

RHEA PROJECT RWANDA

Rwanda Client Registry

Version 2.5



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Introduction

The MOH Client Registry is responsible for holding demographic information for all persons in Rwanda. These persons can become either patients and/or HC professionals. In this document we will use the word “clients” to describe this register. Besides demographic information this registry will also hold information on the families (chief and dependants) as well as social categories. This is important information for the public health insurance administration – Mutual.

Current situation on national identifiers in Rwanda

Currently Rwanda has a unique national number called NID that is given to all persons above 16 years old by the National ID Office from the Ministry of Local Government. The NID database has 98% of Rwanda population registered. For all those above 16 there is biometric information attached to the record. The NID office printed and distributed the cards for all persons over 16 in the country, in a very successful operation. The NID is a smart card with a bi-dimensional bar code that stores the person name, DOB and biometrical data. On the card the information printed is: LAST NAME, Name; DOB; GENDER; Place of Issue and the NID, as well as the person photograph. All persons bellow 16 also have a unique number provided by the NID: the “application number”. This is a number automatic generated by the NID system when the form is typed in. There is no biometric data attached to records of persons bellow 16, neither identification cards were issued for them.

In parallel with the NID, the MOH has a national database of persons called *Ubudehe* that already holds a large percentage of citizen records (more than 95%). This database was created in 2010, and has data on every Rwandan household in order to introduce stratified payments based on ability to pay the public health insurance Mutual. The *Ubudehe* database contains nearly 9 million records (people) today. This database has the NID numbers for all persons that have it, but none application number. A sequential number was generated to uniquely identify all persons. This number is used to establish the association between the households chief with his/hers dependents. This database is at the moment being cleaned and revised. The MOH will send this database to the NID in order to obtain the application number for all persons. This will allow for the direct mapping between the two databases.

There is a MOU between the MOH and the NID that will send the updates from one side to the other. In our pilot project this is going to happen in a single direction as described below.

Premises

- The NID will be used as a unique identifier for health for all persons above 16 years old.
- For those under 16 the MOH unique ID will be used as the unique identification
- The client registry is the official source of demographic information about all persons (including health care professionals). POC applications should update the client registry with the most recent information collected from the patient at each encounter. For example, names and addresses updates.
- Anyone accessing directly the client registry must be already registered and work in the healthcare facility from where the system is being accessed.
- All information sent to SHR must come with the unique identifiers of the patient, health care professional and facility, otherwise it will be stored in a temporary area of errors to be later on cleaned up by the MOH data manager

Requirements for the client registry

All documents and identifiers must be described in the table DOCUMENTS . Note this is not going to be asked for the point of care to inform. This should be pre-loaded in the system at the central level according to the national standards. (This is also described in the HC professional registry document)

- For the NID, this is the information that should be pre-loaded on the table Documents:
 - TB_DOCUMENTS.IDENTIFIER_GEOGRAPHIC_AREA = "N"- meaning "National Identifier"
 - TB_DOCUMENTS.IDENTIFIER_TYPE = "1", meaning "NID";
 - TB_DOCUMENTS.IDENTIFIER_ISSUER = "NIDO", meaning "National ID Office"

- For the MOH_NUMBER, this is the information that should be pre-loaded on the table Documents:
 - TB_DOCUMENTS.IDENTIFIER_GEOGRAPHIC_AREA = "N"- meaning "National Identifier"
 - TB_DOCUMENTS.IDENTIFIER_TYPE = "2", meaning "National Health Number";
 - TB_DOCUMENTS.IDENTIFIER_ISSUER = "3", meaning "MOH"

- For the MUTUAL_HEALTH_INSURANCE_NUMBER, this is the information the that should be pre-loaded on the table Documents:
 - TB_DOCUMENTS.IDENTIFIER_GEOGRAPHIC_AREA = "N"- meaning "National Identifier"
 - TB_DOCUMENTS.IDENTIFIER_TYPE = "3", meaning Public Health Insurance;
 - TB_DOCUMENTS.IDENTIFIER_ISSUER = "MUTUAL", meaning "Mutual Health Insurance"

- For the RAMA_HEALTH_INSURANCE_NUMBER, this is the information the that should be pre-loaded on the table Documents:
 - TB_DOCUMENTS.IDENTIFIER_GEOGRAPHIC_AREA = "N"- meaning "National Identifier"
 - TB_DOCUMENTS.IDENTIFIER_TYPE = "3", meaning Public Health Insurance;
 - TB_DOCUMENTS.IDENTIFIER_ISSUER = "RAMA", meaning "Rama Health Insurance"

