions; and
- Measure progress in protecting children from key protection problems over time.

In Kenya there are a number of governmental, NGO, and other actors involved in child protection work. Most of the child information systems are manual and not centrally managed. A

national child protection system comprises a package of laws, policies, regulations and services in all social sectors – especially social welfare, education, health, security and justice – to support prevention and response to protection-related risks. The coordination of these multiple services, and of the different kinds and levels of institutional responsibilities, constitutes a key element for a systemic approach to protection, and relies as much on the existence of a system of routine reference as on information and monitoring system of situations and of protection services. Nairobi Children Home is one of the actors in child protection work. Its management processes are all manual and with the above identified challenges. Thus the need for a Child Protection and Surveillance with a Decision Support Management Information System (CPSMIS). CPSMIS can be defined as a subsystem of national child protection surveillance system that does not exist but it is recommended in this research project. From the research finding the organizational structure of the home and the key actors that interact frequently with the home is as shown on figure 3 next page;

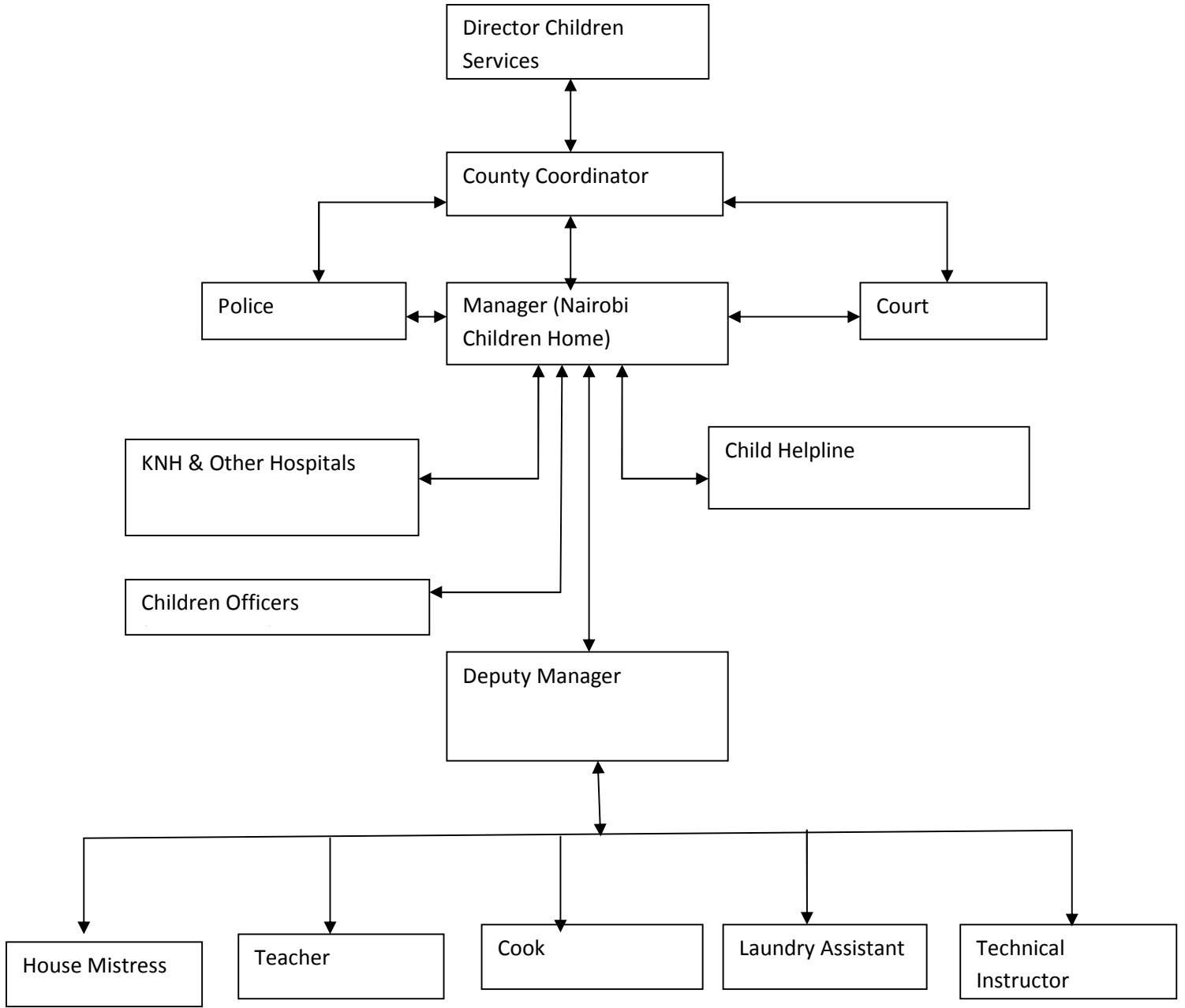


Figure 3: Organizational Structure of NCH with key partners and stakeholders

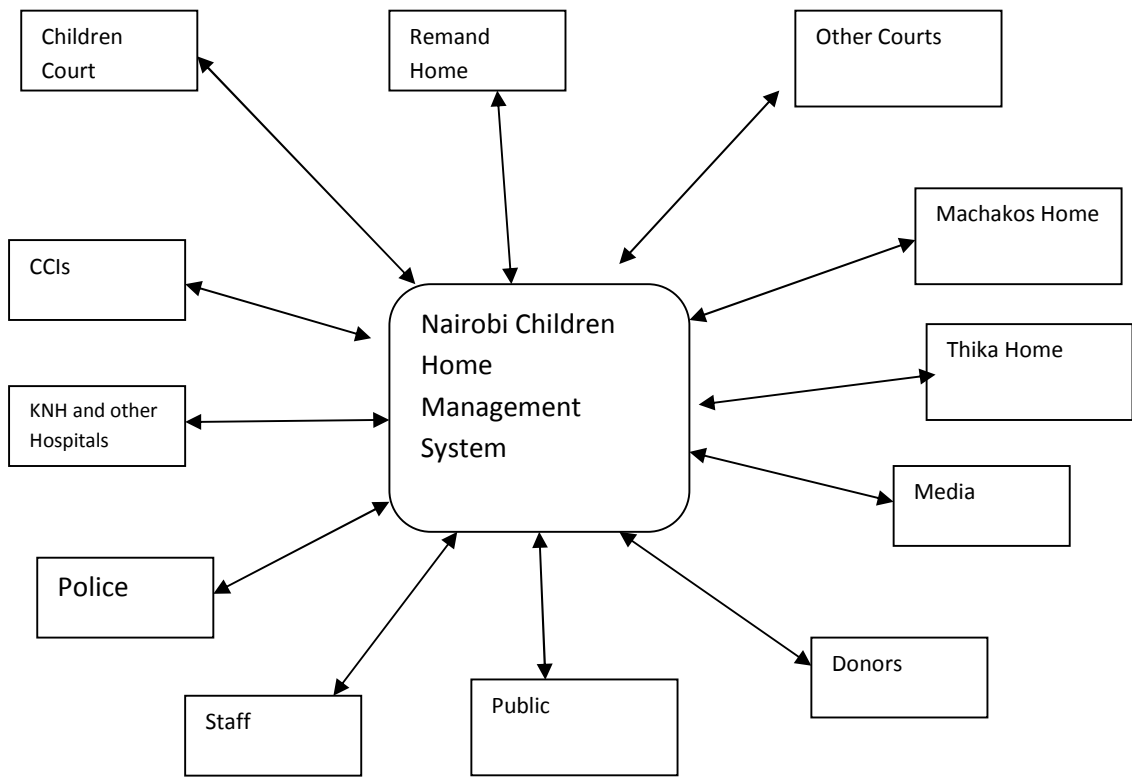


Figure 4: *The Conceptual Manual System model*

CHAPTER THREE

3.0 METHODOLOGY

The methodological process of the project was largely qualitative in nature. The data acquisition sources were;

- a) Internal sources – a desk review of existing written materials like files records, letters, reports containing information about existing system
- b) External sources - publications, use of a semi-structured interview tool (appendix 1) for personal interviews and interaction with key informants; focus with the Manager NCH, County Coordinator, Deputy Manager and
- c) Visits to NCH and the selected CCIs providing services for children.

3.1 Requirements Gathering

A case definition was established to guide the project: a CPSMIS is an integrated set of processes for the routine collection, analysis and interpretation of data used in the planning, implementation and evaluation of child protection programming at NCH. The internal sources reviewed consisted of Child Admission Daily Register, Case Conference Minutes, Individual Child Care Plan and Exit Strategy forms and reports , Family Group Decision Making Conference forms and reports, Donations Book and sample reports which included monthly population returns and health returns. The principal informants for this research project were the Manager NCH, County Coordinator Children Services Nairobi , Deputy Manager, Manager Tumaini Children Home and Manager Nyumbani Children Home. They were considered since they interact with the Home mostly on daily basis except the Managers of Tumaini and Nyumbani. They are also involved in the management of the Home and participate in making of key decisions pertaining to the Home. The Managers of Tumaini and Nyumbani were selected to represent CCIs to inform on how the management system at the Home interacts with CCIs. CCIs also are of different categories depending on the type of category of children they admit under their custody and this information was used in system analysis and development. The semi-structured tool (appendix1) assisted in carrying out situation analysis at the home as pertains to child protection data and ICT.

