

Analysis of Washington’s Nurse Supply Data: Suggestions for Improvement

July 8, 2020

Introduction

Since 2000, information on the supply of registered nurses (RNs), advanced registered nurse practitioners (ARNPs) and licensed practical nurses (LPNs) licensed in Washington was limited to age, sex and mailing address, the information that nurses were asked to provide upon initial licensing and renewal. Several stand-alone surveys of Washington’s nurses have been conducted over the past two decades, but none provided recurring information about the supply of nurses in the state. Starting in 2015, nurses could voluntarily provide more detailed information about demographics, education and work history through a link to an online survey. The Washington Nursing Care Quality Assurance Commission (NCQAC) required all nurses to complete these questions beginning in January 2018 as part of the initial licensing and renewal process.

For the NCQAC requirement, each nurse was directed to fill out two questionnaires: one managed by the state Department of Health that asked for detailed information on race and ethnicity and one managed by Nursys e-notify that asked for workforce supply information. The Nursys e-notify system is a national databased administered by the National Council of State Boards of Nursing (NCSBN) and includes questions based on the National Forum of Nursing Workforce Center’s Minimum Nurse Supply Dataset. Nursys applies a set of data quality rules, stores the supply data and provides data downloads to authorized entities upon request. When a nurse updates their workforce supply information, Nursys overwrites the previous information with the updated questionnaire responses. NCQAC also uploads to Nursys a complete roster of nurses licensed in Washington, which is updated regularly and can also be provided to approved entities.

In early 2019, the University of Washington Center for Health Workforce Studies (UW CHWS) was contracted by the Washington Center of Nursing to perform the first analysis of the Nursys supply data for Washington’s RNs, LPNs and ARNPs. The application for review of the study procedures was approved by the Washington State Institution Review Board on June 18, 2019 and a copy of the Nursys supply data and the DOH detailed race data was obtained. There was some difficulty in obtaining a copy of the complete nurse license roster that contained records for all nurses licensed in Washington but this was provided by Nursys on September 4, 2019 (see “Ensure the nursing roster obtained from Nursys includes all nurses licensed in Washington” on page 8 for details).

This document lists 16 specific suggestions for changes that should be considered before the next analysis of Washington’s nursing supply data. These suggestions by UW CHWS researchers are based on their experience obtaining and analyzing these, and prior similar, data and do not necessarily represent the views of WCN, NCSBN, NURSUS or any other organization. All suggestions were formulated under the following guiding principles: surveys should provide data from which an accurate profile of the nursing population can be assessed; data should be collected in a transparent manner that minimizes barriers to providing and using the information; surveys should be administered in a cost-effective

manner; survey questions should allow collection of information that is important for understanding the composition, preparation and work characteristics of specific nursing occupations (LPNs, RNs and ARNPs); and survey data should be collected in a consistent fashion that allows comparison over time.

This document is divided into three sections: *Preparing for the next analysis*, which lists topics that would ideally be resolved as soon as possible; *Implementing the next analysis*, which list topics that should be resolved as preparations for the next analysis are underway; and *Suggested Changes to questionnaire content*, which would ideally be addressed before the next data analysis, but may require significant coordination between NCQAC and Nursys to resolve. Each suggestion is assigned an estimate of how difficult it will be to come to a resolution (easy, difficult, very difficult) and a suggested timing for resolution (soon, 1-2 month before data analysis, before next analysis begins). This report was funded by nursing licensing surcharge fees as allowed under RCW 18.79.202 through the WA State Department of Health.

A list of the suggestions is included in the table below. See the specified page number for a detailed description.

Topic	Problems and suggestions for improvement	Difficulty	Timing	Page Number
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	Base the data set extraction timing on license renewal practices	Easy	Before next analysis	10
Questionnaire	Change questionnaire to obtain information more relevant to ARNPs and LPNs	Very Difficult	Soon	11
	Change ethnicity question in the Nursys questionnaire	?	Soon	12
	Add a write-in option for the work setting, specialty, job title and reason for unemployment questions	?	Soon	12
	Change the number of employers, number of hours worked and current employment status questions	Very Difficult	Soon	13

Preparing for the next analysis

Confirm that each Washington nurse has updated the Nursys questionnaire during each license renewal period

<u>Difficulty</u>	<u>Timing</u>
Difficult	Soon

The mandatory collection of the nurse supply data, which began in January 2018, was preceded by a period of voluntary data submission. We found that a small percentage of nurses who had completed the Nursys questionnaire completed the questions before January 2018. This raises the concern that, if the nurse does not update the data in the Nursys questionnaire on a regular basis, the data may not apply to their current working situation. It is possible this problem could be amplified as time goes on.