- For the SOCIAL_SECURITY_NUMBER, this is the information that should be preloaded in table TB_DOCUMENTS:
 - TB_DOCUMENTS.IDENTIFIER_GEOGRAPHIC_AREA = "N"- meaning "National Identifier"
 - TB_DOCUMENTS.IDENTIFIER_TYPE = "4", meaning "Social Security";
 - TB_DOCUMENTS.IDENTIFIER_ISSUER = "SOCIAL SECURITY FUND OF RWANDA"

- The client registry will export all records that belong to the catchment area of the HC facilities that belong to our pilot. See definition of the catchment area in HC facilities registry document. A database script using the HC facility code as filter will export all records from the client registry of persons that live in villages (TB_ADDRESS) that are defined in the HC facility registry as part of their catchment area. The export format should either be plain SQL and or delimited (a tool like SQL developer can be used to generate the different formats).
- These exports are going to be physically stored in a media (CD or USB stick) and manually uploaded in each HC facility into each POC application. The POC will match the records and update them with the MOH unique number and the NID for those who have it.
- All persons below 16 will be identified by the MOH unique number. This number plus the person name (LAST NAME, REST OF THE NAME), and date of birth (DD/MM/YYYY) will be printed in a label and in a 1-d bar code and placed on the back of the plastic cards previously distributed by the MOH to all HC facilities in our pilot. The plastic card will have no information on it but the art in the card, everything else will be in the label. These labels will be printed at the POC when the patient appears for an encounter.
- If the person is not yet registered in the client registry (newborns) or someone who does not have a NID or does not have yet the MOH unique number, the POC application will collect the person data and send the query/add message to the client registry. The client registry will return a unique number for that person. This can be a new number or an existing one if the person is found. If the query returns more than one record the POC application will have to decide which one is correct, according to the demographics sent. If there is no Internet connectivity this has to be done later in an asynchronous method. No label will be printed for the patient until the POC receives the unique number from the MOH. In this case the label will be printed when the patient returns in the next visit.
- The client registry should incorporate a PIDS – Person Identification Service according to the OMG standard [ref]. The “finding candidates” interface that finds possible candidates that may represent the same record and the interfaces to “merge, un-merge and deprecate the client registries id should be implemented. A phonetic algorithm to match the similar records should be implemented. The PIDS service should:
 - Associate client registry Ids (PIDS service) – to associate two or more NIDs, and or application numbers and or MOH temporary numbers that in fact represent the same person. Used to solve the duplicates in the registry.
 - Merge client records– in case two different records have to be merged, since they are in fact the same person
 - Inactivate client record – in case the registry was merged with another one,
- The client registry should be able to register newborns allowing for temporary names that after will be updated to the actual name (ISO 22220). The newborn registry can be attached to the mother registry;
- The client registry should be able to print the civil registration form in case of newborns registration;
- The client registry should be able to register the patient death and print the death

registration form. The death registry will contain a minimum set of data in this first iteration. See description in the Death Registry section below;

- The point of care should be able to store the National Health ID and associate it to its local Identifier. It is recommended that these applications follow the ISO 22220 structure to define the different identifiers informing if they are local, regional, state/province or national. These applications should also be able to revise/update their registry based on the demographic information returned from the MOH Client Registry;
- Client, father and mother names should be stored in a phonetic form as well as the original text to allow for phonetic searches when querying the client registry.
- All modifications on the client registry for clients that are also health care workers should generate a notification to the health professional registry
- All modifications in the client registry should be versioned and the history stored in the database
- No record is deleted from the database. Records can be inactivated in the case of a merge of two IDs
- The selection of district of birth and country of passport should allow for searches based on the first letters of the text.
- The Mutual and Rama Health Insurance number, together with the social security number and the passport number can be in a separate tab in the client registry
- After the Ubudehe database import is complete the client registry will automatically generate new MOH numbers that should follow the sequence from the original Ubudehe database. From this moment all the Mutual application should also use the same database instead the current access in order to avoid the creation of unique numbers on both database what will cause a terrible integrity problem. In order not to make any confusion between these two IDs, the client registry, when generating the sequential numbers should start from 50 million on. Since Rwanda population is around 10 million people all numbers from 50 million on will be the “new” MOH numbers created by the client registry. The Ubudehe database used a sequential number that does not reach near 50 million on the HeadHouseholdID and DependantID.
- Registering Clients with only one name - Some people do not have a family name and a given name; they have only one name by which they are known. If the subject has only one name, it should be recorded in the family name field and leave the given name field blank.
- Registering an unnamed newborn baby - An unnamed (newborn) baby is to be registered using the mother's given name in conjunction with the prefix “Baby of”.
- Registering unnamed multiple birth An unnamed (newborn) baby from a multiple birth should use their mother's given name plus a reference to the multiple birth. For example, if the baby's mother's given name is “Fiona” and a set of twins is to be registered, then record “Twin 1 of Fiona” in the given name field for the first born baby, and “Twin 2 of Fiona” in the given name field of the second born baby. In the case of triplets or other multiple births, the same logic applies. The following terms should be used for recording multiple births:
 - Twin Use Twin i.e. Twin 1 of Fiona
 - Triplet Use Trip i.e. Trip 1 of Fiona
 - Quadruplet Use Quad i.e. Quad 1 of Fiona
 - Quintuplet Use Quin i.e. Quin 1 of Fiona

