Internship Training

at

HISP INDIA

"Design & Development of Non-Communicable Disease Tracking System

For

MSF Lebanon"

By

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Enroll No. PG/15/046

Under the guidance of

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Post Graduate Diploma in Hospital and Health

Management 2015-17

International Institute of Health Management Research New Delhi

2015-17

The certificate is awarded to

Monika Rani

In recognition of having successfully completed
her Internship in Organization

HISP INDIA

And has successfully completed her Project on

To Study Design & Development of non-communicable disease tracking system

For

MSF Lebanon

13 May 2017

She comes across as a committed, sincere & diligent person who has a
strong drive & zeal for learning

We wish her all the best for future endeavors

HISP India Info Systems Pvt. Ltd. A-17 Noida 201301 INDIA

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TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Monika Rani** student of Post Graduate Diploma in Hospital and Health Management (PGDHM) from International Institute of Health Management Research, New Delhi has undergone internship training at **"HISP INDIA"** from 13 February to 13 May 2017.The Candidate has successfully carried out the study designated to her during internship training and her approach to the study has been sincere, scientific and analytical.

The Internship is in fulfillment of the course requirements.

I wish her all success in all his future endeavors.

Dr. A.K. Agarwal
Dean, Academics and Student Affairs
IIHMR, New Delhi

Dr.Vinay Tripathi
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Certificate of Approval

The following dissertation titled **"Design & Development of non-communicable disease tracking system for MSF Lebanon"** at **"HISP INDIA"** is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **Post Graduate Diploma in Health and Hospital Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

Dissertation Examination Committee for evaluation of dissertation.

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May 12, 2017

Certificate from Dissertation Advisory Committee

This is to certify that **Monika Rani** a graduate student of the **Post- Graduate Diploma in Health Management** has worked under our guidance and supervision. She is submitting this dissertation titled "**To Study Design & Development of non-communicable disease tracking system for MSF Lebanon**" at "**HISP INDIA**" in partial fulfillment of the requirements for the award of the **Post- Graduate Diploma in Health and Hospital Management.**

This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

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CERTIFICATE BY SCHOLAR

This is certify that the dissertation titled **" Design & Development of non-communicable disease tracking system for MSF Lebanon"** and submitted by **Monika Rani** Enrollment No.**PG/15/046** under the supervision of Mrs. **Arunima Mukherjee** for award of Postgraduate Diploma in Hospital and Health Management of the Institute carried out during the period from 13 February to 13 May embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.

Monika Rani

FEEDBACK FORM

Name of the Student: Monika Rani

Dissertation Organization: HISP India

Area of Dissertation: Study design & development of non communicable disease tracking system

Attendance: Regular

Objectives achieved: able to adapt organizational culture & work flow

Deliverables: Contribution to on going projects.

Strengths: Good understanding of concept, positive attitude

Suggestions for Improvement: retain same quality in future

Suggestions for Institute (course curriculum, industry interaction, placement, alumni):

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Place: NOIDA

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Thank You

Monika

PGDHM, IIHMR, New Delhi

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LIST OF SYMBOLS & ABBREVIATIONS

MSF : Médecins Sans Frontières

OCB : Operational Center Brussels

HISP : Health information system project

DHIS : District health information system

HMIS : Health management information system

GIS : Geographic Information Systems

M&E : Monitoring and evaluation

NCD : Non-communicable disease

MAST : Monitoring and surveillance tools

EMR : Electronic medical records

PHC : Primary health centre

ANC : Antenatal-natal care

BMI : Basic medical information

INTRODUCTION

HISP India is a not for profit NGO specializing since more than a decade in designing and implementing solutions in health informatics for the public health sector in Indian states, and also recently in Bangladesh and Sri Lanka. They are not a solely technology focused Organization, and pride ourselves for being multi-disciplinary and seeking to the knowledge domains of public health and informatics. They have a strong commitment to free and open source technologies, and work with a global perspective of the Health Information Systems Programmes (HISP) network, coordinated by the University of Oslo, Norway, and active in more than 20 countries in Africa and Asia.

The **District Health Information System** (**DHIS**) is a highly flexible, open-source health management information system and data warehouse. It is developed by the Health Information Systems Programme (HISP).The core development activities are managed and coordinated by the Department of Informatics at the University of Oslo, and supported by The Norwegian Research Council, NORAD, The University of Oslo, and The Norwegian Centre for International Cooperation in Education.

The solution covers aggregated routine data, semi-permanent data (staffing, equipment, infrastructure, population estimates), survey/audit data, and certain types of case-based or patient-based data (for instance disease notification or patient satisfaction surveys). The system supports the capture of data linked to any level in an organizational hierarchy, any data collection frequency, a high degree of customization at both the input and output side. It has been translated into a number of languages.

PROFILE

HISP India is both a node in a global network called HISP Global coordinated from University of Oslo, Norway, and is helping to create a regional node around Health Information Systems for South East Asia. HISP India is comprised of a dedicated team of professionals from the domains of informatics and public health, and also draws upon the global HISP network for specific expertise as and when needed.

Likewise, HISP India contributes to strengthening the global HISP network when its expertise is required.

HISP India subscribes to and supports the broader HISP agenda of creating "networks of action" which seeks to strengthen collaborative action by learning and sharing about health information systems, including around software, training material and implementation experiences, in a collective network. Learning in collectives is more effective than that done in singular sites, as we learn from each other and don't reinvent the wheel. This supports Global HISP and HISP India's strategy towards addressing challenges of scale and sustainability.

Vision:

To strengthen the development and use of integrated health information systems within a public health inspired framework in India and the South Asian region.

Mission:

To enable networks of collaborative action with like-minded actors who aspire to the ideology of open source software, open standards and decentralized decision-making to create complementary strengths in providing integrated and public health friendly health information systems.

OBJECTIVES OF THE ORGANISATION

- Create and contribute to advocacy networks that promote Open Source software and Open Standards in Public Health Systems.
- Contribute towards research related to integrated Health Information architecture that has at its core, routine aggregate reporting systems, patient-based integrated District Hospital systems, Human resource for health information system, mobile-based reporting systems, and Geographic Information Systems (GIS).
- Contribute towards the design, development and implementation of integrated Health Information architecture including the core components described above.
- Processes of design, development and implementation are based upon and guided by principles supporting participatory design and mutual learning.
- Actively promote the cultivation of an information culture in Public Health Systems, such that health information becomes a strategic resource that contributes towards improving health outcomes, and is not just used for upward reporting.
- Contributing to building internal capacity in health systems, such that they are able to internally sustain systems of assured quality, and scale them geographically and functionally based on their evolving needs.

SERVICES

- DHIS2 (District Health Information System)
- DHIS2 Mobile
- DHIS2 Tracer
- DHIS Hospital

DHIS 2

Collect, manage, visualize and explore your data

DHIS 2 is the flexible, web-based open-source information system with awesome visualization features including GIS, charts and pivot tables.

Data management and analytics

DHIS 2 lets you manage aggregate, routine data through a flexible meta-data model which has been field-tested for more than 15 years. Everything can be configured through the user interface: You can set up data elements, data entry forms, validation rules, indicators and reports in order to create a fully-fledged system for data management. DHIS 2 has advanced features for data visualization, like GIS, charts, reports, pivot tables and dashboards which will bring meaning to your data.

GIS

DHIS 2 features an awesome web-based GIS feature that lets you do thematic mapping of areas and points, view facilities based on classifications, visualize catchment areas for each facility. You can define custom legend sets and link them to indicators. The DHIS 2 GIS lets you put labels on areas and points and search and filter based on

various criteria. You can overlay multiple layers and use Google Maps as background layer. You can move points and set locations on-the-fly. Maps can be saved as favorites and shared with other people.

Charts

DHIS 2 provides nice charting capabilities. It supports all the standard chart types like column, line, pie, stacked column and area charts. You can display trend lines, legends, titles, labels, target lines and baselines. Select easily from all of your indicators, Organizational units, time periods and other dimensions, and flip categories and series around as you like. Charts can be saved as favorites and shared. You can write interpretations of your chart data and discuss with colleagues. Charts can be downloaded as images and PDFs.

Pivot Table

DHIS 2 features a fully web-based pivot table which lets you analyze data along all data dimensions and arrange these on columns, rows and as filters at demand. You can include totals and subtotals and remove empty rows, and control display density, font size and digit group separator. Pivot tables can be saved as favorites and be downloaded and used as basis for offline MS Excel pivot tables.

Dashboard and social features

DHIS 2 provides a personal dashboard where you can put your favorite charts, maps and reports for fast access. You can search directly from the dashboard for analysis related to a particular subject or for other people. The dashboard features integrated messaging functionality which lets you communicate directly with other users. From the dashboard you can view the data interpretation feed - data interpretations shared from

the various analytics modules will appear here so that you can better understand your data and your Organization. From the feed you can comment on other people's interpretations and start discussions.

Data entry and validation

DHIS 2 lets you capture aggregate data on a variety of devices - it even works offline. If Internet connectivity drops during capture, data will be stored locally in the browser and you can continue working as before. When connectivity is back you can push data up to the online server. DHIS 2 can generate data entry forms automatically based on your data model, or you can design highly customized forms to cater for special needs. You can define auto-calculated fields inside the form, logical validation rules and set min and max values to improve data quality.

Individual data records (Tracker)

DHIS 2 enables you to collect, manage and analyze transactional, case-based data records. It lets you store information about individuals and track these persons over time using a flexible set of identifiers. You can capture information about anonymous events and cases as well. DHIS 2 lets you configure SMS-reminders, track missed appointments and generate visit schedules. You can create dynamic reports based on cases and generate on-the-fly statistical reports. For all programs you can easily create statistics and summaries on participation and completeness.

The DHIS 2 Tracker is an extension of the DHIS 2 platform and supports management, data collection, and analysis of transactional or disaggregated data. The Tracker shares the same design concepts as the overall DHIS 2 - a combination of a generic data model and flexible metadata configuration through the user interface that allows for rapid Customization to meet a wide range of use cases.

Common for all the use cases is that the transactional data can be easily aggregated and fed into the main aggregated data warehouse in the same DHIS 2 system, making complicated inter-operability setups redundant.

In addition to being a powerful HMIS tool for following up health programs, DHIS2 Tracker is also a simple tool for sharing critical clinical health data across multiple health facilities. The DHIS 2 tracker currently does not aim at becoming an advanced EMR system to support clinical care, but rather a basic transactional system that is easy to set up and that builds on an existing and proven platform and available technical capacity. On a national level, one may wish to combine the use of DHIS Tracker for some facilities with more advanced EMR systems for other facilities.

Features

- Collect transactional data - set up automated aggregation queries - populate the aggregated data warehouse directly - all in one system!
- Enroll individuals into longitudinal and chronic programs - schedule visits - set up automated SMS reminders - track missed appointments - improve retention.
- Define your own programs with stages - decide what to collect at each stage - all through the user interface.
- Generate daily or weekly visit schedules (work plans) for your facility or community health workers.
- Tools for tracking and following up patients who do not come to scheduled visits.

- Collect detailed ICD-10 codes for inpatient admissions and deaths to enhance data analysis of morbidity and mortality.
- Set up detailed maternal or neonatal death audits - analyse your data using the tabular reports with both case-based data and ad-hoc aggregation.
- Collect detailed health facility surveys (e.g WHO's SARA) - link to aggregated indicators - analyze your results on maps, dynamic charts, and pivot tables
- Collect data using mobile phones - online in web browser or offline with java clients

Here are some use case descriptions outlining the possibilities of the DHIS 2 Tracker:

Use Case 1: Anonymous inpatient admissions and deaths with ICD-10 coding

Use Case 2: Longitudinal tracking of women through pregnancy, delivery and postnatal care

Use Case 3: Neonatal and Maternal death audits

Use Case 4: Educational events in the community

Use Case 5: Facility surveys (e.g. the WHO SARA)

DHIS Mobile

DHIS Mobile covers the wide area of mobile development related to DHIS2, with focus on a wide portfolio of solutions for utilizing mobile technology to expand the reach of the Health Information System. The clients can be deployed as a standalone mobile reporting system, or the clients can be used together with the web interface to support

an integrated HIS system that reaches all levels of the health service, including community health workers and citizens.

Java mobile clients

There are two DHIS Java ME based applications for low-end Java phones, one supporting aggregate data entry and the second supporting name-based program tracking. These applications communicate with an online DHIS2 instance, downloading datasets, activity plans and program stages, and allow the health worker to enter data back into the online server. The main strength of these applications is that they work well even when the phone is "offline", which is when the phone has no data connection to the server. Data entered during offline-mode is stored and can be submitted at a later time. The Java clients are simple to use, run on cheap mobile phones and offer a fast way of rolling out data entry capability to a large number of staff.

Browser based mobile client

In contexts where mobile data coverage is good and health workers already have phones, using the mobile browser DHIS2 interface may be an important complement to other clients. Cheap, low end mobile phone support browser-based data entry through a simple mobile interface optimized for small screen sizes. You may also consider using a more advanced user interface customized for Android smart phones. The Android smart phone interface also supports offline data entry using HTML5.

SMS based solutions

DHIS2 also supports a wealth of SMS-based functions. Because SMS is most widely available technology, these features can help you increase the scale of your information system. The SMS features of the system could be deployed as a standalone function, but

is more commonly used together with the other mobile clients and the web based interface of the system, as a portfolio of technologies that caters for the specific user context. Some of the use cases that are supported through SMS include:

- A simple web based interface for sending SMS to individual or groups of health workers or patients.
- Automatic SMS sent to patients, for example to remind them of an upcoming or missed visit, or as part of a general education program related to a health program.
- Reporting data by sending an SMS to the system.
- Sending messages from SMS to users of the system, for example for support or feedback purposes.
- Registering and enrolling a patient into a health program by sending an SMS.
- Entering individual health data for a patient visit using SMS.
- Checking the status of a patient's follow up using SMS.

The SMS functions of DHIS2 is used for a wide range of functions, including tracking mother and child health, HIV reporting, lab sample tracking, as well as education and coordination.

Review of Literature

DHIS2 is used in more than 40 countries; Africa, Asia, Latin America and the South Pacific, and countries that have adopted DHIS 2 as their nation-wide HIS software include Kenya, Tanzania, Uganda, Rwanda, Ghana, Liberia, and Bangladesh. A rapidly increasing number of countries and organizations are starting up new deployments. It is developed by the (HISP). The core development activities of the DHIS 2 platform (see note on releases and versions further down) are coordinated by the Department of Informatics at the University of Oslo, and supported by NORAD, PEPFAR, The Global Fund to Fight AIDS, Tuberculosis and Malaria, UNICEF and the University of Oslo.

The solution covers aggregated data (e.g. routine health facility data, staffing, equipment, infrastructure, population estimates), and event data (disease outbreaks, survey/audit data, patient satisfaction surveys, longitudinal patient records etc.). The system supports the capture of data linked to any level in an organisational hierarchy, any data collection frequency, a high degree of customisation at both the input and output side. DHIS 2 comes with easy to use analytics through tailored Dashboards, charts, pivot tables and maps, and can be extended with Apps or used by third-party software through the open Web-API. It has been translated into a number of languages.

The DHIS was originally developed for three health districts in Cape Town in 1998-99, but has since spread via the HISP network to more than 40 countries The initial scope - routine monthly Primary Health Centre data – has systematically been expanded to cover nearly all aspects of health data and information, and recently been used by other sectors such as Education, Water and Sanitation, Forestry, and Food Security.

- Development of DHIS2 in Java started 2004
- First implementation Kerala –India 2006

- With HMN & Sierra Leone from 2007 develop DHIS to HMN + “African requirements”
- The Gambia from 2009; + more West African countries
- In India: implemented in many states + Bangladesh & Sri Lanka
- GIS developed with WHO + More functionality
- 2010: Full Health Information Architecture: - SDMX-HD Interoperability Standard launched in Accra

The DHIS version 1 series goes back to 1996 and was developed on the Microsoft Access platform consisting of VBA for the interface or program logic (front-end), Access as a database (back-end), Excel for reporting and Windows as the OS. DHIS 1.4 (from 2005) is a significant overhaul of the version 1.3 database structure, using various output formats for reporting. It bridges the gap between DHIS 1.3 and 2.

DHIS 2

DHIS 2 (from 2008) is a continuation of DHIS version 1 developed on open source Java technologies and available as an online web application. The first release, version 2.0, came in February 2008 after three years of development releases, and the most recent (as of January 2016) version is 2.22. DHIS 2 is developed using open-source Java frameworks and tools, such as the Spring Framework, Hibernate, Struts2, Maven, and J Unit. Follow the latest DHIS 2 development on the DHIS 2 Launchpad site

Background

Medicines' Sans Frontiéres is a private international association that provides assistance to populations in distress, to victims of natural or man-made disasters and to victims of armed conflict. Client observes neutrality and impartiality in the name of universal medical ethics and the right to humanitarian assistance and claims full and unhindered freedom in the exercise of its functions. Members undertake to respect their professional code of ethics and to maintain complete independence from all political, economic or religious powers.

MSF's staff

Some 30,000 Medicines' Sans Frontiéres (MSF) from all over the world provide assistance to people in crisis. They are doctors, nurses, midwives, surgeons, anaesthetists, epidemiologists, psychiatrists, psychologists, pharmacists, laboratory technicians, logistics experts, water and sanitation engineers, administrators and other support staff. More than 90 per cent are recruited in the countries where the programmes are, and they work with a small number of international staff.

MSF's organization

MSF offices, units, operational centres and associations interconnect and work together in various ways, and are formally bound as one movement by a shared name, a shared commitment to the client Charter and principles, and shared membership of client International.

MSF Operational Center of Brussels

The Operational Center Brussels is one of five operational centers that manage Client humanitarian assistance programs. The others being Operational Centre Geneva,

Operational Center Amsterdam, Operational Center Barcelona, and Operational Center Paris.

Monitoring and Surveillance Tools Program

The monitoring and surveillance tools (MAST) program is run out of the Medical Department of OCB and will act as the focal point for any DHIS2 initiatives at OCB. The program is directly supported by members of the Medical Department, Operations Department, and Information and Communication Technology team.

