Payroll-Based Journal
Public Use Files:
Technical Specifications

July 2023

1. Background

The Centers for Medicare & Medicaid Services (CMS) has prepared public data sets, the Payroll Based Journal Public Use Files (herein referred to as "PBJ PUFs") that have daily data on nursing home staffing levels based on data submitted by nursing homes to CMS through the Payroll Based Journal (PBJ) system and daily resident census information based on Minimum Data Set (MDS) records. Long-term care (LTC) facilities must electronically submit to CMS through the PBJ system complete and accurate direct care staffing information, including information for agency and contract staff, based on payroll and other verifiable and auditable data in a uniform format according to specifications established by CMS. Facilities are required to submit the number of hours that each staff member (including agency and contract staff) is paid to deliver services for each day worked.

There are two PBJ PUFs, one for nursing staff (RNs, LPN/LVNs and nurse aides) and one for all other categories of non-nursing staff for which PBJ data submission is mandatory. Both quarterly files are available beginning with data from the first calendar quarter of 2017[1]. New data files will be uploaded to data.cms.gov on a quarterly basis. The public use files report information on staffing hours for each day in the quarter, along with resident census information derived from the Minimum Data Set (MDS). Note that the PBJ PUFs include only data that were received by the reporting deadline (which is 45 days after the last day in the quarter) and exclude data from facilities that submitted incomplete or erroneous data (see details below).

More details on the PBJ system, including the PBJ Policy Manual, can be found here: https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/NursingHomeQualityInits/Staffing-Data-Submission-PBJ.html

2. Aggregation

The staffing data in the PBJ PUFs are aggregated to the facility-day. This means that all included facilities will have one record (or row of data) for each day in the quarter. This will range from 90-92 records depending on the number of days in the quarter but for a given quarter will be the same for all included facilities. Thus, the total number of records in the file will be equal to the number of included facilities multiplied by the number of calendar days in the quarter.

3. Inclusion and Exclusion Criteria

a. Facility Inclusion Criteria
In order to be included in the PBJ PUF, nursing homes must have been active on last day of the quarterly submission period. If a facility meets in the inclusion criteria for the nursing PUF for a given quarter, that facility will also be included in the non-nursing PUF for the same quarter.

b. Facility Exclusion Criteria
A nursing home is excluded from the PBJ PUFs if the nursing home had aggregate PBJ nurse staffing levels for the quarter that are considered aberrant, based on rules previously applied for the exclusion of Certification and Survey Provider Enhanced Reports (CASPER)-based staffing measures

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[1] The specifications for generating these files have changed over time. The differences in the specifications for the earlier files are described in the Appendix to this document.

reported on Nursing Home Compare and used in the Five-Star Quality Rating System. Specifically, nursing homes are excluded from the PBJ PUFs if:

(1) Total nurse staffing = 0 hours 0[2] per resident per day; or
(2) Total nurse staffing > 12 hours per resident per day; or
(3) Nurse aide staffing > 5.25 hours per resident per day ; or
(4) Total nurse staffing on weekends = 0 hours per resident per day[3]; or
(5) Total nurse staffing on weekends >12 hours per resident per day[3]; or
(6) Total nurse aide staffing on weekends > 5.25 hours per resident per day[3]

For this purpose, total nurse staffing includes the following specific job categories: Registered Nurse (RN) Director of Nursing (DON), RN with administrative duties, RN, Licensed Practical Nurse (LPN) with administrative duties, LPN, Certified Nursing Assistant (CNA), Medication Aide/Technician, and Nurse Aide in Training. Aggregate staffing for the quarter is calculated by summing all relevant staffing hours across the quarter and dividing this by the sum of the daily MDS census across the quarter. For weekend staffing, both staffing hours and census are aggregated across all weekend days (Saturdays and Sundays) in the quarter. These aggregates include only days for which there was a non-zero census. Note also that if a nursing home is excluded due to aberrant weekend staffing (i.e., exclusions 4, 5, or 6 above), no data for this provider will be included in the PUFs, regardless of staffing levels on other days in the quarter. In other words, the PUFs will include all days in the quarter for a nursing home or the nursing home will be excluded entirely.

