

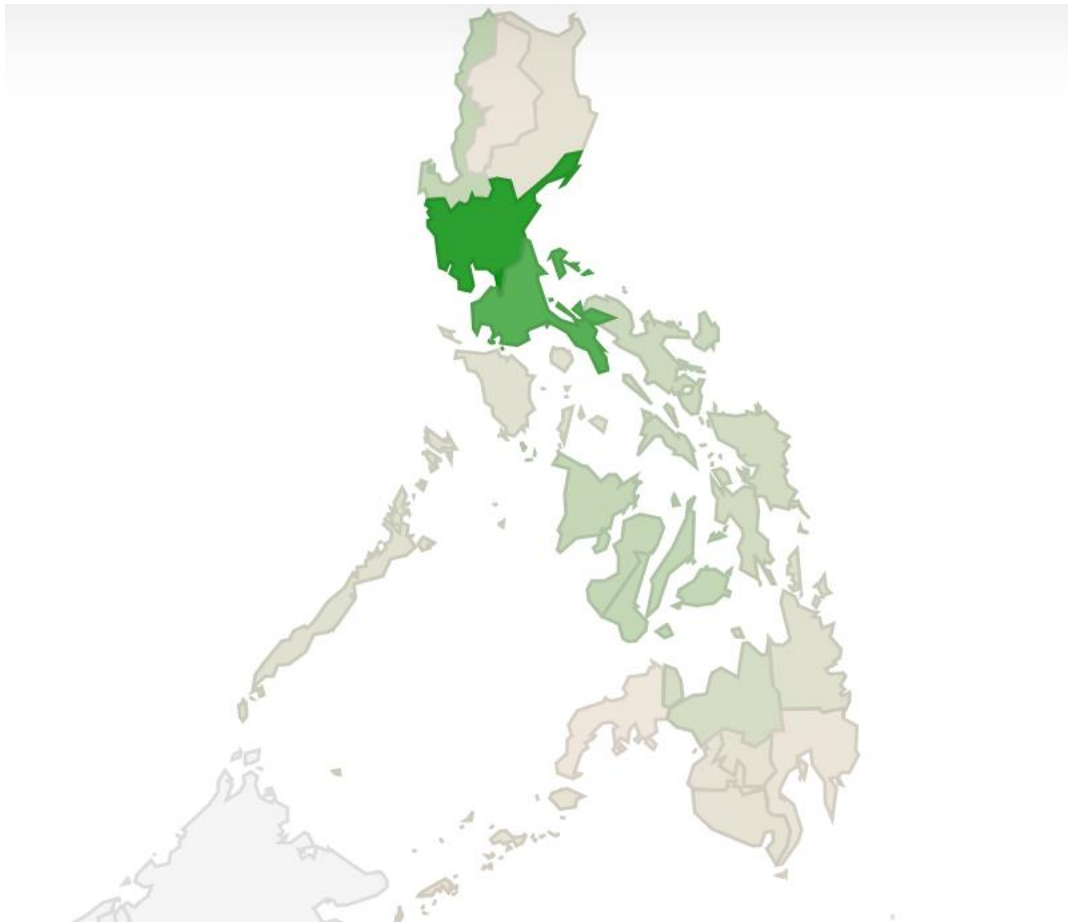


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HRH2030
HUMAN RESOURCES FOR HEALTH IN 2030

Improving Quality and Use of the National Tuberculosis Program Health Workers Data

HRH2030: Human Resources for Health in 2030



May 30, 2019

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Cover photo: Heat map of health workers providing tuberculosis services registered in ITIS, excluding providers that registered to mandatory TB case notification network. (Credit: GeoCharts/Google generated via danielpiñero.com)

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Acronyms

ARMM	Autonomous Region in Muslim Mindanao
CAR	Cordillera Administrative Region
DOH	Department of Health
DOTS	Directly Observed Treatment, Short-course
DQC	Data Quality Check
HRH	Human Resources for Health
HRH2030	Human Resources for Health by 2030 Project
ITIS	Integrated Tuberculosis Information System
KMITS	Knowledge Management Information Technology Services
MIMAROPA	Mindoro, Marinduque, Romblon, Palawan
NCR	National Capital Region
NTP	National Tuberculosis Program
PMDT	Programmatic Management of Drug Resistant TB
PRC	Professional Regulation Commission
SQL	Standard Query Language
SRF	Service Request Form
RHU	Rural Health Units
TB	Tuberculosis
UHC	Universal Health Care
USAID	United States Agency for International Development

Background

Through the Human Resources for Health 2030 (HRH2030) project in the Philippines, the United States Agency for International Development (USAID) is providing technical support to the Department of Health (DOH) to strengthen the development, deployment, training, and management of a fit-for-purpose and fit-for-practice health workforce to improve equity, access, and quality of tuberculosis (TB), family planning, and maternal and child health services. The development of a fit-for-practice and fit-for-purpose national health workforce requires reliable, standardized, and high quality health workforce information to ensure the population has its health needs met through access to the appropriate human resources for health (HRH) skill mix. The availability, completeness, and accuracy of health worker data are essential for evidence-based decision-making on HRH recruitment, distribution, skill mix, and performance management.

The Integrated Tuberculosis Information System (ITIS) is the national reporting system of National Tuberculosis Program (NTP), managed and maintained by the DOH Knowledge Management Information Technology Services (KMITS). All health facilities within the NTP Network are required to utilize ITIS for official TB data recording and reporting.¹ All health workers providing TB services within the NTP network are given an ITIS user account to access the system. Prior to receiving a user account, individuals submit a Service Request Form (SRF) — which can be either paper-based² or online³ — that contains their personal and employment information.