- Sextuplet Use Sext i.e. Sext 1 of Fiona
- Septuplet Use Sept i.e. Sept 1 of Fiona
- TB_PERSON holds the actual name of the client. Older versions of the name should be stored in a separate table TB_NAMES with the corresponding dates.

Import from the Ubudehe database

The *Ubudehe* database will be imported once to the client registry. This should be done as an SQL script since this is a one time operation.

Requirements for the Ududehe database import

- The table Ubudehe.Household should be the first one imported. Each record from this table will generate one record at the PERSON table and two others: HOUSEHOLD and SOCIO_DEMOGRAPHIC tables. These last two are NEW to the ezVida and must be created.
- The NID number is not present in all records on both tables at Ubudehe database, however there are unique numbers for all records: on the table Ubudehe.Household the unique number is the HeadID and in the Ubudehe.Dependants the unique number is the DependantID number. Those are sequential numbers that will be imported into the MOH_Number. In this operation a mod 11 control digit should be added. The table Ubudehe.Dependants should be the second to be imported and it will only generate records to the PERSON table and establish the relationship to the HOUSEHOLD table – (reason why this table must be loaded first).
- Since the Ubudehe database does not have a complete DOB, just the year of birth, the import will be to the ESTIMATED_AGE field. According to the documentation from Ubudehe database all ages = “1900” mean an unknown year of birth. In this case this field will not be imported.
- After the import is finished the table PERSON will include all persons from the Ubudehe database no matter if household chiefs or his/hers dependants. When importing data from the Ubudehe.Household table the fields HOUSEHOLD_FK and SOCIO_DEMOGRAPHIC will establish the link between the tables.
- Whenever the Ubudehe.Nid is imported into the TB_PERSON.NID_NUMBER the FK to the TB_DOCUMENTS record that has the NID identifier details should be populated in the field DOCUMENTS_NID_NUMBER_FK
- Whenever the Ubudehe.HeadId or the Ubudehe.DependantId are imported into the TB_PERSON.MOH_NUMBER the the FK to the TB_DOCUMENTS record that has the MOH_NUMBER identifier details should be populated in the field DOCUMENTS_MOH_NUMBER_FK
- Whenever the Household.CardMutualSante is imported into the MUTUAL_HEALTH_INSURANCE_NUMBER the FK to the TB_DOCUMENTS record that has the MUTUAL_HEALTH_INSURANCE identifier details should be populated in the field DOCUMENTS_HEALTH_INSURANCE_NUMBER_FK
- The only information that the Ubudehe database contains on address is the village code. Based on this field the codes for cells, sectors, district and province should be recuperated according to the hierarchy above village.

Import from the Ubudehe.Household table

Each record from the Ubudehe.Household table will generate one record in the PERSON and one record in the TB_HOUSEHOLD table one in the TB_SOCIO_DEMOGRAPHIC and one in the TB_ADDRESS as described below.

The structure of the Ubudehe.Household database is:

Field	Type	Null	Links to	Comments
<u>HeadID</u>	bigint(20)	No		Chief of household identification code
HouseHoldCode	varchar(10)	No		
FirstName	varchar(25)	No		
LastName	varchar(25)	No		
NID	varchar(16)	No		National Identification
Age	int(4)	No		
Gender	varchar(1)	No		
VillageCode	varchar(10)	No	villages ->	Village code where this
CatUbudehe	int(1)	Yes		Socio-economic Category
CardUbudehe	int(1)	Yes		Socio-economic Category
MutuelSante	int(1)	Yes		MoH Category
CardMutuelSante	varchar(30)	Yes		-
LandOwner	varchar(1)	No		Set yes or no if one owns
NbrDependants	int(2)	No		Number of dependents
NbrDependants18	int(2)	No		Number of dependents with
AbleToWork	int(1)	Yes		Set yes or no if one is able
Retired	int(1)	Yes		Set yes or no if one is retires
Sick	int(1)	Yes		Set yes or no if one is sick or not
Handicaped	int(1)	Yes		Set yes or no if one is handicapped or not
Studies	int(1)	Yes		Set yes or not if one goes at

				school or not
OtheReasons	text	Yes		Provides a clarification or remark
AuthorID	varchar(10)	No		The Identification code of the data clerk
Created	datetime	No		The date when this record is created
Modified	timestamp	No		The date when this record is modified