There were anecdotal reports in the first half of 2020 that nurses were not clearly instructed to update the supply questionnaire when they renewed their license. NCQAC reports that this has been remedied, which is important because it is essential that nurses clearly understand what is expected of them and that the instructions they encounter when renewing their license are clear and easy to follow.

The dataset from the survey that is provided by Nursys includes a variable that indicates the date that the questionnaire was last completed. According to the data documentation, the entire set of questions is replaced when the questionnaire is updated. This allows the analyst to assess the time period between the last data submission date and the date that the data were downloaded. This provides some understanding of how valid the data may be for each nurse under the assumption that too long of a time period might indicate the data are out of date.

However, if there were no changes to be made at each license renewal (the nurse had not changed jobs in many years, for example), the analyst, upon seeing it had been a long time since the data were updated, may incorrectly assume the data were not valid. Therefore, using the length of time since the data were last updated to conclude that the information for each nurse is (or is not) current may not be valid in all cases. In addition, it is not possible to tell if the nurse respondent updated just one variable in the questionnaire or multiple variables, let alone which variables were updated.

Suggested solutions:

1) Require each nurse to update the Nursys questions every time they renew their license, even if there have been no changes since their last renewal. It is important that this expectation be clearly communicated to nurses even before they attempt to renew their license. Then, once they are in the process of renewing their license, the instructions they encounter must be clear and easy to follow. The analyst can then compare the date that the nurse's license was last renewed to the date the Nursys questionnaire was last completed. If the dates do not match, analyses can convey that the supply data for that nurse is not current.

2) Devise a system whereby the nurse can review the data that was submitted the last time they renewed their license (if applicable). If there are no changes, the nurse can check a box confirming that no changes are needed. If changes are needed, they are sent to the Nursys website to update their information. In both cases, the data submission date collected by NURSYS should be updated. The

current data rules will update the data collection date for nurses who fill out the NURSYS survey, but new rules will need to be implemented to update the data collection date for nurses who indicate there have been no changes since their last renewal. This approach could save individual nurses some time and effort, but would require significant work with Nursys to implement.

Clarify what happens to records that are incomplete or do not meet Nursys data submission requirements

<u>Difficulty</u>	<u>Timing</u>
Difficult	Soon

Nursys provided a document titled “Nursys Licensure Update File: Standard File Layout, version 5.3.1, last updated April 4, 2018.” This document describes the data rules that are applied after the nurse has submitted questionnaire responses but before the answers are saved to the Nursys data file. Note that there are likely additional data rules that are applied as the nurse is filling out the questionnaire. See the “Obtain a copy of the questionnaire as respondents see it, including skip logic” section for a discussion the need to better-understand these rules.

Examples of data rules included in the Standard File Layout document are:

- “Any invalid values will cause the record to be rejected and written to the Exception Report for Workforce data.”
- “If the Year received Diploma in Nursing field (cols 1061-1064) is valid and this field does not contain a ‘Y’, then this field will be overlaid with a ‘Y’ and will be written to the Exception Report for Workforce data.”

This document, while informative, raises some questions that should be discussed and understood before the next data analysis occurs:

- Under what specific conditions will the entire set of survey responses be rejected?
 - What happens if a small number of key variables do not meet the requirements (but the rest of the variables do)? Is the whole record rejected?
- What are conditions that cause individual answers provided by the nurse to be changed before the data are saved (but the entire record is not rejected)?
- If the record is rejected or an answer is changed, does the nurse know this? Are they given an opportunity to correct the errors?
- If the record is rejected, is the *Workforce Data Collection Date* variable (which records the most recent date the questionnaire was updated) changed?