The main identified activities of the home that required keen review and observation were ; child registration and admission, individual child care plan and exit strategy, reintegration process, family group decision making conference incase reintegration requires intervention of several parties related to the child, placement to CCIs and referrals to other institutions .

3.2 System Analysis and Design

The user requirements were obtained through semi-structured interview tool (appendix1), face to face interview with the key informants and reviewing of existing documents. Structured data analysis method was used. The flow of information within NHC was analyzed using data flow diagrams. The findings helped in designing and developing the overall system as below;

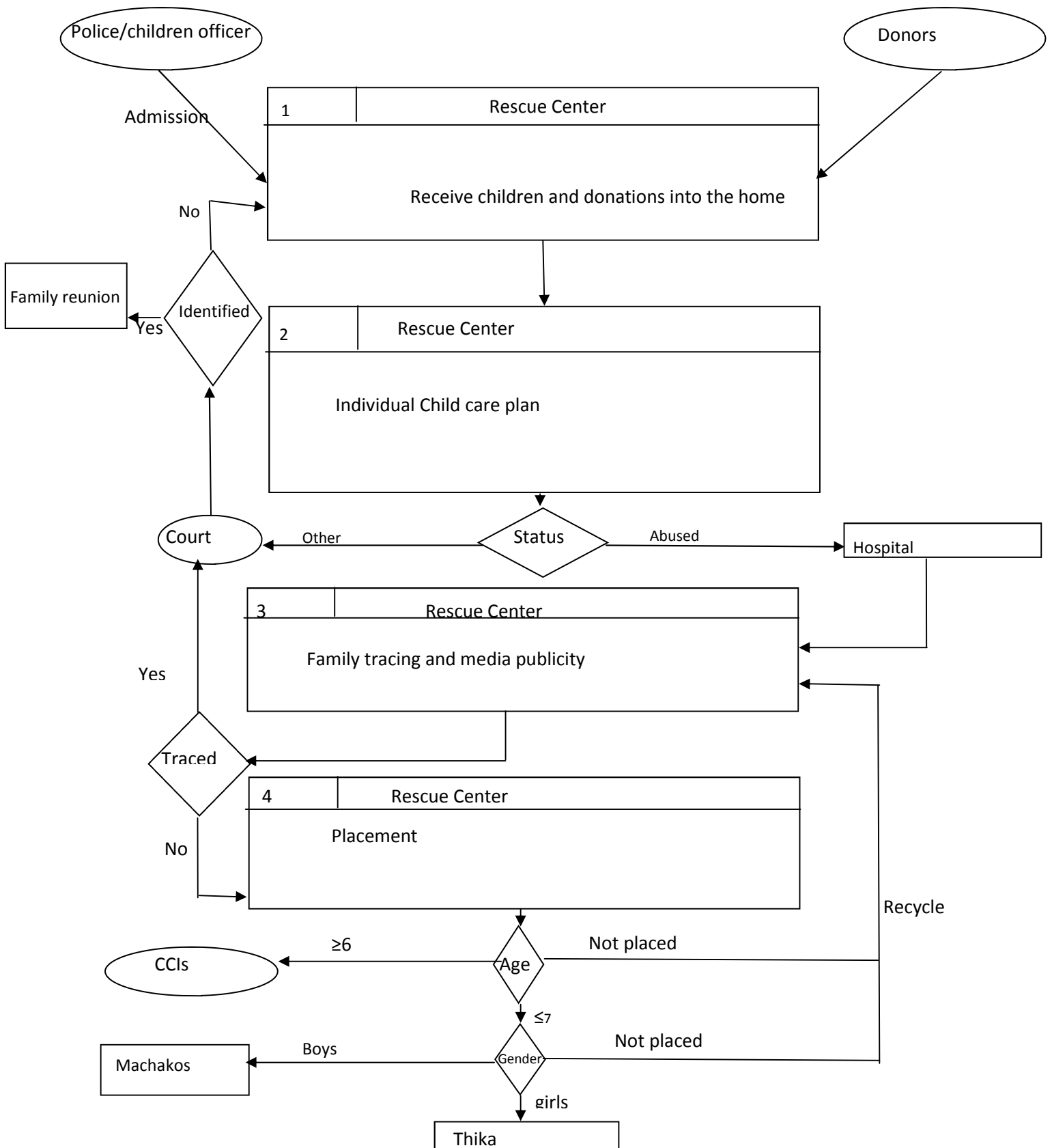


Figure 5: Overall System Design Model

3.21 Data Flow Diagrams

The Data Flow Diagrams below shows what kind of information that will be input to and output from the system and where the data will come from and go to.

3.211 Level -0 DFD

At level -0 DFD it shows the inputs and outputs of the system and makes the boundaries clear. A user or a concerned parent queries or reports as incidence to the system to find a solution i.e. whether his/her child is already in the center.

For reporting, an alert is sent to the system administrator for verifications hence authorization, thereafter an alert is sent to a CCI to which the reported incidence category it subscribes to.

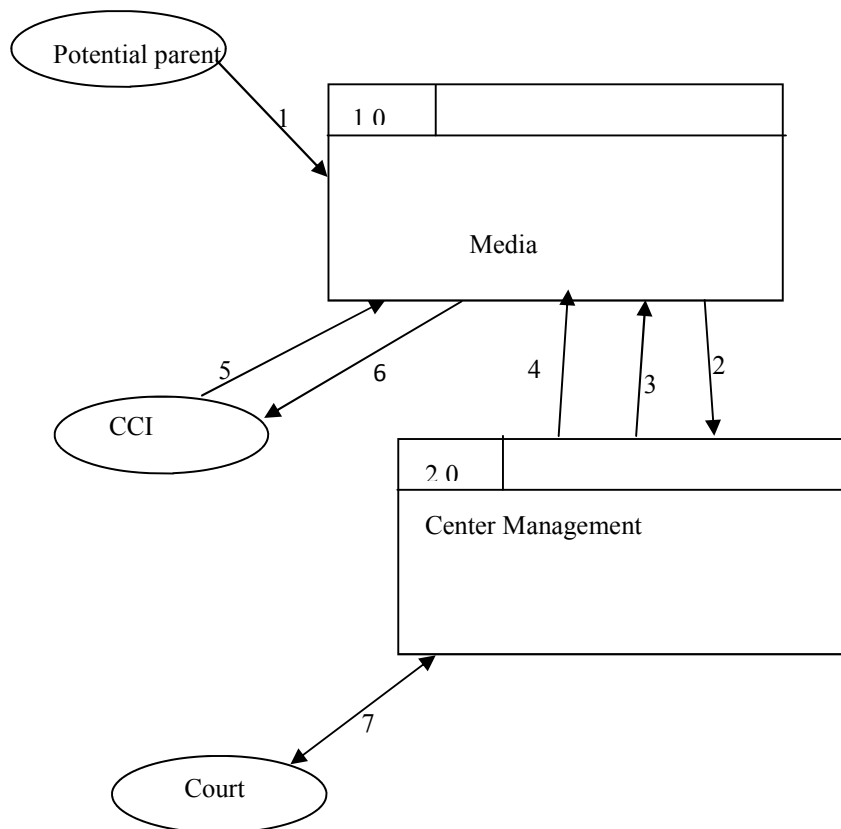


Figure 6: Level -0 DFD

Flow	Data	Document
1	Search query/incidence reporting	N/A
2	Search query/incidence reporting	N/A
3	Query response	Query list
4	Incidence reporting authentication	N/A
5	Subscription alert	Subscription list
6	Subscription follow-up	N/A
7	Legal entity	Court admission document

3.212 LEVEL -1 DFD

At Level- 1 DFD the process above labeled as ‘center management’ is analyzed in more details, and the data flows between the separate children protection actors.