Insert into the TB_PERSON Table

Not all required fields on TB_PERSON are present on the Ubudehe database, therefore all database requirements for mandatory fields should be turned off to allow this import to happen.

TB_PERSON table on the client registry	Household table from Ubudehe database	O=Optional R= Required	Description
PERSON_ID	Unique ID created by the database		
NID_NUMBER	Household.NID	O	NID number
DOCUMENTS_NID_NUMBER_FK	Link to the table documents that describe the NID identifier	R if the NID number is not null	
MOH_NUMBER	Household.HeadId	R (If not record cannot be imported)	A mod 11 control digit should be applied to his identifier when importing the data
DOCUMENTS_MOH_NUMBER_FK	Link to the table documents that describe the MOH identifier	R	
MUTUAL_HEALTH_INSURANCE_NUMBER	Household.CardMutualSante	O	Mutual Health Insurance number of the household chief
DOCUMENTS_HEALTH_INSURANCE_NUMBER_FK	Link to the table documents that describe the Health Insurance Number	R if the MUTUAL_HEALTH_INSURANCE_NUMBER is not null	
LAST_NAME	Household.LastName	R	Person Last Name

OTHER_NAMES	Household.FirstName	R	First name of the person
GENDER	Household.Gender	R	1 = Male 0 = Female
DATE_OF_BIRTH	Household.Age	O	Should only be populated if Ubudehe.Age is not = 1900
ACCURACY_INDICATOR_DATE_OF_BIRTH	Has the code of the accuracy indicator of birth. In this case it should be "UUA" meaning unknown day and month and accurate year.		
DATE_CREATED	Household.Created	R	Date time
DATE_MODIFIED	Household.Modified	R	Date time

Insert into the TB_HOUSEHOLD (new table)

TB_HOUSEHOLD on the client registry	Table household from Ubudehe database	O=Optional R= Required	Description
HOUSEHOLD_ID	ID automatically created	R	
PERSON_ID_FK	Foreign key to the record that contains the MOH number of the HeadID in the TB_PERSON	R	PERSON_ID_FK
HOUSEHOLD_CODE	Household.HouseHoldCode	R	
NUMBER_DEPENDANTS	Houshold.NbrDependants	O	Integer
NUMBER_DEPENDANTS_GTEQ_18	Houshold.NbrDependants18	O	integer
LAND_OWNER	Houshold.LandOwner	O	Y = 1 N = 0
TB_HOUSEHOLD.DATE_CREATED	Houshold.created	R	Date time
TB_HOUSEHOLD.DATE_MODIFIED	Houshold.modified	R	Date time

Insert into TB_SOCIO_DEMOGRAPHIC table (new table)

Field Name	Description	Requirement	Data Type
TB_SOCIO_DEMOGRAPHIC table on the client registry	Household table from Ubudehe database	O=Optional R= Required	Description
TB_SOCIO_DEMOGRAPHIC_ID	Unique number generated by the DB	R	
PERSON_ID_FK	Foreign key to the record that contains the MOH number of the HeadID in the TB_PERSON	R	
SOCIO_ECON_CATEGORY_2010	Household.CatUbudehe	O	integer
SOCIO_ECON_CATEGORY_2007	Household.CardUbudehe	O	integer
SOCIO_ECON_CATEGORY_MOH	Household.MutuelSante	O	integer
HANDICAPED	Household.Handicaped	O	Y = 1 N = 0
STUDIES	Household.Studies	O	Y = 1 N = 0
DATE_CREATED	Household.Created	O	Date time
DATE_MODIFIED	Household.Modified	O	Date time

