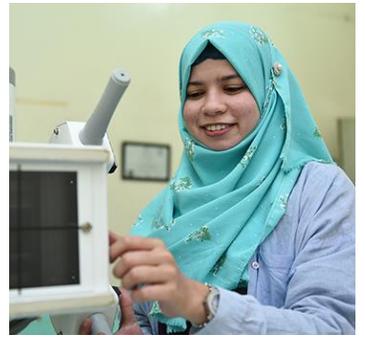
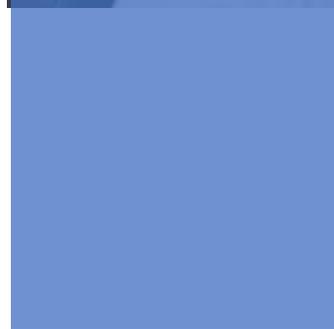




**USAID**  
FROM THE AMERICAN PEOPLE

**HRH2030**  
HUMAN RESOURCES FOR HEALTH IN 2030



Final Report | January 2020

# Review of the Integrated Database System for Human Resources for Health

USAID's HRH2030/Philippines: Human Resources for Health in 2030 in the Philippines

**Cooperative Agreement No. AID-OAA-A-15-00046**

**Cover photo: Mollent Okech, WISN Consultant (third from left), conducting training with the Department of Health. (Credit: USAIDHRH2030/Philippines)**

**January 31, 2020.**

This publication was produced for review by the United States Agency for International Development. It was prepared by members of the HRH2030 consortium.

**DISCLAIMER**

This material is made possible by the generous support of the American people through the United States Agency for International Development (USAID) under the terms of cooperative agreement no. AID-OAA-A-15-00046 (2015-2020). The contents are the responsibility of HRH2030 consortium and do not necessarily reflect the views of USAID or the United States Government

## Contents

<b>Contents</b> .....	<b>i</b>
<b>Acronyms</b> .....	<b>ii</b>
<b>Introduction</b> .....	<b>1</b>
<b>Assessment Methodology</b> .....	<b>2</b>
Objectives .....	2
Documentation Review .....	3
Functional Specifications Review .....	4
Data and Database Review .....	6
Integration Review .....	9
<b>Overall Assessment</b> .....	<b>10</b>
<b>Recommendations</b> .....	<b>12</b>
Establish a Governance Structure .....	12
Enact a New Data Sharing Agreement .....	12
Use Web Technologies to Share Data .....	12
Use Data Exchange Standards.....	13
Use Open Source Technologies.....	13
Include Data Validation Functions.....	13
Utilize Existing Hosting Options.....	14
Create User Manual and Technical Documentation .....	14
<b>Conclusion</b> .....	<b>14</b>
<b>Annex A. Assessment Methodology</b> .....	<b>15</b>
<b>Rationale</b> .....	<b>15</b>
<b>Objectives</b> .....	<b>15</b>
<b>Assessment Methodology</b> .....	<b>15</b>
<b>External Review</b> .....	<b>16</b>
Organization Review .....	16
Documents Review.....	16
Functional Requirements Review .....	17
<b>Technical Review</b> .....	<b>17</b>
Database Review .....	17
Code Review .....	17
Integration Review .....	18

<b>Assessment Criteria</b> .....	<b>18</b>
Criteria Rubric.....	19
<b>Annex B. IDSHRH Database Schema</b> .....	<b>22</b>
<b>Annex C. Minimum Data Set</b> .....	<b>36</b>
<b>Rationale</b> .....	<b>36</b>
<b>Minimum Data Set Fields</b> .....	<b>36</b>



## Acronyms

API	Application Programming Interface
DOH	Department of Health
DICT	Department of Information and Communications Technology
FHIR	Fast Healthcare Interoperability Resources
HHRDB	Health Human Resources Development Bureau
HL7 FHIR	Health Level Seven International Fast Healthcare Interoperability Resource
HRH	Human Resources for Health
HRH2030	Human Resources for Health in 2030 Project
IDSHRH	Integrated Database System for Human Resources for Health
KMITS	Knowledge Management Information and Services
MDS	Minimum Data Set
NWHA	National Health Worker Accounts
USAID	United States Agency for International Development
WHO	World Health Organization

## Introduction

Led by the Philippines Department of Health's Health Human Resources Development Bureau (HHRDB), and supported by the United States Agency for International Development (USAID), through the Human Resources for Health in 2030 (HRH2030) Project, the Philippines is endeavoring to progressively implement National Health Workforce Accounts (NHWA). NHWA, developed by World Health Organization (WHO) and implemented by member states, provides a means by which the Philippines can systematically review and improve the availability, quality, and use of health workforce data. NHWA consists of 78 indicators across 10 modules. The WHO recommends a progressive implementation of NHWA, with emphasis given to the country's priority HRH policy directions and questions when selecting among the 78 indicators. The Philippines National Health Workforce Accounts Implementation Roadmap describes the process by which NHWA will be implemented in the Philippines.

As the Philippines implements the NHWA, a central integrated information system is needed to gather data from multiple sources in a single repository for review, cleaning, and analysis. Data from this repository can be shared with the WHO NHWA Portal. The NHWA Technical Working Group and Steering Committee have identified the Integrated Database System for HRH (IDSHRH) as a potential platform, but an assessment is needed to determine whether the IDSHRH is an appropriate system for this purpose.

The IDSHRH was developed in the Philippines to facilitate the data sharing and collaboration of various agencies under the Human Resources for Health (HRH) Network agencies. The objectives of IDSHRH are to:

- Establish linkages and synchronize information system towards the integration of HRH information in the country; and
- Generate reports to support research, policymaking, and workforce planning for HRH.

As part of the work plan for HRH2030 and HHRDB, an assessment of IDSHRH was planned. However, the system was not available for a full assessment due to undergoing enhancements to meet the requirements of Knowledge Management and Information Technology Services (KMITS). A partial review was completed, particularly of the documentation and schema, and the results of the review are presented in this document. Although additional enhancements to IDSHRH must be deferred while the more critical action of NHWA data collection is addressed, this report can still provide useful guidance for either future enhancements to IDSHRH or the creation of an alternative NHWA staging database as the Philippines progressively implements the NHWA.

This report recommends that the NHWA staging database – whether IDSHRH or another system – should have a clear governance mechanism, use web technologies, utilize open source technologies, and – most importantly – use standards to promote interoperability with other systems. As HHRDB looks to commission the development of the NHWA staging database, it is proposed that the recommendations submitted in this report be considered in developing the terms of references.

## Assessment Methodology

### Objectives

The original objectives of the assessment are as follows:

- Assess the readiness of IDSHRH to serve as the central integrated information system for HRH data in the Philippines, starting with priority NHWA indicators
- Identify gaps that are present in IDSHRH that would prevent its use as a central integrated platform, and provide possible recommendations to address the gaps
- If necessary, propose a new system/solution that will satisfy the requirements for an integrated HRH information system

### Information Collection and Review Process

The following are the information collection steps that were proposed in assessing IDSHRH.

- **System Review:** The goal of the system review is to collect as much information as possible regarding the system. The output of the review is a gap analysis of the system. The system will be reviewed using the following steps:
  - External Review
    - Organization Review
    - Documentation Review
    - Functional Requirements Review
  - Technical Review
    - Database Review
    - Code Review
    - Integration Review
- **Assessment of the system based on the Principles of Digital Development.** The goal of the assessment is to provide a quantitative way of accessing the system to have a way of determining whether the system is ready or not to be the country's health worker registry.

Since IDSHRH itself was not available for a code review, this report only covers the external review and the database and integration review portion of the technical review.

## Component Assessment

### Governance Review

The goal of a governance review is to look into the current governance of the system and the accompanying data. Governance of the system is mainly discussed in two agreements that were produced. These are:

- The Joint Statement of Commitment for the Creation of Human Resources for Health Network signed in 2006 (Document 1)
- Memorandum of Agreement on the Data Sharing for the Integrated Database System for Human Resources for Health signed in 2014 (Document 2)

The first document discusses the formation of an inter-agency network that will handle the management of HRH issues and problems to ensure that quality healthcare is provided in the country. It has assigned the Department of Health (DOH) as the lead agency, and the Department

of Labor and Employment as the Co-Lead agency. Three technical working groups were created: Entry, Workforce and Exit.

The second document serves as a data sharing agreement among the members of the HRH Network. The document operationalizes how data sharing can be done and discusses the ownership of data. It stated that while DOH owns the database, all shared data is owned by the originator of the data.

Exhibit I contains the key assessment questions for governance, and the information provided by the two documents.

### Exhibit I. Governance Issues

Issue	Questions	Findings
<b>System Ownership</b>	Who owns the system? Who maintains the system? Who updates the current components of the system?	The system is owned and was commissioned by the HHRDB as the DOH focal point for HRH. However, the system is currently maintained and supported by the KMITS, which is the main IT department of DOH.
<b>System Governance</b>	Is there an operational manual for the system? Is there a governance structure for the system?	Given current documentation, no operational manual nor governance structure is found.
<b>Organizational Capacity</b>	Is there enough manpower to maintain and make the system sustainable?	The system was developed by an external consultant. Although the technologies used were open source technologies, actual technology transfer was not done both with HHRDB and KMITS. A recurring issue for IDSHRH is continued dependence on the external consultant whenever updates or bug fixes are required. The consultant is not consistently available to address these requests immediately.