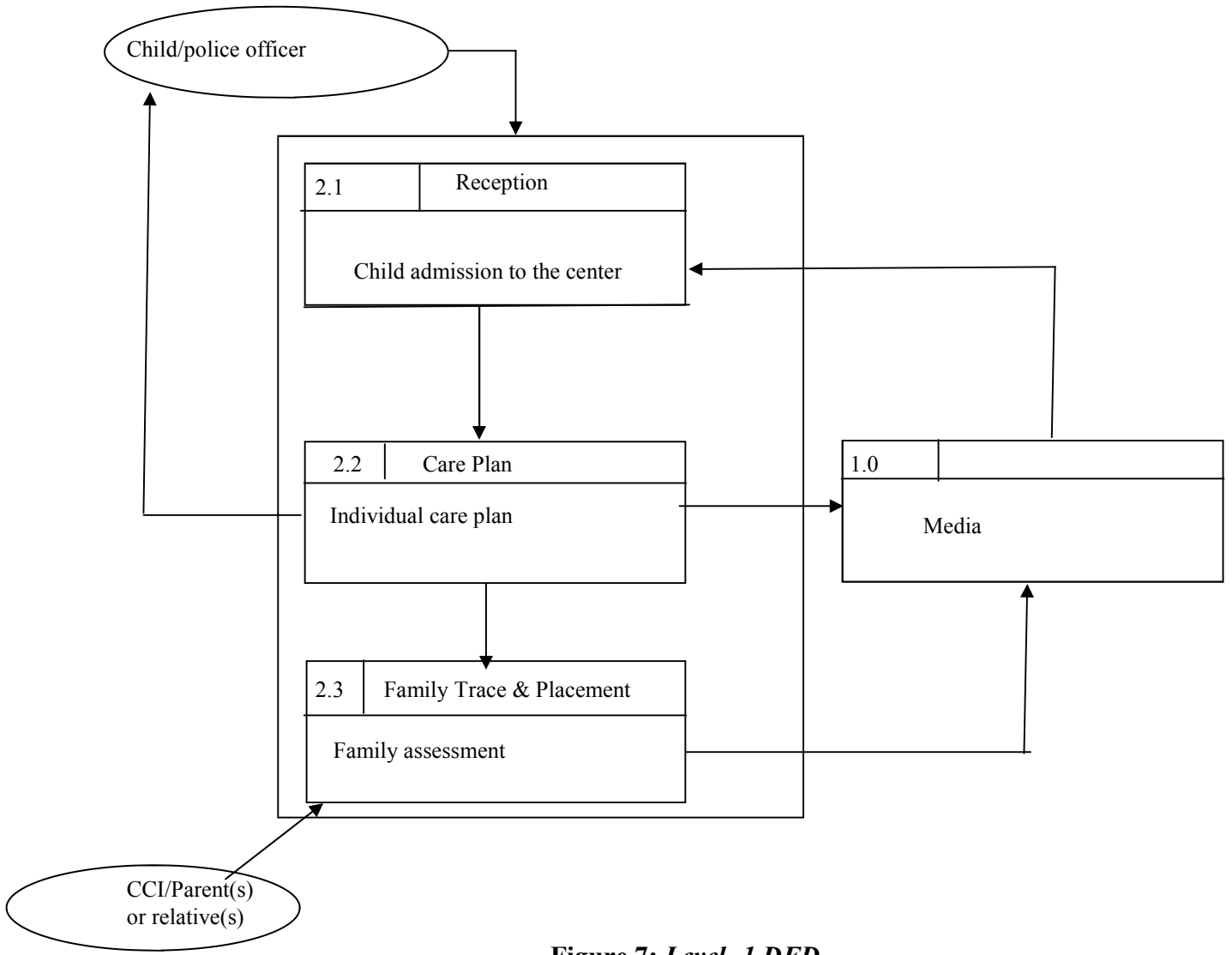


Figure 7: Level -1 DFD

Flow	Activity	Document
1	Incidence reporting	Child list
2	Media publicity	Child list
3	Child care plan	Care plan form
4	Child bio	Child list
5	Media comments	
6	Family tracing	Family tracing form
7	Assessment reports	Reports

3.213 Level -2 DFD

Level-2 DFD is for each of the reception, child care plan and placement subsystems.

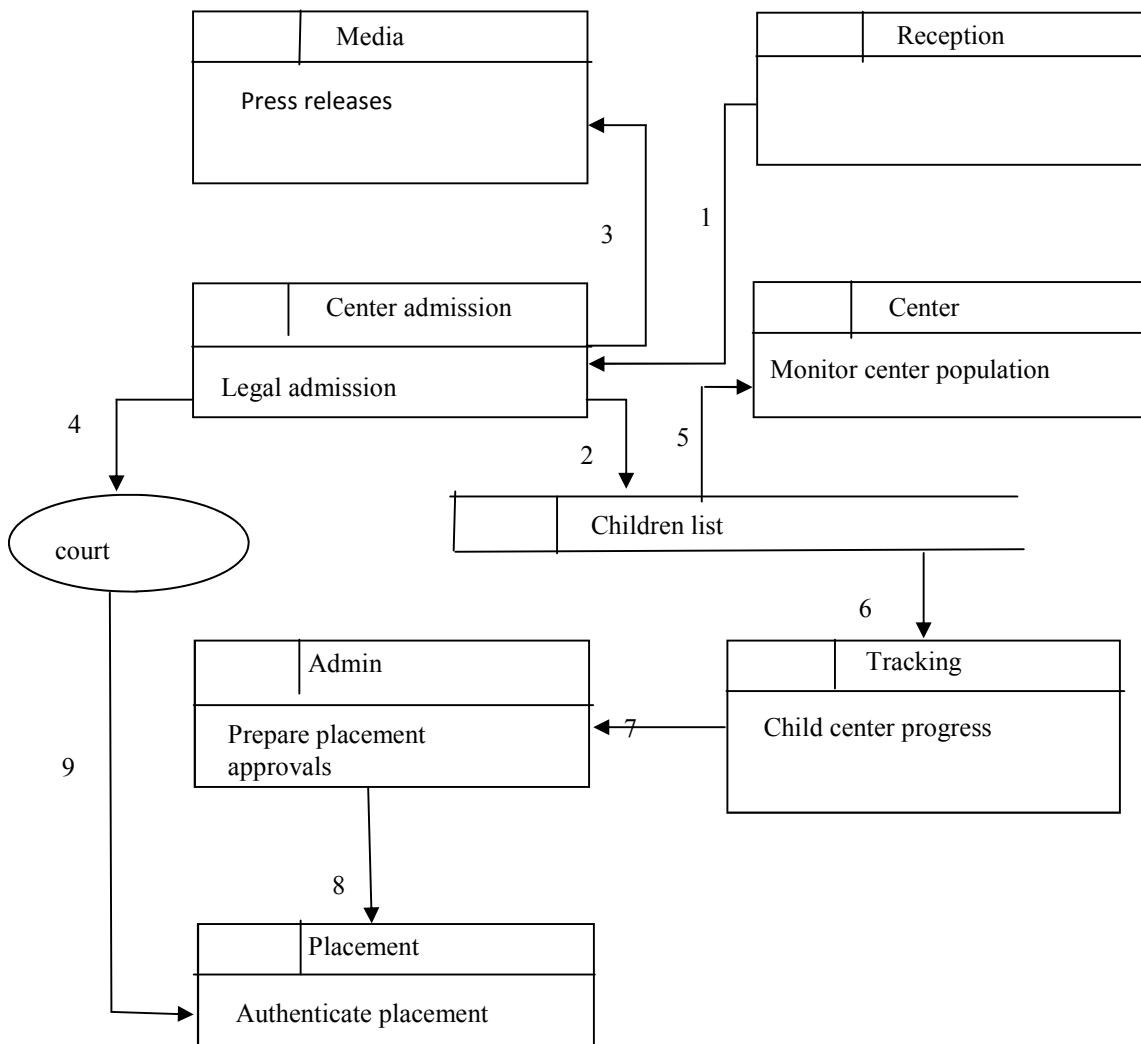


Figure 8: Level -2 DFD

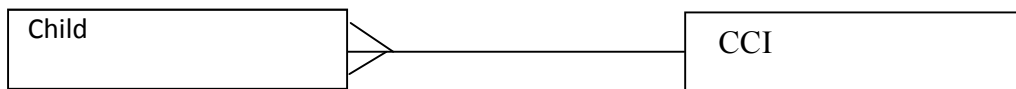
Flows	Activity	Documents
1	Incidence reporting	N/A
2	Database absorption	N/A
3	Media publicity	Child list
4	Legal admission	Court document
5	Care plan	Individual care plan and family
6	Legalize placement	Court documents
	Authenticable placement parties	N/A

3.214 Entity Modelling

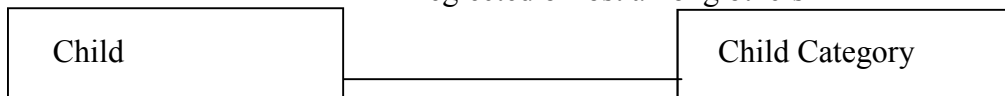
1. One child can only belong to one charitable institution



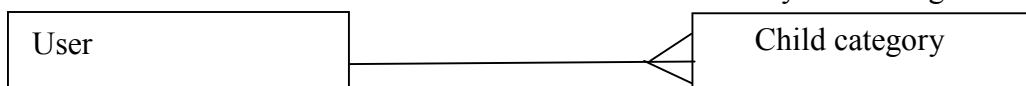
2. Many children can belong to one charitable institution



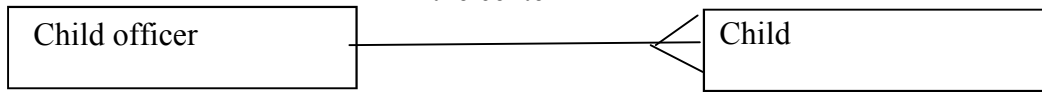
3. A child can only belong to one category i.e. abused, neglected or lost among others



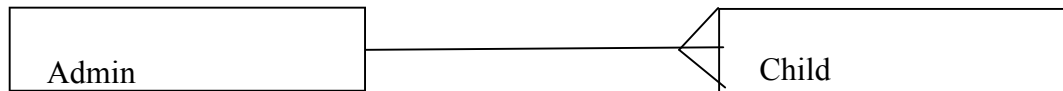
4. One user can subscribe to many child categories



5. One child officer can register or bring in many children to the center



6. One administrator can authorize the admission, placement and care plan of many children in the center



Entity	Relationship	Entity
Child category	Subscription	Child/CCI
Child	Admission/placement	Child officer/Admin
Admin	Admission/placement	Court
CCI	Placement	Child
Child officer	Admission	Child

3.3 System Testing

The system testing was performed on the entire system in the context of System Requirement Specifications (SRS). The following tests were carried out: acceptance, system, integration and unit testing.