Insert into TB_ADDRESS

Field Name	Description	Requirement	Data Type
TB_ADDRESS in the client registry	Household table in the Ubudehe database	O=Optional R= Required	Description
TB_ADDRESS_ID	Unique ID generated by the system		
PERSON_ID_FK	Foreign key to the record that contains the MOH number of the HeadID in the TB_PERSON	R	PERSON_ID_FK
PROVINCE_CODE_FK	Not present. Has to be populated based on the district code	String	Mapped to State/ FK to the table state
DISTRICT_CODE_FK	Not present has to be populated based on the sector code	String	Mapped to Town/ FK to the table Town
SECTOR_CODE_FK	Not present has to be populated based on the cell code	String	NEW
CELL_CODE_FK	Not present has to be populated based on the village code	String	FK to table CELL NEW

VILLAGE_CODE_FK	Household.village join TB_VILLAGE	String	FK to table VILLAGE NEW
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Import from the Ubudehe.Householddetails table

Each record from the Ubudehe.Householddetails table will generate one record in the TB_PERSON table, one record in the TB_SOCIO_DEMOGRAPHIC and one in the TB_ADDRESS, as described below.

The current structure of the Ubudehe.Householddetails table is:

Field	Type	Null	Links to	Comments
	bigint(20)	No		The id code of the dependent
HeadID	bigint(20)	No	household -> HeadID	The id code of the dependent household
FirstName	varchar(25)	No		
LastName	varchar(25)	No		
NID	varchar(16)	No		
Age	int(4)	No		
Gender	varchar(1)	No		
AbleToWork	int(1)	Yes		Set yes or no if one is retires or not
Retired	int(1)	Yes		Set yes or no if one is sick or not
Sick	int(1)	Yes		Set yes or no if one is handicapped or not
Handicaped	int(1)	Yes		Set yes or not if one goes at school or not
Studies	int(1)	Yes		Provides a clarification or remark
OtheReasons	text	Yes		The Identification code of the data clerk
Created	datetime	No		The date when this record is created
Modified	timestamp	No		The date when this record is modified

Each record from the Ubudehe.Householddetails table will generate one record in the PERSON and one record in the TB_SOCIO_DEMOGRAPHIC and one in the TB_ADDRESS as described below.

Insert into the TB_PERSON Table

Not all required fields on TB_PERSON are present on the Ubudehe database, therefore all database requirements for mandatory fields should be turned off to allow this import to happen.

TB_PERSON table on the client registry	Household table from Ubudehe database	O=Optional R= Required	Description
PERSON_ID	Unique ID Automatically created by the DB		
NID_NUMBER	Householddetails.NID	O	NID number
DOCUMENTS_NID_NUMBER_FK	Link to the table documents that describe the NID identifier	R if the NID number is not null	
MOH_NUMBER	Householddetails.DependantId	R (If not record cannot be imported)	A mod 11 control digit should be applied to his identifier when importing the data
DOCUMENTS_MOH_NUMBER_FK	Link to the table documents that describe the MOH identifier	R	
HEAD_HOUSEHOLD_FK	Contains the TB_PERSON_ID of the Household chief. To obtain it is necessary to get the HouseholdDetails.HeadID and obtain the PERSON_ID of this record to populate this field, establishing a recursive relationship.	O - for all that are imported from the HouseholdDetails table.	
LAST_NAME	Householddetails.LastName	R	Person Last Name
OTHER_NAMES	Householddetails.FirstName	R	First name of the person
GENDER_FK	Householddetails.Gender should be converted to the gender domains as in the client registry, where 1 = male and 2 = female	R	1 = Male 0 = Female
DATE_OF_BIRTH	Household.Age	O	Should only be populated if Ubudehe.Age is not = 1900
ACCURACY_INDICATOR_DATE_OF_BIRTH	Has the code for the accuracy indicator on the date of birth. In this case it should be "UUA" meaning unknown day and month and accurate year.		
DATE_CREATED	Householddetails.created	R	Date time
DATE_MODIFIED	Householddetails.modified	R	Date time

Insert into TB_SOCIO_DEMOGRAPHIC table (new table)

Field Name	Description	Requirement	Data Type
TB_SOCIO_DEMOGRAPHIC	Household table from Ubudehe database	O=Optional R= Required	Description
TB_SOCIO_DEMOGRAPHIC_ID	Unique number generated by the DB		
PERSON_ID_FK	Foreign key to the MOH number of the dependant (householddetails.DependantID) in the TB_PERSON	R	
SOCIO_ECON_CATEGORY_2010	NULL	O	integer
SOCIO_ECON_CATEGORY_2007	NULL	O	integer
SOCIO_ECON_CATEGORY_MOH	NULL	O	integer
HANDICAPED	Householddetails.Handicaped	O	Y = 1 N = 0
STUDIES	Householddetails.studies	O	Y = 1 N = 0
DATE_CREATED	Householddetails.created	O	Date time
DATE_MODIFIED	Householddetails.modified	O	Date time