Two directories exist within ITIS: the Facility Directory and the Personnel Directory. The NTP Facility Directory was created first and started as a registry of facilities providing TB services before eventually expanding to contain health workers supporting or providing TB services in these facilities. The registry of the TB health workers eventually became the NTP Personnel Directory. The health facilities, with support from KMITS, populated the NTP Personnel Directory in ITIS with their respective personnel providing TB services.

As a result of the implementation of the NTP Personnel Directory in ITIS, health workers' information is recorded twice in the ITIS database. Within ITIS, there are 17,627 records of user accounts and 15,313 records of health workers in the personnel directory. A record remains in ITIS regardless of a user's activity level or whether the health worker is an active or inactive TB health provider.

To synchronize the health worker records in ITIS, the NTP and KMITS will streamline the process for issuing ITIS users accounts; they will validate the health worker's records in the NTP Personnel Directory before issuing a new user account. To operationalize this process, existing ITIS records of health workers' data needed to be mapped and migrated between the user and personnel tables. USAID's HRH2030 project is providing technical assistance for this mapping and migration, with the goal to improve the availability, completeness, and accuracy of health worker data in ITIS. This effort will also result in improved quality of health worker data

¹ For additional information on this mandate, access Administrative Order 2015-0024: Implementing Guidelines on ITIS at: <http://www.ntp.doh.gov.ph/downloads/issuances/aopdf/ao2015-0024.pdf>

² The ITIS SRF can be viewed at: https://itisdoh.pbsp.org.ph/downloads/SRF/SRF_ITIS_New_Account.pdf

³ To access the ITIS Online Registration Form, go to: https://itisdoh.pbsp.org.ph/v2/index.php/Registration/itis_reg?reg_to=tb_notif

in ITIS so that the data can be readily shared in the National Health Workforce Registry, as soon as the systems to guide this process are in place.

Scope of the Data Mapping and Migration Activity

Together, the NTP, KMITS, and HRH2030 identified and agreed upon the scope of the data cleansing, mapping, and migration activity as follows:

1. Identify duplicate records of users within ITIS and personnel within the NTP Personnel Directory
2. Match the existing records of ITIS users to the NTP Personnel Directory
3. Copy health worker records found within ITIS users table but not within the NTP Personnel Directory

Methodology

The activity methodology included reviewing the records in the ITIS personnel and users tables. The ITIS data dictionary also served as a reference to ensure the proper interpretation of the data recorded in ITIS. A non-disclosure agreement was signed by HRH2030 prior to the start of the activity to comply with the requirements set by KMITS regarding confidentiality, privacy, and security of information. The extracted ITIS data in this report are from February 2019.

This data mapping and migration activity involved three tables, namely the personnel, users and the health facility table. The personnel and users tables were the focus of this activity, while the health facility table served as a reference of health facilities for the personnel and users tables. The personnel table contains all the records of health workers as displayed in the NTP Personnel Directory, while the users table contains health workers who have previous or current access to ITIS. Within each of the personnel and users tables, there exists a data field to map personnel to the user records and vice versa.

HRH2030 created a script to read respective tables in ITIS and generate the corresponding standard query language (SQL) statements to run in ITIS database in order to map and migrate the health workers' records in personnel and users tables, as required by the activity objective. Before HRH2030 created the bulk SQL statements, KMITS validated the SQL statement, checking that it was correct and produced no errors when run in ITIS. HRH2030 conducted random checks on the generated scripts and the mapped data to ensure that the mapping and migration were executed correctly.

Over 24,000 scripts were created to map the current and new records between the two tables, and 5,914 scripts were created to copy the health worker records in ITIS users table to the personnel table. HRH2030 provided KMITS and NTP with lists of the discovered duplicates and the scripts to execute in ITIS.

Findings

I. Identify duplicate records of users within ITIS and personnel within the NTP Personnel Directory

The lack of a unique personal identifier makes it difficult to uniquely identify an individual in ITIS. In an attempt to identify duplicate records, HRH2030 first screened the ITIS user and personnel

records by email address to identify individuals with multiple records. This action was based on the assumption that an email address is more unique than an individual’s given name (in other words, many people share the same given name, but email addresses are usually unique to the individual). After screening for the uniqueness of the email address, the given name of an individual was the second criteria to check. KMITS advised HRH2030 to mark the records that were found to be duplicates. Therefore, based on these two criteria, HRH2030 generated a list of potential duplicate records. The duplicates were identified regardless of whether there had been recent activity on the user account, or whether the account was enabled or disabled. KMITS will use this list to check and validate the identified duplicate email addresses and names. Critical data fields such as email, ID (primary key), name, user level, and default stations were also extracted for ease of KMITS validation.

Users Table

A total of 1,061 — or 6 percent — out of 17,627 records in the users table appear to be duplicates. HRH2030 used three criteria to identify these potential duplicates in the users table: (1) matching name (irrespective of the middle initial), (2) matching email address, and (3) matching name or email address. An example of the third criteria is provided in Exhibit I; all three records would be considered a potential duplicate for a single individual. Even after passing these three criteria, however, the records’ user access level was checked before records were tagged as duplicates.

Exhibit I. Example of Matching Name OR Email Address

Name	Email Address
Juana Santos	juanasantos@mail.com
Juana Santos	juana@mail.com
Juan Santos	juanasantos@mail.com

Using these three criteria, within the users table, HRH2030 found 506 matches with the same name, 555 matches with same email address, and 116 matches with the same name or email address.