Methodology

Proposed Methodology

Phase I: Requirement elicitation and DHIS2 Orientation Workshop

The requirement elicitation exercise would involve visited the OCB in order to carry out a Workshop jointly between OCB and HISP India team to understand the key processes followed interms data collection, and monitoring & evaluation for the operational projects. This exercise would help HISP team to understand the data points for which data is collected, the process of conversion of raw data into indicators, the analysis methodologies, and data dissemination mechanism followed at OCB. Following the requirement elicitation exercise, HISP proposes a DHIS2 fundamentals training to the central team at OCB which encompasses the basic configurations done in relevance to the requirements set of the envisaged client prototypes. The aim would be to train a team at OCB who can carry out similar configurations in the existing prototypes to cater new pilot projects initiating at OCB.

The specific tasks to be covered in this phase will discuss in Chapter 1

Phase I Deliverable:

a. At the end of first phase, HISP team submitted a system design document which would Include the requirements gathered from OCB, and a sketch of how the system will be designed on basis of all use cases understood during the requirements phase.

b. Based on the requirements a development roadmap will be defined which will illustrate the release of prototypes along with scope of work involved in each.

Phase II: Design and Development of Client Prototypes

Once the OCB gives a sign-off on the above submitted document, HISP team would start working on the application which would include the following set of activities which have been divided into

two prototypes. The activities under each prototype have been defined below:

Prototype II: MSF's NCD Cases Tracking Prototype

1. Design database and relevant standardized metadata (data elements, datasets, organization unit hierarchy, programs, specific indicators by different categories, and validation rules) in Excel sheets, and sending to expert committee for approval.

2. Develop first prototype of the database with rationalised data entry formats (including gaps in data in existing formats), datasets, reporting units and groups on the basis of feedback received from expert committee.

3. Design and develop Excel import utility, and import the data provided by the OCB for the pilot projects in order to maintain the continuity of data at the point of care once the system goes live during field testing, and later the implementation.

4. Develop design of dashboard mock-ups to enable effective program wise M&E and present these for feedback.

Phase III : Capacity Building and Handover

The capacity building component would be focused on end users. End user training of the Identified users staff to support roll out the systems at field level would be carried out. We propose to had a central workshop at OCB where designated focal persons can be trained in order to create super users, who can also support the phasing out of the systems to the other point of care sites not covered in the pilot.

Training would include skill development on basic use cases from data entry, data quality checks, data analysis, monitoring & evaluation using dashboards by following the 'Train the Trainers approach. All the training material developed would be released together with the user training process.

Phase IV: Pilot Implementation and Remote Technical Support

This phase would involve the field testing and implementation of the system with full functionalities (data input and output) in the sites proposed by OCB. The performance of the system during the pilot exercise would be closely observed, and remote support would be provided in order to have a smooth implementation of the system. Once the teething issues are resolved, the system would be then phased out to other point of care sites.

HISP India proposed to provide free of charge free remote technical support during the first 3 months of the pilot implementation in phase III. This will be followed by 9 months of paid support, where 5 days of support per month can be budgeted, to carry out the following tasks:

a. Routine troubleshooting support.

b. Remote server administration support, including upgrading with new versions of DHIS2 as and when required.

c. Carry out routine customization tasks such as changing user roles, adding new users, Datasets, making changes to data elements, indicators, validation rules etc.

d. Creating new reports, or reconfiguring of dashboards.

Phases

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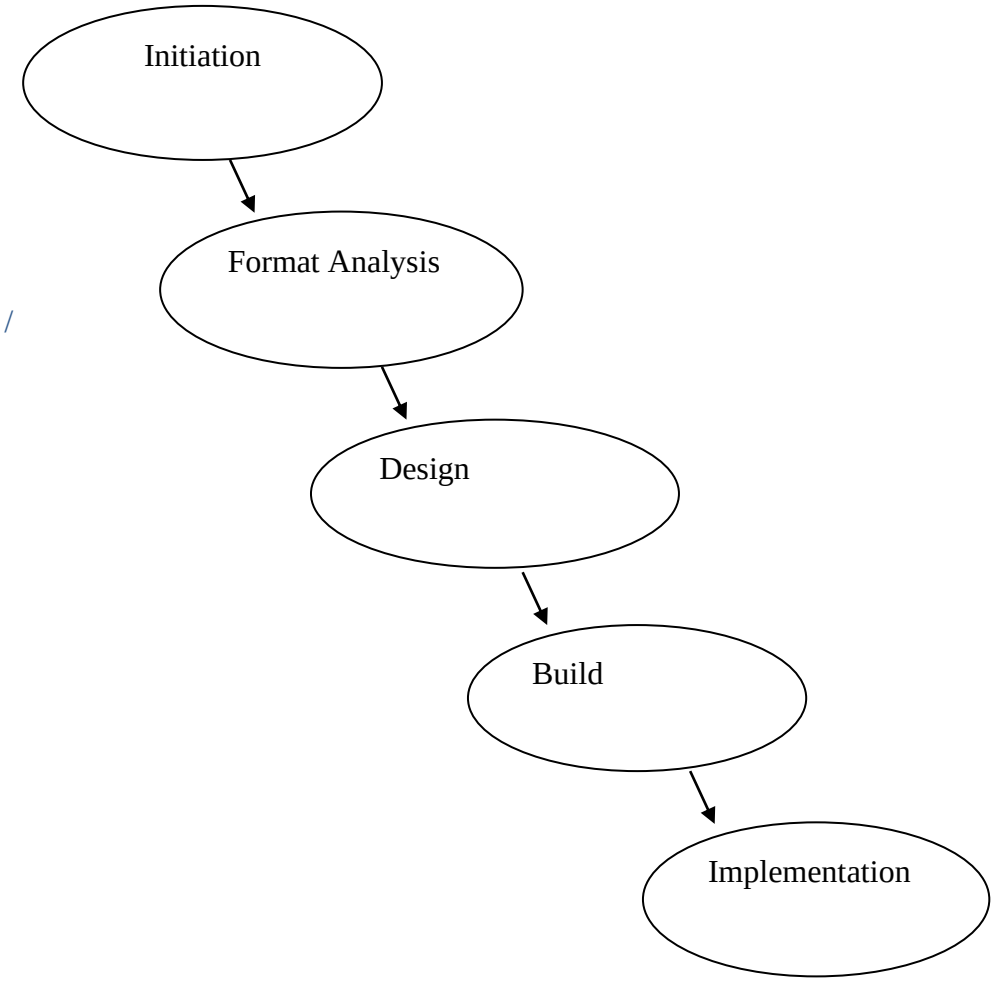


Figure:-1.1 Phases of Design and development of Client DHIS2

- In Chapter 1, the INITIATION stage of Design and Development of project in detail
- In Chapter 2, the ANALYSIS stage of Design and Development of project in detail
- In Chapter 3, the DESIGN stage of Design and Development of project in detail
- In Chapter 4, the BUILD stage of Design and Development of project in detail
- In Chapter 5, the IMPLEMENTATION stage of Design and Development of project in detail
- In Chapter 6, Analysis part given.

Chapter 1

Initiation

In initiation chapter we gather the all information require for the design and development of project. and understand the following format provided by Client. Like

a) NCDs indicators category list-the following indicators category required for analysis, these are Use of services, Quality of services, surveillance, patient outcome
b) NCDs Concept detail list-Patient form, Baseline information, current treatment details, Pregnancy details, test required, Investigation result, Home insulin management, Exit information
c) NCDs patient files list-patient files information in the format of first visit, follow up visit, Exit type

The specific tasks to be covered in this phase would include:

- The requirements elicitation process would start with the OCB identifying the stakeholders
- who would play a key role in the system design, acting as the prime source of the information required to understand the information flow, and data needs. Amongst the stakeholders, proposed is the creation of an expert committee who can overview the important aspects and progress of the project. During the requirement understanding exercise we would follow a bottom-up approach where smaller components will be integrated into subsystems, and later these sub-systems would be integrated as a whole. Therefore, changes later in the

requirements may lead to changes across the system, to avoid that the stakeholders in congruence with the expert committee are requested to analyse the requirements in detail internally before it goes into the design and development cycle.

- The OCB needs to shares all existing data input formats along with their reporting frequencies, the details of data quality protocols, and data approval protocols (if any) currently in use. This would help to assess and formulate a reporting protocol for the OCB which would involve the data collection process, data quality management and approval, dissemination between users, and finally pushing the data from the country level to regional level.
- HISP team to study these formats, in order to carry out a rationalisation exercise in order to come up with a standard reporting solution by removing redundancies, and maximize compatibility with identified monitoring indicators.
- Identify needs for mapping of legacy data. This will require understanding the data available in the existing system; its comparison with the new data collection formats being designed, in order to identify gaps/challenges if any and preparing the approach towards migration of legacy data.
- Identify need for offline data entry where required depending upon the proposed mode of implementation in each country, as per the existing ICT infrastructure.
- Study key indicators required for program specific M&E and determine whether these indicators can be required through the existing data entry forms, and gaps if any.
- Study all output report formats required from the system, the periodicity of reporting, and the stakeholders to whom these made to be disseminated to.

- Study the existing geographical/administrative structure in order to design the reporting hierarchies, and creation of organizational unit which can facilitate the data analysis.
- Obtain access to existing data reporting mechanism or existing surveillance systems in use (which may or may not be DHIS2, and use other tools such as MS Excel, and study in detail to understand how it works, and how it can contribute towards creation of a standardised database.
- Study all requirements for all types of end users with required privileges and access rights for each type of user at OCB, intermittent levels, and finally at the point of care.
- Study all shape files for GIS based analysis that need to be included in the application.

Chapter 2

Format Analysis

In analysis chapter, we analyze the documents received from Client (the NCD patient file, and list of concepts) worked towards design of the program which would be implemented in DHIS2 Tracker Capture Module. The program has been divided into the following stages:

a) Patient Beneficiary and Enrolment

b) Baseline/Medical History (One time)

c) First Visit (One time)

d) Follow-ups (Repeatable)

e) Exit (One time)

Each of these program stages have been further segregated into various program stage sections in order to group the information as given on the patient's NCD file. The MS Excel document submitted contain the above structure along with proposed data types, option sets applied as per the list.

As a result of the above compilation, there are few observations which need clarification from the project team at MSF B, the same are listed below:

NCD Registration and Enrolment

a. We are capturing patient ID's, a file number, facility code etc., we assume these would be used for patient searching and identification. Is it required to create a unique patient identifier, and whether it needs to have a custom format?

b. We are capture if the patient is a registered refugee (UNHCR or UNRWA), but we are not capturing the respective ID numbers, which can also be a unique way of identifying patient? Do we need to add a field for entering these IDs?

Patient Baseline

a. We propose to add BMI as a program indicator, where it can be calculated using the 'height and weight' parameters captured in the patient baseline/medical history. Please suggest if fine?

b. For most of the investigations the results are known to be stored mostly in numerics, or as a dropdown. We would like to know what result has to be stored for the following tests:

    1. Urine Analysis (given that this has multiple sub-tests involved)

    2. LFT (given that this has multiple sub-tests involved)

c. We have a specific format for capturing the Medication Plan, is the same format to be used for capturing the current regimen plan when baseline data is collected?

d. Patient baseline has details for laboratory details we assume no lab orders are being given, only the latest lab results are entered within the system?

First visit and Follow-up

a. The medication regimen has the medicine name, frequency and number of tabs as entry fields (please correct if wrong). For the frequency can we use standard medicine frequency nomenclature as dropdowns (QD, BID, TID, QID, PRN)?

b. The referral information is given in the concept details file, but the referral data points were not found in the patient file. Do we need to include the referral information in the forms?

Chapter 3

Design

In Design chapter, we design the metadata excel sheet for customization.

a) Data elements for First visit and follow up like this

Data elements				
First visit				
Code	Name	Form name	Type	Option Set
Program Stage Section - Consultation Details				
consultation_provider	NCD_Consultation provider	Consultation provider	Text	Consultation provider
doctor_name	Doctor name	Doctor's name	Text	Doctor list
nurse_name	Nurse name	Nurse name	Text	Nurse list
Program Stage Section -Risk factors				
ncd_weight	NCD_Weight (kg)	Weight (kg)	Positive or Zero Integer	
ncd_height	NCD_Height (m)	Height (m)	Positive or Zero Integer	
smoking_status	NCD_Smoking status	Smoking status	Yes/No	
Program Stage Section-Vital Signs				
abp_systolic	NCD_Blood pressure-systolic (mm Hg)	Blood pressure-systolic (mm Hg)	Positive or Zero Integer	
abp_diastolic	NCD_Blood pressure-diastolic (mm Hg)	Blood pressure-diastolic (mm Hg)	Positive or Zero Integer	
blood_glucose	NCD_Fasting/Random blood glucose (mmol/L)	RBG/FBG (mmol/L)	Positive or Zero Integer	
Program Stage Section - Pregnancy details				
edd	NCD_ANC details-Estimated date of delivery	Estimated date of delivery	Date	
puerperium_contraception_yesno	NCD_ANC details-Contraception proposed/accepted	Contraception proposed/accepted	Yes/No	

Figure:-2.1

Program Stage Section - Primary Diagnosis				
diagnosis_hbp	NCD_Primary diagnosis-Hypertension	Hypertension	Text	Diagnosis status
diagnosis_hbp_pregnancy_induced	NCD_Primary diagnosis-Pregnancy induced hypertension	Pregnancy induced hypertension	Text	Diagnosis status
diagnosis_diabetes1	NCD_Primary diagnosis-Diabetes type I	Diabetes type I	Text	Diagnosis status
diagnosis_diabetes2	NCD_Primary diagnosis-Diabetes type II	Diabetes type II	Text	Diagnosis status
diagnosis_diabetes_gestational	NCD_Primary diagnosis-Gestational diabetes	Gestational diabetes	Text	Diagnosis status
diagnosis_asthma	NCD_Primary diagnosis-Asthma	Asthma	Text	Diagnosis status
diagnosis_copd	NCD_Primary diagnosis-COPD	COPD	Text	Diagnosis status
diagnosis_epilepsy	NCD_Primary diagnosis-Epilepsy	Epilepsy	Text	Diagnosis status
diagnosis_hypothyroidism	NCD_Primary diagnosis-Hypothyroidism	Hypothyroidism	Text	Diagnosis status
diagnosis_cvd	NCD_Primary diagnosis-CVD	CVD	Text	Diagnosis status

Figure:-2.2

Program Stage Section- Lab Order and results					
test_required_ecg	NCD_Investigations-ECG	ECG	Yes only		
test_required_echo	NCD_Investigations-Echo	Echo	Yes only		
test_required_hba1c	NCD_Investigations-HbA1C	HbA1C	Yes only		
test_hba1c_value	NCD_Investigations-HbA1C result	HbA1C result	Number		
test_required_cholesterol_total	NCD_Investigations-Total cholesterol	Total cholesterol	Yes only		
test_cholesterol_total_done	NCD_Investigations-Total cholesterol result	Total cholesterol result	Number		
test_required_creatinine	NCD_Investigations-Creatinine	Creatinine test	Yes only		
test_creatinine_done	NCD_Investigations-Creatinine result	Creatinine result	Number		
test_required_urine_analysis	NCD_Investigations-Urine analysis	Urine analysis	Yes only		
test_required_urine_microalbumin	NCD_Investigations-Urine microalbumin test	Urine microalbumin	Yes only		
test_required_alt	NCD_Investigations-ALT/SGPT	ALT test	Yes only		
test_required_k	NCD_Investigations-Pottasium	Pottasium test	Yes only		
test_required_tsh	NCD_Investigations-TSH	TSH test	Yes only		
test_tsh_done	NCD_Investigations-TSH result	TSH result	Number		
test_required_lft	NCD_Investigations-Liver function test	Liver function test	Yes only		
test_required_other1	NCD_Investigations-Other test I	Other test I	Yes only		

Figure:-2.3

Program Stage Section- Medication First Visit					
treatment_current_name_01	NCD_Medication-Name I	Name I	Text	Medicine list	
other_medication_name_01	NCD_Other medication name I	Other medication name I	Text		
treatment_frequency_01	NCD_Medication-Frequency I	Frequency I	Text	Frequency	
treatment_tab_numbers_01	NCD_Medication-Tab numbers I (per month)	Tab numbers I (per month)	Positive or Zero Integer		
med_non_msf_dispenser_01	NCD_Medication I Non-MSF dispenser	Medication I Non-MSF dispenser (if applicable)	Text	Non-MSF dispenser	
treatment_current_name_02	NCD_Medication-Name II	Name II	Text	Medicine list	
other_medication_name_02	NCD_Other medication name II	Other medication name II	Text		
treatment_frequency_02	NCD_Medication-Frequency II	Frequency II	Text	Frequency	
treatment_tab_numbers_02	NCD_Medication-Tab numbers II (per month)	Tab numbers II (per month)	Positive or Zero Integer		
med_non_msf_dispenser_02	NCD_Medication II Non-MSF dispenser	Medication II Non-MSF dispenser (if applicable)	Text	Non-MSF dispenser	
treatment_current_name_03	NCD_Medication-Name III	Name III	Text	Medicine list	
other_medication_name_03	NCD_Other medication name III	Other medication name III	Text		
treatment_frequency_03	NCD_Medication-Frequency III	Frequency III	Text	Frequency	
treatment_tab_numbers_03	NCD_Medication-Tab numbers III (per month)	Tab numbers III (per month)	Positive or Zero Integer		
med_non_msf_dispenser_03	NCD_Medication III Non-MSF dispenser	Medication III Non-MSF dispenser (if applicable)	Text	Non-MSF dispenser	
treatment_current_name_04	NCD_Medication-Name IV	Name IV	Text	Medicine list	
other_medication_name_04	NCD_Other medication name IV	Other medication name IV	Text		
treatment_frequency_04	NCD_Medication-Frequency IV	Frequency IV	Text	Frequency	

Chapter 5

Build

In build chapter, we import the excel sheet in DHIS2, Steps and Modules of DHIS2 involved in Customisation and Designing of MSF B DHIS2 for Lebanon