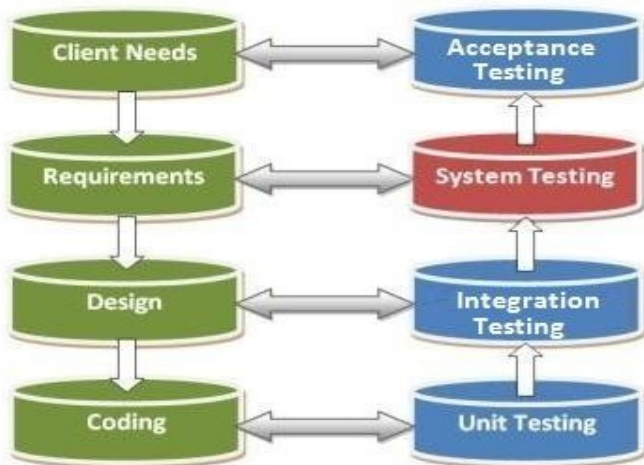


Figure 9: System Testing

- a) *Unit testing* – For each of the six modules identified and developed, unit testing was done (sample code appendix 2).
- b) *Integration testing* – System Integration Testing is done after the individual software modules are integrated as a group. Integration testing focuses to check that after integrating, modules are communicating with each error free. In this research project for the system to function XAMPP directory has to communicate with Apache server and MySQL database. Initializing of services at startup has to take place as illustrated below in figure 10.

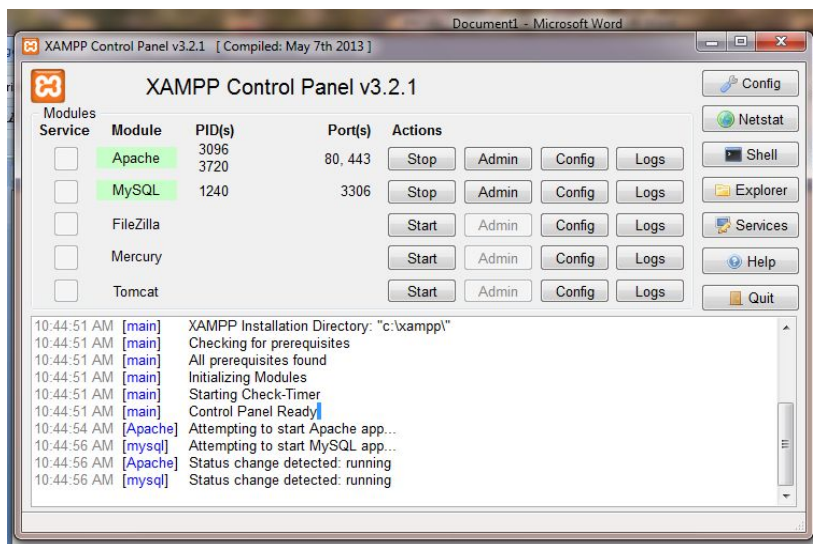


Figure 10: Print Screen caption of initializing of services for CPSMIS

- c) *System testing* – It involves end to end testing of fully integrated software application before handing over to the client. CPSMIS was tested using identified children cases from the time of admission at the home up to the placement to a CCI or reintegration with the family. Reports were generated to check whether they were error free and reflected the desired results.(sample reports appendix 3)
- d) *Acceptance testing* – User acceptance testing is performed by the client to certify the system with respect to the requirements that were agreed upon. The key informants were trained on how to use CPSMIS. They were given a chance to interact with CPSMIS with identified children cases i.e. entered data and generated reports. They were interviewed face to face and using unstructured questionnaire after the interaction with the system. The interview was meant to establish whether their requirements were met. Below are Sample Questions to validate acceptance of the system;

Module	Activity(ies)	User acceptance/ validation question	User Response
Incidence	Data capture for each child case	- Has all the data captured as per the Home requirement?	Yes..... No..... If no, what are the reasons.....
Reports	Generate various reports	-Is the CPSMIS system generating the reports as required?	Yes..... No..... If no, what type of report(s) has been left

		-In your opinion, has the CPSMIS added value in report generation?	Yes..... No..... If no, what is your suggestion(s) on how to improve on report generation.....
	CCIs Update on the category of children at the Home through email.	-What is your opinion concerning this feature. -Do you think it has added value as far as interaction with the Home is concerned? Yes..... No..... If no, give reasons.....

Table 1 : Sample unstructured Questionnaire to validate user acceptance

The users accepted the system as per the requirements but made some recommendations that are highlighted at *section 4.3 - CPMIS Evaluation*.

CHAPTER FOUR

4.0 RESULTS

In this research project, the main objectives were review of the existing management processes and developing a working child protection management system for NCH. The various sections of this chapter highlight the findings;

4.1 Current Manual Processes

From extensive face to face interviews with the Manager NHC, Deputy Manager NHC and two manager representatives of CCIs and desk review of existing documentation on the processes, it is evident the current manual system has the following system weaknesses:

- 1) The process of identification of lost children takes long and is therefore ineffective and expensive. As informed by the Manager, a press release is done once in every two months in the hope of children being identified and re-united with their families. From her experience and observation, this is a slow process since only 6 times per year is done and only those who have access to newspapers get the information. Several children have not been identified and especially those with special needs.
- 2) Staff has difficulty to collect and retrieve data shortest time possible. As observed, the population and health returns are prepared using Microsoft Word and as such the data is disaggregated. Child admission registers are manual and no indexing is done, thus during retrieval it is tedious.
- 3) The current manual system does not accommodate tracking of children after they are referred to CCIs , Machakos and Thika Homes. As observed, no linkage of protection data of child after referral.
- 4) Some children referred to the NHC do not know their name(s) or/and age. During the period of research, 50% of the children at the Home didn't know their names and as such were using 'given names'.

- 5) It is expensive, time consuming and exhaustive for parents and guardians to identify their lost children as media coverage is limited and they need to physically travel to NHC to look for the lost ones. For the members of the public who are informed of the existence of the Home, searching for a lost child involves visiting the home whereas those who are not aware, only through press releases that they are informed of lost children.
- 6) Some children may never be re-united with their family because of lack of access to newspapers and lack of mechanisms to trace children after they are placed in CCIs and government sponsored homes. There was an observation that once children are referred to other institutions, no mandatory linkage of data. The institutions operated independently.
- 7) A lot of data on child protection that goes undetected / and lost among the various stakeholders and partners. There are no agreed indicators among the actors. Each institution collects data as per their needs without any national guidelines.
- 8) Collection and transfer of information from NCH to the Senior Management at the headquarters relies heavily on paper records. It was observed that the monthly population and health returns are prepared using Microsoft Word then printed and forwarded to the Senior Management.

4.2 Developed CPSMIS System

To address the above mentioned challenges, CPSMIS was designed and developed. It consists of integrated set of processes for the routine collection, analysis and interpretation of data used in the planning, implementation and evaluation of child protection programming at NCH. Six key modules are integrated that allow the Staff of NCH, Members of Public and CCIs to interact and share/use information.