Note that the exclusions for aberrant nurse staffing levels are applied to facilities' data aggregated across all days (or all weekend days for exclusions 4, 5, and 6) in the entire quarter, not for individual days. As a result, some extremely high and low daily values exist in the data, and in particular, none of the inclusion or exclusion criteria require that facilities reported RN or LPN hours. Analysts may wish to apply additional edits to the data and should be cautious in the interpretation of extreme values. It should also be noted that facilities are instructed to report only paid hours; yet, some staff, particularly salaried workers, may work additional hours that are unpaid and unreported.

Administrator Exclusion Criteria[4]
Administrator staffing data is excluded from the PBJ PUFs if the nursing home submitted PBJ data suggesting an erroneously high number of administrators. Specifically, if a nursing home reports administrator hours (job code 1) for five or more individuals (based on employee IDs) on 4 or more days during the quarter, the administrator staffing hours will be excluded and flagged as invalid.

4. Data Contents

Table 1 shows the variables (columns) that are included in the PBJ nursing PUF, and Table 2 shows the variables (columns) that are included in the non-nursing PUF. For additional description of the job categories, see the PBJ Policy Manual (URL in Section 1). For additional methodological detail regarding the MDS census, see Section 5.

The file contains missing data only in cases of administrator exclusions. If there are no hours reported for a given job category for a given day, the hours variable for this job category will have a value of 0 in

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[2] Beginning with 2021Q3 data (posted in January 2022), the low staffing exclusion criteria was changed from 'Total Nurse Staffing < 1.5 hours per resident day' to 'Total Nurse Staffing = 0 hours per resident day'.

[3] The exclusion criteria related to weekend staffing were added beginning with the 2021Q3 data (posted in January 2022).

[4] The administrator exclusion criteria were added beginning with the 2023Q1 data (posted in July 2023).

the PUF. This will be the case if there were no hours submitted by the quarterly reporting deadline for that facility for that job category for that day.

Additionally, as noted above, beyond the inclusion and exclusion criteria, no additional editing or exclusions were applied for individual days or hours. Thus, some erroneously high (or low) values may remain in the data.

Table 1. Columns included in the PBJ Nursing Public Use File

Column Name	Description	Specification notes
PROVNUM	Medicare provider number	6 characters
PROVNAME	Provider name	character
CITY	Provider City	character
STATE	Postal abbreviation for State	2 characters
COUNTY_NAME	Name of Provider County, unique within state	character
COUNTY_FIPS	FIPS Code for Provider County, unique within state	3 digits
CY_Qtr	Calendar Quarter (yyyyQq, e.g. 2018Q4)	6 characters
WorkDate	Day for Reported Hours (yyyymmdd)	8 characters
MDScensus	Resident Census from MDS	integer
Hrs_RNDON	Total Hours for RN Director of Nursing (PBJ job code 5)	numeric
Hrs_RNDON_emp	Employee Hours for RN Director of Nursing (5)	numeric
Hrs_RNDON_ctr	Contract Hours for RN Director of Nursing (5)	numeric
Hrs_RNadmin	Hours for RN with administrative duties (6)	numeric
Hrs_RNadmin_emp	Employee Hours for RN with administrative duties (6)	numeric
Hrs_RNadmin_ctr	Contract Hours for RN with administrative duties (6)	numeric
Hrs_RN	Total Hours for RN (7)	numeric
Hrs_RN_emp	Employee Hours for RN (7)	numeric
Hrs_RN_ctr	Contract Hours for RN (7)	numeric
Hrs_LPNadmin	Total Hours for LPN w/ admin duties (8)	numeric
Hrs_LPNadmin_emp	Employee Hours for LPN w/ admin duties (8)	numeric
Hrs_LPNadmin_ctr	Contract Hours for LPN w/ admin duties (8)	numeric
Hrs_LPN	Total Hours for LPN (9)	numeric
Hrs_LPN_emp	Employee Hours for LPN (9)	numeric
Hrs_LPN_ctr	Contract Hours for LPN (9)	numeric
Hrs_CNA	Total Hours for CNA (10)	numeric
Hrs_CNA_emp	Employee Hours for CNA (10)	numeric