Email Address Duplicates

A total of 237 — or 2 percent — out of 11,666 unique email addresses were found to be associated more than once to individuals in the ITIS users table. These 237 emails are associated with 553 records — or 3 percent — of the 17,627 total records in the users table. Email addresses that are used more than once are associated with a range from two to 13 records at the most. A total of 5,645 — or 37 percent — of records were found to be associated with a null email address. An example of a null or invalid email addresses is “@gmail.com” (without any prefix).

Individuals’ Given Name Duplicates

A total of 506 — or 3 percent — of records within the users table have the same exact name. The criteria used to identify these potential duplicates was the similarity of how the name was recorded in the database, regardless of the suffixes or prefixes. Most of the duplicate names are repeated twice, and the majority of these are associated with varying user levels. This finding is

likely due to a single health worker being assigned as both an encoder for the TB laboratory and TB case management data, which requires different levels of user access in ITIS. Nine is the maximum number of times that a name was repeated in the ITIS record.

Further analysis revealed that out of the 506 duplicate records, 127 had the same user level, meaning they are more likely to be duplicates. Thus, the health facility and user level data were also extracted to support KMITS with data validation.

Personnel Table

Within the personnel table, a total of 7,212 records — or 47 percent — appear to have duplicate emails and names. Furthermore, 5,815 records have the same email address, and 1,397 records have the same names. Within the personnel table, 1,193 records were found to both have similar email and names.

Email Address Duplicates

A total of 1,593 duplicate email addresses were found in the NTP Personnel Table. These email addresses are associated with 5,815 records. The number of records associated with a duplicate email address ranges from two to 109 records. The mode (or the most common number of times the same email address is used repeatedly) is two. An interview with KMITS revealed that email address duplicates tend to occur when a single person submits the Service Request Form for multiple users in ITIS. The devolution of generation of the user accounts is also factor in the duplicate issues.

Individuals' Given Name Duplicates

A total of 1,397 records appeared to be duplicates in the NTP Personnel Directory. The duplicate records were generated by comparing the similarity of the records' last name and first name in the personnel table. Within the personnel table, 31 was the highest number of duplicate records associated with a single individual based on similar first name, last name, email address.

2. Match the existing records of ITIS users to the NTP Personnel Directory

HRH2030 analyzed 17,627 records within the ITIS users table to match with 15,313 records within the personnel table. The criteria used for matching were: (1) the email addresses that are unique to both tables; (2) the combination of first name and last name of the personnel compared with the users table; and (3) truncated username generated from the combination of first name and last name compared with the users' username. Records found to have duplicate names were excluded in the matching, but those records found with a duplicate email address were included using the second and third criteria.

After analysis, 9,048 unique user records (representing 51 percent of the total records in the users table or 59 percent of the total records in the personnel table) were matched successfully. HRH2030 provided KMITS the SQL statements to run in the personnel table to map the records in the users table and vice versa.

3. Copy health worker records found within ITIS users table but not within the NTP Personnel Directory

HRH2030 identified 5,914 health worker records in the users table were valid for copying to the NTP Personnel Directory. Corresponding SQL statements were made to add these records in the personnel table and to match the newly created record in the personnel table to the users table.

The criteria to identify which health workers are present in the users table but not in the personnel table and are valid for copying were: (1) users tagged as active; (2) individual with only one record in the users table; and (3) irrespective of titles (e.g., Dr., Ms., Lt.). Some records that met these criteria were not copied to the personnel table such as records that were clearly not individuals (e.g., NTP Ocampo, San Mateo RHU, privatemd) or records that had invalid entries (e.g., health facility is blank, health facility does not exist in the facilities reference table).

Prior to generating the migration scripts, HRH2030 cleaned the data by removing white spaces at the start and end of the names and email addresses. All names were also converted to sentence case (e.g. JUANA cRUZ to Juana Cruz), removing inconsistencies of uppercase or lowercase. The titles and suffixes (e.g., Dr., Lt. Maj., Sr.) were also removed from the names. The name data are unstructured in the users table, meaning the health workers' full name is recorded in a single data field. HRH2030 deconstructed the full name to determine the first name and last name. For new records in the personnel table, these restructured data will be inserted into the first name and last name fields respectively. These actions will improve the quality of data being transferred from the users table to the personnel table. However, since logic checks were used to improve the data quality, actual validation at the health facility level will be needed to ensure the accuracy and timeliness of the data.

Data Mapping Audit

HRH2030 performed an audit on the records that had been matched between the users table and personnel table. This audit provided a final check that there was a one-to-one relationship between records in the two tables. In other words, a record in the users table was linked to only one record in the personnel table. Likewise, a record in the personnel table was linked to only one record in the users table.

The data mapping audit identified records in the users table that were matched to multiple records in the personnel table, and vice versa. HRH2030 created logic checks to correct this error. The logic check ensured that when two records are linked between the users and personnel table, the names are consistent. All inconsistencies in the data were fixed prior to providing the SQL scripts for mapping to KMITS.

Analysis

After the cleaning, mapping, and migrating of records between the two tables in ITIS, HRH2030 identified 14,962 unique entries. Out of these unique entries, HRH2030 identified 14,598 that are marked as currently active TB health workers and are assigned to health facilities that

correspond with the 2018 Philippine Standard Geographic Code⁴, including private physicians registered in the mandatory TB Case Notification System. Furthermore, cleaned ITIS health worker data were transformed into data visualizations to quickly see trends, and to support analysis. HRH2030 utilized selected indicators from the National Health Workforce Accounts⁵ Active Health Workforce Stocks module.

