Technical Documentation: Florida Center for Nursing Analyses of Nurse Licensure Data

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Background

The Florida Center for Nursing (Center) was established in 2001 to address issues related to nurse supply, demand, and shortage. The nurse licensure database maintained by the Florida Board of Nursing (FBON) is one important source of information on the state's nurse supply. The licensure database contains the most complete information available in the state specific to the regulation of nurses. Included is information on the number of licensed nurses, their eligibility to practice, their demographic characteristics, and their distribution across the state of Florida.

Licensure data collected by the FBON do not include information about the work behavior of nurses, and this limits their usefulness for strategic labor force planning. The data do not indicate whether nurses are working, whether they work in or outside the field of nursing, how much they work, or in what setting. Because the Center is primarily interested in the amount of nursing *labor* provided in Florida, in contrast to the number of Florida nursing *licenses* that are held, licensure data are cleaned and subset to isolate nurses who could reasonably be practicing nursing within the state of Florida. We call this subset the **potential nurse workforce**. This document provides technical details about the subsetting process and analysis of licensure data presented in Center reports.

Data Extract

In 2006, an agreement between the Center and FBON was reached whereby licensure data is provided to the Center regularly as a data extract (a static file) drawn from the dynamically changing licensure database. The extract includes records for each nursing license held in Florida by Registered Nurses (RNs), Advanced Registered Nurse Practitioners (ARNPs), Clinical Nurse Specialists (CNSs), and Licensed Practical Nurses (LPNs). Each record contains information on license type (RN, ARNP, CNS, or LPN), license status, date of birth, gender, race/ethnicity, year of initial licensure in Florida, and address. Beginning in 2007, application type (examination or endorsement) was incorporated into the extract.

The Center uses an extract drawn in late December of each year to represent the population of licensees as of January in the following year. In addition to being an intuitive measurement time since it is the start of a calendar year, this time point is also the beginning of license renewal cycles. Florida nurses renew their licenses every two years. In odd years, approximately one-third of RNs and ARNPs renew from January through April and all LPNs renew from March through July. In even years, the remaining two-thirds of RNs and ARNPs renew from January through July. Analysis of the late December extract has two advantages. First, it avoids the rapid changes to the licensure database that occur during renewal cycles. Second, it gives nurses who missed their renewal deadlines from the previous year an additional five or seven months to complete renewal and be counted as part of the potential nurse workforce.

Data Cleaning and Nurse Placement Procedures

Licensure data are first cleaned for implausible dates of birth and initial licensure. The data contain some records with clearly inaccurate birth years dating back to the 19th century. Nurses with birth years earlier than 1919 or with missing birth years are coded as missing for age. The upper limit for age is 90 using this procedure. Similarly, some records contain birth years that would render the nurse implausibly young. For RNs, age is coded as missing if the birth year dates them at less than 20 years of age. For LPNs, the lower limit for age is set to 19 years of age. These lower limits were selected based on the earliest typical age at graduation from nursing programs as well as a sharp drop in the number of records with younger ages.

Dates of initial licensure are also inspected for implausible dates and the proportion of records containing each date. Nurses recorded as being licensed before 1951, a date indicating the nurse has been continuously licensed in Florida for 57 years, are coded as missing for this field. An important note regarding this variable is that it may be "reset" if nurses allow their licenses to expire but later become licensed again in the state. Since it is not possible to tell whether this has happened to nurses in the licensure extract we receive, the measure must be interpreted with caution. Average tenure as a nurse in Florida may be underestimated by these data.

Missing data generated by these cleaning procedures are typically minimal. Around 0.5 percent of RN and ARNP cases are recoded to missing on the age variable, as are around 1 percent of LPN cases. Even fewer cases are recoded to missing on original license year. However, naturally occurring missing data do exist in notable quantities for some variables in the database. For example, 7-8 percent of records are typically missing data on gender and 8-11 percent are typically missing data on race and ethnicity. In analyses reported by the Center, percentages are based on cases with non-missing values for a variable.

The Center uses address information to identify nurses who report living and/or working in the state of Florida. The licensure database contains two sets of address fields: a mailing address (where nurses wish to receive mail from the FBON) and a practice address. Analysis of the two fields indicates that more than half of nurses have the same zip code listed for both mailing and practice addresses. Discussion with FBON and Medical Quality Assurance staff revealed that "mailing" address may be a home residence or a work location – wherever the nurse wishes to receive mail from the FBON. In addition, mailing address may be substituted for practice address if the latter is left blank. In this case, the addresses may be identical either because the nurse receives mail at work *or* because the nurse is not practicing. As a result, the data do not allow a clean analysis of where nurses live and work, although they do allow identification of nurses who report working or receiving mail outside of Florida.