### Documentation Review

The following are the documentation that were provided to facilitate the review of IDSHRH:

- Functional Requirements
- Technical Design Document
- System Integration Plan

Review of this documentation found that typical components were not present, as discussed in Exhibit 2.

### Exhibit 2. Available Documentation

Documentation	Standard Components	Actual Components
<b>Functional Requirement</b>	Use cases/use case diagrams user roles functional requirements non-functional requirement System output	Only contains process flows No discussion of user roles Functional requirements are not defined in detail No discussion on non-functional requirements No discussion of reports to be generated
<b>Technical Design</b>	System architecture Implementation stack	No system architecture Technologies used are listed

Documentation	Standard Components	Actual Components
	Technologies to be used	Database schema is included No description of database tables
<b>System Integration Plan</b>	Must describe how IDSHRH will integrate with other application	A manual integration is proposed.

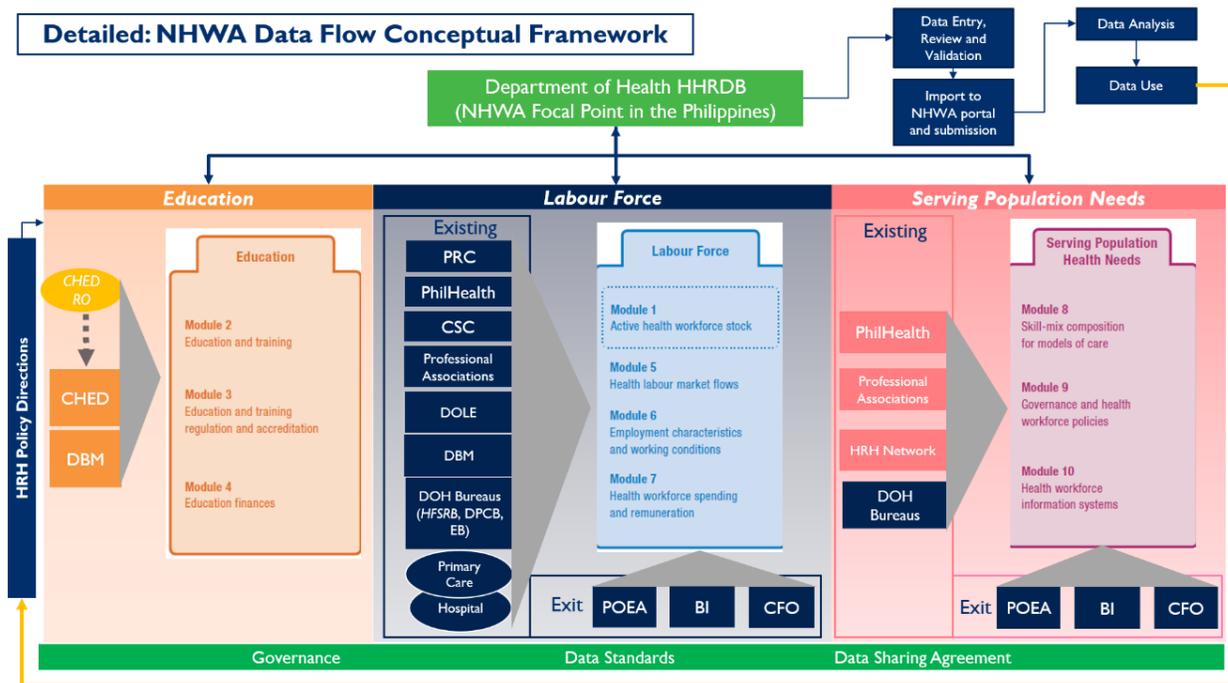
It is to be noted that the following documentation were not available during the review, but should be considered during a full system assessment:

- Testing plan, testing scripts
- Deployment plan
- System architecture
- User Manual
- Technical Manual

### Functional Specifications Review

In this section, the functional specifications will be assessed and will be matched to the requirements of the NHWA implementation plan. The Philippine National Health Workforce Accounts Implementation Roadmap was developed to discuss how the country will implement NHWA. In particular, the following framework was presented:

**Exhibit 3. Detailed NHWA Conceptual Framework**



In the data flow framework, 10 modules from NHWA, comprising 18 data fields, are selected to be the NHWA indicators. To generate these indicators, the following processes should be done:

- Data entry
- Review
- Validation
- Import to NHWA portal
- Analysis
- Data Use

The IDSHRH was designed as the reporting platform for the HRH Network. Compared to the NHWA staging database, where individual data are to be inputted, the IDSHRH accepts integrated reports. Exhibit 4 lists the functionalities that are available in IDSHRH. The functionalities of IDSHRH are mostly focused on how to accept data submitted by agencies. Data can be manually entered, or structured data can be uploaded.

#### Exhibit 4. IDSHRH Modules

Module	Sub-Module	Data Type	Description
<b>Data Importation</b>			
	Data Extraction	Source Data	Parses SQL, XLS, and CSV data from HRHN agency and inserts into database
<b>User Data Management</b>			
	Manual Data Entry	Primary Data	Enter data from paper-based or flat files, edits and deletes data based on user level access
<b>Administration</b>			
	User Accounts Maintenance		Creates, edits, and deletes users and assigns privileges
	Audit Trail		Log of all user activities
	Library Maintenance		Creates, edits, and deletes the libraries

Exhibit 5 compares the NHWA data flow framework and the IDSHRH functionalities. The mapping of the functionalities shows some of the lacking functionalities in IDSHRH that were presented in the NHWA conceptual framework. It should be noted that data review and validation can be done in the respective agency levels and hence may not be included in the actual functionalities of IDSHRH. However, data analysis is another important functionality and should be present in any system that would serve as a staging point for NHWA data.

### Exhibit 5. Comparison of NHTWA and IDSHRH Functionalities

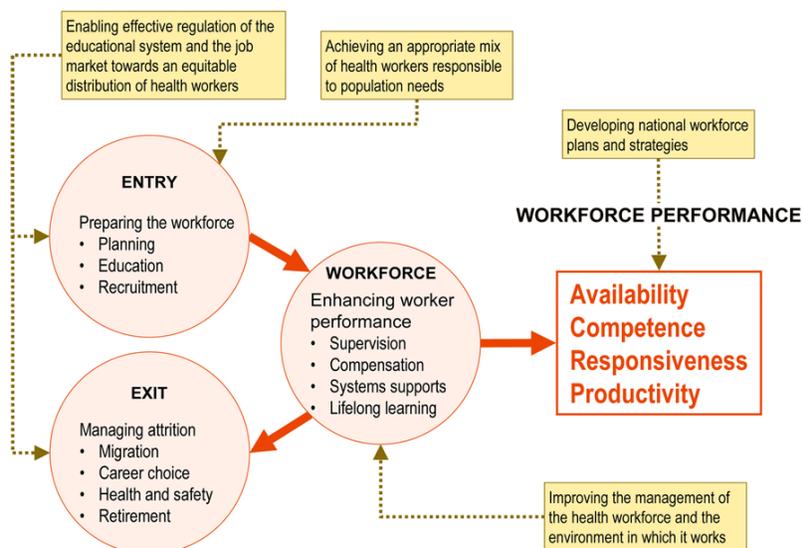
NHTWA Functionality	IDSHRH Functionality	Assessment
Data Entry	Manual Data Entry	The IDSHRH can be used for manual data entry
Data Review	Not discussed	
Validation	Not discussed	
Import to NHTWA Portal	Data Extraction	SQL, XLS and CSV data can be shared to IDSHRH for data upload
Analysis	Not discussed	
Data Use	Reports Generation	Reports can be generated from IDSHRH for agency use

### Data and Database Review

The IDSHRH was designed to collect data using the WHO Working Lifespan Strategies Framework (Exhibit 6).

### Exhibit 6. WHO Working Lifespan Strategies Framework

#### Stages of health workforce development



World Health Organization, 2006

As such, the following are the data that are being collected by IDSHRH as defined in the functional specifications document (Exhibit 7).

### Exhibit 7. Data Collected by IDSHRH

Entry	Workforce	Exit and Re-entry
Number of enrollees and graduates for each health profession	Per working health profession : age, gender and distribution, employment type (clinical, public health), sector of employment (public, private), employment status (self-employed, temporary, permanent, part-time, full-time), industry (educational, health facility or institute, research institute, non-health sector), identifiers, sector and industry of origin upon employment to health sector	Age, gender, distribution, profession/s and identifiers of productive workers that leave the health sector to migrate under
Number of second-degree enrollees and graduates		Age, gender, distribution, profession/s, experiences and skills and identifiers of productive workers that return to the Philippines due to : termination or pre-termination of labor contract, opportunities for employment or reintegration into health system
Number of enrollees and graduates for each post-graduate course or training program		Age, gender, distribution and identifiers of health professionals retired from practice
Age, gender, distribution		Age, gender, distribution and identifiers of health professionals that died

On the other hand, based on several meetings and workshops between HHRDB and USAID's HRH2030, a NHWA staging database will require additional data fields to support calculation of the NHWA indicators. Exhibit 8 lists NHWA indicators that will be collected by the NHWA staging database. Mapping the indicators with the data being collected by IDSHRH, we will be able to determine the possible gaps.