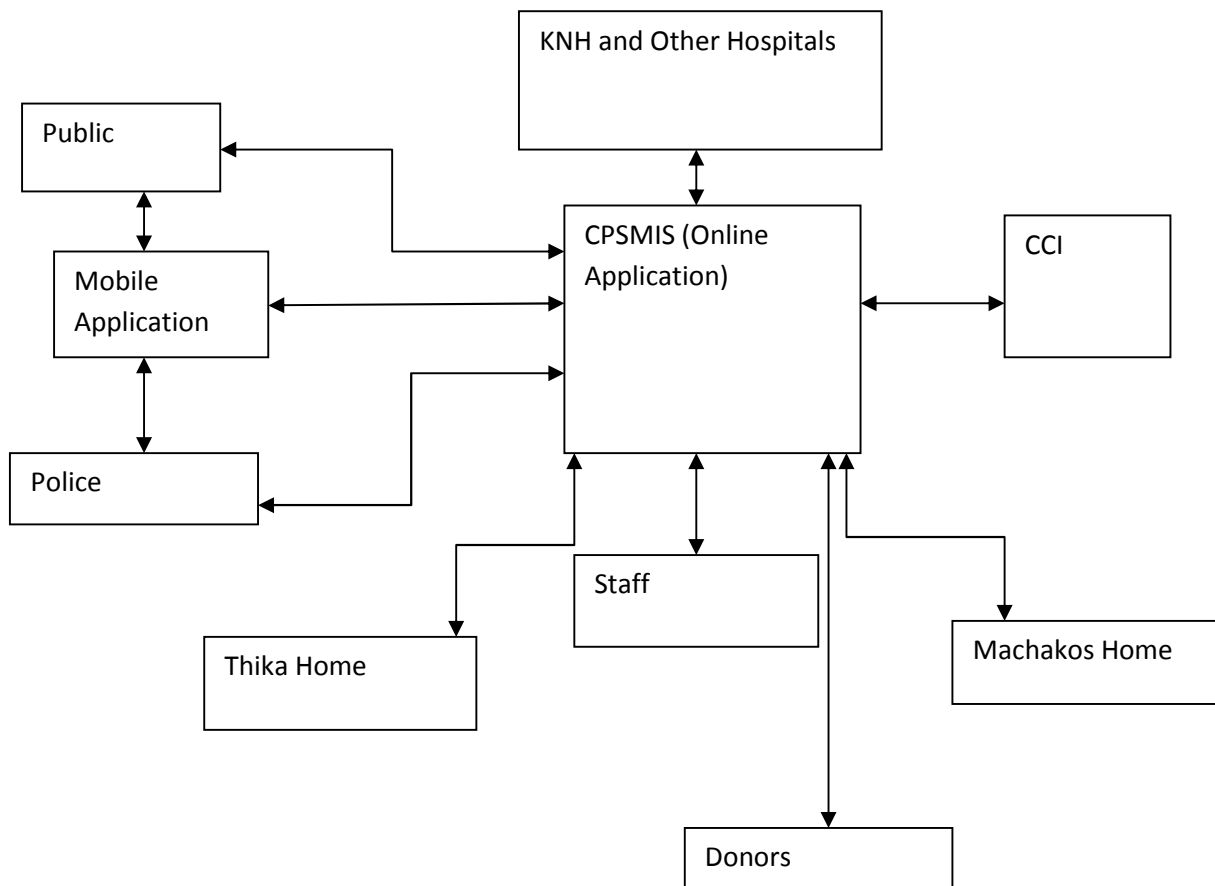


Figure 11: Proposed and developed Subsystem Model of CPSMIS

The modules of the CPSMIS system are;

a) Admin Module

The Admin Module provides the administrator of the system with full control of the system.

Through the Admin Module, one can:

- Add other administrators, and set access levels for each user
- Handling security issues (access logs)
- Data importing and exporting

- Data backup
- Adding custom fields

b) Incidence Module

This module maintains all relevant child related information for example age, sex, name, category among others. Information captured in this module is utilized by all other modules, thus eliminating data redundancy.

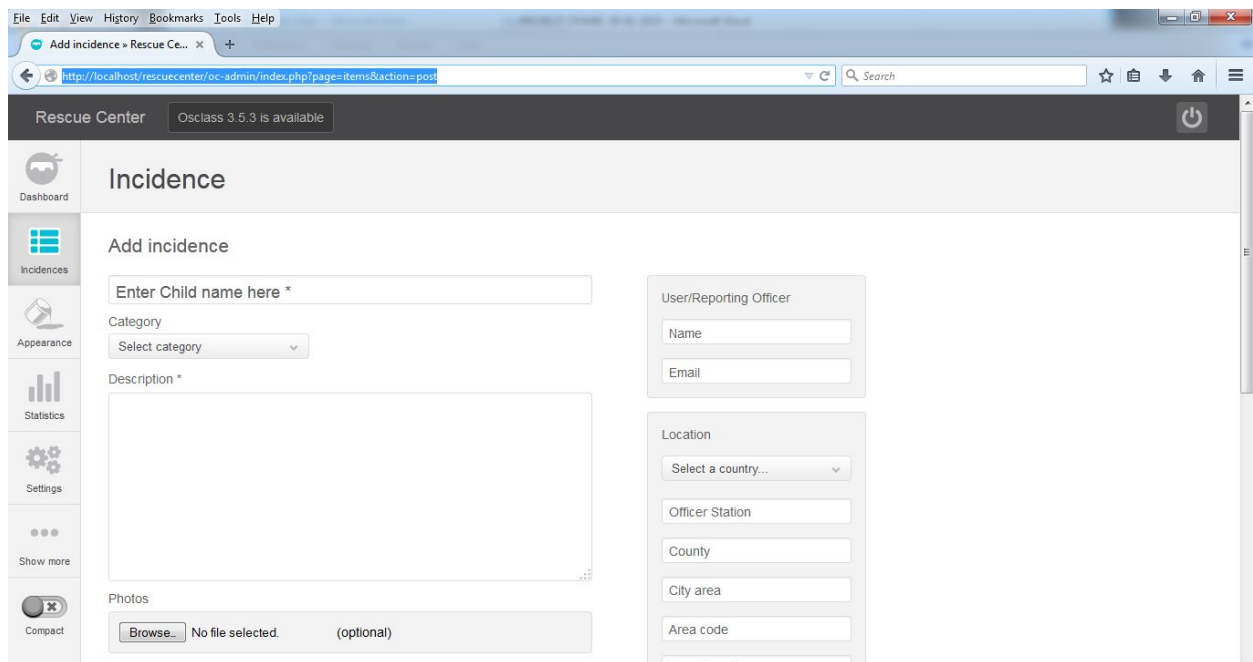


Figure 12: Print screen of an incidence module

c) Members of Public Module (MoP)

This module allows general users (members of public) to report lost child/found incidences and update vital information pertaining to the child that he/she reported.

Members of Public can access the system and report lost/found child

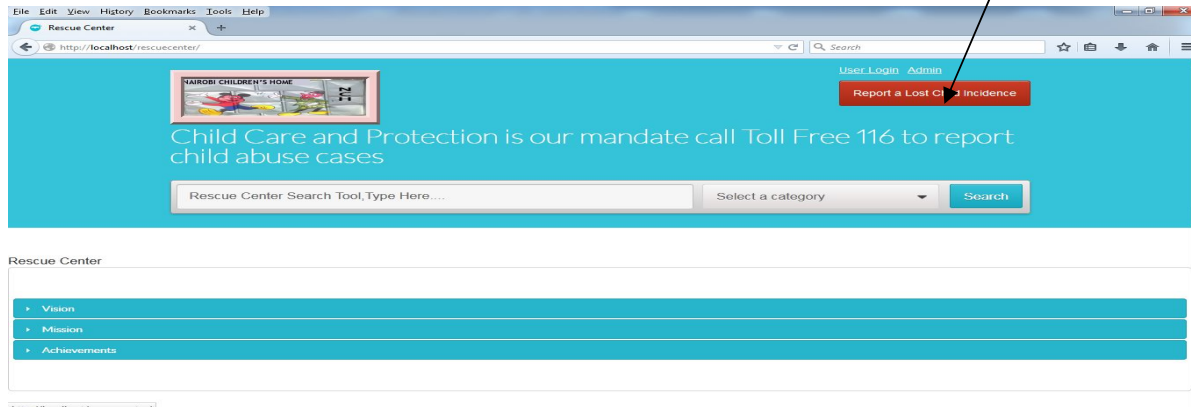


Figure 13: Print Screen of Members of Public Module

d) Reports Module

Several reports are made available using various logical data. The various tabs in the figure below represent different reports that can be used for decision making.