Insert into TB_ADDRESS

Field Name	Description	Requirement	Data Type
TB_ADDRESS in the client registry	Household table in the Ubudehe database	O=Optional R= Required	Description
TB_ADDRESS_ID	Unique ID generated by the DB	R	
PROVINCE_CODE_FK	Not present. Has to be populated based on the district code	String	Mapped to State/ FK to the table state
DISTRICT_CODE_FK	Not present has to be populated based on the sector code	String	Mapped to Town/ FK to the table Town
SECTOR_CODE_FK	Not present has to be populated based on the cell code	String	NEW
CELL_CODE_FK	Not present has to be populated based on the village code	String	FK to table CELL NEW

VILLAGE_CODE_FK	Householddetails.village join TB_VILLAGE	String	FK to table VILLAGE NEW
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Printing and distribution of the IDs for persons under 16's

After this initial load from the *Ubudehe* database it will be necessary to print an identification for all persons under 16 since they do not yet have a NID number but instead the MOH number . This number will be printed in a one dimensional bar code card that will also have the person name, DOB, an place of birth (province, district, sector, cell, and village) in human readable form to identify them at the POC. The bar code will include the number, the name, DOB, and place of bit birth (province, district, sector, cell, and village codes).

There are at least three alternatives here to print these paper cards:

- print all paper cards centrally and distribute them through the community HC workers
- print the paper cards only at the POC application when the person comes for treatment. This will have to occur every time the person comes to the HC facility and forgets/loses her/his paper card
- use both approaches. Print most of the records centrally for the area where the pilot will be and distribute them using the CHW. After that the paper card will only be printed at the POC.

The decision has no impact in the client registry that no matter what should be able to print the labels as well as the POC application. The issue is more of methods and organization on how to distribute them.

Interoperability

The client registry will communicate to:

- POC applications – OpenMRS via the health interchange layer (HIX) using HLv2.5 messages and web services
- RapidSMS – will communicate to the client registry via the health interchange layer (HIX) using HLv2.5 messages and web services

Key Use Cases for the POC applications using the HIX layer

Register a New Client

External systems (any system at the point of care) will interoperate with the MOH Client Registry through web services, using the Interoperability layer (HIX).

This will happen whenever a person (can be a new born or not) appears in the clinic and has no ID. First a query should be made at the client registry to make sure this person is not registered and after that the new registration should be done. A temporary ID number (application number) will be generated and printed. If new born or someone that does not have yet an ID, the civil registration form will also be printed. **(Richard can you please provide this form to us so that we can incorporate it in the Annexes).**

In the event there is no internet access and a query against the client registry is not possible the POC will not send the data to the client registry waiting for internet to return. The POC should be able to store all these queries in a line to send them after Internet returns.

Any other information that the Ministry of Health wishes to have printed will be configured accordingly in Phase two.

The data to be entered is described in the section Client Registry Data Structure below in the text.

Maintain client registry

The desired situation is that the POC systems represent the patient ID in the same way as it is stored in the client registry. For that to happen POC systems should query the client registry every time the person comes for an encounter confirming and updating the information whenever necessary. Filters for the query can be: NID, MOH number, last name, name, full name, DOB (can be partial date), gender, place of birth (province, district, sector, cell, village, mother name and or father name. At least one type of name should be provided as a filter and one additional field. All demographic data can be updated except the NID and the MOH number. Although that is ideal - it is recognized that there will be many occasions that the internet connectivity is not available or fast enough to perform this function. In that case the patient will be validated in the POC system only. Since all facilities that will be part in the pilot will receive a copy of their catchment area population registries it is expected that even without Internet the POC applications will be able to find either the NID or the MOH_number for all known patients. New records must wait for Internet in a line to be submitted to the client registry. One alternative is that the HIX layer will incorporate the functionality necessary to deal with asynchronous communications.

Key use cases for the Client Registry application

- Register a New Client - Print the patient health card / application form / birth declaration
- Maintain client registry
- Register a Death / Print the Death Declaration
- Merge identifications (for duplicate registries)
- Correlate identifications
- Query the client registry
- Send updates of the client register to the NID database (phase 2)
- Receives updates of the client register from the NID database (phase 2)

Add New Client Registry directly at the Client Registry

In this case the new register will be entered directly in the client registry application. Internet connectivity must be present and the person entering the information should have the proper permissions to do that in the application. The client registry will be generated and the ID will be printed. In case of a newborn the civil registration form can also be issued and should be printed and given to the parents.