### Exhibit 8. NHWA Indicators

NHWA Module	Sub-Module	Indicator	Ability to generate
<b>Module 1: Active health workforce stock</b>			
1	I-01	Health worker density	Can be generated
2	I-02	Health worker density at subnational level	Cannot be generated
3	I-05	Health worker distribution by facility ownership	Can be generated
4	I-06	Health worker distribution by facility type	Can be generated
<b>Module 5: Health labor market flows</b>			
5	5-04	Voluntary & exit rate from health labour market	Can be generated
<b>Module 7: Health workforce spending and remuneration</b>			
10	7-06	Policies on public sector wage ceilings	Cannot be generated

NHWA Module	Sub-Module	Indicator	Ability to generate
<b>Module 8: Skill mix composition for models of care</b>			
11	8-01	Percentage of health workforce working in hospitals	Can be generated
12	8-03	Percentage of health workforce working in ambulatory health care	Can be generated
<b>Module 9: Governance and health workforce policies</b>			
13	9-01	Mechanisms to coordinate an intersectoral health workforce agenda	Cannot be generated
14	9-02	Central health workforce unit	Cannot be generated
15	9-03	Health workforce planning processes	Cannot be generated
16	9-05	Institutional models for assessing health care staffing needs	Cannot be generated
<b>Module 10: Health workforce information systems</b>			
17	10-06	HRHIS for tracking the number of active stock on the labour market	Can be generated
18	10-07	Ability of HRHIS to generate information to track exits from the labour market	Can be generated

Although it appears that IDSHRH cannot generate many of the NHWA indicators, it should be noted that some of these indicators are to be generated from separate channels such as existing government laws and policies. These include:

- Standard Working Hours – Book 3: Conditions on Employment 2014
- Regulations on Working Hours – Book 3: Conditions on Employment 2014
- Regulation on Minimum Wage – RA 602 (Minimum Wage Law)
- Regulation on Social Protection
- Policies on public sector wage ceilings – Salary Standardization Law V
- Mechanisms to coordinate an intersectoral health workforce agenda
- Central health workforce unit
- Health workforce planning processes
- Institutional models for assessing health care staffing needs – HRH Development Plan

The only lacking indicator is the ability to generate health worker density on subnational level, and **this can be addressed if facility location can be added in the system.**

In terms of the current database schema, we have assessed the database to ensure that it is technically sound and would be secure as it would handle sensitive data. The following are the results of the analysis:

- Account/Agency types are hardcoded in the database. This limits the scalability of the software; when new account types or agency types needed to be inputted, they must be hardcoded into the database.
- Data to be input are already aggregated. By inputting aggregated data, agencies will not be able to use the database to utilize individual data for their regular workflows. Aggregated

data have already been processed in agencies, and it will not be possible for agencies to validate the correctness of these reported data.

- Reports are stored in the system instead of generated. Reports should not be stored in databases; rather, reports should be generated by the system itself. It would be problematic to store reports because they will not change automatically when the data is updated.
- Several fields should have been utilized from data sources, and would no longer be stored in the database. For example, the DOH already uses a standard facility ID, and thus it is not necessary to have another facility ID within the database. Utilizing fields from the data sources will make the database more efficient and will ensure interoperability with other systems.

## Integration Review

The integration review was presented in the Integration Plan. The integration plan presents options on how the system can be integrated with other existing systems. Possible strategies that were considered for integration were a fully automated system and a manual system. Several factors were considered to determine the best integration strategy. Exhibit 9 summarizes the two plans that were considered.

**Exhibit 9. Integration Plan Options**

	Full Automated, Real-time	Manual, Non-real Time
Number of servers	6 (including the IDSHRH server)	1 (i.e. the IDSHRH server)
Number of software interfaces	5	None
Security requirements	Security for 5 additional servers	Security for 1 server
Technical support requirements	Technical support for 5 additional servers	Security for 1 server
Updating of data	Real-time	Non real-time

After considering the costs of each integration strategy, the integration plan proposed a manual non-real time system. By proposing the manual non-real time strategy, IDSHRH does not truly integrate with other systems, particularly DOH-based systems. The proposed strategy does not use APIs or web services. Although it is a web-based application, it does not utilize web technologies for integration. The proposed strategy also does not follow KMITS standards and database schema.

It is worth noting that strategies for system integration should not be decided based only on cost-related constraints; rather, decisions should be made based on the actual benefits that a fully integrated system can produce, in combination with cost considerations. The available technologies should also be considered because using web-based technologies and standards can lower the hard costs of integrating systems.

## Overall Assessment

An overall assessment of IDSHRH was done using the Principles of Digital Development. The Principles of Digital Development (<https://digitalprinciples.org/>) are a set of nine globally accepted standards or best practices for developing and implementing digital interventions. These principles are widely used in international digital implementations, and have received support from donors, governments, and implementing partners. Exhibit 10 presents the criteria to be used and the source of the evaluation.

**Exhibit 10. Principles of Digital Development**

Criteria	Description	Review Steps
Design with user	Check the user interface of the system and check if the user interface is something the expected user can work on	1. Functional Review
Understand the existing ecosystem	Check if the system can easily (with minimal modification) work with the other information systems used to collect HRH data.	1. Integration Review 2. Database Review
Design for Scale	Check how the system will be able to scale up	1. Integration Review 2. Database Review 3. Functional Review 4. Code Review
Build for Sustainability	Check how DOH will be able to sustain the system	1. Documentation Review 2. Organization Review
Be Data Driven	Check the data collected and how it drives the improvement of the system	1. Database review 2. Integration review
Use Open Standards/Open Data/Open Source/Open Innovation	Check whether the system uses open standards	1. Database review 2. Organization review 3. Integration review
Reuse and Improve	Check whether components of the system can be reused/improved by other agencies.	1. Organization review 2. Integration review 3. Code review
Address Privacy and Security	Check how the system is being secured	1. Organization review 2. Code review 3. Documentation review
Be Collaborative	Check how the system can work with other agencies	1. Organization review

Given these criteria and the initial assessment done, the overall assessment is provided in Exhibit 11. Given that the IDSHRH is an existing system, improvements should prioritize the following digital principles:

- Design for scale
- Build for sustainability
- Be data driven

These principles are recommended because they are the principles that support scalability and sustainability, two vital components for the NHWA staging database, which will collect increasingly large volumes of data throughout the progressive iteration of NHWA. In general, systems like IDSHRH need to be scalable because they are used by multiple agencies. The system should be able to function as the number of agencies continues to increase.

Sustainability of the system should also be important because, as a government information system, this database is expected to be used for many years. Sustainability of government information systems is a frequent challenge because government offices usually lack ICT personnel to support information systems.

Also, since the system is a reporting system, it is important to look at how the system can be data driven so that it can support the reporting requirements of the HRH Network.

### Exhibit II. Assessment based on Principles of Digital Development

Criteria	Assessment
Design with user	Since IDSHRH is mostly a report generation system, it satisfies the requirements of the agencies to have a reporting platform and for HHRDB to have data to be collected easily. However, since individual data is not collected, it does not serve the real purpose of having an integrated database, where data collected in one agency is consistent with the data collected with other agencies.
Understand the existing ecosystem	The system is designed based on the current structure of HRH Network.
Design for Scale	Given that: <ul style="list-style-type: none"> <li>▪ Some of the fields are hardcoded</li> <li>▪ No sufficient documentation is provided</li> <li>▪ No proper governance framework is present</li> <li>▪ No transfer of technology is done</li> </ul> The system is not scalable and would bog down if more data fields are required or more agencies join the network.
Build for Sustainability	Since IDSHRH was developed by an external consultant on behalf of HHRDB, and no transfer of the technology or code was done, it is hard to sustain the system. Due to the lack of a full system handover, KMITS and HHRDB remain dependent on the external consultant for any changes to the system's code.
Be Data Driven	Since the system is mostly for report collection, data analysis on individual data cannot be done.
Use Open Standards/Open Data/Open Source/Open Innovation	All technologies used are open source. However, the system itself is a closed system.
Reuse and Improve	Given the lack of documentation, it will be hard to reuse and improve the system. A more thorough assessment of the system, and development of relevant documentation would be helpful and would enable future users to reuse and improve the system.
Address Privacy and Security	The governance structure for the system should be able to define how it can address security, privacy and security.
Be Collaborative	The system source code is housed in a private server, others cannot collaborate and share improvements for the system

## Recommendations

Given the results of this review and using the guidance from the NHWA Implementation Guide and the Principles of Digital Development, the following are the recommendations on the implementation of a NHWA staging platform. These recommendations can be used to improve IDSHRH or to totally develop a new staging database.