Tracker Capture

(Programme Formation)

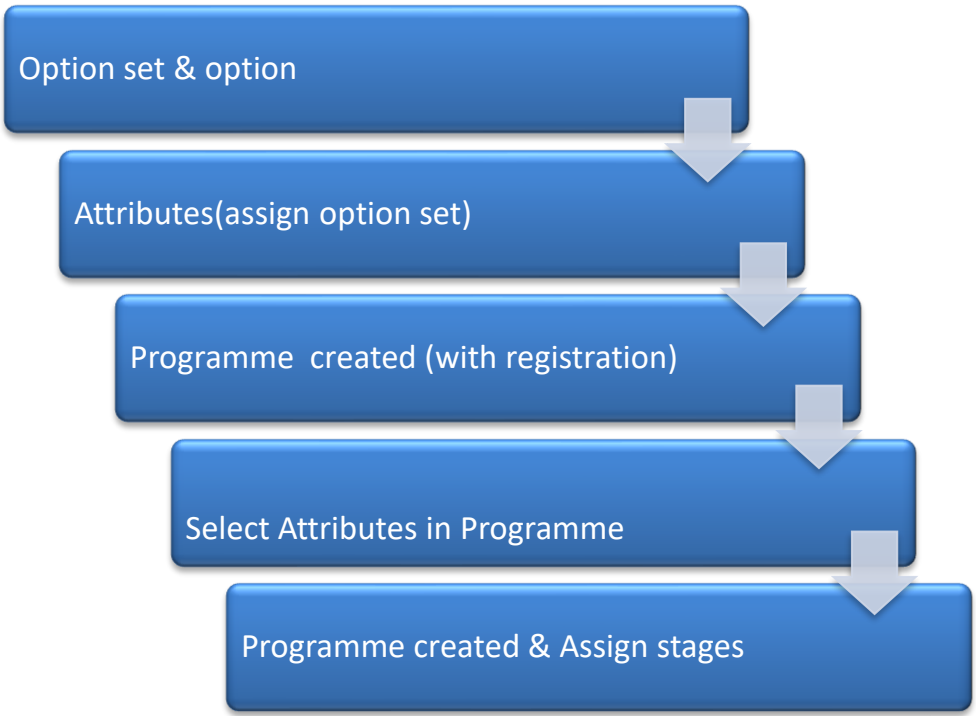
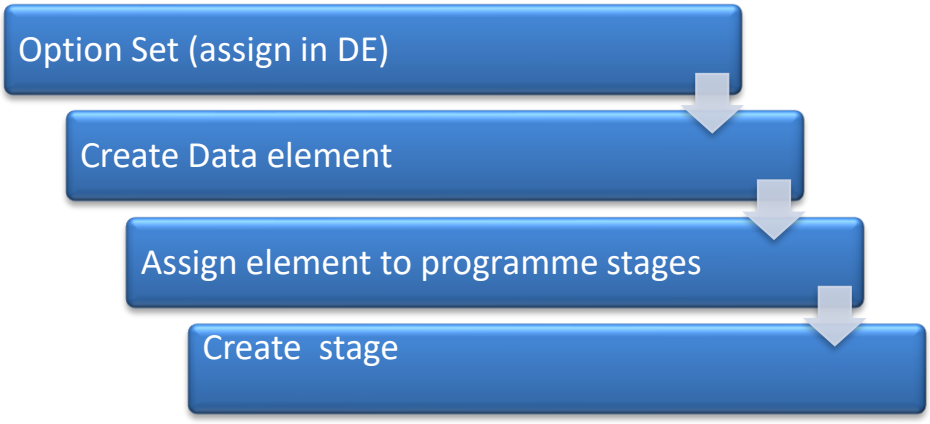


Figure:-3.1

(Stage Formation)



MSF DHIS 2 (Log in Page)

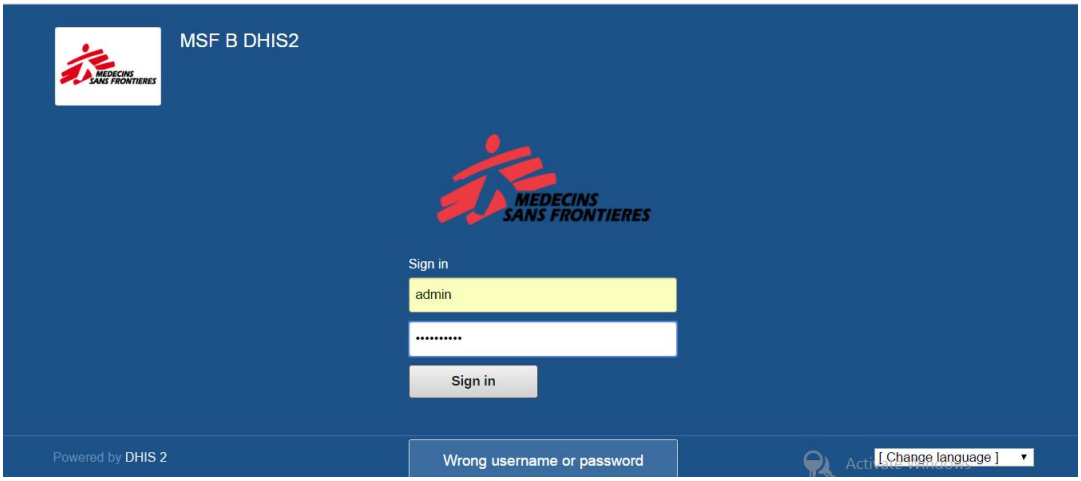


Figure:-3.3

MSF DHIS 2 (Dashboard)

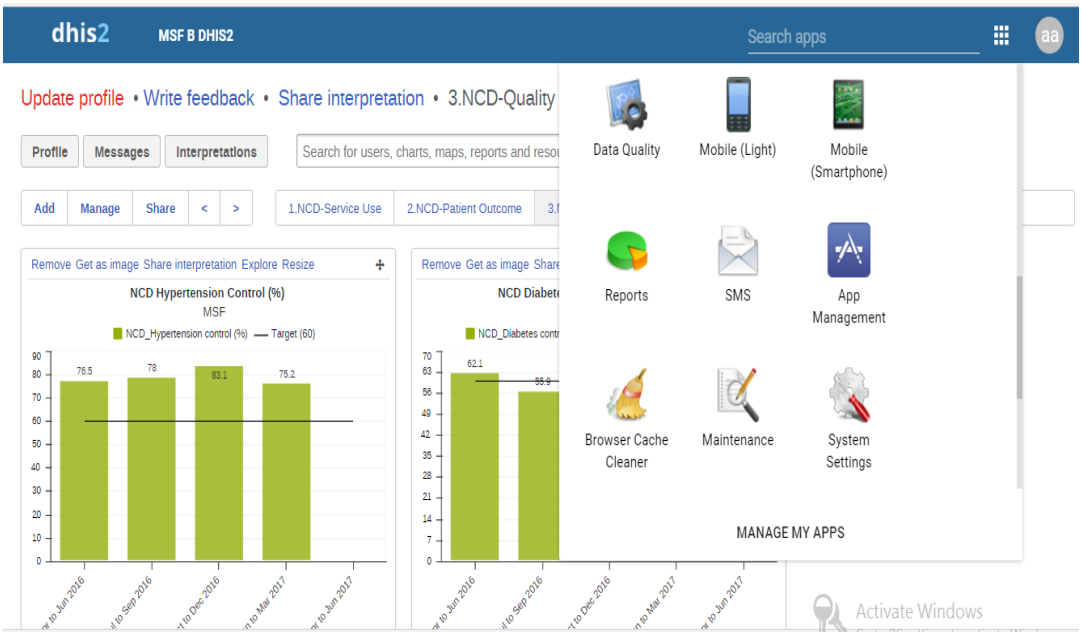


Figure:-4.1

After log in, this page will open. After that you can search app on the right side