The goal of the discussion with Nursys would be to understand how their data rules affect the Washington requirement to complete the supply questionnaire. For example, if the nurse submits their questionnaire but the data are rejected according to the Nursys rules, would it appear that the nurse had not completed the data?

Suggested solutions:

- 1) Obtain the current version of the Standard File Layout document from Nursys.
- 2) Ask Nursys the above questions (and any others that may arise) and document their responses. If necessary, make changes based on their responses.

[Link detailed race questions collected by DOH to licensing data](#)

<u>Difficulty</u>	<u>Timing</u>
?	Soon

The Washington Center for Nursing developed a set of detailed race and ethnicity categories. The Nursys questionnaire includes questions that collect race and ethnicity data based on the definitions employed by the U.S. Census Bureau.

The more detailed categories are collected separately from the Nursys questionnaire and cannot currently be linked to licensing data or Nursys data. The result is that the race and ethnicity of Washington's nurses can be classified based on the Census Bureau categories, but not the more detailed categories. The main limitations are:

1. There is no way to separate the answers from nurses with an active license from data for nurses who provided an answer when they had an active license but have since transitioned to another license status. Therefore, any analysis of the detailed race/ethnicity will provide information about all nurses who have ever answered this question, rather than nurses who currently have an active license.
2. There is not a way to analyze the detailed race categories based on certification type (RN, ARNP, LPN). Results from the first analysis of the Census Bureau categories showed that there were differences in the racial composition of each nursing group. It would be good to do a similar analysis using the more detailed categories.

Suggested solutions:

- 1) Save the nurse's license number with detailed race and ethnicity questions. This would allow these data to be linked to licensing data and Nursys questions for the purposes of aggregate data summaries. But the data could be stored in such a way that would not allow easy identification of individual nurses.
- 2) If it is not possible to save the license number with the detailed race and ethnicity questions, save the nurse's certification type (RN, LPN, ARNP). This would allow an analysis of the detailed racial categories by license type for all nurses who had ever completed this question. However, there would still be uncertainty about how well these summaries represent nurses with a currently active license, those who practice in Washington (as opposed to those who have a WA license but practice in another state) or those who are certified at one (or more) level but practice at another (those with an RN license who practice as an ARNP, for example).

Consider changing the way data are uploaded to Nursys

<u>Difficulty</u>	<u>Timing</u>
Difficult	Soon

Along with answers to the supply questions, Nursys also stores a complete roster of all nurses licensed in Washington. This roster is supplied by NCQAC and is updated on a regular basis. Because one of NCQAC's major roles is to ensure that each nurse license is maintained in good standing, they provide this roster based on each license granted by the state. However, some nurses may have more than one license (many are actively licensed as an RN and an ARNP, for example).

When analyzing the Nursys data to describe Washington's nurse supply, it seems important to analyze the information based on the number of people, rather than the number of licenses. This gives an accurate count of the number of individuals at each certification level. For example, if the records for nurses with both an RN and an ARNP license are not handled correctly, the number of RNs will be artificially inflated.

It is possible for the analyst to account for the multiple licenses that could be held by individual nurses, but this task is complicated by the fact that the Nursys supply questionnaire data may be saved to one or both records. If only one licensing record were saved per person, this task would be simplified. It could also allow a more rapid analysis of the data completion rate for each license type. Since the Nursys data are stored separately from the Department of Health licensing data, storing the Nursys data for each individual nurse would not affect work the Commission does to ensure that each license is maintained in good standing.

Suggested solution: Save only one licensing record per person in the nursing roster maintained by Nursys. If the person has more than one active license, save the record for the higher license type (for example save the ARNP record, but not the RN record). If the person has one active license, but one or more inactive license records, save only the active license record.

Consider providing Nursys with more detailed information about the license status of each nurse

<u>Difficulty</u>	<u>Timing</u>
?	Before next analysis

The license status variable provided by Nursys with the nursing roster data was coded as Yes or No. The DOH has much more detailed information about the license status. Assuming the Nursys system will allow more detailed coding of this variable, this could allow more flexibility in the types of analyses that are completed. For example, should military licenses be included? Could we analyze provisional licenses granted to transfers from other states? These analyses could be achieved by obtaining the more detailed variable from DOH and linking it to the Nursys data by license number. But including it in the Nursys data could save a step.