### Establish a Governance Structure

The proposed NHWA staging database will be utilized by a multisectoral group, therefore, the governance structure should mirror the agency affiliation of system users. The proposed governance structure will have two layers: a steering committee and a TWG. The steering committee should comprise agency heads who will decide on the overall direction of the system. The TWG should be composed of selected IT personnel from the respective agencies. The TWG should work to encourage the agencies to use the system on a regular basis. A multisectoral governance structure has the advantage of increasing agencies' sense of ownership of both the system and the data collected therein. The NHWA steering committee may be the same as the NHWA staging database steering committee, but the TWG for the staging database should be different from the NHWA TWG. If the NHWA TWG contains sufficient IT personnel, it may be possible to create the staging database TWG as a subset of the NHWA TWG.

### Enact a New Data Sharing Agreement

It is proposed that members of the HRH Network adopt a revised data sharing agreement. The initial data sharing agreement identifies the DOH as the sole owner of the database where the shared data will be stored. In contrast, the new data sharing agreement should acknowledge that a multisectoral network (the HRH Network) will have joint ownership and control of the data. The data sharing agreement should align with the Data Privacy Act of 2012 and should be patterned after the template shared by the National Privacy Commission, Circular 16. The data sharing agreement specifically requires agencies to discuss the following:

- List of data to be shared
- Responsible personnel
- Process that will be done on the data
- Security protocols
- Online access of data

The minimum data set (Annex C) should be included in the data sharing agreement to ensure that agencies know exactly which data they will be sharing.

The Department of Trade and Industry and the Department of ICT must also be consulted on the security protocols that will be used in securing the data that will be shared.

### Use Web Technologies to Share Data

One of the key weaknesses of IDSHRH is that integration is often done manually through data upload or data encoding. This process defeats the purpose of having an integrated database. Ideally, the integrated system will be directly connected to the data source (in this case, the agency-based information systems), so that real time submission can be done. By making the agencies encode data separately, errors in encoding may occur. Multiple instances of data entry

may lead to redundancy of work. Since most government applications in the Philippines are now web-based, the latest techniques in data sharing between web-based applications should be used. These techniques include using a web service or application programming interface (API). Using APIs can enable interoperability among systems, and systems developed and housed in different offices/agencies can easily share data in real-time. The whole of government architecture design by the Department of Information and Communications Technology (DICT), the Philippine Government Interoperability Framework, encourages agencies to use APIs in data sharing. DICT has even set up its own API store to assist agencies in sharing APIs with others.

### **Use Data Exchange Standards**

As a corollary to the use of APIs, it is also proposed that standards be used in data sharing. It is possible that the agencies within the HRH Network can define a standard; however, it may be more sustainable for the agencies to use international standards such as Health Level Seven International Fast Healthcare Interoperability Resource (HL7 FHIR) ([www.hl7.org/fhir](http://www.hl7.org/fhir)). HL7 FHIR is the leading standard in health data exchange and uses APIs as its infrastructure for data exchange. HL7 FHIR also provides a data model that can be used as a backend for health-related information systems. Using a recognized international standard will also improve the sustainability of the system because FHIR is regularly updated to reflect evolving user needs.

One of the activities undertaken by the HRH2030 project was the mapping of the minimum data set (MDS) with the corresponding FHIR resources (Annex C). This activity revealed that all identified fields in the minimum data set have corresponding resources in FHIR. The MDS will ensure interoperability of individual systems to the NHWA staging database. Aside from the MDS, it is proposed that individual data are stored in the system. Storing individual data will require additional privacy and protection measures, but it will enable agencies to track individuals across different data sets and facilitate additional analysis, rather than limiting the system to a mere reporting module.

### **Use Open Source Technologies**

Another way of increasing the sustainability of the NHWA staging database is to use open source technologies. By using open source technologies, the platform can be modified and maintained by KMITS or the TWVG without paying or buying proprietary solutions or services. It is proposed that preference be given to open source technologies over proprietary technologies. It should be noted, however, that unlike proprietary technologies, open source technologies cannot be deployed out of the box; customizations must be done as part of deployment. In the long term, however, open source technologies tend to be less expensive because they do not lock the user into a specific technology, contract, or licensing agreement.

### **Include Data Validation Functions**

The staging database should have data validation and data review functionalities to be consistent with the NHWA conceptual framework. Although agencies have their respective data validation and data review processes, a centralized process hosted in the NHWA staging database would still be helpful and would ensure consistency in the quality of data that are uploaded by the agencies.

## **Utilize Existing Hosting Options**

Since the NHWA staging database will be an interagency system, DICT should be involved in determining the proper hosting infrastructure. DICT, through the Government Common Platform and Government Cloud, offers many resources to government offices. By involving DICT, or by using DICT services, the NHWA staging database TWG will be able to utilize the expertise of DICT and will save on the usual cost of hosting servers such as electricity and manpower costs. Once hosted by DICT, the system will also be secured using the technologies being used by the Department.

## **Create User Manual and Technical Documentation**

The NHWA staging database should have a user manual and technical documentation at the time of deployment. Given that the system will be used by personnel from different agencies, it should have a user manual that can facilitate independent use of the system. While it is possible that IT support to the NHWA staging database may reside in KMITS or HHRDB, the users from other agencies or offices should be able to navigate the system with minimal support from IT support through the user manual.

The technical documentation is a vital component because it will enable the NHWA staging database TWG to continue development of the system even without assistance from the original system developers. Even if the staging database is developed internally, technical documentation will enable future system developers to continue improving and enhancing the system.

Technical trainings and user trainings should be conducted for both system users and for the staging database TWG to ensure that those who will receive the system can maintain and modify the system as needed.

## **Conclusion**

A desk review of IDSHRH compared the documented features of IDSHRH to the requirements of a NHWA staging database as described in the Philippines NHWA Implementation Roadmap. A key finding is that IDSHRH was not designed to handle individual HRH data; rather, the system serves as an integrated reporting system for aggregate data. The NHWA staging database, on the other hand, is required to handle individual HRH data and to be used by agencies whenever they need to access HRH data. Therefore, it may be appropriate to identify or develop a separate NHWA staging database.

This report recommends that the NHWA staging database should have a clear governance mechanism, use web technologies, utilize open source technologies, and – most importantly – use standards to promote interoperability with other systems. As HHRDB looks to commission the development of the NHWA staging database, it is proposed that the recommendations submitted in this work be considered in developing the terms of references.

# Annex A. Assessment Methodology

## Assessment Methodology of DOH systems for suitability as Integrated HRH Information System Platform

### Rationale

As the Philippines implements the National Health Workforce Accounts (NHWA), a central integrated information system is needed to gather data from multiple sources in a single repository for review, cleaning, and analysis. Data from this repository can be shared with the WHO NHWA Portal. The NHWA TWG and Steering Committee have identified the Integrated Database System for HRH (IDSHRH) as a potential platform, but an assessment is needed to determine whether the IDSHRH is ready to serve this purpose.

### Objectives

The objectives of the assessment are as follows

- Assess the readiness of IDSHRH to serve as the central integrated information system for HRH data in the Philippines, starting with priority NHWA indicators
- Identify gaps that are present in IDSHRH that would prevent its use as a central integrated platform, and provide possible recommendations to address the gaps
- If necessary, propose a new system/solution that will satisfy the requirements for an integrated HRH information system

### Assessment Methodology

The following are the data collection steps that are proposed in assessing Integrated Database System for Human Resource for Health (IDSHRH).

- **System Review:** The goal of the system review is to collect as much information as possible regarding the system. The output of the review is a gap analysis of the system. The gap analysis will show what are the existing gaps in the system. The system will be reviewed using the following steps:
  - External Review
    - Organization Review
    - Documentation Review
    - Functional Requirements Review
  - Technical Review
    - Database Review
    - Code Review
    - Integration Review
- Assessment of the system based on the Principles of Digital Development. The goal of the assessment is to provide a quantitative way of accessing the system to have a way of determining whether the system is ready or not to be the country's health worker registry.

## External Review

### Organization Review

For the organization review we will look at the following items:

Issue	Description	Questions
<b>System Ownership</b>	Determine who really owns the system.	Who owns the system? Who maintains the system? Who updates the current components of the system?
<b>System Maintenance</b>	Determine who currently hosts and maintains the system and how the system is being maintained.	Who maintains the system? Who updates the current components of the system? Is there a log of the different modifications done to the system after turnover? Is there an agreement/governing rules between the system owner and the maintainer?
<b>System Governance</b>	Determine the governance structure for the system	Is there an operational manual for the system? Is there a governance structure for the system?
<b>Organizational Capacity</b>	Determine if the system maintainer and system owner are capable in performing their tasks (or roles as identified in the RACI matrix)	Is there enough manpower to maintain and make the system sustainable?

### Steps

- Conduct Key Informant Interviews (KII) with the KMITS person in charge and the HHRDB person in charge of the system
- Review the relevant documentation:
  - System rationale/purpose (should have been done before the system was commissioned)
  - Manual of Operations (if present)
  - Agreement between KMITS and HHRDB
  - Role of KMITS in DOH governance
  - Review KMITS/HHRDB organizational chart

### Documents Review

For the assessment of documents, it would be necessary to determine if the following documents are available:

1. Functional Requirements - Lists down the requirements needed to be implemented for IDSHRH
2. Database Schema - Database structure for IDSHRH
3. System Architecture - Architecture description for IDSHRH
4. User Manual - How the system can be used
5. Technical Documentation - Technical description of the components of the system.