Several reports can be generated in aid of quick decision making

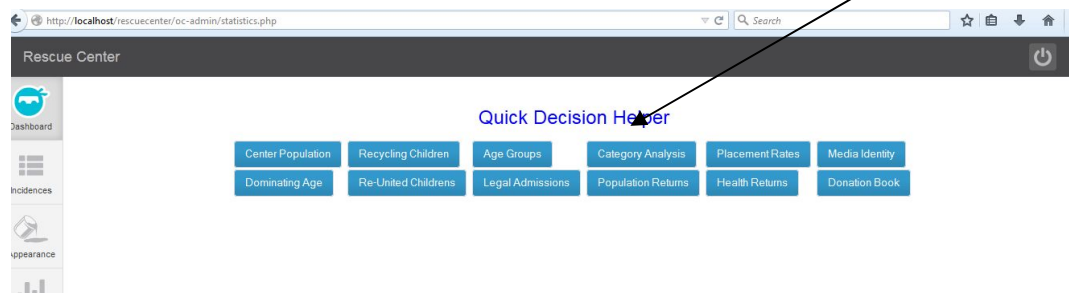


Figure 14: Print Screen of the various reports that can be generated

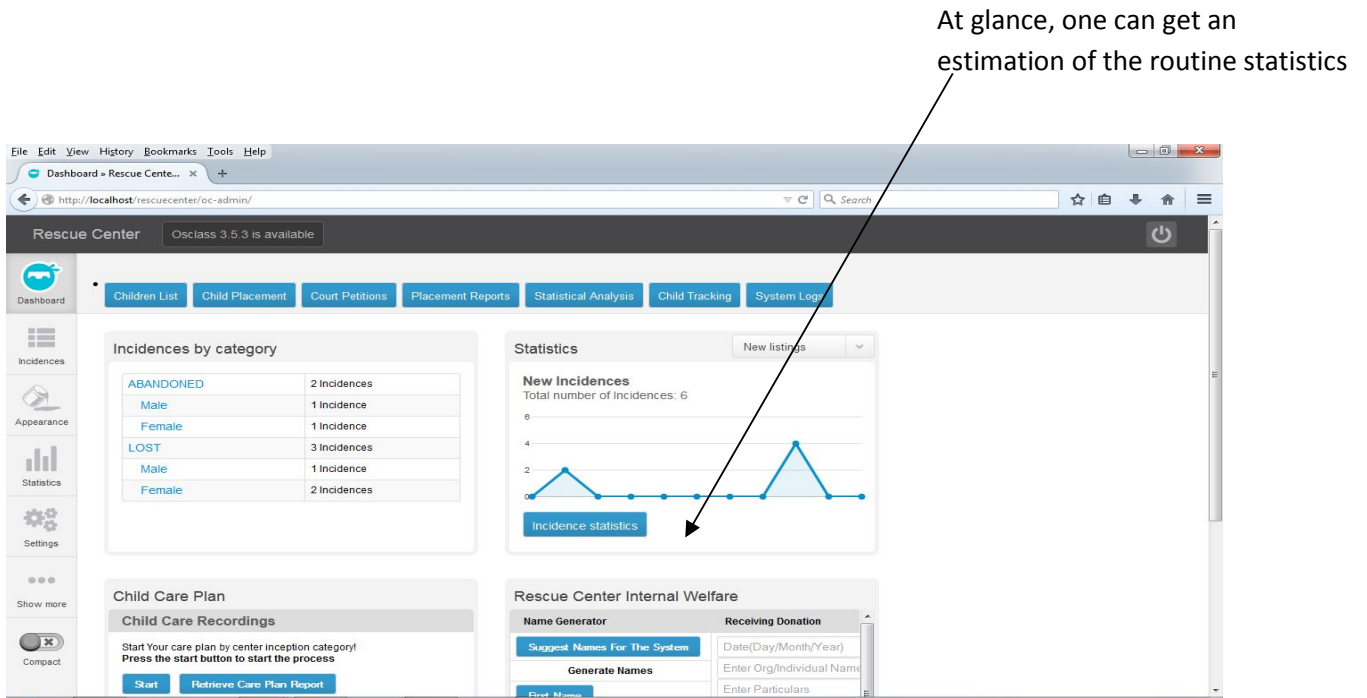


Figure 15: Print Screen of the incidence statistics

e) Child Tracking Module

This module ensures easy retrieval of child's details from the time of admission to the retrieval date.

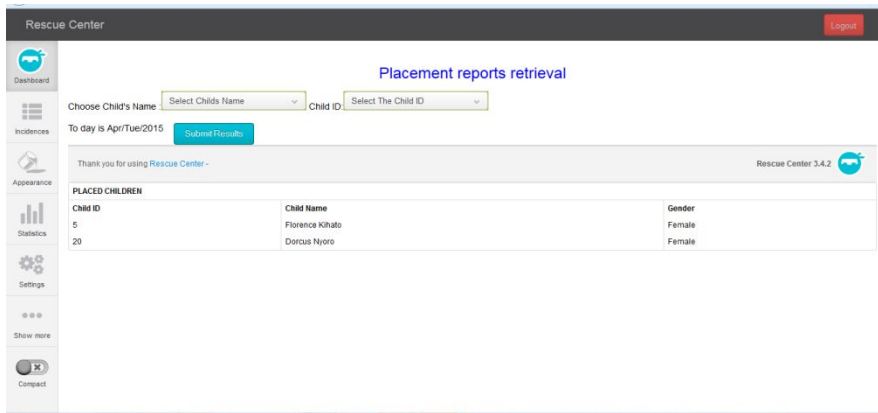


Figure 16: Print Screen of Placement Reports Retrieval

f) Search Module

Allow members of public to log on to the system and search for lost/found child. Members of public can also subscribe for updates on the reported cases.

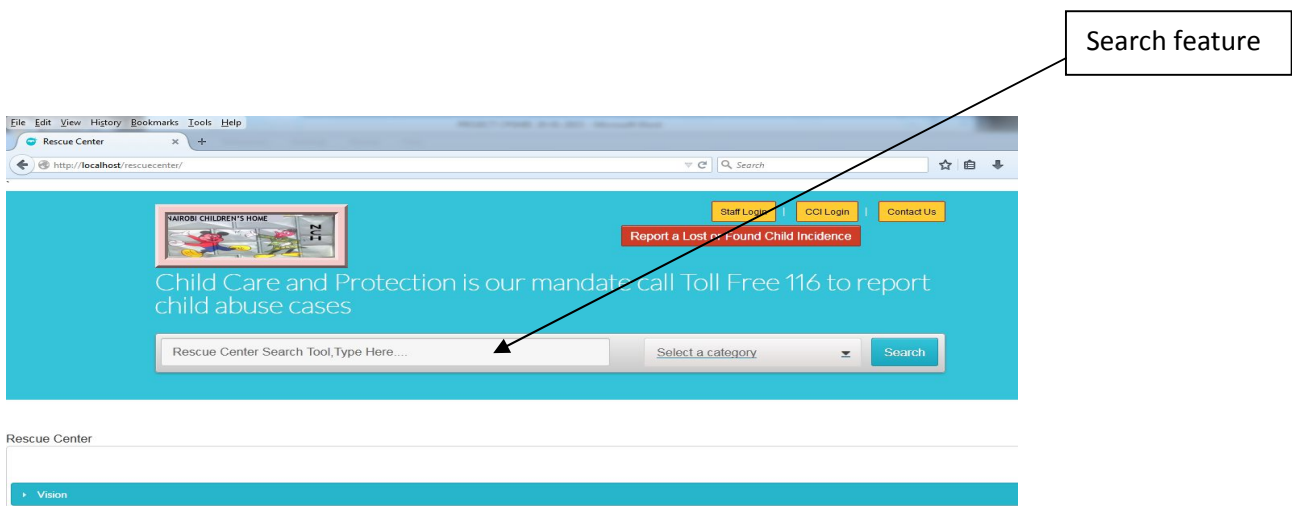


Figure 17: Print Screen of Search Module feature

4.21 Decision Support Component

Some children referred to the NCH do not know their name(s) or/and age. For this the developed system is able to assist the staff in generating names and estimation of age using the logic below. This logic is an extraction from webmd.com (2015).

Tooth Eruption Times

Teeth	Number	Age at Eruption*
Baby (Deciduous) Teeth (20 Total)		
Lower front teeth (lower central incisors)	2	5–9 months
Upper front teeth (upper central incisors)	2	8–12 months
Upper side teeth (upper lateral incisors)	2	10–12 months
Lower side teeth (lower lateral incisors)	2	12–15 months
First back teeth (first molars)	4	10–16 months
Eye teeth or cupids (canines)	4	16–20 months
Second back teeth (second molars)	4	20–30 months
Adult (Permanent) Teeth (32 Total)		
First back teeth (first molars)	4	5–7 years
Front teeth (incisors)	8	6–8 years
Bicuspid (premolars)	8	9–12 years
Eye teeth or cuspids (canines)	4	10–13 years
Second back teeth (second molars)	4	11–13 years
Wisdom teeth (third molars)	4	17–25 years

*Varies greatly.