Exhibit 2 shows a heat map of the Philippines reflecting the distribution of TB health workers (without the private physicians who registered in the mandatory TB Case Notification System in ITIS). The corresponding count of health workers per region is provided in the table in Exhibit 2. In regions III, IV-A and NCR, there is an intensified advocacy by NTP and supported by implementing partners to engage and register private physicians in the mandatory TB Case Notification in ITIS, resulting in a much higher count of health workers in ITIS in these regions.

Exhibit 2. TB Health Worker Distribution⁶

Region	Health Worker Count	Health Worker %	TB Notification Network	Total
I	670	5%		670
II	300	2%		300
III	2,418	19%	856	3,274
IV-A	1,919	15%	743	2,662
MIMAROPA	358	3%		358
V	573	4%	I	574
VI	664	5%		664
VII	685	5%		685
VIII	518	4%		518
IX	198	2%		198
X	477	4%		477
XI	241	2%		241
XII	305	2%	I	306
Caraga	375	3%		375
NCR	2,732	21%	50	2,782
CAR	227	2%		227
ARMM	287	2%		287
Total	12,947	100%	1,651	14,598



MIMAROPA (Mindoro, Marinduque, Romblon, Palawan), NCR (National Capital Region), CAR (Cordillera Administrative Region), ARMM (Autonomous Region in Muslim Mindanao)

⁴ The Philippine Standard Geographic Code is a systematic classification and coding of geographic areas of the Philippines and can be accessed at: <https://psa.gov.ph/classification/psgc/?q=psgc/regions>

⁵ To learn more about National Health Workforce Accounts, go to: <https://www.who.int/hrh/statistics/nhwa/en/>

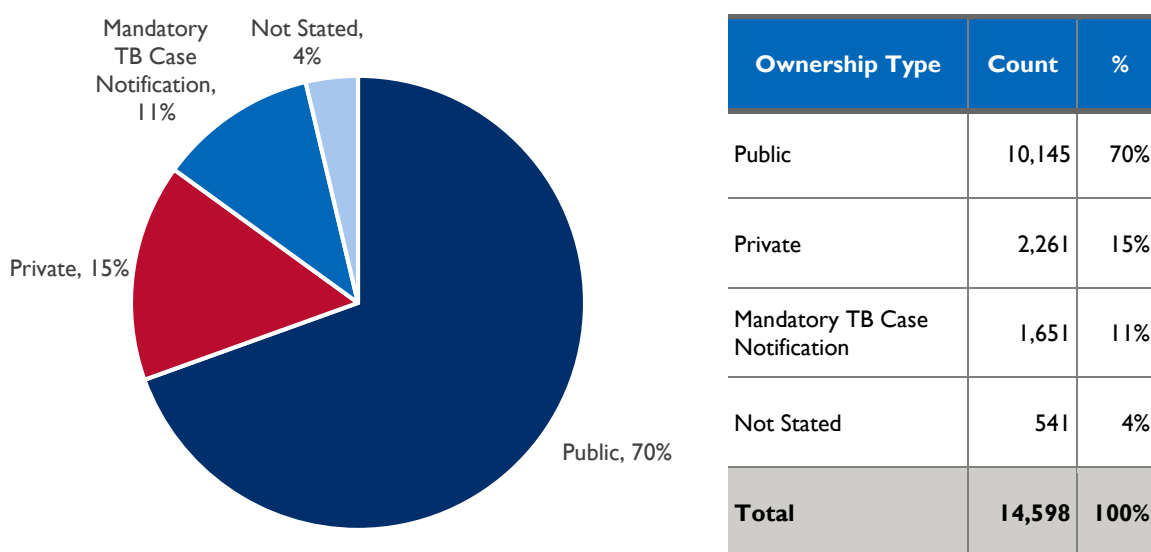
⁶ The Philippines heat map was generated in Google Geocharts via <http://www.danielpinero.com/how-to-create-heat-map-philippines>

Out of the 17 regions, the three most populous⁷ regions in the country, namely regions III, IV-A and NCR, comprise 55 percent of the total TB health workers registered in ITIS. The other 14 regions comprise the remaining 45 percent, with a data coverage ranging from 2 percent to 5 percent. The TB health workers could be further compared with the NTP TB case data for better use of TB health worker data, once the health worker data in the NTP Personnel Directory are more complete.

Currently in ITIS, the 14,598 cleaned, unique health worker records represent TB health workers in 6,266 facilities. However, the ITIS Facility Directory contains 10,026 active facilities. This finding suggests that the HRH data cover only 62 percent of all active TB facilities. This data gap means that any inferences drawn from the data will lack information on over one-third of TB facilities.

Exhibit 3 shows how the TB health worker records are distributed by facility ownership, whether public or private. Public health facilities are those that are under the national government, while the private health facilities are owned and operated by non-government entities such as an individual, corporation, cooperative, foundation, religious, non-government organization and others. Seventy percent of TB health workers are employed in public facilities while 15 percent are employed in private facilities. The private physicians registered in the mandatory TB Case Notification represented 11 percent of the health worker records in ITIS, while 4 percent of the records belong to health workers from health facilities where ownership type was not stated in the ITIS.

Exhibit 3. TB Health Worker Distribution by Facility Ownership



⁷ Based on the latest census on housing and population by the Philippine Statistics Authority. Data can be viewed at: <https://psa.gov.ph/population-and-housing>

Exhibit 4 shows the health worker distribution by facility type. The ITIS has 11 facility types: Hospital, Health Center/Rural Health Units (RHU), Private Clinic, Office, Jail, Laboratory, Warehouse, Barangay Health Stations, Prison, Quality Assurance (QA) Center, and Others. Upon checking, the 14,598 cleaned, unique health workers in ITIS are associated with only eight out of the 11 facility types. In addition, for this analysis, the Jail and Prison facilities were combined, as were Laboratory and QA Centers, due to the small number of health workers associated with these facility types and their similar function.