The following are the assessment items that we will be looking at:

1. Presence - Are the documents present or not?
2. Comprehensive - Are the components of each document comprehensive and complete? There is a standard software engineering template for such documents - do these documentations follow such templates?
3. Timeliness - Are the documents updated based on the changes from the system?
4. Relevance - Were the documents submitted suffices the requirements of the HHRDB/DOH?

#### **Steps**

- Request for the documents stated in this list
- Review each of the document
- Conduct KII if necessary (KMITS person in charge/HHRDB point person)

### **Functional Requirements Review**

For the functional assessment, we will be looking if the requirements made by HHRDB during the initial stages of system development have been incorporated in the functional requirements documents and whether these requirements have been reflected in the actual system. The goal of this step is to have a mapping of the requirements to the actual functionalities implemented in the system.

#### **Steps**

- List down all the requirements made by HHRDB
- Map this to the contents of the functional requirements document
- Review the system if the ones listed in the functional requirements are in the system.

### **Technical Review**

For the technical assessment we will review the actual technical infrastructure of the system. These includes database, code, and integration review. To perform the review, we will access the system at KMITS and perform the review will connected to the system.

### **Database Review**

For the database review, we will be looking at the database schema of the system. The following are the items that we will be looking at the database:

1. Redundant database fields - are there fields that are repetitive and could be removed?
2. Comprehensiveness of database fields - are the fields enough to generate the necessary NHWA indicators?

### **Code Review**

We will be conducting a rapid code review to determine the following:

1. Does the code follow KMITS standards?
2. Does the technology stack follow KMITS standards?
3. Will the code be easily scalable?
  - Check code readability
  - Check if there are code documentation inside the source code itself.

## Integration Review

We will check if the system can be integrated with other information systems.

1. Does the system allow the use of APIs or web services?
2. Does it follow KMITS standards on the use of web services?
3. What are the requirements needed to connect to the system?

## Assessment Criteria

A set of assessment criteria is being identified to have a systematic way in looking for possible gaps. This will also guide the process to have a unified way of assessing. Some of the criteria may be used in multiple steps. The assessment criteria is mostly based from the Principles of Digital Development (<https://digitalprinciples.org/>).

Criteria	Description	Review Steps
Design with user	Check the user interface of the system and check if the user interface is something the expected user can work on	2. Functional Review
Understand the existing ecosystem	Check if the system can easily (with minimal modification) work with the other information systems used to collect HRH data.	3. Integration Review 4. Database Review
Design for Scale	Check how the system will be able to scale up	5. Integration Review 6. Database Review 7. Functional Review 8. Code Review
Build for Sustainability	Check how DOH will be able to sustain the system	3. Documentation Review 4. Organization Review
Be Data Driven	Check the data collected and how it drives the improvement of the system	3. Database review 4. Integration review
Use Open Standards/Open Data/Open Source/Open Innovation	Check whether the system uses open standards	4. Database review 5. Organization review 6. Integration review
Reuse and Improve	Check whether components of the system can be reused/improved by other agencies.	4. Organization review 5. Integration review 6. Code review
Address Privacy and Security	Check how the system is being secured	4. Organization review 5. Code review 6. Documentation review
Be Collaborative	Check how the system can work with other agencies	2. Organization review

## Criteria Rubric

The following is the assessment rubrics that will be used.

Criteria	Items	Score
Design with user	The functionalities of the system are exactly the ones needed by the users	3
	The functionalities of the system are partly the ones needed by the system	2
	The functionalities of the system are not the ones needed by the system	1
	The functionalities of the system are based on the requests of the users	3
	The functionalities of the system are partly based on the requests of the users	2
	The functionalities of the system are not based on the requests of the users	1
Understand the existing ecosystem	The data collected by the system are exactly the ones needed for data reporting	3
	The data collected by the system are partly the ones needed for data reporting	2
	The data collected by the system are not needed for data reporting	1
Design for Scale	The system can easily add more fields for input and reporting	3
	The system requires some effort for adding more fields for input and reporting	2
	The system requires extensive modification for adding more fields for input and reporting	1
	The system can easily include additional modules	3
	The system requires some effort in adding additional modules	2
	The system requires extensive modification for adding new modules	1

Criteria	Items	Score
	The system can be used by more users	3
	The system needs some changes to be used by more users	2
	The system requires modifications to be used by more users	1
Build for Sustainability	The in-house team of HHRDB and KMITS can maintain and expand the system	3
	The in-house team of HHRDB and KMITS will need help in maintaining and expanding the system	2
	The in-house team of HHRDB and KMITS will need to outsource the maintenance and expansion of the system	1
Be Data Driven	The output of the system is readily available to those who need it.	3
	The output of the system is available, upon curation of KMITS/HHRDB to those who need it	2
	The output of the system is available only upon extensive processing of KMITS/HHRDB	1
Use Open Standards/Open Data/Open Source/Open Innovation	The system follows open standards	3
	The system partly follows open standards	2
	The system does not follow open standards	1
	The system uses open source technologies	3
	The system partly uses open source technologies	2
	The system completely uses proprietary technologies	1
Reuse and Improve	Components of the system can easily be reused	3
	Components of the system needs some work before it can be reused	2
	Components of the system requires extensive modification before it can be reused	1

Criteria	Items	Score
Address Privacy and Security	The system follows KMITS security and privacy standards	3
	The system partly follows KMITS security and privacy standards	2
	The system does not follow KMITS security and privacy standards.	1
Be Collaborative	The system can be modified by other organizations	3
	Only parts of the system can be modified by other organizations	2
	The system cannot be modified by other organizations	1
	The system can be reviewed by other organizations	3
	Only parts of the system can be reviewed by other organizations	2
	The system cannot be reviewed by other organizations	1



### 1.1 Table structure for table account

Column	Type	Null	Default
<b>acc_id</b>	int(10)	No	
<b>acc_username</b>	varchar(30)	No	
acc_password	varchar(32)	No	
acc_last_name	varchar(30)	No	
acc_first_name	varchar(60)	No	
acc_type	enum('admin', 'dev', 'user', 'cfo', 'ched', 'prc', 'doh', 'cfo', 'poea', 'nrco')	No	user
acc_failed_login	tinyint(3)	No	0
acc_status	enum('active', 'locked', 'deleted')	No	active
acc_image	varchar(50)	No	

### 1.2 Table structure for table article

Column	Type	Null	Default
<b>art_id</b>	int(11)	No	
art_title	varchar(100)	No	
art_blurb	varchar(200)	No	
art_slug	varchar(100)	No	
art_content	text	No	
art_thumb	text	No	
art_image	text	No	
art_published	enum('published', 'draft')	No	
art_featured	enum('yes', 'no')	No	
art_date	date	No	
art_author	varchar(100)	No	
art_date_created	datetime	No	
art_created_by	varchar(30)	No	
art_date_modified	timestamp	No	CURRENT_TIMESTAMP
art_modified_by	varchar(30)	No	

### 1.3 Table structure for table banner

Column	Type	Null	Default
<b>ban_id</b>	int(11)	No	
ban_title	varchar(100)	No	
ban_description	varchar(255)	No	
ban_link	varchar(512)	No	
ban_image	text	No	
ban_thumb	text	No	
ban_order	int(11)	No	
ban_published	enum('published', 'draft')	No	
ban_created_by	varchar(30)	No	

ban_date_created	datetime	No
ban_date_modified	datetime	No
ban_modified_by	varchar(100)	No

#### 1.4 Table structure for table cfo

Column	Type	Null	Default
<b>cfo_id</b>	int(10)	No	
cfo_individual	int(10)	No	
cfo_year	year(4)	No	
cfo_initials	varchar(10)	No	
cfo_birth_date	date	No	
cfo_sex	enum('N/A', 'MALE', 'FEMALE')	No	N/A
cfo_country_of_destination	varchar(100)	No	
cfo_profession	varchar(120)	No	
cfo_datetime_uploaded	datetime	No	

#### 1.5 Table structure for table courses

Column	Type	Null	Default
<b>cou_id</b>	int(11)	No	
cou_qualification	varchar(255)	No	
cou_year	year(4)	No	
cou_en_male	int(11)	No	
cou_en_female	int(11)	No	
cou_en_total	int(11)	No	
cou_gr_male	int(11)	No	
cou_gr_female	int(11)	No	
cou_gr_total	int(11)	No	

#### 1.6 Table structure for table database\_updates

Column	Type	Null	Default
<b>dat_id</b>	int(11)	No	
dat_name	varchar(100)	No	
dat_path	varchar(200)	No	
dat_datetime	datetime	No	

#### 1.7 Table structure for table discipline\_category

Column	Type	Null	Default
<b>dic_id</b>	int(10)	No	
dic_discipline_code	varchar(2)	No	
dic_title	varchar(100)	Yes	0