Nurses with Florida addresses are placed into counties, Regional Workforce Boards, and larger regions of the state consisting of multiple workforce boards. There are 67 counties and 24 Regional Workforce Boards, a classification used by Workforce Florida, Incorporated for workforce planning and outreach efforts. See Appendix A for a map of Florida showing the regions into which each county falls. As noted previously, precision is difficult to obtain since many nurses do not have unique practice location information and it is unknown whether their mailing address represents a residence or work location. Since many nurses are likely to

commute from one county to another in order to work, county placement is probably least accurate for describing the distribution of the nursing workforce. More accuracy is probable in larger geographic areas since the areas are more likely to encompass both work and residence locations.

When nurses give unique practice location information, they are placed according to the county in which they are employed. In all other cases, nurses are placed according to the county in which their mailing address – which may be home or work – is located. This procedure maximizes the accuracy of placement for describing workforce distribution as much as can be expected given the data limitations.

To investigate data quality and salvage missing data on county placement, each licensee's recorded zip code is compared against a SAS statistical software lookup table of zip codes which matches the extract date as closely as possible.[1] In the vast majority of cases, nurses with Florida placements give valid zip codes within the state of Florida. In some cases, however, nurses have a valid county placement pre-assigned by FBON when the zip codes they give are invalid. The decision was made to use the pre-assigned county placement from FBON in all cases where it is given. The zip code lookup table is used to assign county and regional placement in cases where valid zip codes are available but pre-assigned county placements are not. The process typically creates a county placement for several hundred Florida addresses which were previously unplaced.

Excluded Licensees By Year and Reason

A four-step process is used to generate a subset from the total file representing the potential nurse workforce. In the first step, nurses with an inactive license are dropped. In the second, nurses with status codes rendering them ineligible to practice, such as Delinquent, Suspended, or Retired, are dropped. In the third step, nurses who give an out-of-state address for both mailing address and practice location are dropped. In the final step, the remaining nurses who give a *practice* address outside the state of Florida are dropped (those who give a mailing address in Florida but have a missing practice address are retained). Table 1 details the number of licensees excluded in each step of the subsetting process for the years of licensure data available to the Center since the January 2007 analysis.

Table 1. Licensees Excluded From Analysis, By Year and Reason

Analysis Year	Inactive License	Ineligibility	Lives and Works Outside FL	Lives Inside but Works Outside FL	Total Exclusions
2007	9,535	20,651	26,279	6,824	**63,289**
2008	10,680	22,044	32,134	2,004	**66,862**
2009	10,015	24,763	32,481	2,110	**69,369**

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[1] Zip codes change over time but are reasonably steady in the short term. SAS makes new zip code lookup tables available quarterly. Zip code tables can be downloaded from
http://support.sas.com/rnd/datavisualization/mapsonline/html/misc.html

Reasons for exclusion are roughly split between license status and non-Florida address in all years. In 2008 and 2009, a much larger number of licensees were excluded in the third subsetting step, which drops any case providing out-of-state address information for both mailing and practice address. Investigation of this difference revealed that a large number of the 2008 licensees excluded in this step had applied for endorsement into Florida during the past year, and many of them may have applied before they had a Florida address.

To more fully understand the behavior of nurses who apply for endorsement into Florida, an analysis of newly licensed nurses providing non-Florida addresses in the 2007 extract was conducted. The analysis followed those nurses who were initially licensed in either 2005 or 2006, provided an address outside of Florida, and were scheduled to renew during one of the two renewal cycles in 2007. If they were endorsing into Florida because of an imminent move into the state, the 2008 extract should have revealed that they renewed and that they now provide a Florida address. A total of 2,430 nurses scheduled to renew were examined. Only 1,631 of those nurses (or two-thirds) actually completed renewal as required. Only 609 nurses (or one-quarter of the initial nurses followed) provided a Florida address when they renewed. The evidence indicates that many nurses who apply for endorsement into Florida do not actually begin practice in Florida immediately or, alternatively, work for very short periods of time as travelling nurses in this state. As a result of this analysis, the decision was made to exclude all nurses providing a non-Florida address regardless of their initial license year or application type. If and when they renew and provide a Florida address, those nurses will be included in Center analyses of licensure data.