Maintain client registry at the client registry application

In this case the client registry is directly accessed through Internet. The person accessing should have the proper authorization to do that (to be registered and be a worker of the specific health facility from where the data is being typed in). The usual procedure is to query the client registry using filters with Name, dob, gender, place of birth, parents name and check if the data is correct and update it when necessary. NID or Application numbers cannot be updated. This would be an exception since the most frequent scenario will be access through the POC. If, however, the mother has a complication and goes to a hospital, the scenario here described may occur.

Rapid SMS integration with the client registry

The integration between Rapid SMS and the SHR for the clinical messages will only happen in the regions where the pilot is deployed. The RAPID SMS will only send messages from the catchment area where the pilot running. RAPID SMS messages will often generate a new encounter in the SHR (shared Health Record). But before this happens it will be necessary to validate the mother NID or MOH number. This should be done through the HIX layer and using the client registry query. If the mother NID number or even the CHW NID is not found on the client registry an error message will be sent back to the HIX that will send it to RapidSMS. At the same time the HIX should send the original messages to the MOH data administrator in order to register these clients and or CHW.

Data elements of the Client Registry

Since one client may have one or more identifiers of different types, national, local, insurance, the data structure proposed in the ISO TS 22220 Identification of Subjects of Care was adapted for Rwanda as follows. Local systems (point of care (POC) systems) should incorporate the ability to store at least the NID number, application number and the temporary health number as well as the local number. The source of the domains comes from the ISO TS 22220 Identification of SOC and from the UK Patient Banner Guidelines.

The client registry is composed by different tables:

- TB_PERSON – contains the demographic information about the person
- TB_NAMES – contains historical data about the client's name
- TB_HOUSEHOLD - contains information about the head of the household
- TB-SOCIO_ECONOMIC – contains socio-economic information about the head of the household
- TB_ADDRESS – contains the person's address

TB_HOUSEHOLD and TB_SOCIO_ECONOMIC data structures have already been defined above, in sections 4.2.2 and 4.2.3 that describe the import from the Ubudehe databases. On the other hand, TB_PERSON and TB_ADDRESS were only partially described above, since the Ubudehe database does not have all the fields to populate these two tables. The full data-structure of these two tables is described bellow.

TB_PERSON data structure

Element	Description	Length/ TYPE	Status (R = required and O =Optional)	Behavior
NID_NUMBER	Rwanda NID	16	R	This is the national unique identifier number (NID) as provided by the national NID database..
MOH_NUMBER	Unique health number	16	R	One these two (NID or Health number must be informed).
DOCUMENTS_MOH_NUMBER_FK	Link to the table documents that describe the MOH identifier		R	
MUTUAL_HEALTH_INSURANCE_NUMBER	Mutual health insurance number		O	
DOCUMENTS_MUTUAL_NUMBER_FK	Link to the table documents that describe the Mutual Health Insurance Number		R	Required if the Mutual_Health_Insurance_Number is not null
RAMA_HEALTH_INSURANCE_NUMBER	Rama Health Insurance Number	16	O	
DOCUMENTS_RAMA_NUMBER_FK	Link to the table documents that describe the RAMA Health Insurance Number			Required if the RAMA_Health_Insurance_Number is not null
SOCIAL_SECURITY_NUMBER	Social security number	String (9) - 8 digits and one (1) letter at the end with no space	O	

DOCUMENTS_SOCIAL_SECURITY_FK	Link to the table documents that describe the RAMA Health Insurance Number		R	If the SOCIAL_SECURITY_NUMBER is not null
LAST_NAME	Last Name of the client	30	R	
OTHER_NAMES	Other names of the client	50	R	
NAMES_DETAILS_FK	Link to the TB_NAMES with the older versions of the name			
FATHER_NAME	Full name of the father	80	R	
MOTHER_NAME	Full name of the mother	80	R	
DATE_OF_BIRTH	Date of birth	8	R	

DATE_OF_BIRTH_ ACCURACY_ INDICATOR	Estimates the accuracy of DOB	AAA - (Exact Date) EEE (Estimated Date) UUU – (Unknown date) EAA – (Accurate day and month, estimated year) AAU – (Unknown day, accurate month and year) UUE – (Unknown day and month, estimated year) UUA- Unknown day and month, accurate year	O	If month or days are missing, the client registry system should automatically calculate the accuracy indicator. POC systems should also present this functionality or ask for the accuracy indicator every time a data is entered.
ESTIMATED_AGE	Estimated age of the client	Integer	R	Automatically calculated by the system current date - DOB
TEMPORAL_UNITS_FOR_ESTIMATED_AGE_FK	Link to to the temporal units for estimated age, based on the calculation made (from the patient-banner standard)	1	R	1= "> 2 hours display min => 120m " 2 = " > 2 days display hours => 30h 3= " > 4 weeks display days => 28d 4 = " > 1 year display weeks and days => 7w 2d" 5=" > 2 years display month and days => 6m 7d 6= " < 18 years display year and month => 17y 6m 7 = " >= 18 years display years => 18y"