#### 1.8 Table structure for table discipline\_course

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Default</b>
<i>dis_id</i>	int(10)	No	
dic_id	int(10)	No	
mad_id	int(10)	Yes	NULL
dis_code	varchar(6)	No	
dis_title	varchar(150)	No	
dis_science_and_technology	int(1)	No	
dis_dateitem	datetime	No	

### **1.9 Table structure for table edu\_enrollment**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Default</b>
<i>ede_id</i>	int(10)	No	
reg_id	int(10)	Yes	NULL
pro_id	int(10)	Yes	NULL
ins_id	int(10)	Yes	NULL
mad_id	int(10)	Yes	NULL
ede_ay_start	year(4)	No	
ede_ay_end	year(4)	No	
ede_ay_label	varchar(10)	No	
ede_male	int(11)	No	
ede_female	int(11)	No	
ede_count	int(11)	No	

### **1.10 Table structure for table edu\_graduate**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Default</b>
<i>edg_id</i>	int(10)	No	
reg_id	int(10)	No	
pro_id	int(10)	No	
ins_id	int(10)	No	
mad_id	int(10)	No	
edg_ay_start	year(4)	No	
edg_ay_end	year(4)	No	
edg_ay_label	varchar(10)	No	
edg_male	int(11)	No	
edg_female	int(11)	No	
edg_count	int(11)	No	

### **1.11 Table structure for table email**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Default</b>
<i>eml_id</i>	int(11)	No	
eml_mail_to	varchar(150)	No	
eml_cc	varchar(150)	No	

eml_bcc	varchar(150)	No
eml_subject	varchar(150)	No
eml_message	text	No
eml_date_sent	timestamp	No CURRENT_TIMESTAMP

#### I.12 Table structure for table excel\_uploaded

Column	Type	Null	Default
<b>exu_id</b>	int(10)	No	
exu_type	enum('category', 'discipline', 'course', 'ched')	Yes	NULL
exu_filename	varchar(150)	No	0

#### I.13 Table structure for table feedback

Column	Type	Null	Default
<b>fbk_id</b>	int(11)	No	
fbk_name	varchar(600)	No	
fbk_subject	varchar(500)	No	
fbk_email	varchar(255)	No	
fbk_message	text	No	
fbk_date_created	timestamp	No	CURRENT_TIMESTAMP

#### I.14 Table structure for table health\_facility

Column	Type	Null	Default
<b>hfa_id</b>	int(10)	No	
hft_id	int(10)	No	
hfa_title	varchar(200)	No	
hfa_ownership_type	enum('Public', 'Private')	Yes	NULL
reg_id	int(10)	No	
pro_id	int(10)	No	
mun_id	int(10)	No	
hfa_create_datetime	datetime	No	
hfa_update_datetime	datetime	No	

#### I.15 Table structure for table health\_facility\_professions

Column	Type	Null	Default
<b>hfp_id</b>	int(10)	No	
hfa_id	int(10)	No	
prf_id	int(10)	No	
hfp_numbers	int(10)	No	
hfp_male_numbers	int(11)	No	
hfp_female_numbers	int(11)	No	
hfp_no_info_numbers	int(11)	No	
hfp_ages_1_10	int(11)	No	

hfp_ages_11_20	int(11)	No
hfp_ages_21_30	int(11)	No
hfp_ages_31_40	int(11)	No
hfp_ages_41_50	int(11)	No
hfp_ages_51_60	int(11)	No
hfp_ages_61_70	int(11)	No
hfp_ages_71_80	int(11)	No
hfp_ages_over_80	int(11)	No
hfp_ages_unknown	int(11)	No
hfp_permanent_full_time	int(11)	No
hfp_permanent_part_time	int(11)	No
hfp_contractual	int(11)	No
hfp_visiting_consultant	int(11)	No
hfp_casual	int(11)	No
hfp_volunteer	int(11)	No
hfp_no_information	int(11)	No

#### 1.16 Table structure for table health\_facility\_type

**Column Type Null Default**

<b>hft_id</b>	int(11)	No
hft_name	varchar(200)	No

#### 1.17 Table structure for table institute\_major\_program\_discipline

**Column Type Null Default**

<b>imp_id</b>	int(11)	No
ipd_id	int(11)	No
dis_id	int(11)	No
ins_id	int(11)	No

#### 1.18 Table structure for table institution

**Column Type Null Default**

<b>ins_id</b>	int(10)	No
ins_name	varchar(100)	No 0
reg_id	int(11)	No 18
pro_id	int(11)	No 88
mun_id	int(11)	No 1632

#### 1.19 Table structure for table institution\_program\_discipline

**Column Type Null Default**

<b>ipd_id</b>	int(11)	No
ins_id	int(11)	No 0
prl_id	int(11)	No 0

ipd\_program\_name varchar(250) No

### I.20 Table structure for table ipd

Column	Type	Null	Default
<i>ipd_id</i>	int(11)	No	
dic_id	int(11)	No	0
dis_id	int(11)	No	0
ins_id	int(11)	No	0
prl_id	int(11)	No	0
ipd_acad_year	varchar(50)	No	0
ipd_acad_year_start	year(4)	No	
ipd_acad_year_end	year(4)	No	
ipd_program_name	varchar(250)	No	
ipd_program_major	varchar(250)	No	
ipd_prc_code	varchar(250)	No	
ipd_progcred	varchar(250)	No	
ipd_emtotal	int(11)	No	0
ipd_efttotal	int(11)	No	0
ipd_emfttotal	int(11)	No	0
ipd_gmttotal	int(11)	No	0
ipd_gfttotal	int(11)	No	0
ipd_gtotal	int(11)	No	0
ipd_gaa_region_id	int(11)	No	0
ipd_sucmain	varchar(200)	No	
ipd_normalize_dis_id	varchar(200)	No	
ipd_psched_name	varchar(200)	No	
ipd_psched_group	int(10)	No	0
ipd_discipline_group	varchar(200)	No	
ipd_sn	int(10)	No	0
ipd_sucspvt	varchar(50)	No	
ipd_ms_phd	int(1)	No	0
ipd_xcoor	double	No	
ipd_ycoor	double	No	
ipd_region_2	int(10)	No	0
ipd_ucnonsuc	enum('undefine', 'SUC', 'NonSUC')	No	
ipd_imputed_from	varchar(200)	No	
ipd_imputed_date	date	Yes	NULL

### I.21 Table structure for table lic\_examinees

Column	Type	Null	Default
<i>pre_id</i>	int(11)	No	

lpr_id	int(11)	No
pre_year	year(4)	No
pre_total_male	int(11)	No
pre_total_female	int(11)	No
pre_total_passer	int(11)	No
pre_total_failed	int(11)	No
pre_age_10_19	int(11)	No
pre_age_20_29	int(11)	No
pre_age_30_39	int(11)	No
pre_age_40_49	int(11)	No
pre_age_50_59	int(11)	No
pre_age_60_69	int(11)	No
pre_age_70_79	int(11)	No
pre_age_80_89	int(11)	No
pre_age_90_99	int(11)	No

#### **I.22 Table structure for table lic\_foreign\_board**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Default</b>
---------------	-------------	-------------	----------------

<i>fbo_id</i>	int(11)	No	
fca_id	int(11)	No	
fbo_name	varchar(500)	No	

#### **I.23 Table structure for table lic\_foreign\_categories**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Default</b>
---------------	-------------	-------------	----------------

<i>fca_id</i>	int(11)	No	
fca_name	varchar(400)	No	

#### **I.24 Table structure for table lic\_foreign\_professionals**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Default</b>
---------------	-------------	-------------	----------------

<i>stp_id</i>	int(11)	No	
fbo_id	int(11)	No	
stp_year	year(4)	No	
stp_number	int(11)	No	

#### **I.25 Table structure for table lic\_prf\_mapping**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Default</b>
---------------	-------------	-------------	----------------

<i>id</i>	int(11)	No	
lpr_id	int(11)	No	
prf_id	int(11)	No	

#### **I.26 Table structure for table lic\_professions**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Default</b>
---------------	-------------	-------------	----------------

<i>lpr_id</i>	int(11)	No	
lpr_singular_name	varchar(160)	Yes	NULL
lpr_plural_name	varchar(160)	Yes	NULL

### 1.27 Table structure for table lic\_registered\_professionals

Column	Type	Null	Default
<i>rpr_id</i>	int(11)	No	
lpr_id	int(11)	No	
rpr_year	year(4)	No	
rpr_age_10_19	int(11)	No	
rpr_age_20_29	int(11)	No	
rpr_age_30_39	int(11)	No	
rpr_age_40_49	int(11)	No	
rpr_age_50_59	int(11)	No	
rpr_age_60_69	int(11)	No	
rpr_age_70_79	int(11)	No	

### 1.28 Table structure for table major\_discipline

Column	Type	Null	Default
<i>mad_id</i>	int(10)	No	
dic_id	int(10)	No	0
mad_code	varchar(2)	No	
mad_title	varchar(150)	No	0