Suggested solution: Provide Nursys with a more detailed license status variable.

Implementing the next analysis

Obtain a copy of the questionnaire as it appears on the survey website, including skip logic

<u>Difficulty</u>	<u>Timing</u>
Difficult	1-2 months before analysis

As described in the “Clarify what happens to records that are incomplete or do not meet Nursys data submission requirements” section, Nursys applies data rules before saving questionnaire responses. It is likely they also apply rules that determine how each nurse fills out the questionnaire. They may limit the types of responses that nurses can provide in the online questionnaire and may allow nurses to skip some questions based on their responses to previous questions. We asked Nursys for a document that details these data entry rules, but never received one. This document is important for several reasons:

- Having the exact wording of each question ensures the proper interpretation of each question during analysis.
- Knowing if certain values can or cannot be entered by nurses explains the values seen in the final dataset.
- Knowing how many values can be entered for each question leads to proper interpretation of the data.
- Knowing the skip patterns in the questionnaire explains why some questions are or are not answered, which leads to proper interpretation of the degree of missing data for each question.

Suggested solution: Obtain from Nursys a document that has detailed descriptions of the data rules that are applied as the nurse is filling out the online questionnaire.

Specific data questions to address before next analysis

There were several specific issues with the data that should be investigated before the next data analysis. We have not included suggested solutions for these items, because the solution may depend on what is found in discussions with Nursys, further analysis of the data or documentation of Nursys’s data quality rules.

The rate of missing data for the initial education question was very high, especially for RNS and LPNs

<u>Difficulty</u>	<u>Timing</u>
Difficult	1-2 months before analysis

Approximately 80% of RNs and LPNs who indicated they practice in WA did not have data for the question related to the nursing degree/credential that qualified them for their first U.S. nursing license. About 25% of ARNPs were missing information for this question. Does this mean that one of the data quality rules resulted in ARNPs being more likely to complete this question than RNs/LPNs (for example

a skip pattern)? Was this question added recently? Is the wording of the question confusing? Or is the missing rate accurate and nurses (especially RNs and LPNs) decided not to answer this question?

Some ARNPs had highest education levels of baccalaureate or below

<u>Difficulty</u>	<u>Timing</u>
Difficult	1-2 months before analysis

Since 1997, ARNPs have been required to hold a graduate degree. For this first analysis, 10% - 15% of all ARNPs practicing in Washington indicated their highest education level was a baccalaureate or below. It is possible some of these responses represent nurses who obtained their Washington ARNP license before 1997 and were excluded from the requirement. However, looking only at ARNPs who were first licensed in the 2000s, 17% reported their highest nursing degree as a baccalaureate or lower. We defined an ARNP as any nurse who held an ARNP license, not as any nurse who practices as an ARNP. Could it be possible that some nurses hold an ARNP license but practice as an RN so would not be required to have a graduate degree? Or does this indicate that ARNPs did not understand the question or filled out their response in a manner that was not intended?

Some LPNs listed a baccalaureate in nursing as their highest degree

<u>Difficulty</u>	<u>Timing</u>
Difficult	1-2 months before analysis

About 1% of LPNs practicing in Washington listed a baccalaureate in nursing as their highest degree. This is a very low percentage, but there are not typically baccalaureate level LPN programs. Could these be RNs who were mistakenly classified as LPNs? It is also possible these represent data entry errors – the responding nurse thought the question was asking about their highest degree of any type, not their highest nursing degree.

[Ensure the nursing roster obtained from Nursys includes all nurses licensed in Washington](#)

<u>Difficulty</u>	<u>Timing</u>
Easy	Before analysis

The first nursing roster dataset provided by Nursys included only records coded as having an active license. This may be okay if the nursing roster and supply questionnaire dataset are pulled at the same time. But the survey data were pulled several months before the nursing roster. It was important to ensure the nursing roster included all nurses licensed in Washington - not just those with an active license at the time of the data pull – so that we could accurately count the number with an active license at the time the supply data were pulled. In general, including records for all licensed nurses gives the analyst the most flexibility and guarantees that the survey response rate is calculated correctly.