Tracker Capture

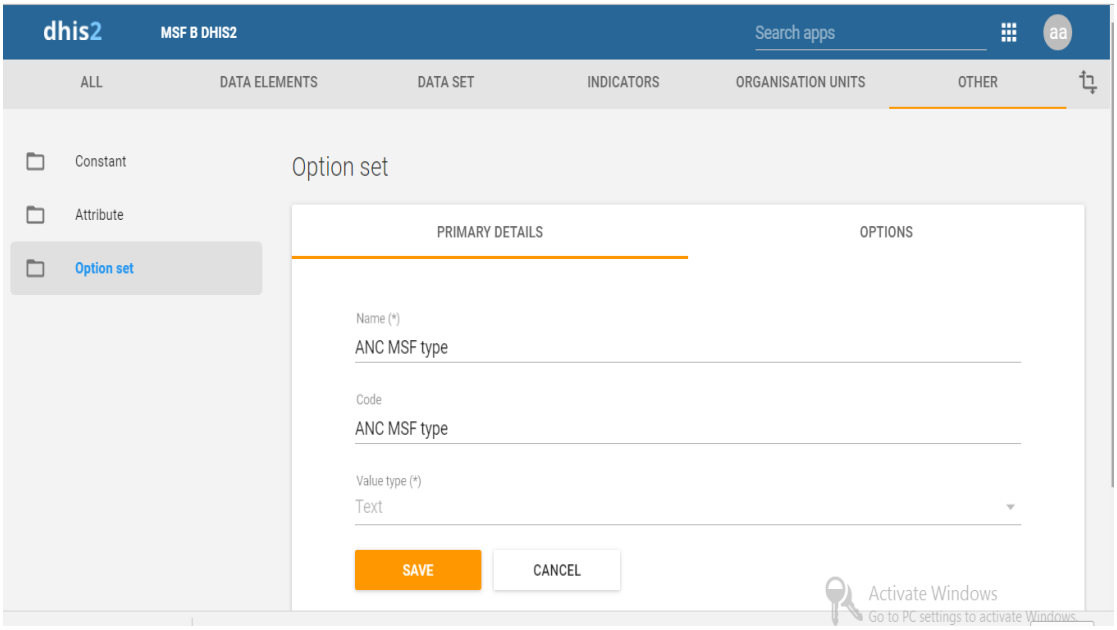


Figure:-4.2

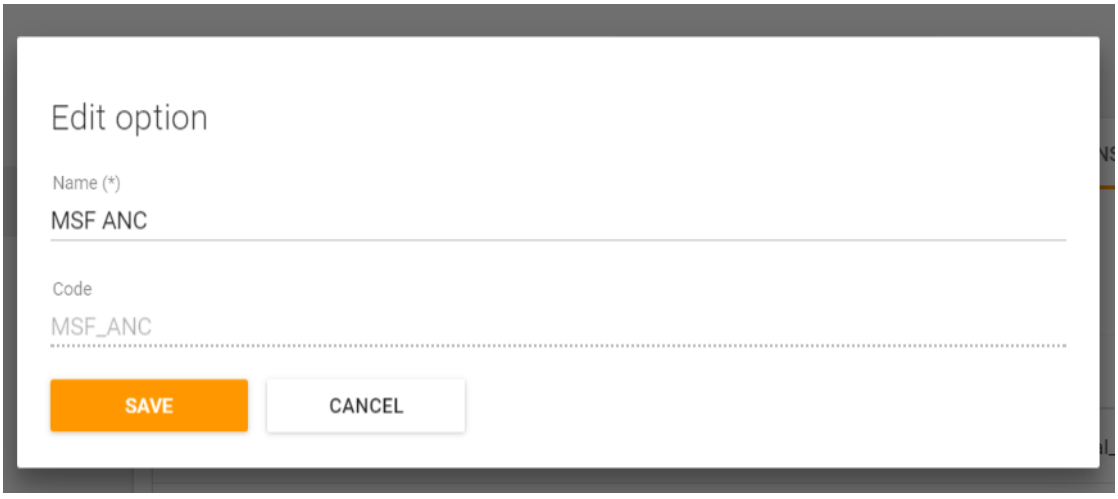


Figure:-4.3

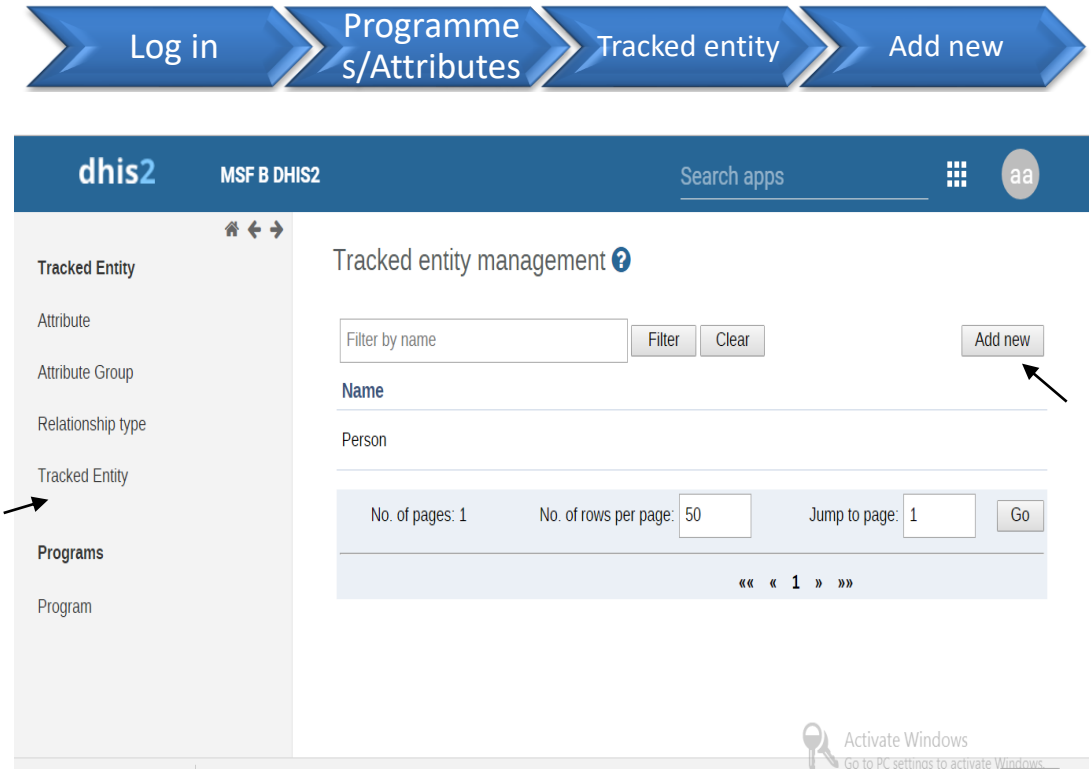


Figure:-4.4

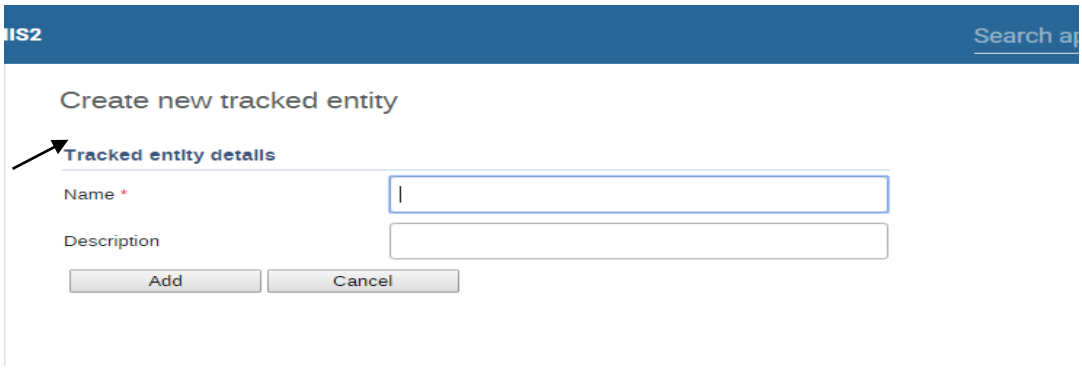


Figure:-5.1

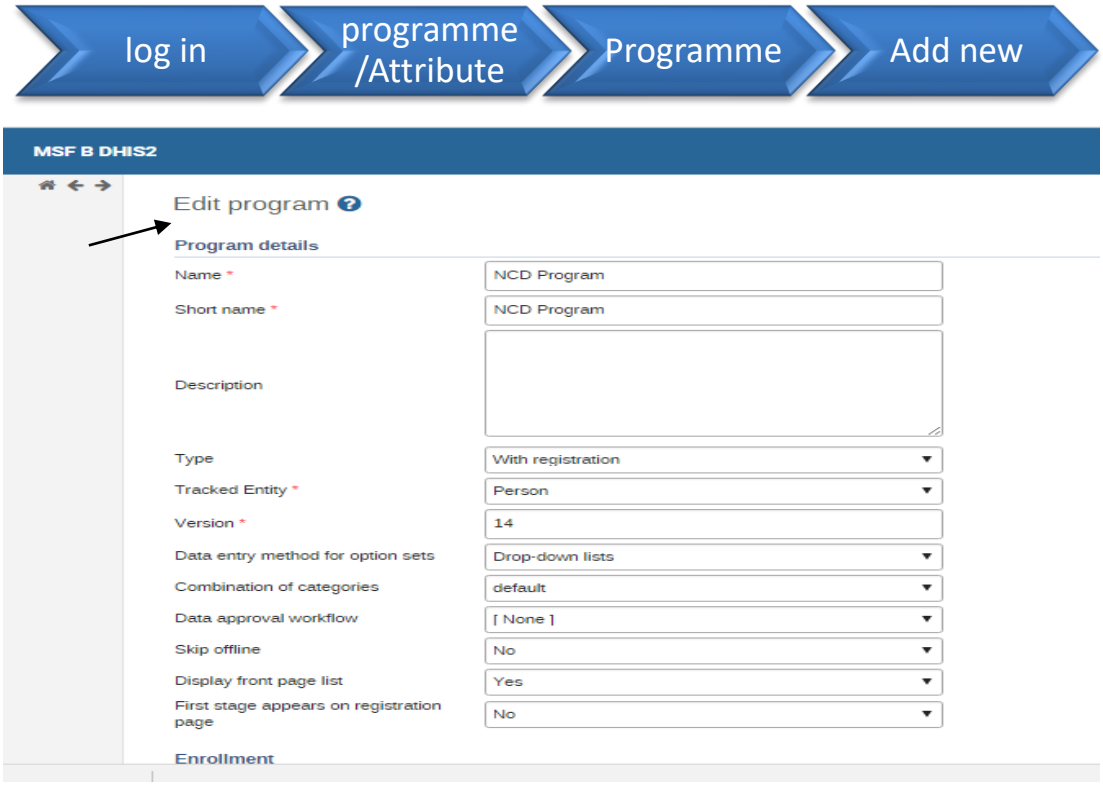


Figure:-5.2

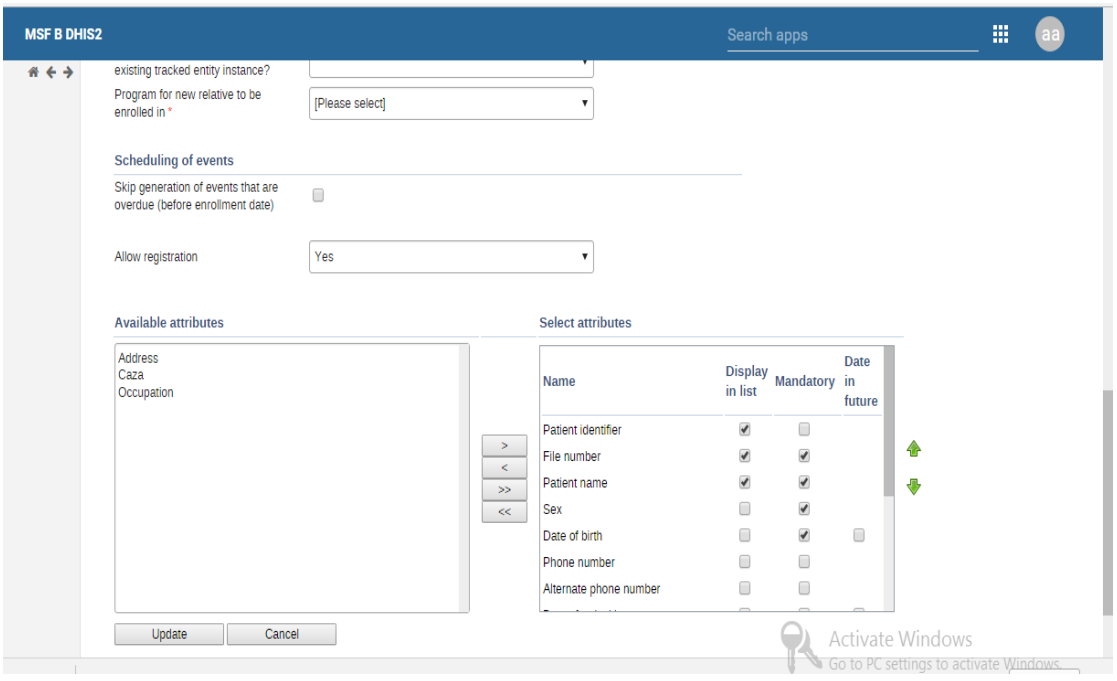


Figure:-5.3

At the end select attributes in the given sheet .After that update the sheet and the programme create and assign the stages in it

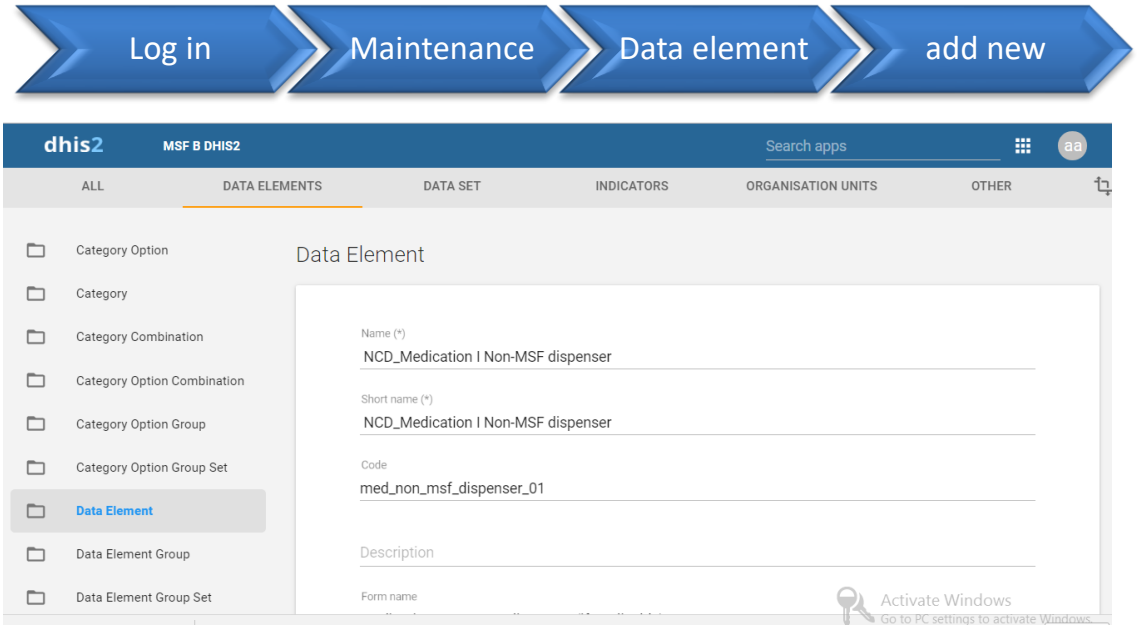


Figure:-5.4

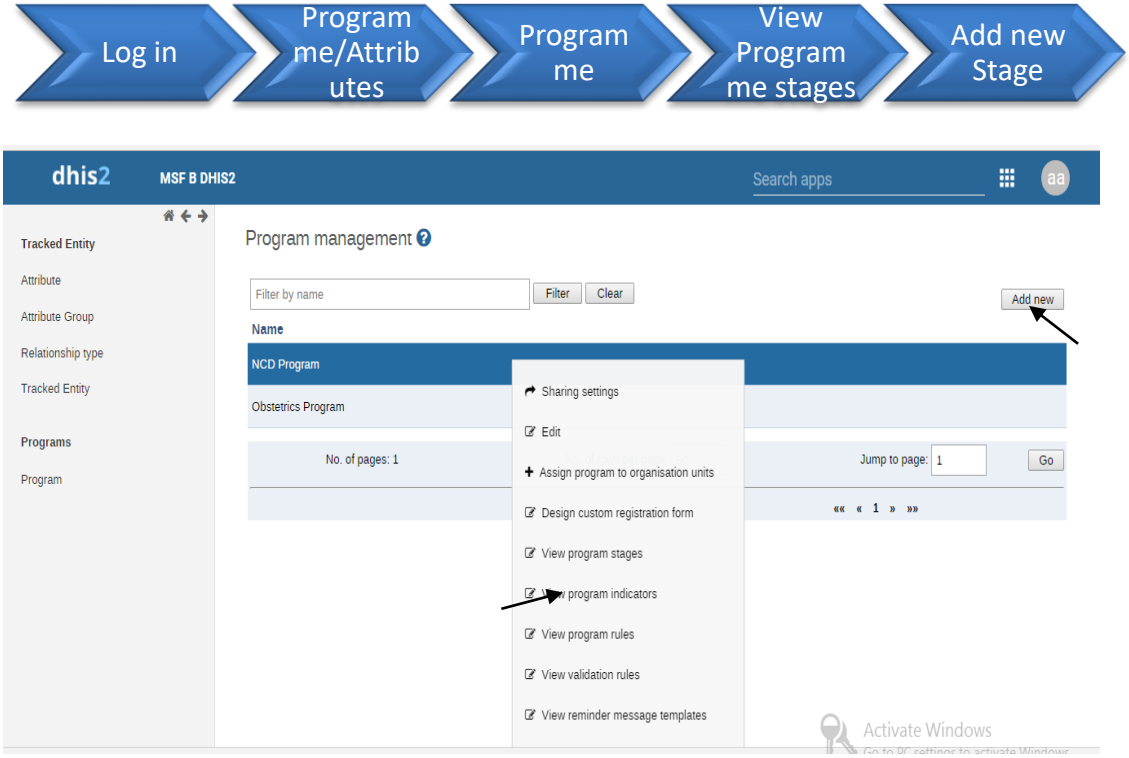


Figure:-5.5

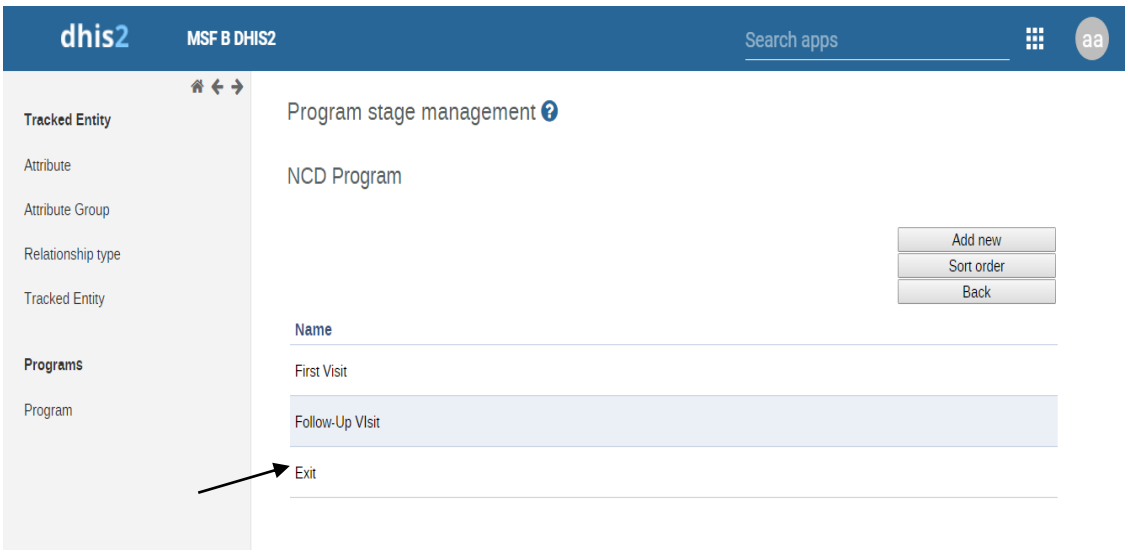
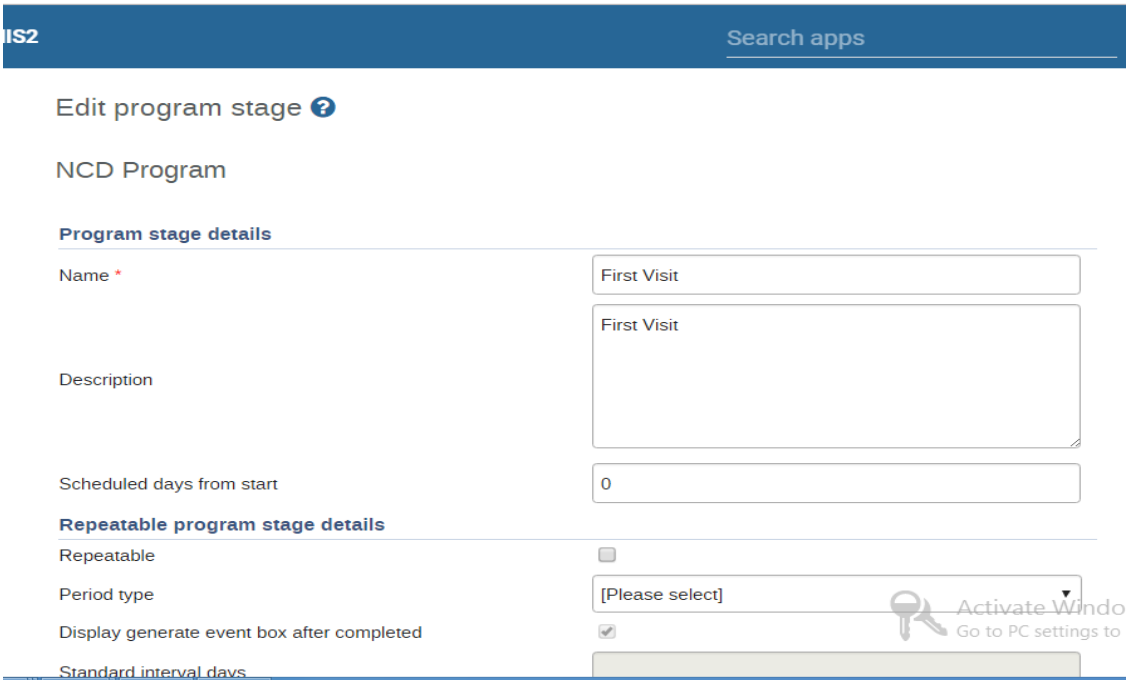


Figure:-6.1



Chapter 5

Implementation

Getting Started

The purpose of the document is to understand the overall workflow of the System from data entry to data analysis.

1. Enter the following URL in the browser:

http://178.79.144.205:21092/msf/dhis-web-commons/security/login.action

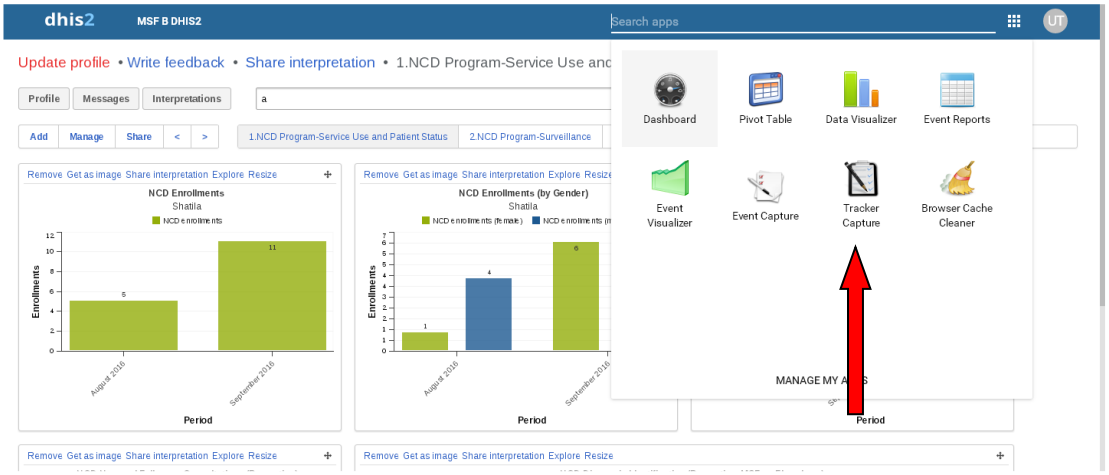
2. Enter the username and password.

3. Click on ‘Sign in’

Once the login is complete the page to the right hand side will appear which the 'Dashboard' is

5. This dashboard displays the, charts and graphs set for frequent monitoring and evaluation exercise.

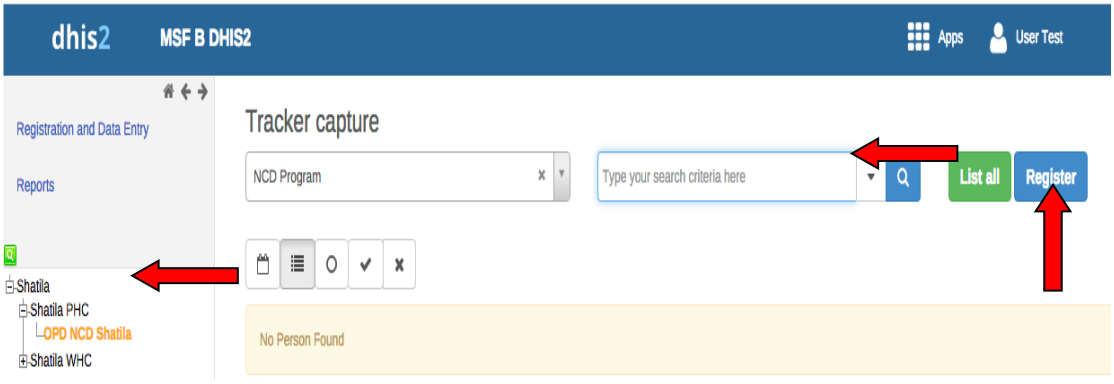
6. To logout of the instance, go to the Profile at the top right corner and click on 'Log out'



Apps: Tracker Capture:-
Tracker capture app allows the following functionalities:

a. Registering patients in the NCD program.

b. Reporting and tracking the data for baseline as well as follow-up visits for the patients.