### 1.29 Table structure for table migration

Column	Type	Null	Default
<i>mig_id</i>	int(10)	No	
mig_individual	int(11)	No	
mig_type	enum('N/A', 'Temporary', 'Permanent')	No	N/A
mig_year	year(4)	No	
mig_initials	varchar(10)	No	
mig_birth_date	date	No	
mig_sex	enum('N/A', 'MALE', 'FEMALE')	No	N/A
mig_country_of_destination	varchar(100)	No	
mig_profession	varchar(200)	No	
prf_id	int(10)	No	
mig_datetime_uploaded	datetime	No	

### 1.30 Table structure for table municipality

Column	Type	Null	Default
<i>mun_id</i>	int(10)	No	
reg_id	int(10)	No	0

pro_id	int(10)	No	0
mun_code	varchar(5)	No	0
mun_name	varchar(250)	No	0

### 1.31 Table structure for table page

Column	Type	Null	Default
<b>pag_id</b>	int(10)	No	
pag_title	varchar(140)	No	
pct_id	int(10)	Yes	0
<b>pag_slug</b>	varchar(80)	Yes	NULL
pag_content	text	No	
pag_date_created	datetime	No	
pag_date_published	datetime	Yes	NULL
pag_type	enum('editable', 'static')	No	editable
pag_status	enum('published', 'draft')	No	published

### 1.32 Table structure for table page\_category

Column	Type	Null	Default
<b>pct_id</b>	int(10)	No	
pct_name	varchar(50)	No	

### 1.33 Table structure for table photo

Column	Type	Null	Default
<b>pho_id</b>	int(11)	No	
phg_id	int(11)	Yes	NULL
pho_src	varchar(5000)	Yes	NULL
pho_caption	varchar(100)	Yes	NULL
pho_date_created	datetime	Yes	NULL
pho_created_by	varchar(50)	Yes	NULL
pho_order	int(11)	No	

### 1.34 Table structure for table photo\_gallery

Column	Type	Null	Default
<b>phg_id</b>	int(11)	No	
phg_name	varchar(100)	Yes	NULL
phg_description	text	Yes	NULL
phg_status	enum('draft', 'published')	Yes	draft
phg_date_created	datetime	Yes	NULL
phg_created_by	varchar(50)	Yes	NULL

### 1.35 Table structure for table prf\_mad\_mapping

Column	Type	Null	Default
--------	------	------	---------

*id* int(11) No  
 prf\_id int(11) No  
 mad\_id int(11) No

**I.36 Table structure for table profession**

Column	Type	Null	Default
<i>prf_id</i>	int(10)	No	
prf_name	varchar(200)	No	

**I.37 Table structure for table profession\_mapping**

Column	Type	Null	Default
<i>pfm_id</i>	int(10)	No	
prf_id	int(10)	No	
pfm_name	varchar(200)	No	
pfm_types	enum('Unspecified', 'Other Name', 'Education Courses', '')	No	

**I.38 Table structure for table program\_level**

Column	Type	Null	Default
<i>prl_id</i>	int(10)	No	
prl_code	int(10)	No	
prl_name	varchar(100)	No	

**I.39 Table structure for table province**

Column	Type	Null	Default
<i>pro_id</i>	int(11)	No	
pro_code	char(2)	No	
pro_name	varchar(50)	Yes	NULL
reg_id	int(11)	Yes	NULL
pro_tag	tinyint(1)	Yes	NULL

**I.40 Table structure for table region**

Column	Type	Null	Default
<i>reg_id</i>	int(11)	No	
reg_code	varchar(3)	No	
reg_name	varchar(100)	No	

**I.41 Table structure for table session**

Column	Type	Null	Default
<i>session_id</i>	varchar(40)	No	0
ip_address	varchar(16)	No	0
user_agent	varchar(50)	No	
last_activity	int(10)	No	0

user\_data text No

#### I.42 Table structure for table site\_options

Column	Type	Null	Default
<b>opt_id</b>	int(11)	No	
opt_name	varchar(256)	No	
opt_slug	varchar(100)	No	
opt_type	enum('text', 'image')	No	text
opt_value	text	No	

#### I.43 Table structure for table user

Column	Type	Null	Default
<b>usr_id</b>	int(10)	No	
<b>usr_username</b>	varchar(30)	No	
usr_password	varchar(32)	No	
usr_lname	varchar(50)	No	
usr_fname	varchar(100)	No	
usr_birthdate	date	Yes	NULL
usr_gender	enum('male', 'female')	Yes	NULL
usr_email	varchar(100)	Yes	NULL
usr_image	text	Yes	NULL
usr_company	varchar(100)	Yes	NULL
usr_website	varchar(100)	Yes	NULL
usr_occupation	varchar(100)	Yes	NULL
usr_mobile	varchar(50)	Yes	NULL
usr_landline	varchar(50)	Yes	NULL
usr_address1	varchar(150)	Yes	NULL
usr_address2	varchar(150)	Yes	NULL
usr_city	varchar(100)	Yes	NULL
usr_country	varchar(50)	Yes	NULL
usr_zip	varchar(10)	Yes	NULL
usr_failed_login	tinyint(3)	No	0
usr_last_login	datetime	Yes	NULL
usr_status	enum('active', 'locked', 'deleted')	No	active
usr_date_created	datetime	No	
usr_verification	varchar(32)	Yes	NULL
usr_ip_address	varchar(20)	No	

#### I.44 Table structure for table user\_api\_ids

Column	Type	Null	Default
<b>uai_id</b>	int(11)	No	
usr_id	int(11)	No	

uai_type	enum('facebook', 'twitter', 'instagram')	No
uai_api_id	text	No
uai_api_token	text	No
uai_api_secret	text	No

#### **I.45 Stand-in structure for view v\_enrollment**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Default</b>
ede_id	int(10)	No	0
ede_ay_label	varchar(10)	No	
reg_name	varchar(100)	Yes	NULL
ins_name	varchar(100)	Yes	0
pro_name	varchar(50)	Yes	NULL
mad_title	varchar(150)	Yes	0
ede_male	int(11)	No	
ede_female	int(11)	No	
ede_count	int(11)	No	

#### **I.46 Stand-in structure for view v\_graduate**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Default</b>
edg_id	int(10)	No	0
edg_ay_label	varchar(10)	No	
reg_name	varchar(100)	Yes	NULL
ins_name	varchar(100)	Yes	0
pro_name	varchar(50)	Yes	NULL
mad_title	varchar(150)	Yes	0
edg_male	int(11)	No	
edg_female	int(11)	No	
edg_count	int(11)	No	

#### **I.47 Table structure for table wor\_general**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Default</b>
<b>wro_id</b>	int(11)	No	
wro_year	year(4)	No	
prf_id	int(11)	No	
wro_age_20_29	int(11)	Yes	NULL
wro_age_30_39	int(11)	Yes	NULL
wro_age_40_49	int(11)	Yes	NULL
wro_age_50_59	int(11)	Yes	NULL
wro_age_60_69	int(11)	Yes	NULL
wro_age_70_79	int(11)	Yes	NULL
wro_age_80_over	int(11)	Yes	NULL
wro_not_filled	int(11)	Yes	NULL

wro_male	int(11)	Yes	NULL
wro_female	int(11)	Yes	NULL
wro_nosex	int(11)	Yes	NULL
wro_hf_public	int(11)	Yes	NULL
wro_hf_private	int(11)	Yes	NULL

#### **I.48 Table structure for table wor\_health\_facility**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Default</b>
---------------	-------------	-------------	----------------

<b>wft_id</b>	int(11)	No	
prf_id	int(11)	No	
wft_year	year(4)	No	
hft_id	int(11)	No	
wft_count	int(11)	No	

#### **I.49 Structure for view v\_enrollment**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Default</b>
---------------	-------------	-------------	----------------

ede_id	int(10)	No	0
ede_ay_label	varchar(10)	No	
reg_name	varchar(100)	Yes	NULL
ins_name	varchar(100)	Yes	0
pro_name	varchar(50)	Yes	NULL
mad_title	varchar(150)	Yes	0
ede_male	int(11)	No	
ede_female	int(11)	No	
ede_count	int(11)	No	

#### **I.50 Structure for view v\_graduate**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Default</b>
---------------	-------------	-------------	----------------

edg_id	int(10)	No	0
edg_ay_label	varchar(10)	No	
reg_name	varchar(100)	Yes	NULL
ins_name	varchar(100)	Yes	0
pro_name	varchar(50)	Yes	NULL
mad_title	varchar(150)	Yes	0
edg_male	int(11)	No	
edg_female	int(11)	No	
edg_count	int(11)	No	

# Annex C. Minimum Data Set

## Documentation for the HRH Minimum Data Set

### Rationale

The purpose of this document is to facilitate data sharing among agencies as specified in the Memorandum of Agreement among the members of the HRH Network. This minimum data set ensures consistency among the different agencies sharing data. The HRH staging database or integrated system would contain all of the data fields contained in documentation. This documentation contains actual source code/API reference that can be used by implementers.