Based on ITIS data, Exhibit 4 shows that the largest proportion of health workers providing TB services — 43 percent — are in Health Center/RHU, followed by 26 percent working in hospitals. The 14 percent of health workers located at private clinics are not only within the mandatory TB Notification Network; rather, this number includes other private clinics. Those who provide program management and administrative services, such as in provincial, regional and central offices, comprise 9 percent of the records, and those who provides TB services in jail and prison make up only 1 percent of the registered users in ITIS.

Exhibit 4. TB Health Worker Distribution by Facility Type

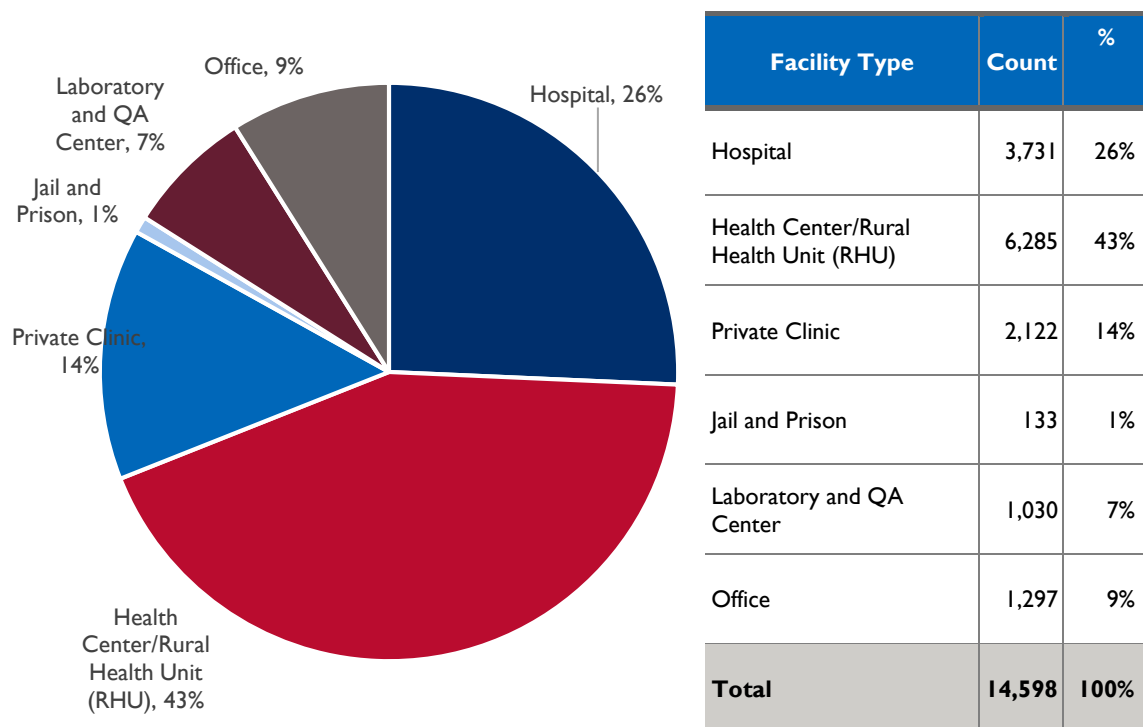


Exhibit 5 further dives into the distribution of TB health workers by facility type within each region. Most of the regions, except for regions III and IV-A, have more health workers in Health Center/RHU than in hospitals. A similar proportion of health workers work in offices across the regions, ranging from 5 percent to 14 percent of the total TB health workers captured in ITIS per region. Exhibit 5 further shows the need for some regions to capture data from private clinics into ITIS if this process has not yet been initiated. More data are provided in the table in Exhibit 6.