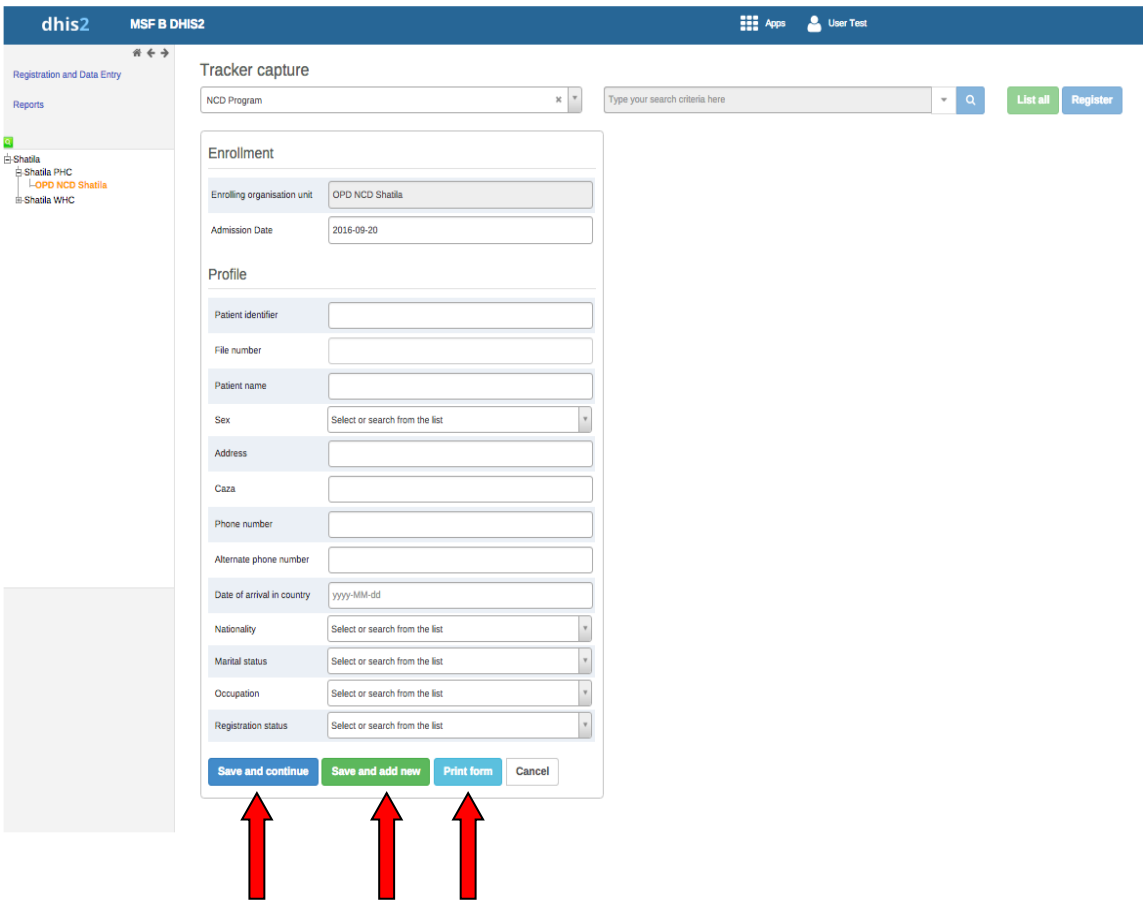
-

Registration:-

1. From the left side of the page, select the organization unit for which the data entry needs to be done.

2. Select the 'NCD program' from the list of programs.

3. Click on 'Register', and enter data in the patient registration form.



4. Enter the data in the patient attributes given in the patient registration form.

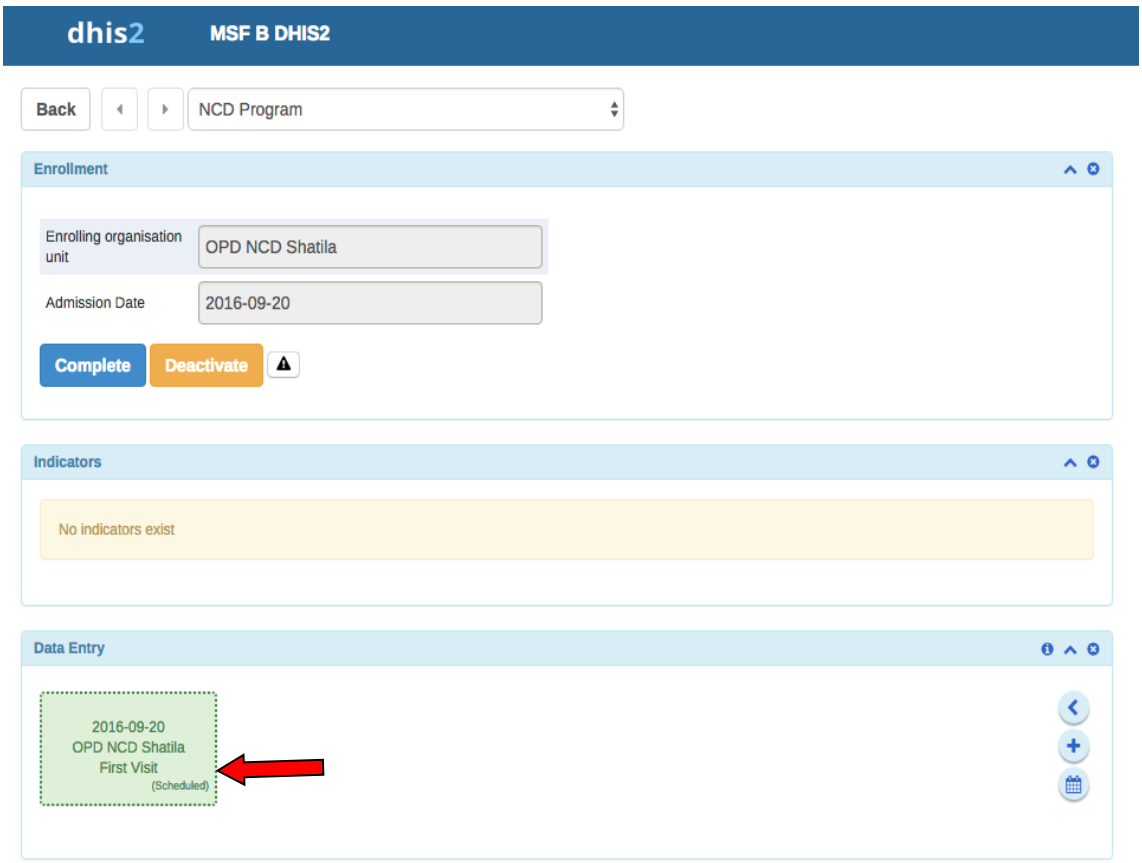
5. Once the data is entered, click on ‘Save and Continue, to enter the next set of the details for the patient visit.

6. in order to register another patient without filling in the visit details click on ‘Save and Add New’, which re-loads the patient registration form.

7. If clicked on ‘Save and Continue’ the system takes the user to the ‘Patient Dashboard’ for entering details for the ‘First Visit’.

8. If this patient registration is to be cancelled, please click on ‘Cancel’.

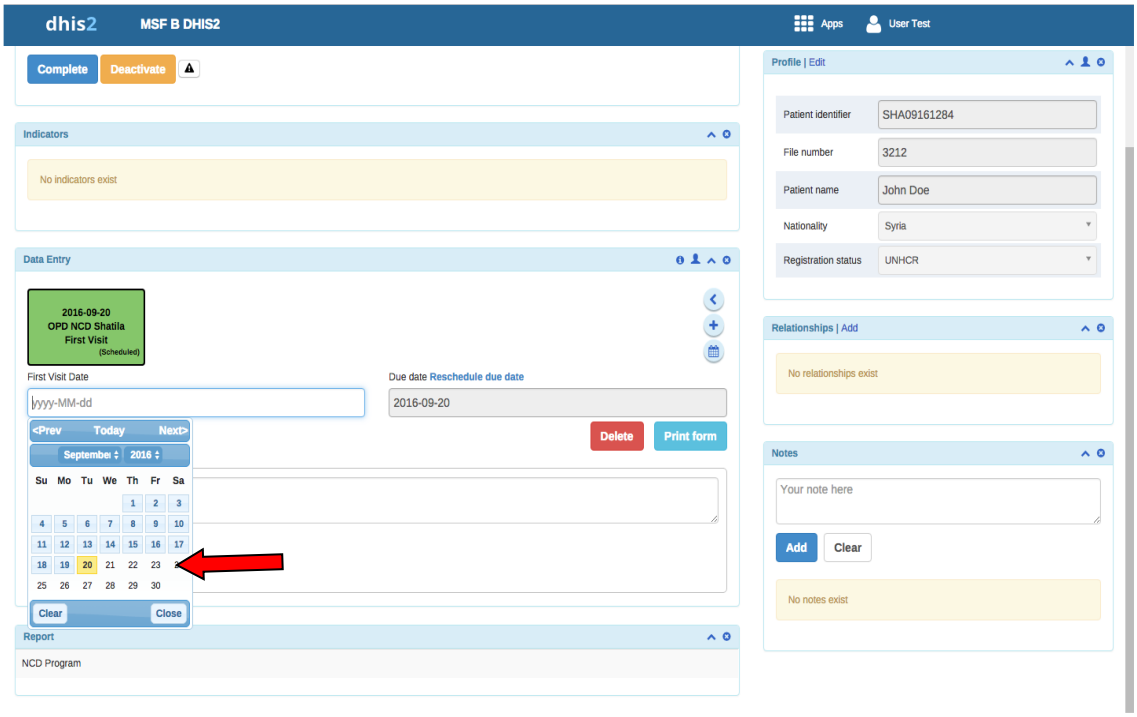
9. The list of registered beneficiaries can be seen for search and selection once the organisation unit and program is selected, as shown in the screenshot.



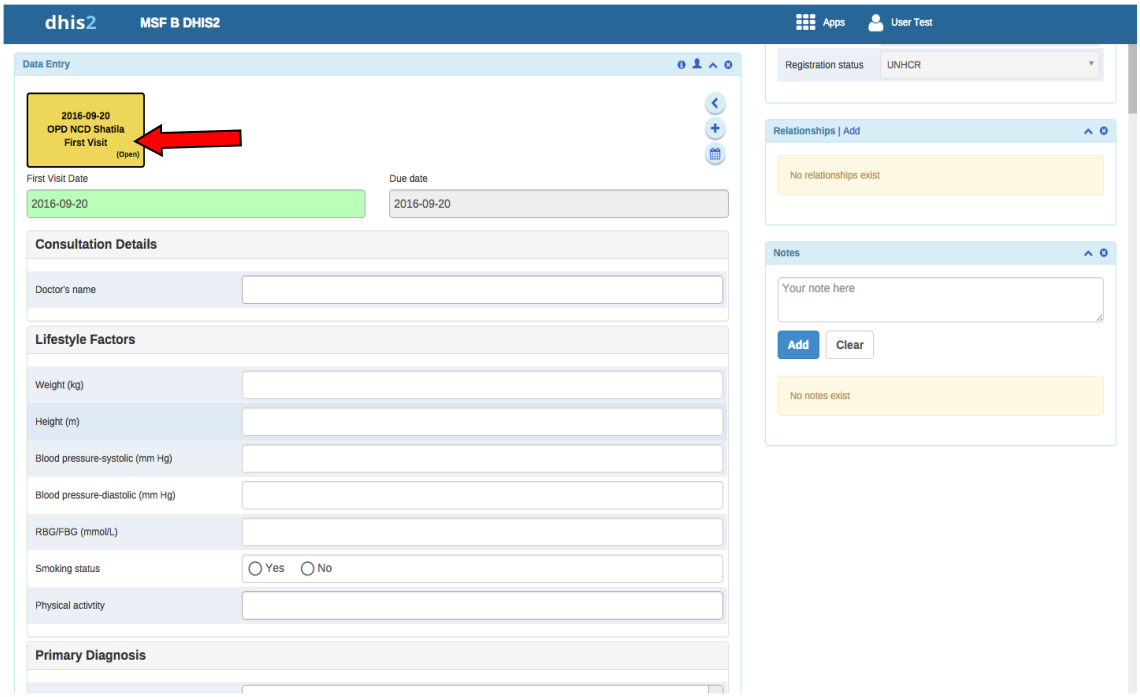
Data Entry for Patient's Visit Details:-

As mentioned above, as the user completes the patient registration, the system takes the user to the 'Patient Dashboard'.

10. On the patient dashboard, in the 'Data Entry' widget, click on the box named 'First Visit' for entering details.

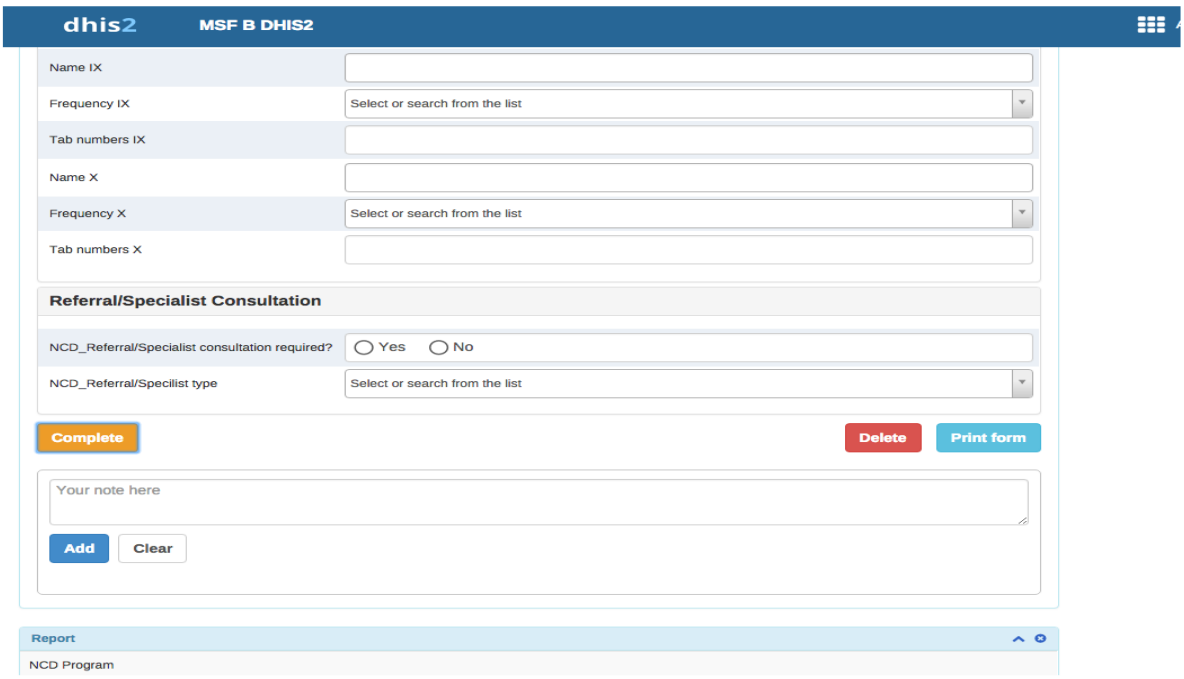


Enter the 'First Visit Date', by selecting the date from the calendar; this will be the date of visit or the date of admission for the patient.

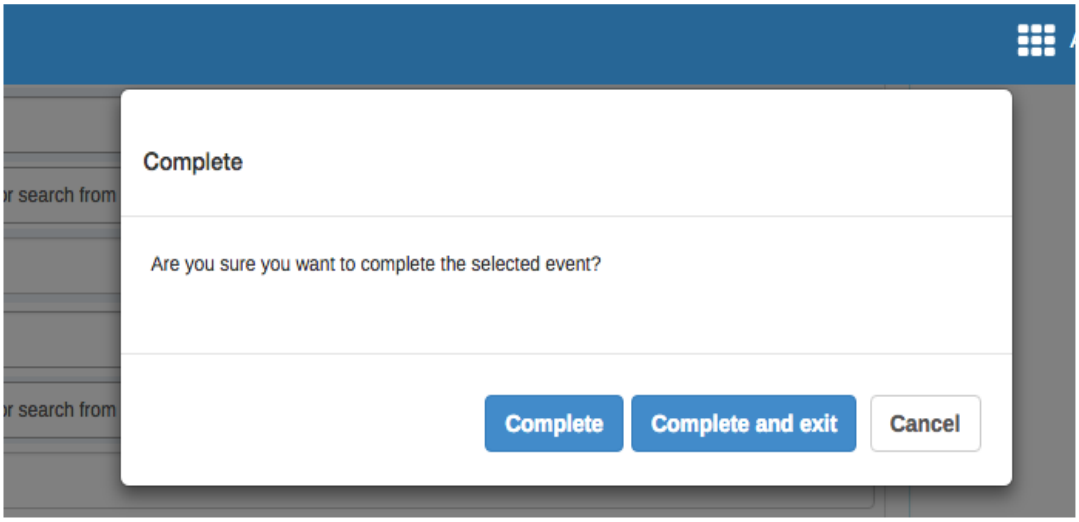


12. The system loads the data points for data entry which are divided into appropriate sections as per the NCD patient file.

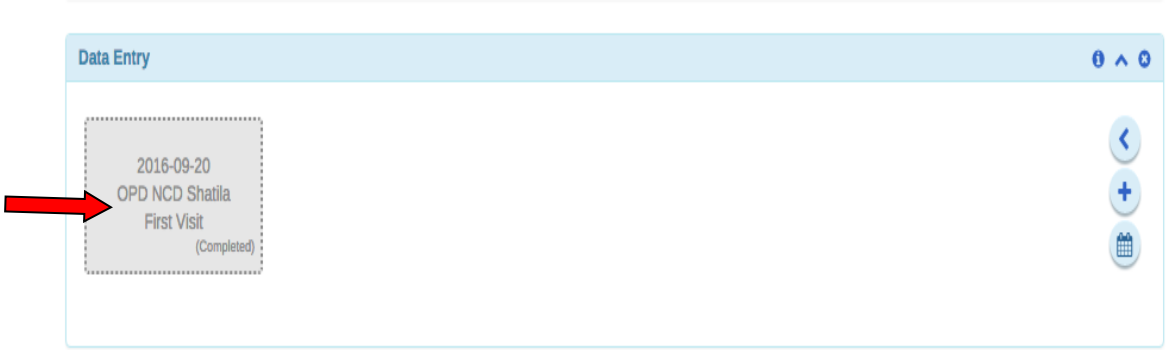
As the visit date is entered the color of the box turns to 'Yellow' indicating that the event is open for data entry.