Column Name	Description	Specification notes
Hrs_CNA_ctr	Contract Hours for CNA (10)	numeric
Hrs_NAtrn	Total Hours for Nurse aide in training (11)	numeric
Hrs_NAtrn_emp	Employee Hours for Nurse aide in training (11)	numeric
Hrs_NAtrn_ctr	Contract Hours for Nurse aide in training (11)	numeric
Hrs_MedAide	Total Hours for Med Aide/Technician (12)	numeric
Hrs_MedAide_emp	Employee Hours for Med Aide/Technician (12)	numeric
Hrs_MedAide_ctr	Contract Hours for Med Aide/Technician (12)	numeric

Note: More information on labor codes and descriptions can be found in Table 1 of the PBJ Policy Manual, which can be found on the web link listed in section 1 of this document.

Table 2. Columns included in the PBJ Non-Nursing Public Use File

Column Name	Description	Specification notes
PROVNUM	Medicare provider number	6 characters
PROVNAME	Provider Name	character
CITY	Provider City	character
STATE	Postal abbreviation for State	2 characters
COUNTY_NAME	Name of Provider County, unique within state	character
COUNTY_FIPS	FIPS Code for Provider County, unique within state	3 digits
CY_QTR	Calendar quarter (yyyyQq, e.g. 2020Q4)	6 characters
WorkDate	Day for Reported Hours (yyyymmdd)	8 characters
MDScensus	Resident Census from MDS	integer
Hrs_Admin	Total Hours for Administrator (PBJ job code 1)	numeric
Hrs_Admin_emp	Employee Hours for Administrator (1)	numeric
Hrs_Admin_ctr	Contract Hours for Administrator (1)	numeric
Hrs_Admin_fn	Footnote for Administrator Hours 1 = Provider submitted invalid administrator hours	integer
Hrs_MedDir	Total Hours for Medical Director (2)	numeric
Hrs_MedDir_emp	Employee Hours for Medical Director (2)	numeric
Hrs_MedDir_ctr	Contract Hours for Medical Director (2)	numeric
Hrs_OthMD	Total Hours for Other Physician (3)	numeric
Hrs_OthMD_emp	Employee Hours for Other Physician (3)	numeric
Hrs_OthMD_ctr	Contract Hours for Other Physician (3)	numeric

Column Name	Description	Specification notes
Hrs_PA	Total Hours for Physician Assistant (4)	numeric
Hrs_PA_emp	Employee Hours for Physician Assistant (4)	numeric
Hrs_PA_ctr	Contract Hours for Physician Assistant (4)	numeric
Hrs_NP	Total Hours for Nurse Practitioner (13)	numeric
Hrs_NP_emp	Employee Hours for Nurse Practitioner (13)	numeric
Hrs_NP_ctr	Contract Hours for Nurse Practitioner (13)	numeric
Hrs_ClinNrsSpec	Total Hours for Clinical Nurse Specialist (14)	numeric
Hrs_ClinNrsSpec_emp	Employee Hours for Clinical Nurse Specialist (14)	numeric
Hrs_ClinNrsSpec_ctr	Contract Hours for Clinical Nurse Specialist (14)	numeric
Hrs_Pharmacist	Total Hours for Pharmacist (15)	numeric
Hrs_Pharmacist_emp	Employee Hours for Pharmacist (15)	numeric
Hrs_Pharmacist_ctr	Contract Hours for Pharmacist (15)	numeric
Hrs_Dietician	Total Hours for Dietician (16)	numeric
Hrs_Dietician_emp	Employee Hours for Dietician (16)	numeric
Hrs_Dietician_ctr	Contract Hours for Dietician (16)	numeric
Hrs_FeedAsst	Total Hours for Feeding Assistant (17)	numeric
Hrs_FeedAsst_emp	Employee Hours for Feeding Assistant (17)	numeric
Hrs_FeedAsst_ctr	Contract Hours for Feeding Assistant (17)	numeric
Hrs_OT	Total Hours for Occupational Therapist (18)	numeric
Hrs_OT_emp	Employee Hours for Occupational Therapist (18)	numeric
Hrs_OT_ctr	Contract Hours for Occupational Therapist (18)	numeric
Hrs_Otasst	Total Hours for Occupational Therapy Assistant (19)	numeric
Hrs_Otasst_emp	Employee Hours for Occupational Therapy Assistant (19)	numeric
Hrs_Otasst_ctr	Contract Hours for Occupational Therapy Assistant (19)	numeric
Hrs_Otaide	Total Hours for Occupational Therapy Aide (20)	numeric
Hrs_Otaide_emp	Employee Hours for Occupational Therapy Aide (20)	numeric
Hrs_Otaide_ctr	Contract Hours for Occupational Therapy Aide (20)	numeric
Hrs_PT	Total Hours for Physical Therapist (21)	numeric
Hrs_PT_emp	Employee Hours for Physical Therapist (21)	numeric
Hrs_PT_ctr	Contract Hours for Physical Therapist (21)	numeric
Hrs_Ptasst	Total Hours for Physical Therapy Assistant (22)	numeric
Hrs_Ptasst_emp	Employee Hours for Physical Therapy Assistant (22)	numeric