Suggested solution: Ask Nursys to provide the nursing roster for all nurses with a Washington license, not those with an active license.

Consider the required preliminary administrative steps that need to be completed before analysis can begin

<u>Difficulty</u>	<u>Timing</u>
Easy	1 -2 months before analysis

For this first analysis of the Nursys supply data, there were several administrative tasks that had to be completed before analysis could begin. The Washington Center for Nursing and the UW Center for Health Workforce studies agreed upon a scope of work and the funding required to carry out the analysis. This process began on February 6, 2019 and, after review by the UW Office of Sponsored Programs, the final contract was signed on April 8, 2019. After the contract was signed, UW CHWS submitted a human subjects review application to the Washington State Institutional Review Board and approval was granted on June 18, 2019. The data could be requested from Nursys and analysis begun only after these steps were completed. It is possible that these steps could be completed more quickly for subsequent analysis efforts, but we suggest allowing 3 – 4 months for these activities and building this period into the analysis timeline.

Suggested solution: Begin discussions about budgeting, scope of work and human subject approval 3 – 4 months before the data that data acquisition and analysis is expected to begin.

Base the data set extraction timing on license renewal practices

<u>Difficulty</u>	<u>Timing</u>
Easy	Before analysis

The Nursing Commission asked Nursys to create a dataset containing the nurse supply data for Washington nurses at the end of June 2019, after all administrative and human subjects approvals had been obtained. Subsequent conversations with NCQAC representatives revealed that many nurses renew their licenses during the summer months, which means the data prepared by Nursys may have been extracted just before many nurses updated their workforce data. To ensure the most up-to-date workforce data, we suggest waiting until after the peak renewal period before requesting the next set of data for analysis.

An additional consideration for 2020 is that, in response to the COVID-19 pandemic, the Washington Secretary of Health ruled that nurses with licenses up for renewal between April 1, 2020 and September 30, 2020 would not be penalized as long as they renewed their license by September 30, 2020. Therefore, it is likely that a significant proportion of Washington’s nurses will wait until late September to renew. An added note to consider in timing the next extraction of data from Nursys is to ensure that the problem preventing nurses from being reminded during renewal to complete the survey is resolved (see problem statement on page 3).

Suggested solution: Wait until at least late October 2020 to request an updated workforce dataset from Nursys. In future years, make the request after the majority of nurses are expected to have renewed their license. It will be important to time subsequent nurse supply analyses using data extracted at similar times of the year.

Suggested changes to questionnaire content

Change the questionnaire to obtain information more relevant to ARNPs and LPNs

<u>Difficulty</u>	<u>Timing</u>
Very Difficult	Soon

The workforce questionnaire that nurses complete is based on the National Forum of Nursing Workforce Center's Minimum Nurse Supply Dataset, which was designed primarily for RNs. There were approximately 91,000 RNs with an active license at the end of May 2019 (compared to approximately 11,000 LPNs and 8,700 ARNPs), so the questionnaire works well for the majority of nurses. But the questions are not ideal for answering some important questions about the ANRP and LPN workforce. For example, the questions about work setting and provider specialties do not include categories that are as relevant to the way ARNPs and LPNs work as they are for RNs. Additionally the questions about education history are not as applicable to the typical LPN education trajectory as they are for RNs and ARNPs.

Suggested solutions:

- 1) Identify a survey instrument that is designed specifically for ARNPs and another instrument for LPNs. Work with Nursys to incorporate these instruments into their system. This will facilitate analyses that answer questions specific to each nursing workforce (RNs, ARNPs and LPNs) but may require considerable coordination with Nursys to achieve. One key question would be how each nurse is directed to the appropriate questionnaire. Would it be based on the Washington license they hold (so nurses with an ARNP license would be directed to the ARNP questionnaire, nurses with an RN license but not an ARNP license would be directed to RN questionnaire, etc.)? This matches the way nurse roles were defined for the first analysis of the workforce data. Or would nurses be directed to the questionnaire that matches the certification type in which they practice, based on their response to a question in the current Nursys survey?
- 2) Create a stand-alone module for ARNPs and LPNs that is managed and housed with the Washington Department of Health Fortress system. This is how the current question with detailed race and ethnicity categories is administered. These stand-alone questions could supplement the Nursys questions and, as long as they can be linked to the license roster and Nursys datasets, could allow more detailed analyses for ARNPs and LPNs. It is unlikely that nurses could be directed to these supplementary questionnaires based on their answers to the Nursys question about their practice certification. They would likely need to be directed based on the license(s) they hold.
- 3) Administer occasional sample surveys to ARNPs and LPNs. This approach would resemble the efforts that were previously carried out in Washington to gather workforce supply data: ARNPs and LPNs would be contacted by mail and email and asked to complete a survey. This approach is typically more expensive than analysis of data collected as part of license renewal and would take more time and effort.