### Minimum Data Set Fields

Data Field	Description
PRC License Number	The license number is obtained from the Professional Regulatory Commission
Full Name	This is the name of the health worker
Date of Birth	The data the health worker was born
Citizenship	Can contain the citizenship at birth or the current citizenship of the health worker
Health worker Address	The current address of the health worker
Gender	The gender of the health worker
Email Address	The health worker's email address
Mobile No	The health workers mobile number
Office No	The health worker's office number
Health Facility	Health facility where the health worker is affiliated

**Field Name**

Purpose for the Field  
Note

Generic Format  
Cardinality  
FHIR  
Representation  
PHP  
Representation  
SQL

**PRC License Number**

The PRC License Number is provided by the Professional Regulatory Commission with the purpose of having a unique identifier for each licensed professional  
The license number is a unique identifier for the data but rather this is a business identifier and should be able to uniquely identify any licensed health worker.

8 digit number (each digit is from 0 – 9)

0...1

<https://www.hl7.org/fhir/practitioner-definitions.html#Practitioner.identifier>

<?php \$prdID = "01234567" ?>

prdID VARCHAR(8) NULL

Java String prcID = new String();  
**Full Name**

**Field Name**

Purpose for the Field Full name refers to the combination of a person's surname/family name, first name and middle name. For women already married, the maiden name may be included.

Note

Generic Format Array/Object containing five fields (all are strings):

- Surname/Last Name: required
- First Name: required
- Middle Name: optional
- Maiden Name: Optional
- Suffix: Optional

Cardinality

1..1

FHIR

<https://www.hl7.org/fhir/practitioner-definitions.html#Practitioner.name>

Representation

PHP

```
<?php $name = array( ?>  
"firstname" => "Juan",  
"middlename" => "Protacio",  
"maidenname" => NULL,  
"lastname" => "dela Cruz",  
"suffix" => "III")?>
```

Representation

SQL

```
firstName VARCHAR(100) NOT NULL  
lastName VARCHAR(100) NOT NULL  
middleName VARCHAR(100) NULL  
maidenName VARCHAR(100) NULL  
suffix VARCHAR(100) NULL
```

Java

```
Class Name  
{  
    String firstName, lastName, middleName, maidenName, suffix;  
}
```

**Field Name**

**Date of Birth**

Purpose for the Field This pertains to the date of birth of the health worker. Can also be used for the computation of age.

Note

Generic Format Can be an object with the following components:

- Month: number from 1-12
- Day: number from 1 – 31
- Year: number from 1900 onwards

Cardinality

Format: year-month-day

1..1

FHIR

<https://www.hl7.org/fhir/practitioner-definitions.html#Practitioner.birthDate>

Representation

PHP Representation

```
<?php $birtdate = date("Y-m-d") ?>
```

SQL

```
birthdate DATETIME not NULL
```

Java

```
Date birthdate = new Date(y,m,d)
```

**Field Name**

**Citizenship**

Purpose for the Field This pertains to the nationality of the health worker. Data differentiating domestic/foreign worker can be extracted from this field

Note

Generic Format	String – but must be coming from a list of independent states as identified by the World Health Organization
Cardinality	1...1
FHIR	Not defined in FHIR, but can be implemented as an extension
Representation	
PHP	
Representation	<?php \$citizenship = "citizenship"?>
SQL	Citizenship TEXT(100) not NULL
Java	String citizenship = new String("citizenship");

<b>Field Name</b>	<b>Health Worker Address</b>
Purpose for the Field	This data pertains to the current address of the health worker.
Note	
Generic Format	Can be an object/array with the following contents: <ul style="list-style-type: none"> <li>• String: House Number + Building + Street + Barangay</li> <li>• String: City or Municipality (listed with PSGC)</li> <li>• String: Province (listed with PSGC)</li> <li>• String: Region</li> </ul>
Cardinality	1...1
FHIR Representation	<a href="https://www.hl7.org/fhir/practitioner-definitions.html#Practitioner.address">https://www.hl7.org/fhir/practitioner-definitions.html#Practitioner.address</a>
PHP Representation	<a href="https://www.hl7.org/fhir/practitioner-definitions.html#Practitioner.address">https://www.hl7.org/fhir/practitioner-definitions.html#Practitioner.address</a>
SQL	<?php \$address = array("specific_address" <= " ", "city" <= " ", "province" <= " ", "region" <= " "); ?>
SQL	specific_address VARCHAR(1000) NULL city VARCHAR(50) not NULL province VARCHAR(50) not NULL region VARCHAR(50) not NULL
Java	class Address { String specificAddress; String city; String province; String region; }

<b>Field Name</b>	<b>Employment Status</b>
Purpose for the Field	This data field indicates if the health worker is employed or not.
Note	An employed health worker is considered as active.
Generic Format	Boolean
Cardinality	1...1
FHIR Representation	Not defined in FHIR, but can be implemented as an extension
PHP Representation	
SQL	<?php \$employed = TRUE?>
SQL	employed BOOLEAN
Java	Boolean employed
	<b>Gender</b>

<b>Field Name</b>	
Purpose for the Field	This data field indicates if the health worker's gender

Note	
Generic Format	Either Male, Female or Others
Cardinality	1...1
FHIR Representation	<a href="https://www.hl7.org/fhir/practitioner-definitions.html#Practitioner.gender">https://www.hl7.org/fhir/practitioner-definitions.html#Practitioner.gender</a>
PHP Representation	<?php \$gender = M, F, O?>
SQL	gender VARCHAR[1]
Java	char gender

<b>Field Name</b>	<b>email address</b>
Purpose for the Field	This indicates the health worker's email address
Note	
Generic Format	This is a text
Cardinality	0...1
FHIR Representation	Not defined in FHIR, but can be implemented as an extension
PHP Representation	<?php \$email = "email@email.com"?>
SQL	email VARCHAR[100]
Java	String emailAddress

<b>Field Name</b>	<b>Mobile Number</b>
Purpose for the Field	This indicates the health worker's mobile number
Note	
Generic Format	(XXXX) - (XXXXXXXX)
Cardinality	0...1
FHIR Representation	<a href="https://www.hl7.org/fhir/practitioner-definitions.html#Practitioner.telecom">https://www.hl7.org/fhir/practitioner-definitions.html#Practitioner.telecom</a>
PHP Representation	<?php \$mobile = "XXXX-YYYYYYY"?>
SQL	mobile VARCHAR[11]
Java	String mobile

<b>Field Name</b>	<b>Work Number</b>
Purpose for the Field	This indicates the health worker's work number
Note	
Generic Format	(XXXX) - (XXXXXXXX) or (XXX)-(XXXXXXXXXX)
Cardinality	0...1
FHIR Representation	<a href="https://www.hl7.org/fhir/practitioner-definitions.html#Practitioner.telecom">https://www.hl7.org/fhir/practitioner-definitions.html#Practitioner.telecom</a>
PHP Representation	<?php \$work= "XXX-YYYYYYY"?>
SQL	work VARCHAR[12]
Java	String work;

**Field Name**      **Health Facility**

Purpose for the Field Note

This data indicates the various health facility where the health worker is currently affiliated.

Generic Format

This is a data with several components:

- String Name
- String ID (from the national health facility registry)
- Address
- of String – specific address, city/municipality/province and region)
- Type (choice of Barangay Health Station, Birthing Home, Drug Abuse Treatment, General Clinic Laboratory, Hospital, Infirmary, Municipal Health Office, Rural Health Unit, Social Hygiene Clinic, DOH)
- Facility ownership (private, public)

1...\*

FHIR Representation

Name	<a href="https://www.hl7.org/fhir/organization-definitions.html#Organization.name">https://www.hl7.org/fhir/organization-definitions.html#Organization.name</a>
ID	<a href="https://www.hl7.org/fhir/organization-definitions.html#Organization.name">https://www.hl7.org/fhir/organization-definitions.html#Organization.name</a>
Address	<a href="https://www.hl7.org/fhir/practitioner-definitions.html#Practitioner.address">https://www.hl7.org/fhir/practitioner-definitions.html#Practitioner.address</a>
Type	<a href="https://www.hl7.org/fhir/organization-definitions.html#Organization.type">https://www.hl7.org/fhir/organization-definitions.html#Organization.type</a>
Ownership	Not defined in FHIR, but can be implemented as an extension

PHP Representation

```
<?php $facility = array("name" =<= "facility name",
"ID" =<= "health facility ID", "address" =<= $address, "type" =<= "type", "ownership" =<=
"ownership");
$address = array("specific_address" =<= " ",
"city" =<= " ",
"province" =<= " ",
"region" =<= " "); ?>
```

SQL

```
name VARCHAR(50) not NULL
ID varchar(10) not NULL
type varchar(10) not NULL
ownership varchar(10) not NULL
specific_address VARCHAR(1000) NULL
city VARCHAR(50) not NULL
province VARCHAR(50) not NULL
region VARCHAR(50) not NULL
```

Java

```
class healthFacility
{
    String name
    String ID
    String type
    String ownership
    class Address
    {
        String specificAddress;
        String city;
        String province;
        String region;
    }
}
```

**U.S. Agency for International Development**

1300 Pennsylvania Avenue, NW

Washington, D.C. 20523

Tel: (202) 712-0000

Fax: (202) 216-3524 [www.usaid.gov](http://www.usaid.gov)