Exhibit 5. TB Health Worker Distribution by Facility Type per Region

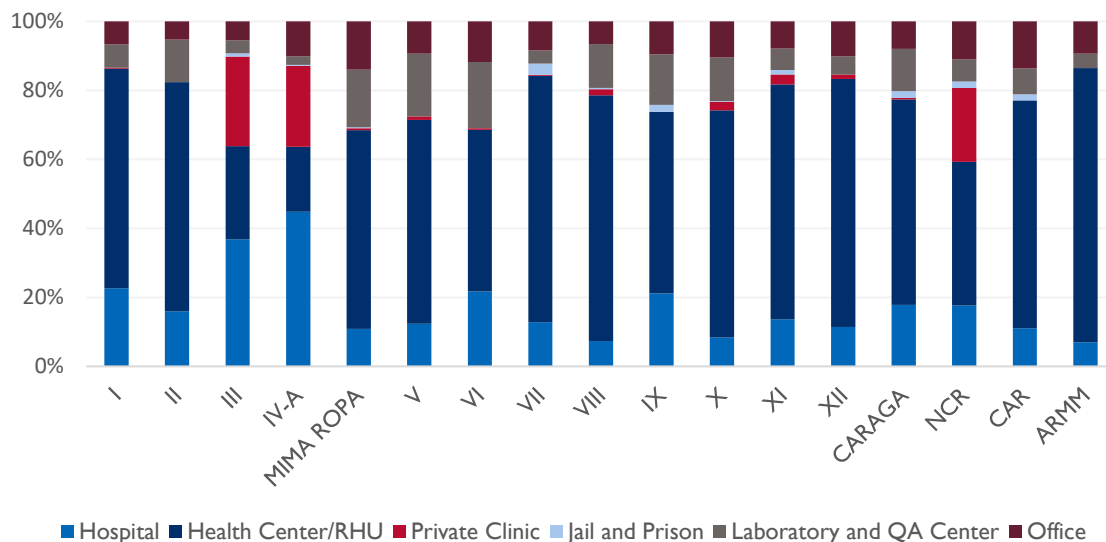


Exhibit 6 provides the numerical values displayed graphically in Exhibit 5 for the TB health worker distribution by facility type per region. Not all of the regions have captured the data of health workers from private clinics in ITIS, particularly regions II, IX, CAR and ARMM. Although not all the regions have captured health workers' data from jails and prisons, this may be due to a lack of jails or prisons in these regions. The data across facility types can be used by the respective regional coordinators to engage new facilities or health providers to be part of the NTP Network. To guide this process, the KMITS ITIS team may provide information on the facilities in the NTP Facility Directory or National Health Facility Registry that do not have at least one health worker reported in ITIS.

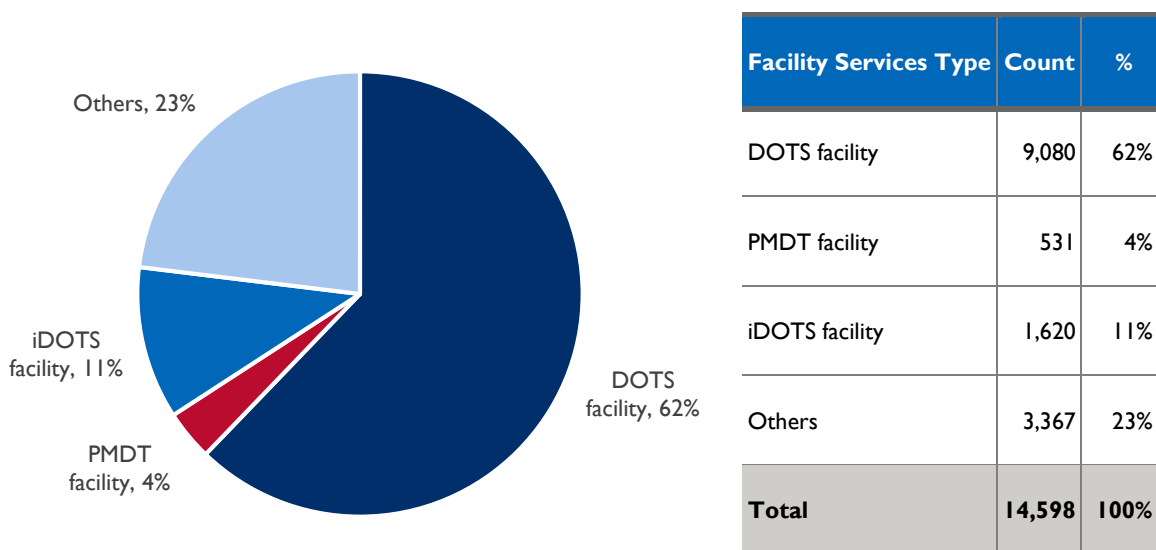
Exhibit 6. TB Health Worker Distribution by Facility Type per Region

Region	Hospital		Health Center/RHU		Private Clinic		Jail and Prison		Laboratory and QA Center		Office		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
I	152	23%	426	64%	2	0%	-	0%	45	7%	45	7%	670	100%
II	48	16%	199	66%	-	0%	-	0%	37	12%	16	5%	300	100%
III	1205	37%	885	27%	850	26%	31	1%	123	4%	180	5%	3274	100%
IV-A	1193	45%	500	19%	626	24%	7	0%	68	3%	268	10%	2662	100%
MIMA ROPA	39	11%	206	58%	2	1%	1	0%	60	17%	50	14%	358	100%
V	71	12%	339	59%	6	1%	-	0%	104	18%	54	9%	574	100%
VI	144	22%	311	47%	3	0%	-	0%	128	19%	78	12%	664	100%
VII	88	13%	489	71%	2	0%	22	3%	26	4%	58	8%	685	100%
VIII	38	7%	369	71%	9	2%	2	0%	66	13%	34	7%	518	100%
IX	42	21%	104	53%	-	0%	4	2%	29	15%	19	10%	198	100%
X	40	8%	314	66%	12	3%	1	0%	60	13%	50	10%	477	100%
XI	33	14%	164	68%	7	3%	3	1%	15	6%	19	8%	241	100%

XII	35	11%	220	72%	4	1%	-	0%	16	5%	31	10%	306	100%
CARAGA	67	18%	223	59%	2	1%	7	2%	46	12%	30	8%	375	100%
NCR	491	18%	1158	42%	597	21%	51	2%	178	6%	307	11%	2782	100%
CAR	25	11%	150	66%	-	0%	4	2%	17	7%	31	14%	227	100%
ARMM	20	7%	228	79%	-	0%	-	0%	12	4%	27	9%	287	100%
Total													14,598	

Exhibit 7 shows the distribution of health workers by facility TB service, whether Directly Observed Treatment Short-course (DOTS), Programmatic Management of Drug-resistant TB (PMDT), or iDOTS, which provides both DOTS and PMDT services. Facilities that provide laboratory or administrative services were categorized as Others. The association depends on the type of treatment that the facility provides. Exhibit 7 shows that 62 percent of health workers are associated with facilities that provide only DOTS services, 23 percent are associated with Others, 11 percent with iDOTS, and 4 percent with PMDT. With the NTP’s direction to shift from DOTS to iDOTS for most of the Health Center/RHUs, the NTP Facility Directory should be validated and updated to reflect the direction shift; health workers associated with DOTS facilities in ITIS may actually be associated with iDOTS facilities.