Suggested changes to specific questions

Below are suggestions for changes to specific questions from the current Nursys workforce supply survey.

Change ethnicity question in the Nursys questionnaire

<u>Difficulty</u>	<u>Timing</u>
?	Soon

Suggestions for linking the detailed ethnicity question that is collected by the Washington Department of Health to the nursing roster and workforce supply questions are detailed in the *Preparing for the next Analysis* section. However, there is a separate question about ethnicity in the Nursys questionnaire. In the dataset that was provided by Nursys for this first analysis, the only answer option for the question related to ethnicity was an “X” for this variable indicating that the respondent indicate they were Hispanic/Latino. The way this variable is presented does not allow the analyst to assess the extent of missing data for this question because there is no way to differentiate nurses who may have answered “No” from those who did not answer this question. It is important to know the amount of missing data to be able to assess how likely it is that the responses represent the true ethnic breakdown of Washington’s nurses. If a high percentage were missing, we might conclude the results were inaccurate.

It is unclear why this variable is presented this way in the data. We did not receive a copy of the questionnaire, so we don’t know if the question was asked in such a way that would allow the proper analysis of this question or if this is truly the way the data were collected. What is needed is a response option for those who selected “No – not Hispanic/Latino.” With both the Yes and No options available in the data, any remaining records that do not have either of these options could be classified as missing. If the question is currently set up to collect the data in this way, Nursys should change the way they save this information in the database so that it can be analyzed properly. If the question is not set up this way, Nursys should change the question to collect both “Yes” and “No” answers.

Suggested solution: Work with Nursys to understand the cause of this issue. Ask them to change the way the data are saved or to change the questionnaire content as appropriate.

Add a write-in option for the work setting, specialty, job title and reason for unemployment questions

<u>Difficulty</u>	<u>Timing</u>
?	Soon

The data for the work setting, specialty, job title and reason for unemployment questions contain a code for “other” but do not include any answers that may have been written in by the nurse. It is unclear if this is because of the way the data are stored or if there is not a write-in option on the questionnaire. In either case, the percentage of nurses who selected “other” was high for some of these questions, approaching 15% for the work specialty question. It is possible that many of the write-in answers could be recoded into the existing categories for these questions, which would change the distribution of responses. To be sure that the reported distribution for these questions is correct, the write-in responses should be included in the data.

Suggested solution: Work with Nursys to understand the cause of this issue. Ask them to change the way the data are saved or to change the questionnaire content as appropriate.

Change the number of employers, number of hours worked and current employment status questions

<u>Difficulty</u>	<u>Timing</u>
Very Difficult	Soon

The questionnaire includes a question about the number of employers that each nurse is working for and the total number of hours that the nurse works per week of all employers. There is a separate question that asks if the nurse is employed in nursing, employed in a field other than nursing, unemployed, retired or working as a volunteer. The way these questions are worded does not make it clear if the nurse spends most working hours in a nursing position or in another field. If the nurse has more than one employer, it is also not possible to calculate the number of FTEs that each nurse represents, a commonly used workforce metric.

It is also possible that a nurse could have a single employer, but work in multiple locations, a situation that would not be reflected with the current questionnaire. This possibility took on extra significance during the COVID-19 pandemic, as employers were concerned about the possibility of employees spreading the virus in multiple work places. If any of these concerns are considered to be of sufficient importance, the questions would need to be changed to allow further investigation in the future.

Suggested solution: Work with Nursys to change the relevant questions.