The graph below shows the percentile of both boys and girls at different stages of growth and height that can be used to verify the correctness of the CPSMIS age estimation

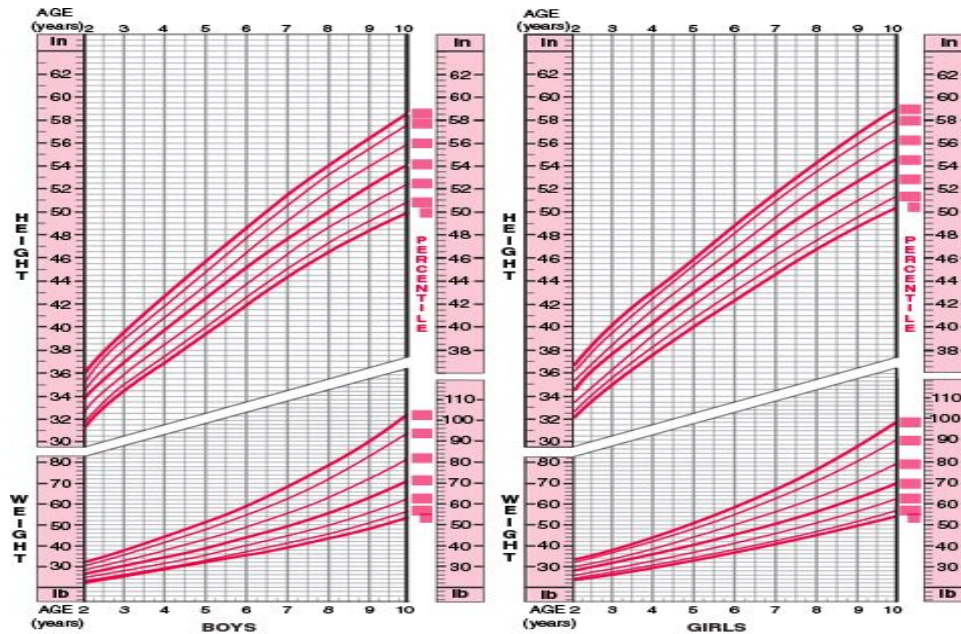


Figure 18: Percentile of Boys and Girls

A description of some technical features of the CPSMIS are given in the table below

	Feature	Description
1	User management	The system should provide different levels of access to the database: administrator with full Access, read, writes.
2	Database maintenance	The system should enable administrator users to insert, update and delete records in database tables.
3	Transfer mechanism	The system should enable users to transfer data from other databases and Excel files to the MySQL database, and to export data into other formats, including but not limited to Excel and SPSS.

4	Data Dictionary	The system should have a way of documenting all the structures that make up the database:
5	Concurrency and transaction	The system should enable multi-user support.
6	Data transfer	The system should allow the data transfer between the internal and external databases
7	Database history	The system should include a log of all changes to the records in the database that can be used as a “restoration table” to undo changes that were made.

Table 2: Some of the Technical features of CPSMIS

4.3 Evaluation of CPSMIS

The system acceptance testing was done. The key informants i.e. County Coordinator, Manager, Deputy Manager , Manager Nyumbani Childrens’ Home and Manager Tumaini Childrens’ Home were involved during the system testing. They were trained on how to use the system and allowed to interact with the system through real data entry and generation of reports. Through face to face interviews and unstructured questionnaire they accepted the system but with the recommendations as follows; a module to integrate the child helpline 116 to CPSMIS be included and CPSMIS need to integrate with other systems in referral institutions for tracking of children to be effective and data to be complete. However in the course of the research project, it emerged that there were several gaps that needed to be filled before CPSMIS or any other automated child protection information system can be implemented and replicated nationally. Below are examples of critical issues and questions that had no answers even by the end of the research project;

4.31 Modules and their functionalities;

- Incidence module – all the reported cases are captured (relevant child protection information). For children who don't know their names or age, the system generates names and estimates age. *What naming convention should be adopted to avoid ethnicity inclinations but still maintain 'Kenyan name feel'?*
- Search Module – members of public can access the system and search for lost/found child. *How much information about a child should be available on the system for public viewing? Suppose an abandoned child who doesn't know his/her name is given a name at the rescue center but the parents/guardian search using the actual names?*
- Tracking module –extracts all the information on each child case since admission at the home. *How long should that data be held in the rescue center after the child is referred to a CCI, other institutions or reintegrated with the family? Since CCI are mostly CBOs and NGOs should they be compelled to retain data for all the children in their custody and for how long? Is there a legal framework for the same?*
- Report module - Using various logical data combinations several reports can be generated. *What key indicators that should be captured. Are there national key indicators that all the actors should capture?*
- Members of Public module – Members of public can log on and report lost/found child. CCIs are updated on the available categories of children at the Home. Members of public with reported cases can subscribe for updates in their emails. *In terms of security of the system, can child identity theft occur? Can illegal harvesting and tracking of child information occur? If it occurs, are there e-safety guidelines, standards and policies regarding children protection data?*
- Admin module – Administrator has full control of the CPSMIS system. *Who is the overall administrator of the system? In other words who is the custodian of child protection data?*

4.4 Other findings

In the course of the research it was evident that child protection is a multi-sectored and multi-disciplinary affair. Issues of child protection are indeed complex and are a function of many

actors. In Kenya, according to National Council for Children's Services (2008) the main child protection and care actors are; Ministry of Labour, Social Security and services, Ministry of planning and devolution, Ministry of Education, Ministry of Health, Ministry of Finance, Ministry of Interior and Coordination, Judiciary, Attorney General Office, Police department, national and international NGOs, CBOs, FBOs, County Government and Private sector. The overall purpose of any child protection system is to promote the well-being of children, through prevention of violence and exploitation; ensuring that when violence and exploitation occurs, prompt and coordinated action is taken to protect further abuse; and ensuring that all actions taken and decisions made are in the best interest of the child. From the research findings, it is revealed that at Nairobi Children's home;

- Acts as a rescue center thus mostly emphasis on reactive responses as opposed to proactive prevention in child protection.
- The Manager of the Home presents on monthly basis population and health returns reports to the Director of Children Services.
- There are weak protection systems for children in the community, at home, schools and care institutions.
- Children with special needs including children with disabilities are mostly not taken up by CCIs (composed of 20% of the home population). CPSMIS has a component that collects data of such children (recycled) which should be a red flag for the Senior Management to act. The children need to be in institutions where care, education and special attention is given to them so as they can integrate with other members of society with ease.
- The available data is mostly inadequate, unreliable and disaggregated for all categories of children.
- There is an inadequate system to track budgets benefiting children and use of the available data for budgeting and programming.
- Weak monitoring and evaluation systems on the success of the reactive responses and programs.
- No legal legislation on development of an integrated child protection information system. Thus CPMIS cannot be implemented fully immediately.

- There is Limited infrastructure to support the online CPSMIS e.g. at the home there is no Local Area Network, only one computer is working and no internet connectivity
- ICT budget allocation at the home is very little.
- There is limited capacity in data/information analytical skills of the staff at the home.

CHAPTER FIVE

5.0 DISCUSSION

The design of CPSMIS was user-centered process based upon an explicit understanding of users, tasks and environments. There are so many initiatives the Government is undertaking through the Department of Children Services and according to those interviewed; Child and family Services need to have a ‘presence effect’ in the country and the development of CPSMIS was a positive contribution to this. CPSMIS being an online system the stakeholders and partners can access the relevant data and members of public can interact with the system especially on reporting lost and found children. Other advantages of CPSMIS are; can support large databases, allow user online access where stakeholders and partners are linked, automatic search optimization(lost and abandoned children listing that can be incorporated at the Huduma centers), support statistical analysis that can aid the various partners and stakeholders in decision making, the system restrict access to authorized users only and grant privileges to individual users based on the types of database tasks they need to perform, classify children admitted in the system by gender, age among others. Each child data can be tracked from the time of admission at the home. Further, the data from CPSMIS system can be used to: trigger interventions to prevent neglect, abuse and exploitation of children; measure trends over time; measure risk factors for children to initiate prevention activities; provide an evidence base for intervention programs and budget allocation during planning; monitor effectiveness and evaluate the impact of prevention measures, intervention strategies, and policy changes; identify high - risk groups or geographic areas to target interventions; and measure progress in protecting children from key protection problems over time.

However from the findings, for CPSMIS to function fully, it must be supported by a framework for child protection system that defines the key components, the institutions involved and how they are regulated and coordinated, both horizontally and vertically. Legal legislation especially on online access of child data needs to be in place. CPSMIS need to be integrated with other systems (referrals) dealing with child protection data for national representation. Proper infrastructures put in place and all the stakeholders and partners sensitized of the system.

5.1 Summary Comparative Analysis of the Developed System (CPSMIS) and what an ideal child protection system should be

A national child protection system comprises; a package of laws, policies, regulations and services in all social sectors – especially social welfare, education, health, security and justice. To support prevention and response to protection-related risks, the coordination of these multiple services and of the different kinds and levels of institutional responsibilities is key. However from the research findings, most of the institutions were uncoordinated and operated independently and thus developing an ideal system was not possible. This was also compounded by the limitations as mentioned in section 5.2.

An ideal child protection information system would provide policy makers and practitioners with a comprehensive national portrait on the magnitude of key protection concerns (prevalence of cases); an understanding of the social, economic, individual and cultural factors that predispose children to protection risks (prevalence of risk factors); detailed information on children in the system (case management information) and, evidence of program effectiveness (evaluation information). Moreover, an ideal system allows for coverage determinations: the percentage of children with a protection problem that receive prevention or remedial assistance. In comparison, the current information in Nairobi Children Home provides an incomplete portrait of the magnitude of child protection concerns; little insight or understanding of vulnerabilities underlying protection problems; moderate to good case management information (with improved coordination of these data through interagency data base projects); no coverage perspective (number of children in need compared to number of children served); and, no evaluation outcome or impact evidence to inform the program planning and budget processes.