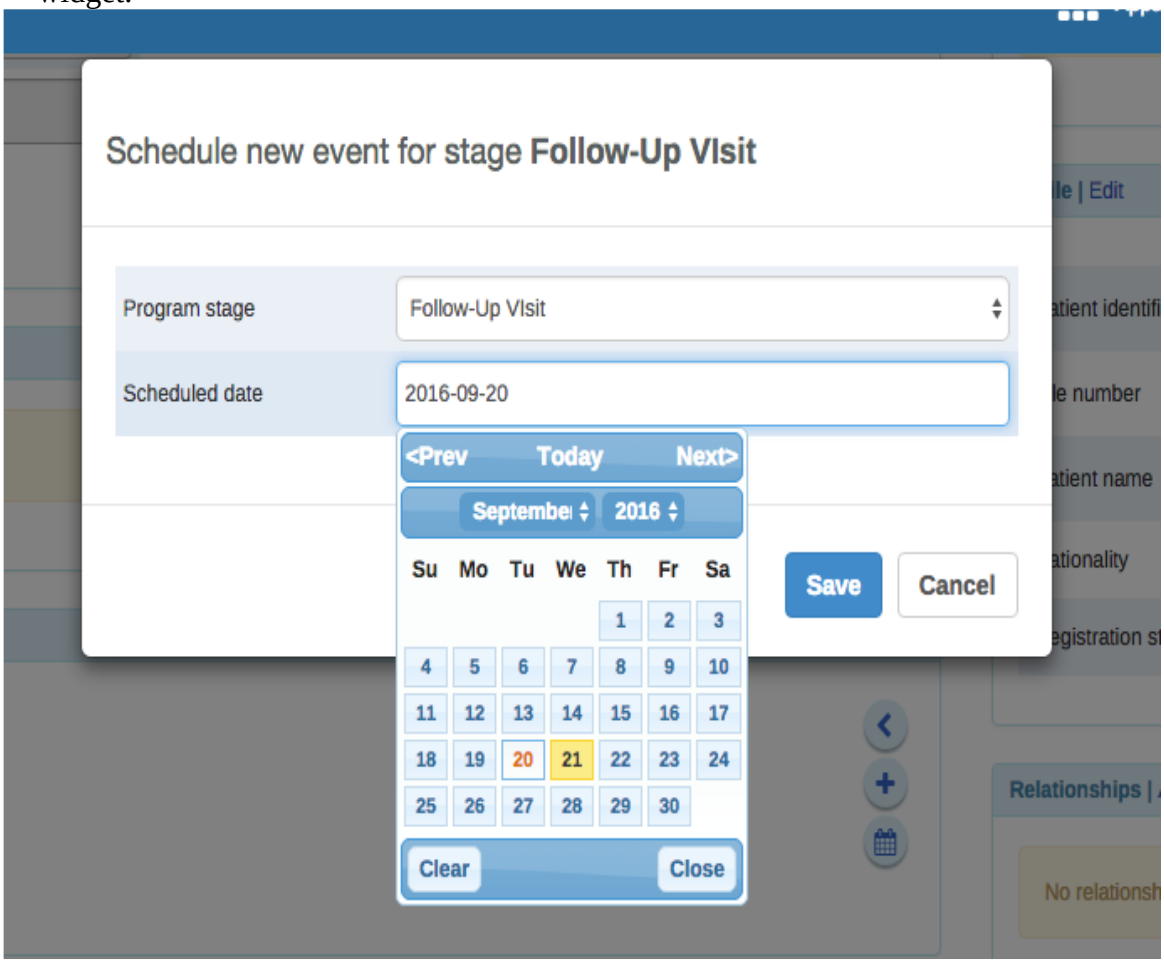
13. Once all the relevant information is filled, click on 'Complete'. In the pop-up again click on 'Complete. The colour of the box turns to 'Green' marking the profile as complete.



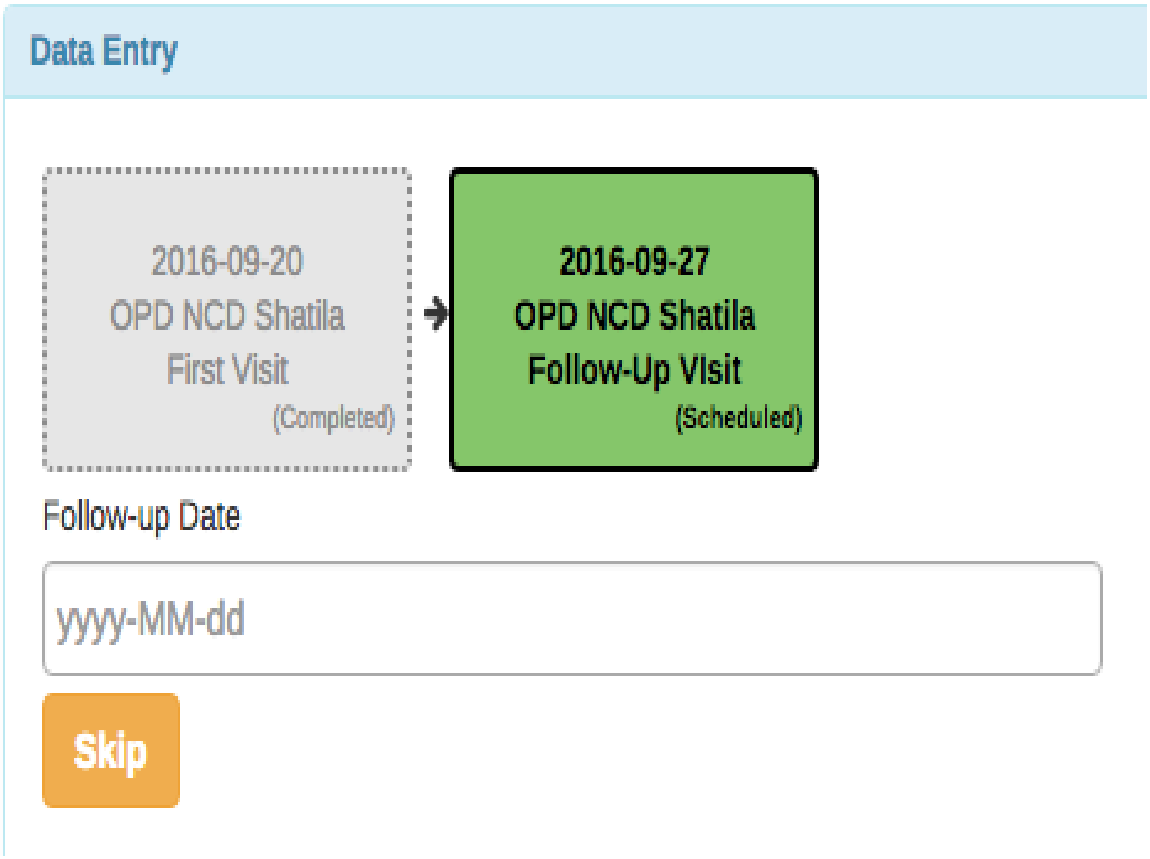
Click on 'Complete' if you would like to add additional events in the same patient record, or else click on 'Complete and Exit' to move out the registered patient list. As the event is completed, the color of the box changes to 'Grey' marking the event as completed.



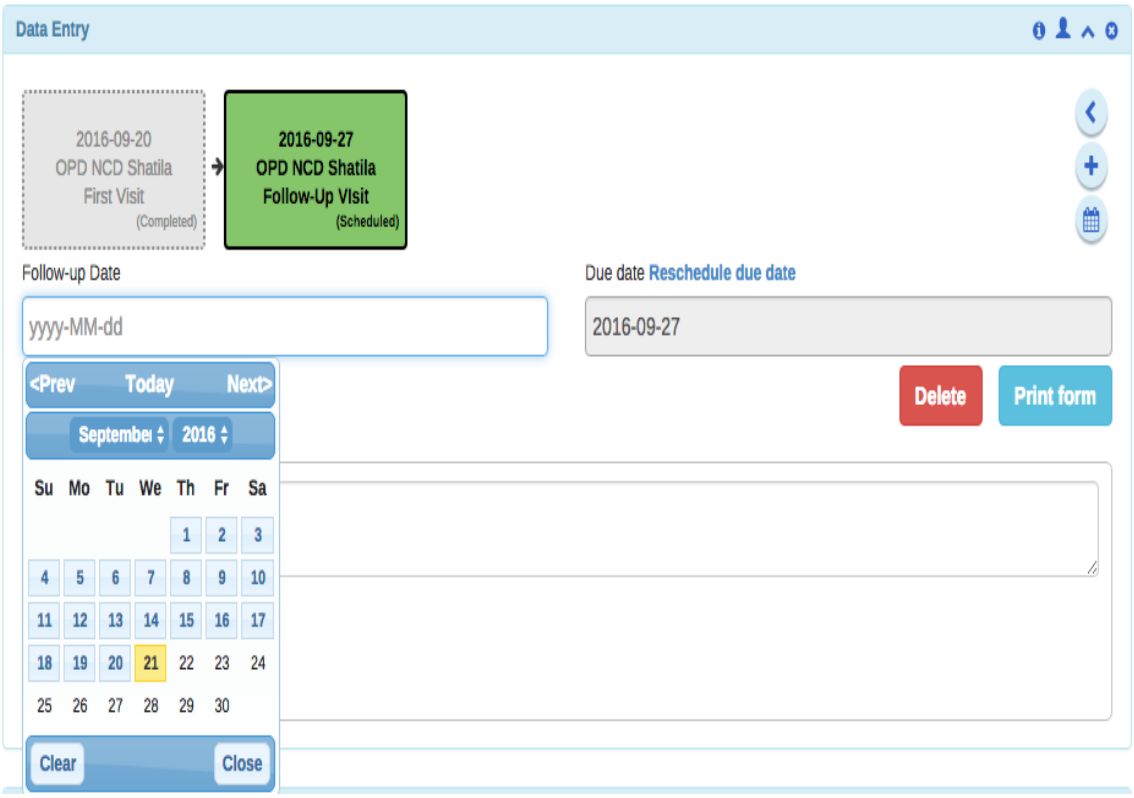
For adding up an event for next appointment, you can schedule a ‘Follow-up’ visit event in advance by clicking on the ‘Calendar Icon’ on the right hand corner of the data entry widget.



Next the system shows a pop-up window to select the event, which will be ‘Follow-up’ in this case, and select the date for which the next appointment has been given, and click on ‘Save.’



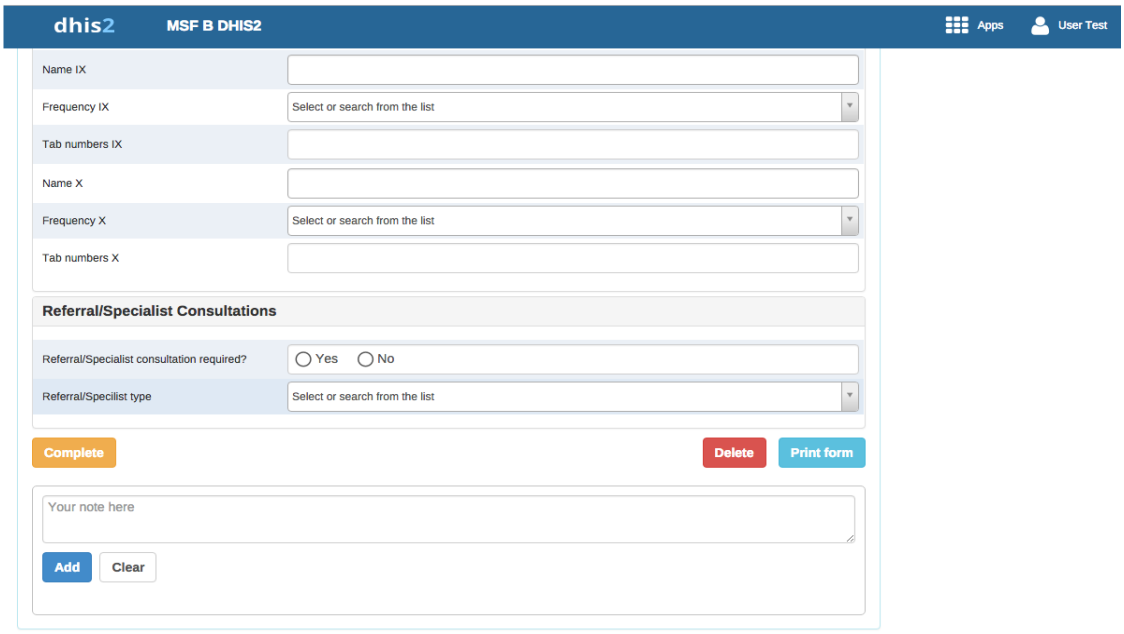
As a result, the system adds a new event for Follow-up for the scheduled date as given by the consultant in the patient file.



In order to reschedule due date for a SCHEDULED (event in dark green colour) event, click on 'Reschedule due date' and choose the date.

Data entry for Follow Up Visit:-

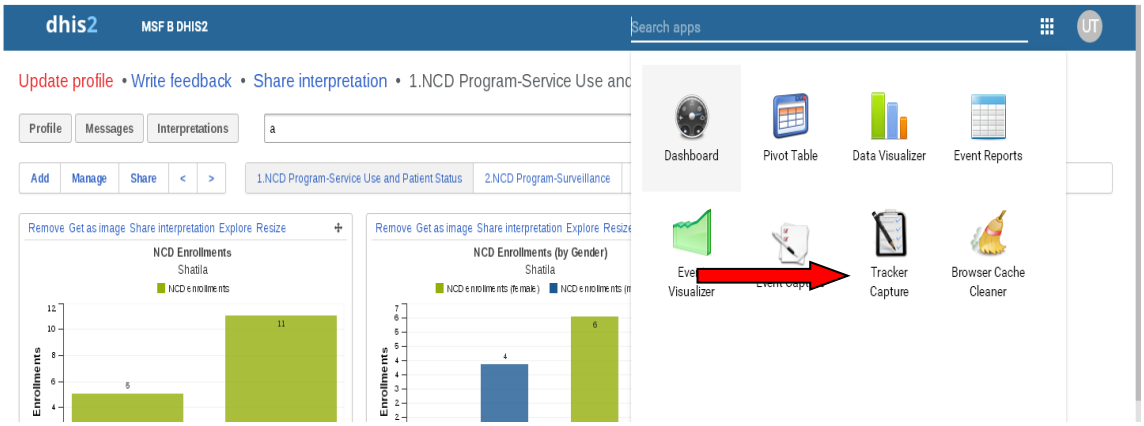
Repeat the same steps as above for entering data for the follow-up visit.
Select for Follow up Visit and enter the data and select the report date.

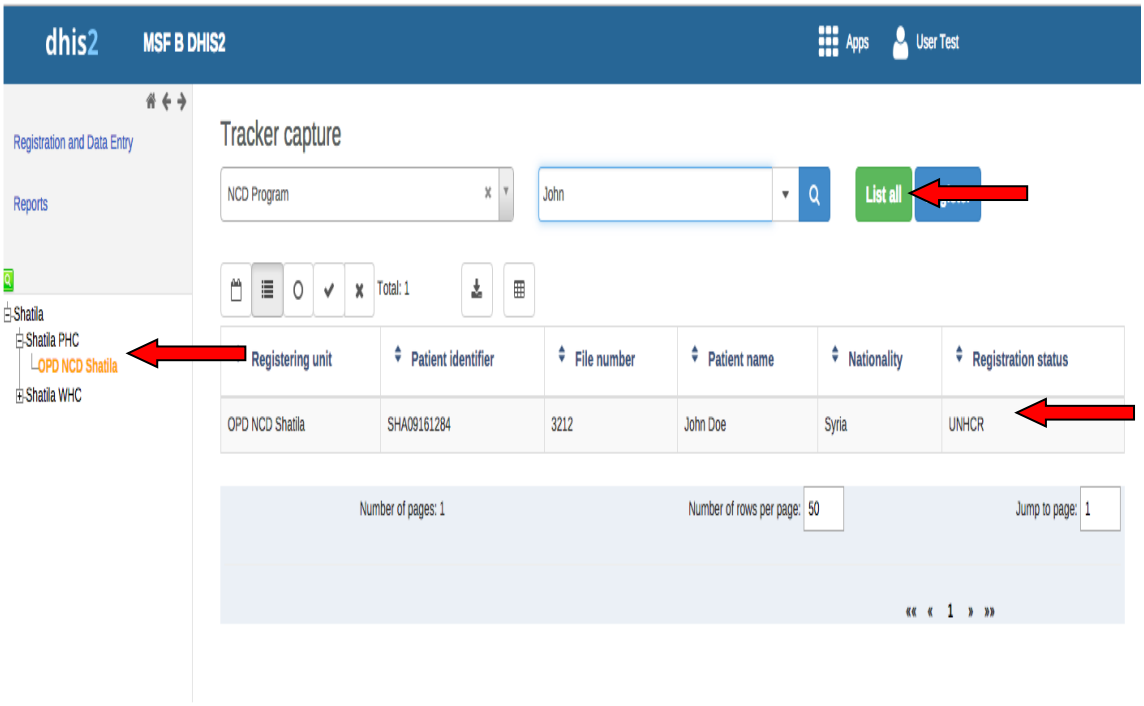


Enter the information for the visit and click on 'Complete'.