MARITAL_STATUS_FK	Link to the specific code at TB_MARITAL_STATUS	1	R	TB_MARITAL_STATUS 1= single 2 =married 3 = widow/widower 4 = divorced 5 = cohabitation
GENDER_FK	Link to the specific code at TB_GENDER	1	R	1= male 2= female 3=undetermined (this field does not appear on the paper form but is part of the domain at the client registry) 4=not known
COUNTRY_PLACE_OF_BIRTH_CODE_FK	Link to the specific country code where the client was born at TB_COUNTRIES	STRING (2)	R	TB_COUNTRIES ISO country codes
DISTRICT_OF_BIRTH_CODE_FK	FK to the district code in TB_DISTRICTS (in ezHIS TB_MUNICIPIOS)	STRING	O	On the data entry this should be facilitated by providing an easy way of searching the districts by typing the first letters and doing the search.
PASSPORT_NUMBER	Passport number in case of foreigners	STRING (10)	O	If foreigner the passport number is mandatory
COUNTRY_CODE_OF_ISSUANCE_FK	FK to the ISO Country code on TB_COUNTRIES (TB_PAISES on ezHIS)	STRING (2)	O	If foreigner, field is required. (ISO country codes)
DATE_PASSPORT_ISSUED	Date passport was issued	DATE	O	If foreigner, field is required
PASSPORT_EXPIRATION_DATE	Date passport expires	DATE	O	If foreigner, field is required

Historical data on the client name

All details from the client's names should be stored in a separated table TB_NAMES as follows:

Element	Description	Length	Status (R = required and O =Optional)	Behavior
Name structure				
TB_NAME_ID	Automatic generated by the database			
LAST_NAME	Last Name of the client	STRING (30)	R	
OTHER_NAMES	Other names of the client	STRING (50)	R	
NAME_USAGE	A classification that enables differentiation between the usage of names for a subject of care. An individual name may have many name uses.	1	R for Newborns	N Newborn name
NAME_USAGE_STRT_DATE	The date at which this name usage for the name to which the usage is associated starts.	Date	R	These two dates are very important since persons can change name and the only way to preserve the information from the previous encounters with a different name is to have the names and periods of time where this name was valid.
NAME_USAGE_END_DATE	The date at which this name usage for the name to which the usage is associated ceased to be used.	Date	R	

TB_ADDRESS (*)				
PROVINCE_CODE_FK	Link to the province code where the client lives, on TB_PROVINCES	STRING (1)	R	TB_PROVINCES 1 = Kigali 2 = North 3 = East 4= South 5 = West
DISTRICT_CODE_FK	Link to the district code where the client lives on TB_DISTRICTS	STRING	R	On the data entry screen, only the district names from the respective province should appear for selection.
SECTOR_CODE_FK	Link to the Sector code where the client lives on TB_SECTORS	STRING	R	On the data entry screen, only the sector names from the respective province/district should appear for selection.
CELL_CODE_FK	Link to the Cell code where the client lives on TB_CELLS	STRING	R	On the data entry screen, only the cell names from the respective province/district/sector should appear for selection.
VILLAGE_CODE_FK	Link to the Village code where the client lives on TB_VILLAGES	STRING	R	On the data entry screen, only the village names from the respective province/district/sector/cells should appear for selection.
POST_OFFICE_BOX	Post Office Box of the client address	STRING	O	
CELULAR_TELEPHONE	Client cell phone	STRING (12)	O	
BUSINESS_TELEPHONE	Client Business Telephone	STRING (12)	O	
EMAIL		STRING (30)	O	
STREET_NAME	Street name where the client lives	STRING (50)	O	
STREET_NUMBER	Street number where the client lives	STRING (10)	O	
COMPLEMENT	Complement of the	STRING	O	

	street number like apt number	(30)		
POSTAL_CODE	Postal code of the address where the client lives		O	
COUNTRY_CODE	Country where the person lives	STRING (2)	O	Use ISO 3166 Country codes
LATITUDE	(degrees, minutes..)	STRING(5)	O	
LONGITUDE	(degrees, minutes..)	STRING(5)	O	

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I have reviewed and approved this document

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