Exhibit 7. Distribution of Health Workers by Facility Services Type



Exhibits 8 and 9 display information on health worker profession and employment status. Unlike Exhibits 1 to 7, wherein 14,598 records were analyzed for the distribution of health workers, for Exhibits 8 and 9, only 8,864 records could be analyzed based on the available data. The difference of 5,914 records are the health worker records copied from the users table to the personnel table. This is because the profession and employment status of health workers are not recorded in the ITIS users table, and therefore only records from the personnel table could be analyzed.

Exhibit 8 shows the health worker distribution by profession. The ITIS only tracks four cadres: doctors, nurses, pharmacists and medical technologies. Other medical or non-medical professions are categorized as Others. For the 1,651 private physicians registered in the

mandatory TB Notification system in ITIS, 23 records were identified in the Others category. In this analysis, an assumption has been made that all 1,651 records tagged as part of the mandatory TB Notification system are doctors based on the system's implementation criteria. The private physicians were separated in Exhibit 8 to provide a better picture of the TB health workers' professions. Hence, 36 percent of health workers in ITIS are identified as doctors, 29 percent as nurses, 10 percent as medical technologists, and virtually none as pharmacists. It should be noted that a majority of the identified duplicate ITIS records appear to be nurses that have both Case Management module and Laboratory Management module user accounts. Once the identified duplicate data are validated and cleaned, there is a possibility that the number of nurses may be closer to the number of doctors.

Exhibit 8. TB Health Worker Distribution by Profession

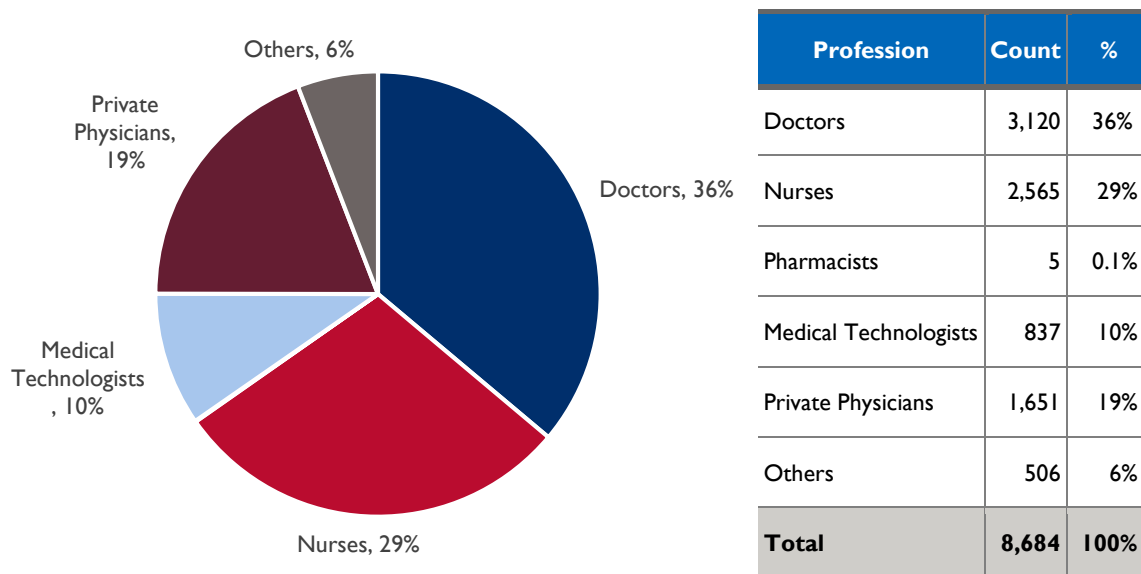
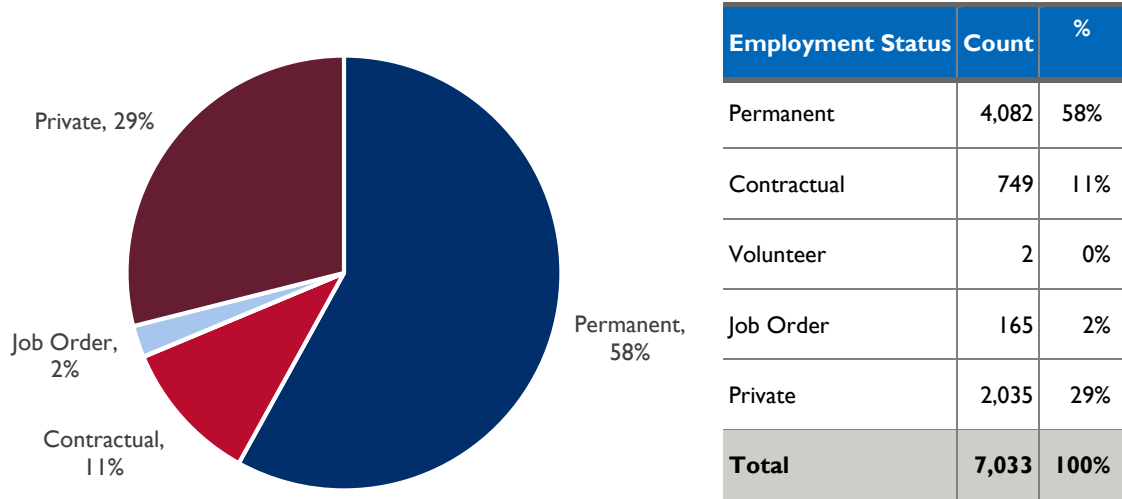


Exhibit 9 shows the employment status of TB health workers, except for the 1,651 health workers that were registered in the mandatory TB Notification system in ITIS. The majority of the health workers (58 percent) have a permanent employment status, 29 percent are employed in private facilities, 11 percent are contractual, 2 percent as job order, and virtually none as volunteer.