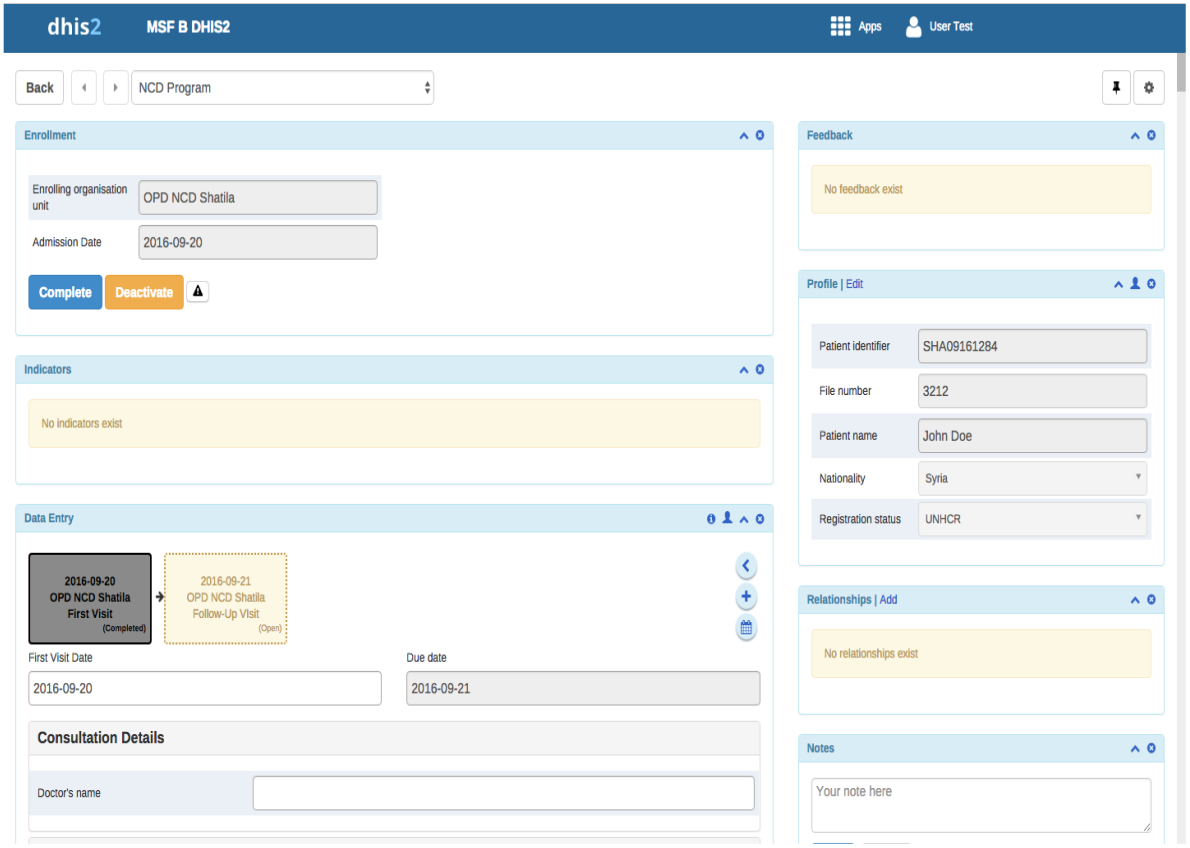
Searching an Existing Patient:-

From Apps menu select ‘Tracker Capture’.

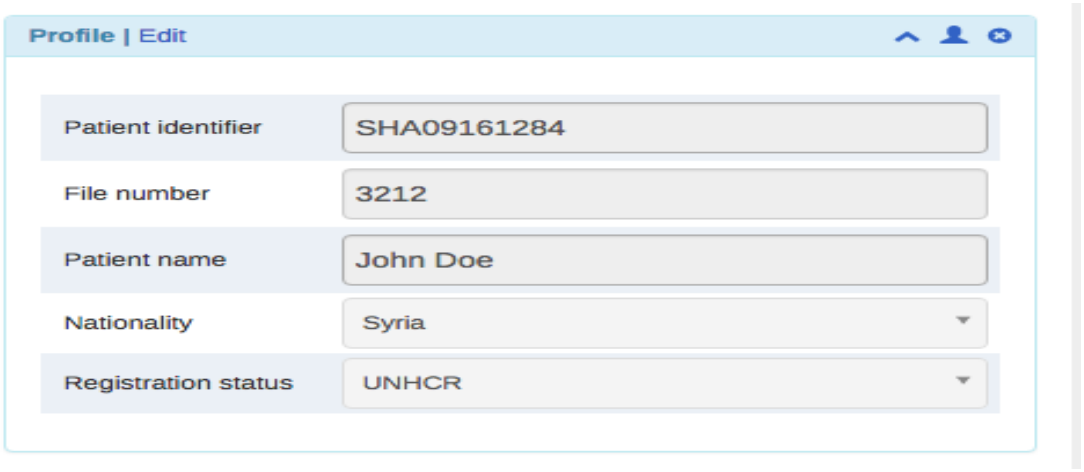




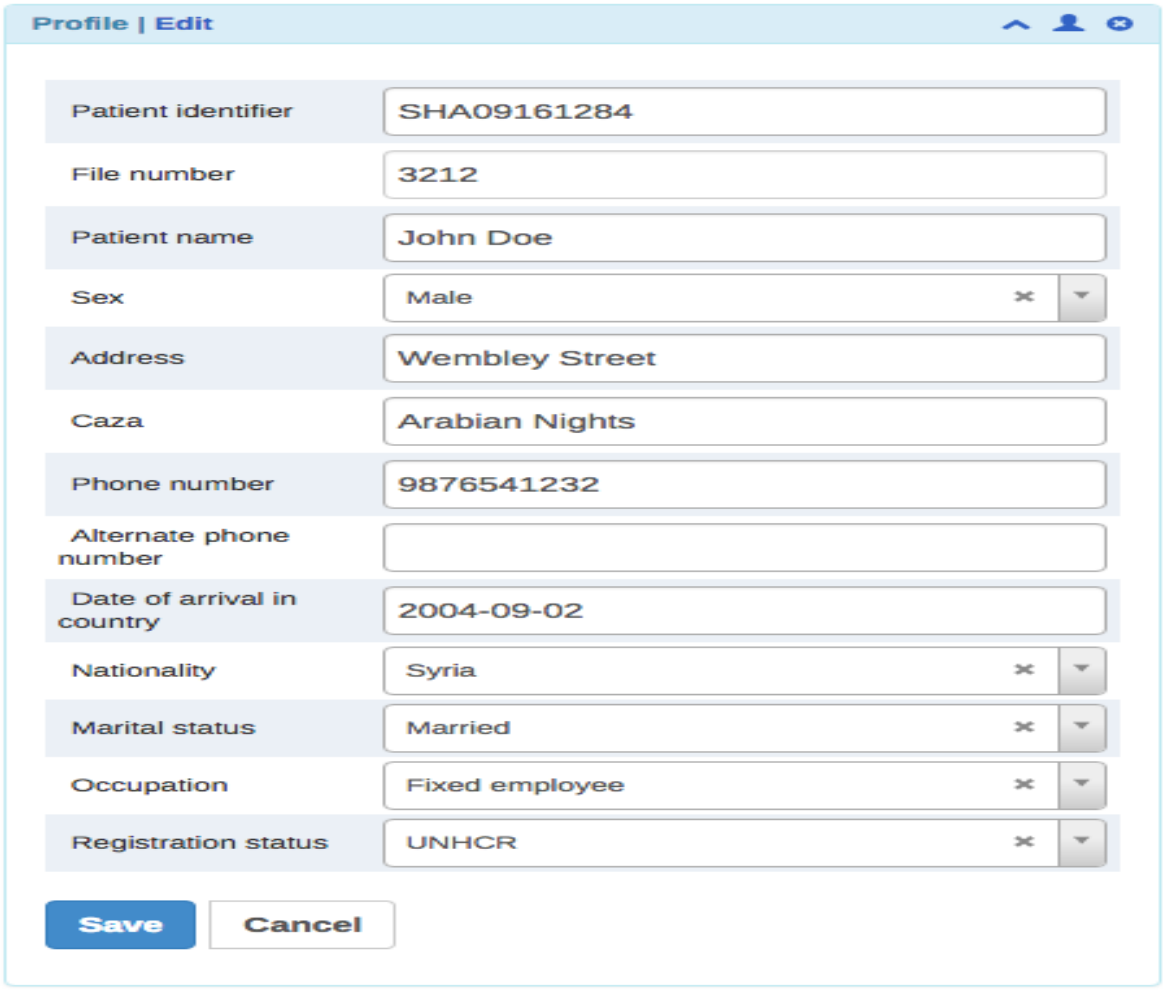
In order to search an existing patient, the user can use the ‘Patient Identifier’, or ‘Mobile Number’ or ‘Name’, or name or any unique attribute and click on ‘Search’ icon. Select the organization unit where you want to look for the patient, and enter a search parameter in the search box given, and click on the ‘Search Icon’.



Click on the desired beneficiary record from the search results and the system takes the user to the beneficiary dashboard.



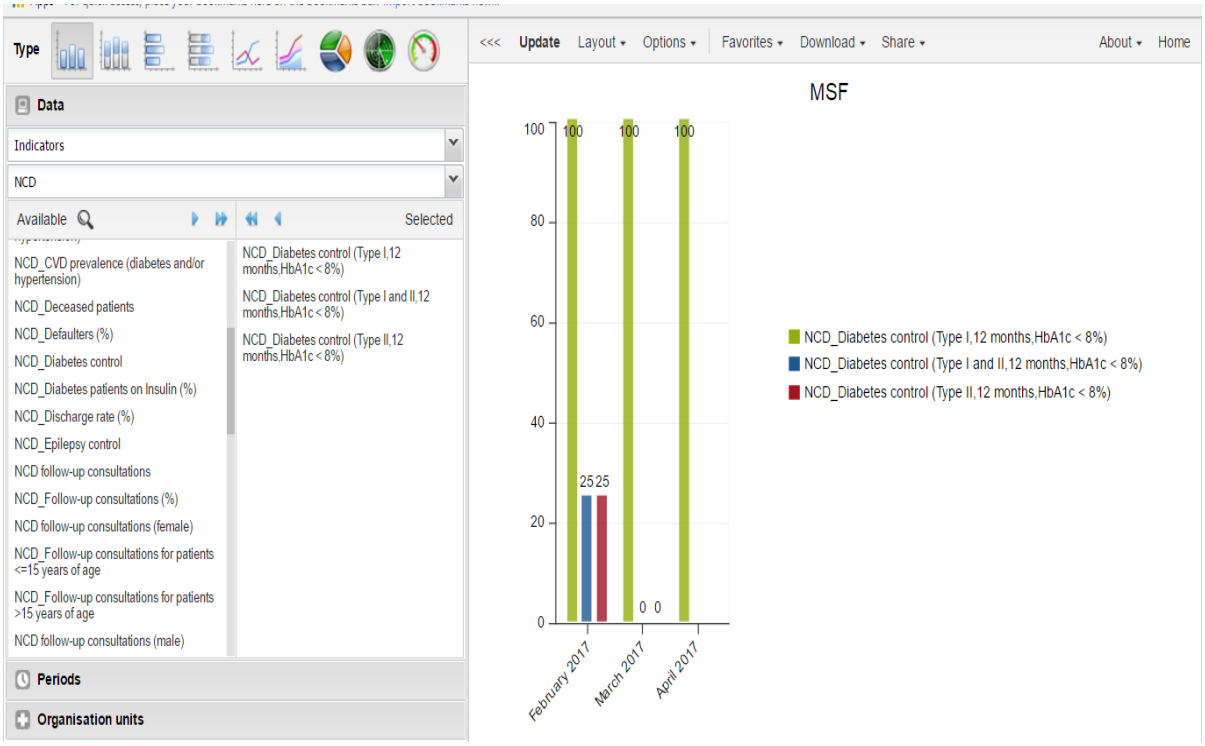
In case any updations are to be made to the beneficiary details, click on 'Edit', make the changes, and click on 'Save'.



Chapter 6

DHIS2 Analysis Module

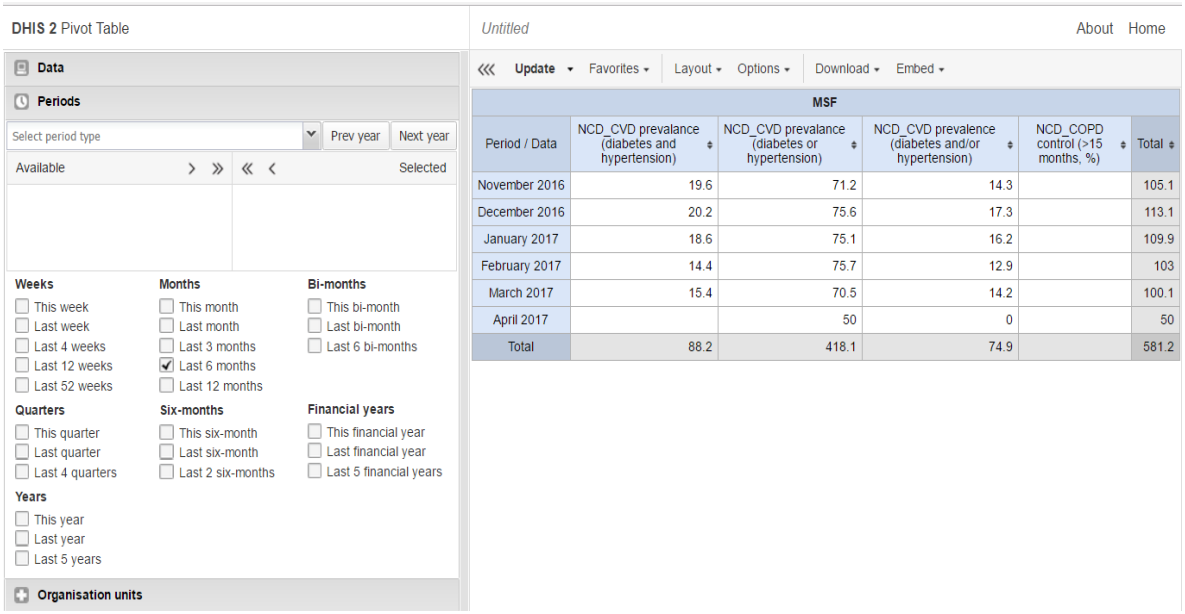
Data visualise:-



With the Data Visualizer app, you can select content, for example indicators, data elements, periods and organisation units, for an analysis. The app works well over poor Internet connections and generates charts in the web browser.

- You can hide and show individual data series in the chart by clicking directly on the series label in the chart. They appear either at the top or to the right of the chart.
- You can click on the triple left-arrow button on the top centre menu. This collapses the left side menu and gives more space for the chart. You can get the menu back by clicking on the same button again.

Pivot tables:-



With the Pivot Table app, you can create pivot tables based on all available data dimensions in DHIS2. A pivot table is a dynamic tool for data analysis which lets you summarize and arrange data according to its dimensions. Examples of data dimensions in DHIS2 are:

- data dimension itself (for example data elements, indicators and events)
- periods (representing the time period for which the data represents)
- organisation hierarchy (representing the geographical location of the data)

From these dimensions you can freely select dimension *items* to include in the pivot table.

A pivot table can arrange data dimensions on *columns*, *rows*, and as *filters*. When you place a data dimension on columns, the pivot table will display one column per dimension item. If you place multiple data dimensions on columns, the pivot table displays one column for all combinations of the items in the selected dimensions. When you place a data dimension on rows, the pivot table displays one row per dimension item in a similar fashion. The dimensions you select as filters will not be included in the pivot table, but will aggregate and filter the table data based on the selected filter items.

Data Analysis

Indicators Categories:-

1.) NCD Service Use

2.) NCD Patient Outcome

3.) NCD Quality of Services

4.) NCD Surveillance

5.) NCD Process indicators

So, we discuss Indicators under Quality of services and Surveillance in Shatila (Lebanon)

NCD Quality of Services

Diabetes control

Indicator rationale: This indicator is required to evaluate the overall effects of the therapy on the diabetic patients over a period of 6 months and 12 months respectively. The indicator evaluates the patients on the following conditions:

a. Patients should be enrolled under the program for more than 6 months but less than 12 months for diabetes control (6 months), and for 12 or more months for diabetes control (12 months).

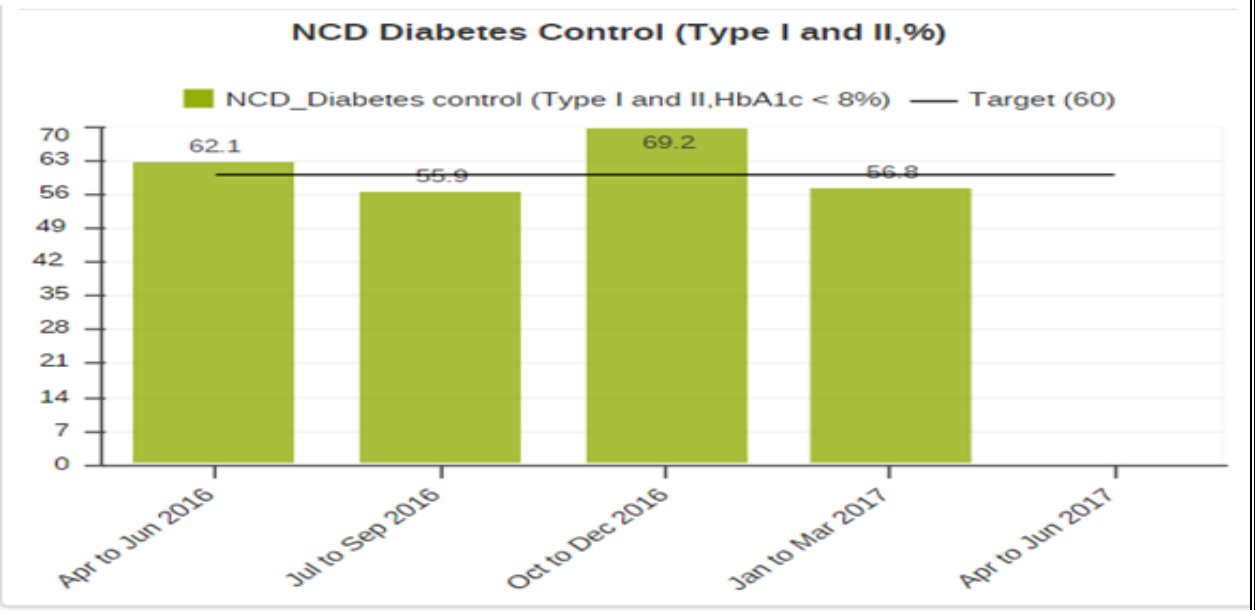
b. Patients should have an Hb1AC test recorded after the completion of desired period of enrolment.

c. Patients should have reported an HbA1c count of less than 8% to defined as diabetes controlled.

Numerator: patients with HbA1c <8.5% in past 12 months (or average glucose <10.9 mmol/L / 200 mg/dL)

Denominator: patients with HbA1c recorded

Factor: Percentage



Graph 1

Observations:

The frequency of data analysis was taken as quarterly. Out of all the diabetic patients who made a visit to the clinic and met the above explained evaluation criteria for last 4 quarters around 60% or more patients were found to be under control for diabetes which shows the effectiveness of the therapy and patient's adherence to the prescribed medicine regimen.