The final subsetting routine excludes nurses who provide a Florida mailing address but report a unique practice address outside the state of Florida. In 2008 and 2009, a much smaller number of nurses were excluded in this step when compared with 2007, and more of those nurses provided a practice address in states that are adjacent to Florida. It is possible that this change reflects the increased number of nurses who renewed their licenses online during the 2007 renewal cycles, where the interface more clearly indicates the need for unique practice location information.

In addition to having status codes that render them ineligible to practice, the nurses who are excluded from analysis in Center reports tend to be slightly older (one or two years, on average) and more often of White race. In general, excluded nurses are similar to those who are analyzed with the exception that they did not meet inclusion criteria.

An additional data cleaning and analytic step was added in 2009 to identify nurses who have both an LPN and an RN record in the FBON database. While license upgrading to the ARNP is detectable because nurses retain their license numbers, LPNs who obtain an RN license receive new license numbers and are more difficult to track via licensure data. Some of the LPNs who have upgraded their license to RN have overlapping license expiration dates, whereby the LPN license expires after the RN license begins. This results in a person having two current nursing licenses and two "near duplicate" FBON records, one for the LPN license and one for the RN license. These "near duplicate" records can be identified through a combination of birth date and social security number. When this situation occurred, we assumed the nurse would be practicing as an RN and removed the LPN license from further analysis. In 2009, we found 1,966 "near duplicate" LPN records. If the duplicate record was generated between 2007 and 2009 (about

1,400 nurses), we counted them as losses to the potential LPN workforce. In the small number of cases where nurse are renewing both LPN and RN licenses year after year, we simply removed the LPN record from further analysis.

<u>Licensure Data Analyses Performed by the Center</u>

The Center performs both point-in-time analysis and evaluation of trends over time using licensure data. Statistics at the county and Regional Workforce Board levels are presented at a single time point. The most recent statistics provided by the Center for these geographic levels are accessible on the [Workforce Data](#) page of our website. Low levels of precision in placing nurses at the county level means that observed trends will also be imprecise, so the Center does not provide trend analysis at these levels.

Trend analyses, in which aggregate changes in the potential nurse workforce are observed, are available at the state level and also within six regions of the state. State-level trends are discussed in a full-length report, and regional trends are presented in our Regional Status Reports. Both can be accessed from our Workforce Data page. Regional Status Reports can be downloaded by selecting the region of interest from our map of Florida on that webpage. The Center also performs longitudinal analyses, in which individual nurses are tracked as additions to or losses from the potential nurse workforce, at the state level. Due to the complexity of tracking individual nurses we do not perform longitudinal analyses for counties or regions.

<u>Conclusions and Limitations of Licensure Data</u>

All Center reports using FBON licensure data use the subset of nurses who meet the requirements discussed above: they have active licenses, statuses rendering them eligible to practice, and Florida addresses. The exclusion process generates our best estimate of nurses who could be working in Florida, including their location in a specific region of Florida. However, it is important to reiterate that licensure data do not indicate whether nurses are working in the field of nursing or, indeed, at all. We can infer that nurses are working in cases where they provide unique practice addresses, but in most cases the practice address is duplicative of mailing address such that it is not known whether the address is a residence or work location.

Center analyses of FBON licensure data should be interpreted as indicative of the *licensed nurse population with eligibility to practice and a Florida address* – **the potential nurse workforce**. Interpretation of county-level results should be cautious, since our placement of nurses into counties does not benefit from the certainty that practice address fields actually reflect the location in which working nurses work. As noted above, more accuracy is possible at the broader levels of geographic classification such as regional workforce boards and the six larger regions of the state used for reporting purposes by the Center.

It is hoped that current collaborative data collection efforts with the FBON, which include a voluntary license renewal survey of nurses regarding their work behaviors, will yield a more refined estimate of the number of working nurses, their county location, the number of hours they work, and their work setting.

Appendix A: County Composition of Regional Workforce Boards and FCN Regions

Key:

Workforce Florida Regions

Northwest Region
1 2 3 4 5

North Region
6 7 8 9

Central Region
10 11 12 13

Southwest Region
14 15 16 17 18 19 24

Southeast Region
20 21 22

South Region
23