5.2 Limitations

1. There is no shared vision among the many child protection actors of what core indicators a national child information system should include.
2. Child protection systems and information systems are relatively new fields of investigation. This research study could have been extended over a very long time frame as more tangentially related components of the system could have been examined. As such, the scope and boundaries of the project were continually being examined and refined in order to maximize learning within the project's timeframe.

3. Restrictions on access to certain kinds of information and delayed access to information also limited the scope and depth of this research e.g. It took three months to get letter of clearance from the Permanent Secretary Ministry of Labour and Social Services.
4. Connectivity and internet infrastructure was not available at NHC. No budget allocation for the same.
5. There is no Legal framework regarding online child protection data access and usage. Examples of Some critical questions that require legal address before implementation of the system;
 - What naming convention should be adopted to avoid ethnicity inclinations but still maintain ‘Kenyan name feel’?
 - How much information about a child should be available on the system for public viewing? Suppose an abandoned child who doesn’t know his/her name is given a name at the rescue center but the parents/guardian search using the actual names?
 - How long should child data be held in the rescue center after the child is referred to a CCI, other institutions or reintegrated with the family? Since CCI are mostly CBOs and NGOs should they be compelled to retain data for all the children in their custody and for how long?
 - In terms of security of the system, can child identity theft occur? Can illegal harvesting and tracking of child information occur? If it occurs, are there e-safety guidelines, standards and policies regarding child protection data?
6. Child protection information systems are relatively new fields of investigation. No specific books and materials for referencing

CHAPTER SIX

6.0 CONCLUSION

In conclusion, the main objective of the research project was to review the management processes at NCH and develop an online child protection, surveillance and management information system. The review was done and the main activities(processes) of the home identified namely; child registration and admission, individual child care plan and exit strategy, reintegration process, family group decision making conference, placement to CCIs and referrals to other institutions .CPSMIS was developed guided by this activities. After testing and especially user acceptance, the feedback from the key informants was that CPSMIS was a positive step towards a national child protection information system. More so they were in agreement that all the management processes at the home were captured in the System. In this regard it can be concluded that the objectives of this research project were achieved.

However it was evident from the research findings that CPMIS cannot be implemented without legal backing and interaction with other child protection systems which mostly are referral systems .To achieve a national child protection system it is recommended that a well designed framework inclusive of all children actors to be developed. Then two types of national information systems can be developed that are based on the routine registration of cases by child protection services and can be integrated with CPSMIS:

- a) National Registry of Rights Violations, which is developed within the social services and which systematically, refers individual cases to other child protection actors. This is in line with a more systematic approach to protection that includes coordination of services, and the development of alert, referral and orientation procedures for children.
- b) National Surveillance System: in order for a recording system to contribute to the production of national statistics, it is necessary to access a higher level of organization. Such a system rests on the recording of the original information according to predefined objectives, on clearly established procedures and classifications, and standard tools that allow the collection of information that are sufficiently disaggregated by source of information, so that it can be consolidated at the central level.

6.1 Suggested Areas of Study and Further System Development

A framework needs to be developed for a well integrated CPSMIS in which all the partners and stakeholders (actors) to be involved. Obstacles that limit child protection incident detection at the community level must be addressed. A simple cell – phone – SMS system could be introduced to ensure different kinds of data are transferred/shared among the various stakeholders including members of public in an efficient and timely manner. An SMS –based reporting system could help support an effective child protection surveillance system through improvements in three particular areas: training for community leaders on how to report incidences; training for community leaders and police on how to report child protection cases that require immediate attention; and, training community leaders and police to report cases that require long term monitoring. Improved community detection and reporting would lead to the improvement of prevalence estimations through routine data collection activities, a key sustainability objective. NCH is a government sponsored home and a lot of data is generated. Various specialists e.g. Psychologists, Sociologists among others should be involved in mining the data to discover trends and interesting knowledge that will help them to guide the government on best practices, programs and interventions on children services.

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8.0 APPENDICES

APPENDIX 1 : SEMI – STRUCTURED INTERVIEW TOOL

Assessing Child Protection Management Information System at Nairobi Children Home

The semi-structured interview tool is intended to be used in conducting interviews with Key staff and partners involved in Child Protection

Name of Organization _____

Date of Interview _____

Location of Interview _____

Contact Person _____

Mobile Phone _____

Website _____

Areas of Work _____

Organization's Mission _____

List any documents to take away from meeting, or to request in follow-up email.

List any people or organizations mentioned that require follow-up for information or interview

SECTION 1: Introduction

1. What is the Mandate of Nairobi Children Home

2. What is the scope of coverage

3. What kind of children do you protect and take care of

SECTION 2: PARTNERS AND STAKEHOLDERS (ACTORS) COORDINATION

4. What if any, standardized policies do you follow to collect data?

5. Which government ministries or organizations do you most closely work with related to gathering and sharing child protection data?

6. Who do you think should lead in managing the data in a national child protection system?
In an Ideal system who would be managing this data and why?

7. What are the current mandates, capacities and /or weaknesses that might help or hinder their taking the lead in coordination efforts?

8. How do you think decentralization has impacted the flow of data between county and central government?

SECTION 3 : DATA GATHERING AND SURVEILLANCE

9. What child protection data do you collect?

10. What data on prevention or early identification do you collect?

11. How is information shared?

12. What do you do to make sure your data is of high quality?

13. What do you think could be done to improve the quality of the data NCH collects? What information/data is still needed at the Ministry

14. What do you do to maintain confidentiality of the data?

15. How often is the data collected analyzed?

16. What kind of analysis are performed on the data ? e.g. reports, trends and other types of analysis

17. Are there types of analysis that the NCH would like to perform but may not have inputs, time, capacity etc?

18. Are your data findings shared with the public and /or the communities you serve? How and how often does this happen?

19. The data that is collected, how is it used to identify children at risk?

20. The data that is collected, how is it used to help children in need of assistance?

21. Are you computer literate?

22. Do you understand the term ICT?

23. How do you think ICT can be used to improve data collection?

24. In terms of ICT, what challenges is the NCH facing?

APPENDIX 2: *SAMPLE CODES*

1. MySQL Database Settings

```
<?php

/**

 * The base MySQL settings of Oclass

 */

define('MULTISITE', 0);

/** MySQL database name for Oclass */

define('DB_NAME', 'rescuecenter');

/** MySQL database username */

define('DB_USER', 'esther');

/** MySQL database password */

define('DB_PASSWORD', 'blsd');

/** MySQL hostname */

define('DB_HOST', 'localhost');

/** Database Table prefix */

define('DB_TABLE_PREFIX', 'rescueCenter_');

define('REL_WEB_URL', '/rescuecenter/');

define('WEB_PATH', 'http://localhost/rescuecenter/');

?>
```


APPENDIX 3: *SAMPLE REPORTS*

1. Individual Child Care Plan and Exit Strategy Report

Page: 1 of 1 Automatic Zoom

Telephone:Nairobi 020-2323780
Email:nairobichome@yahoo.com

As of 13 August 2015

CHILD NAME : Eric Shitanda **ADMISSION NO:**22
NEEDS OF CHILD: Has both parents but neglected. Have kwashiorkor

TIME	ACTION	COMMENTS
Wed-Mar-2015 2:20:53pm	Need to be evaluated by doctor. Balanced diet to be observed at all times. After recovery fgdm to be held.	Parents were not cooperative during the rescue mission.

2. Family Group Decision Making Conference Report

of 1 - + 80%

Telephone: Nairobi 020-2323780
Email: nairobihome@yahoo.com

As of 13 August 2015

NAME OF THE CHILD : John Magati
FAMILY MEETING HELD AT : Chief Office
ON: 20-04-2015 4:41:20pm

NAME OF THE PARTICIPANT	RELATION TO THE CHILD	CONTACTS
Hezekiah Magati	Father	321 Kisii
Magdaline Njai	Mother	675 Kisii
Francis Nyakeri	Chief	546 Kisii
John Kenji	Children Officer	456 Kisii

COMMITMENTS
The members agreed the child to stay with the mother. The father to provide financial support.

NAME	SIGNATURE	DATE
Hezekiah Magati	_____	_____
Magdaline Njai	_____	_____
Francis Nyakeri	_____	_____
John Kenji	_____	_____

3. Population Returns Report

Category	Gender		Total Per Category
	Female	Male	
ABANDONED	3	1	4
ABUSED	1	1	2
BATTERED	0	1	1
DISPUTED PARENTHOOD	1	0	1
DESTITUTE	0	0	0
IMPRISONED MOTHER	0	2	2
LOST	1	2	3
NEGLECTED	0	1	1
ORPHAN	0		
SPECIAL	0		
TERMINALLY ILL PARENT	1	0	1
Total Incidences	15		

3. Category Analysis Report

Category Name	Reported Incidences
ABANDONED	4
ABUSED	2
BATTERED	1
DISPUTED	1
DESTITUTE	0
IMPRISONED MOTHER	2
LOST	3
NEGLECTED	1
ORPHANE	0
SPECIAL	0
TERMINALLY ILL PARENT	1
Total Incidences	15