Upon further analysis of the data, 46 percent of the contractual workers are assigned in Health Center/RHU, 26 percent in offices, 13 percent in hospitals, 11 percent in laboratories, 2 percent in private clinics, while 1 percent are assigned in jails.

Exhibit 9. TB Health Worker Distribution by Employment Status



Additional analysis revealed that the majority of the contractual workers (61 percent) work in DOTS facilities, 19 percent in iDOTS, 14 percent in PMDT facilities, and 5 percent in other facilities. The contractual workers’ professions are mostly nurses at 57 percent, then medical technologists at 12 percent, doctors at 8 percent, and 22 percent others.

Limitations

HRH2030 checked whether the ITIS health worker data had sufficient information to determine the distribution of TB health workers by age group. However, only 8 percent — or 1,165 out of 14,598 health worker records — appear to have a valid birth date. In addition, the health workers’ gender was not recorded in ITIS to allow analysis of the distribution of TB health workers by gender.

Recommendations

Improving data quality is a progressive process. Data quality dimensions include completeness, accuracy, consistency, validity, timeliness, integrity, and accessibility. Addressing gaps in all of these dimensions at once would require enormous effort. Therefore, HRH2030 recommends focusing on one or two of these dimensions first, to lay a foundation for future efforts to achieve high quality TB health worker data.

Within ITIS, a TB health personnel can hold multiple designations and responsibilities; for example, some health workers are assigned to different health facilities in different municipalities with multiple roles. In this complex environment, achieving high quality TB health worker data requires a resilient system design that considers and adapts to these complexities. In this regard, although the NTP Personnel Directory is intended to be the repository of health worker data in ITIS, HRH2030 recommends that the KMITS team supporting ITIS creates a dedicated health workers' table in the database. This table would contain a dedicated list of health workers with their demographic information. This health workers' table will serve as a reference for all the tables or ITIS modules that require health worker data, such as for the Personnel Directory and user accounts. This change will also address the existing duplicates found in the personnel and users tables.

To further improve the integrity of health workers' data, the Professional Regulation Commission (PRC) Number captured in the ITIS Online New Users Registration Form must be incorporated in the recommended health workers' table. However, the PRC Number is not unique per health worker, but rather only unique within each cadre. Therefore, HRH2030 recommends that in addition to the PRC Number, profession/cadre should be included in the ITIS Online New Users Registration Form as a required field, as a preset drop down selection menu. This setup will enable the combination of the PRC Number and profession as an enhanced approach to uniquely identify each health worker in the database.

Furthermore, the data points captured in the service request form for new ITIS user accounts differs between the paper based form and the online system. Therefore, there is a need to harmonize the data collected in both systems, specifically adding the PRC Number and profession in the paper-based form and highlighting this field as mandatory. Finally, the ITIS should be aligned with the HRH data standards of the DOH to ensure the consistency of its data with that of other information systems, for future data exchange needs.

The KMITS ITIS team made great efforts to improve data quality in the personnel filed by structuring the health workers' name field, whereas this field is unstructured in the users table. A similar structure could be added to the users table. The health worker data quality in ITIS can be further improved by enacting automated logic checks on data entries:

- Remove white spaces at the beginning or end of the text;
- Standardize the text into sentence case;
- Using drop down selection as necessary;
- Flag invalid characters; and
- Restrict certain data fields to only accept unique entries as necessary.

Although policies or guidelines on health worker data entries in ITIS can be created and disseminated to further improve the data, implementing these automated logic checks within ITIS will provide a more tangible and efficient improvement.

Furthermore, HRH2030 recommends that NTP stakeholders at different levels should check health worker data as part of their semi-annual Data Quality Checks (DQC) activity to progressively improve the quality of TB health worker data. During the DQC activity, a time can be allotted for the facilities to check and update their respective health workers' data. The DQC can also be utilized to validate the tagged duplicate records.

Philippines Universal Health Care (UHC)⁸ cannot be achieved without health workers. HRH2030 recommends that steps are made to advance the use of health worker data for evidence-based decision and policy making. Developing dashboards and analytics on health workers within ITIS would allow NTP and other stakeholders to quickly see information and trends through data visualizations. However, it should be considered that the usefulness of analytics relies heavily on the quality of the data. To start, the NTP could create dashboards for the distribution of TB health workers because this data set appears to be the most complete and can be readily utilized. Should the NTP decide to create dashboards or analytics that require more data, such as the age group or gender of health workers, the birthdate or gender data must be captured as required fields during the online ITIS new user registration and also be collected for existing users. Lastly, a more meaningful analysis could be performed by comparing the health worker data to the TB case rates. For example, health worker distribution could be compared against trends in TB case notification, holding, or success rates to inform decisions that will help achieve UHC and sustainable development goals in the Philippines.

⁸ To read the Universal Health Care Law of the Philippines, go to:
<https://www.officialgazette.gov.ph/downloads/2019/02feb/20190220-RA-11223-RRD.pdf>

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