Hypertension control

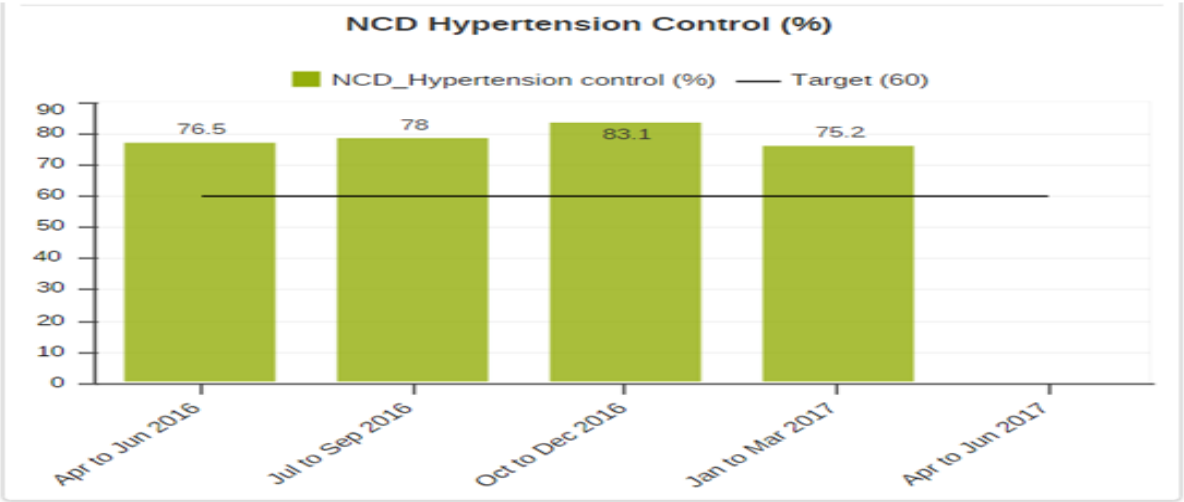
Indicator rationale: This indicator is required to evaluate the overall effects of the therapy on the hypertensive patients over a period of 6 months and 12 months respectively. The indicator evaluates the patients on the following conditions:

a. Patients should be enrolled under the program for more than 6 months but less than 12 months for hypertension control (6 months), and for 12 or more months for hypertension control (12 months).
b. Patients should have an BP recorded after the completion of desired period of enrolment.
c. Patients should have reported an BP <140/90 on therapy less than 12 months to defined as hypertension controlled.

Numerator: Hypertensive patients with BP < 140/90 on therapy >= 12 months

Denominator: Hypertensive patients on therapy >=12 months

Factor: Percentage



Graph 2

Observations:

The frequency of data analysis was taken as quarterly. Out of all the hypertensive patients who made a visit to the clinic and met the above explained evaluation criteria for last 4 quarters around 75% or more patients were found to be under control for hypertension which shows the effectiveness of the therapy and patient's adherence to the prescribed medicine regimen.

NCD Surveillance:-

CVD Prevalence

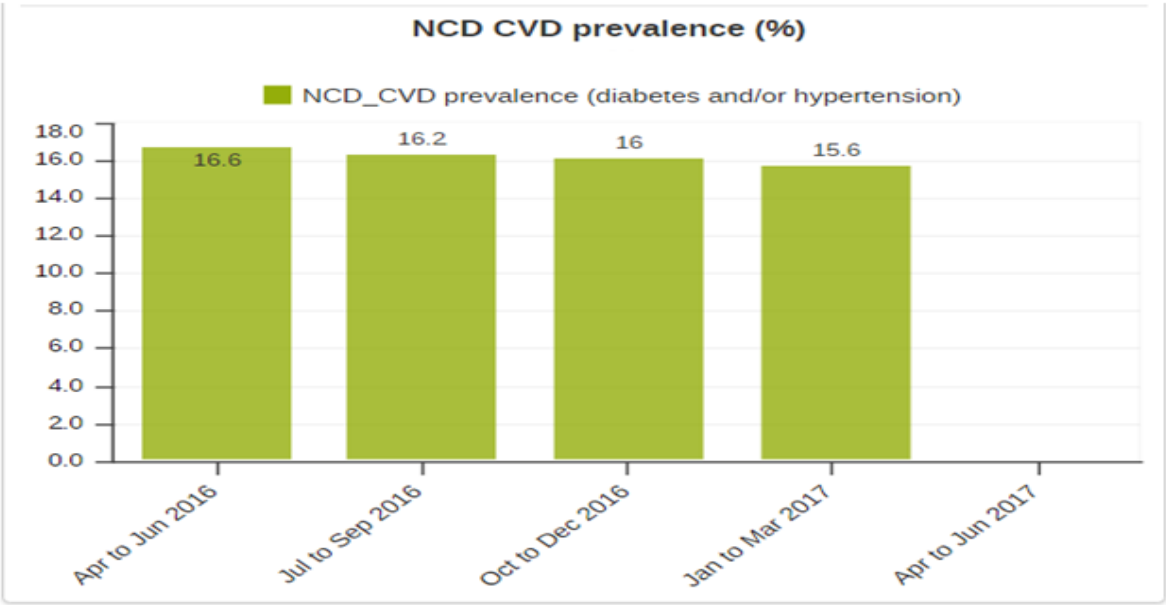
Indicator rationale: This indicator is required to evaluate the overall effects of the therapy on the hypertensive patients over a period of 6 months and 12 months respectively. The indicator evaluates the patients on the following conditions:

a. Patients should be enrolled under the program for more than 6 months but less than 12 months for CVD Prevalence (6 months), and for 12 or more months for CVD prevalence (12 months).
b. Patients should have a CVD, Diabetes, and Hypertension after the completion of desired period of enrolment.
c. Patients should have reported an diabetes or hypertension or diabetes and hypertension.

Numerator: CVD, Diabetes and Hypertension

Denominator: Diabetes or Hypertension or Diabetes and Hypertension Patients

Factor: Percentage



Graph 3

Observations: The frequency of data analysis was taken as quarterly. The CVD patient enrolls registered under NCD those who have diabetes or hypertension and diabetes and hypertension. The above data depicts around 16% or more patients under this health problem, But reduced up to 15.6% in 2017 Jan to Mar.

Diabetes patients on Insulin (%)

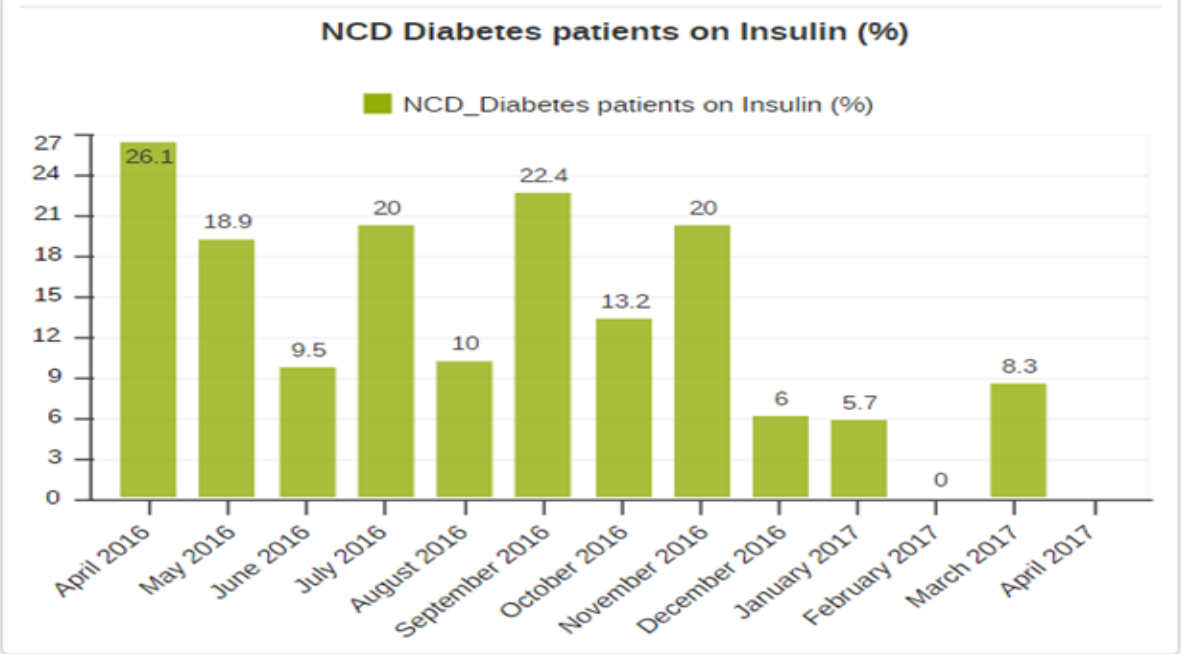
Indicator rationale: This indicator is required to evaluate the diabetes patients on insulin over a period of time respectively. The indicator evaluates the patients on the following conditions:

a. Patients should have identified with diabetes and depends on Insulin.

Numerator: Insulin use

Denominator: Patients identified with Diabetes

Factor: Percentage



Graph 4

Observations:

The frequency of data analysis was taken as quarterly. Diabetes patients on insulin who made a visit to the clinic. This bar graph depicts the increasing trend firstly In April 2016, there is 26.1%of patients dependent on insulin and decreased up to 18.9% in the following month may 2016, after that around reduced up to half of may in june 2016 9.5%.Then 20%patients in July 2016 who depend on insulin, furthermore drop down to 10% in august 2016 and take a spike of 22.4% in following month, 13.2 in October, 20% in November, afterwards shown downward trend.

Hypertensive patients at enrollment (1st, 2nd, 3rd)

Indicator rationale: This indicator is required to evaluate the enrollment of patients during 1st, 2nd, and 3rd stage of hypertension. The indicator evaluates the patients on the following conditions:

NCD_Stage 1 hypertensive patients at enrollment (%)

NUMERATOR = Stage 1 hypertensive patients at enrollment

DENOMINATOR = newly enrolled hypertensive patients

NCD_Stage 2 hypertensive patients at enrollment (%)

NUMERATOR = Stage 2 hypertensive patients at enrollment

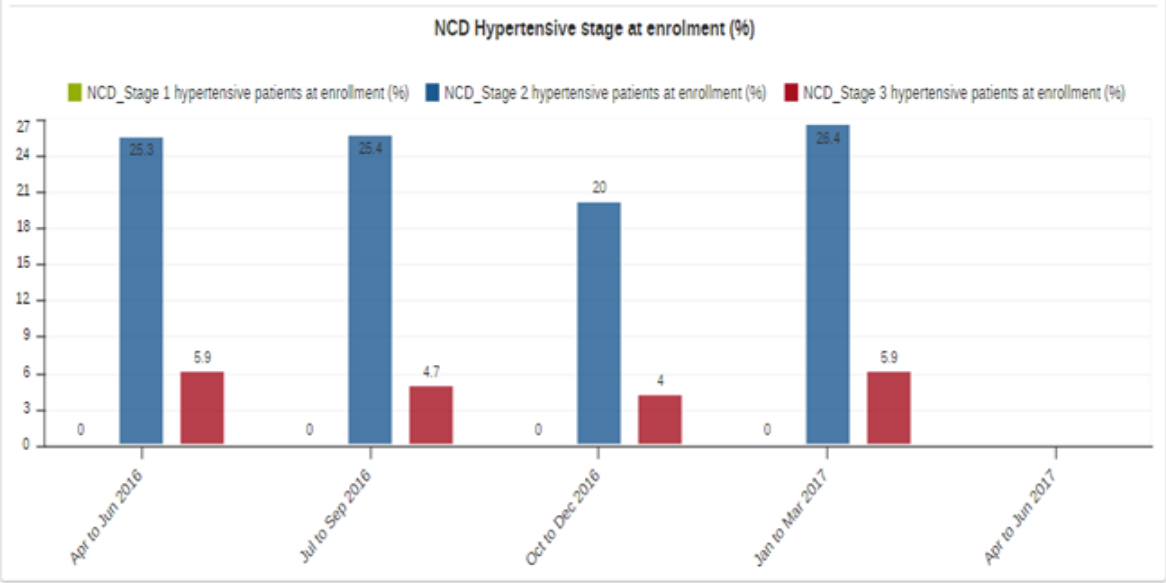
DENOMINATOR = newly enrolled hypertensive patients

NCD_ Stage 3 hypertensive patients at enrollment (%)

NUMERATOR = Stage 3 hypertensive patients at enrollment

DENOMINATOR = newly enrolled hypertensive patients

Factor: Percentage



Graph 5

Observations:

The graph provides the comparative representation of three indicators named as NCD_Stage1 hypertensive patients at enrollment, NCD_Stage2 hypertensive patients at enrollment, and NCD_Stage 3 hypertensive patients at enrollment.

- As we see there is no any enrollment of patients at stage 1, throughout the quarters. (Apr to june2016)(July to sep2016) (oct to dec2016) (Jan to mar2017)
- In,NCD_stage 2,25.3%patients enrol during first quarter April to June 2016,almost same number of patients enrol in July to September 2016 and further reduced up to 20% in the coming quarter October to December 2016 and moreover rise up to 26.4%
- In,NCD_stage 3,5.9%patients enrol in April to june 2016,4.7% in quarter July to September 2016,and drop down to 4% in October to December 2016 and further increase up to 5.9% in January to march 2017.

Co-morbid patients (HTN+DM,%)

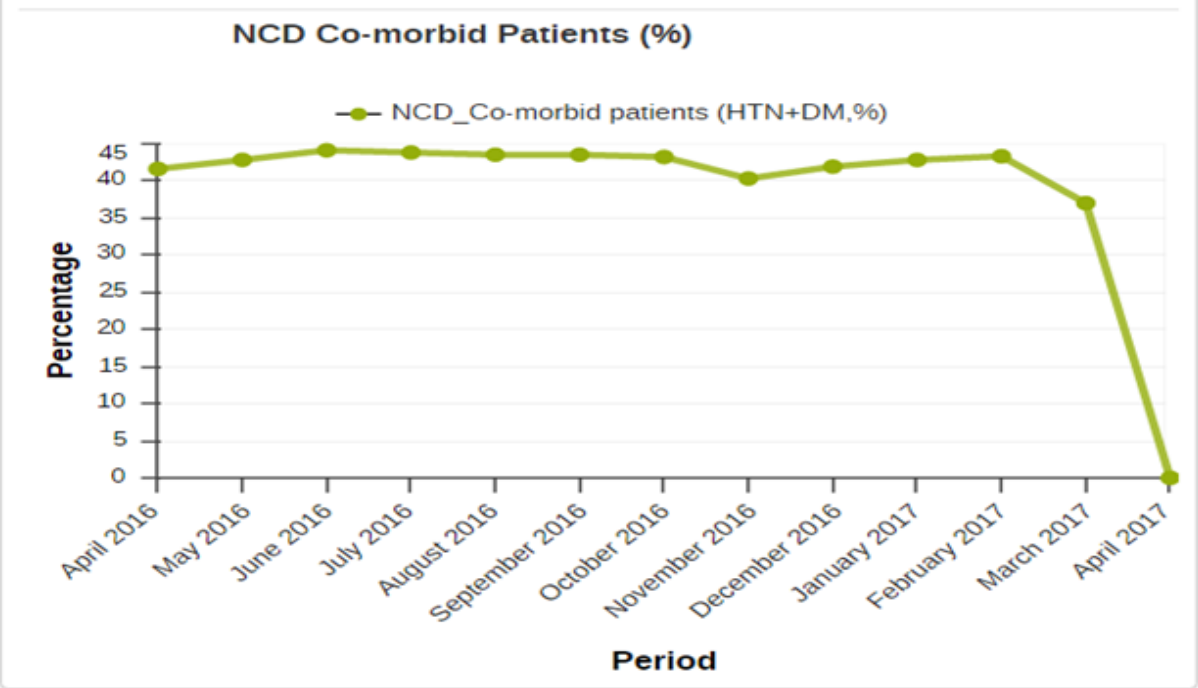
Indicator rationale: This indicator is required to evaluate the number of patients identified with both (HTN+DM,%).The indicator evaluates the patients on the following conditions:

a. Patients should be enrolled under the program have both (HTN+DM)
b. Patients should have an DM or HTN

Numerator: Patients with DM+HT

Denominator: Patients identified with DM or HT

Factor: Percentage



Graph 6

Observations:

The indicator aims to provide a line graph of proportion of Co-morbid patients (HTN+DM) that is registered under NCD program. Calculation defines by total number of patients identified with HTN+DM out of Total number of patients with HTN or DM.First of all in the month of april 2016.41% patients identified with HTN+DM, and around 43% patients in may 2016,who had both this health problem ,after that increase up to 45%patients in june 2016 who are identified with HTN+DM. the percentage was same throughout the month till October 2016,After that drop down in number of patients with HTN+DM in November 2016,that was 40%,afterwards shown an slightly increasing trend that was 41%patients in December 2016,43%patients in January 2017 and 44% patients in February 2017 who are identified with HTN+DM.then decreased up to 38% in the following month and moreover drop down to 0 %in April 2017.

DISCUSSION

Learning:

- Unique implementation of NCD tracking tool in DHIS2 not explored much before.
- Best use of 'learn as you do' approach.
- Deep dive into program rules functioning helped us identifying bugs in the systems which were reported back to Oslo team.
- Exploring program indicators with multiple AND/OR conditions, enhanced knowledge of utilizing the available options.
- Greater understanding of Event Analytics in terms of how it supports indicator calculations.

Challenges:

- Estimation of indicator complexity and requirements.
- Lot of time spent into identifying and applying different approaches in designing the indicators.
- Ineffective communication regarding indicators with MSFB due to lack of clarity.

  Revisit the requirements for data export and import app as both followed different logics.

CONCLUSION

The DHIS 2.0 is a tool for collection, validation, analysis and presentation of aggregate (statistical) data, tailored to integrated health information management activities. It is a generic tool rather than a pre-configured database application, with an open meta-data model and a flexible user interface that allows the user to design the contents of a specific information system without the need for programming.

DHIS 2.0 and upwards is a modular web-based software package and can be used at no cost. The DHIS is designed to support health workers and managers at all administrative levels through a balance between flexibility and standardization, and with a strong emphasis on using information for local action.

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