Column Name	Description	Specification notes
Hrs_Ptasst_ctr	Contract Hours for Physical Therapy Assistant (22)	numeric
Hrs_Ptaide	Total Hours for Physical Therapy Aide (23)	numeric
Hrs_Ptaide_emp	Employee Hours for Physical Therapy Aide (23)	numeric
Hrs_Ptaide_ctr	Contract Hours for Physical Therapy Aide (23)	numeric
Hrs_RespTher	Total Hours for Respiratory Therapist (24)	numeric
Hrs_RespTher_emp	Employee Hours for Respiratory Therapist (24)	numeric
Hrs_RespTher_ctr	Contract Hours for Respiratory Therapist (24)	numeric
Hrs_RespTech	Total Hours for Respiratory Therapy Technician (25)	numeric
Hrs_RespTech_emp	Employee Hours for Respiratory Therapy Technician (25)	numeric
Hrs_RespTech_ctr	Contract Hours for Respiratory Therapy Technician (25)	numeric
Hrs_SpcLangPath	Total Hours for Speech/Language Pathologist (26)	numeric
Hrs_SpcLangPath_emp	Employee Hours for Speech/Language Pathologist (26)	numeric
Hrs_SpcLangPath_ctr	Contract Hours for Speech/Language Pathologist (26)	numeric
Hrs_TherRecSpec	Total Hours for Therapeutic Recreation Specialist (27)	numeric
Hrs_TherRecSpec_emp	Employee Hours for Therapeutic Recreation Specialist (27)	numeric
Hrs_TherRecSpec_ctr	Contract Hours for Therapeutic Recreation Specialist (27)	numeric
Hrs_QualActvProf	Total Hours for Qualified Activities Professional (28)	numeric
Hrs_QualActvProf_emp	Employee Hours for Qualified Activities Professional (28)	numeric
Hrs_QualActvProf_ctr	Contract Hours for Qualified Activities Professional (28)	numeric
Hrs_OthActv	Total Hours for Other Activities Staff (29)	numeric
Hrs_OthActv_emp	Employee Hours for Other Activities Staff (29)	numeric
Hrs_OthActv_ctr	Contract Hours for Other Activities Staff (29)	numeric
Hrs_QualSocWrk	Total Hours for Qualified Social Worker (30)	numeric
Hrs_QualSocWrk_emp	Employee Hours for Qualified Social Worker (30)	numeric
Hrs_QualSocWrk_ctr	Contract Hours for Qualified Social Worker (30)	numeric
Hrs_OthSocWrk	Total Hours for Other Social Worker (31)	numeric
Hrs_OthSocWrk_emp	Employee Hours for Other Social Worker (31)	numeric
Hrs_OthSocWrk_ctr	Contract Hours for Other Social Worker (31)	numeric
Hrs_MHSvc	Total Hours for Mental Health Service Worker (34)	numeric
Hrs_MHSvc_emp	Employee Hours for Mental Health Service Worker (34)	numeric
Hrs_MHSvc_ctr	Contract Hours for Mental Health Service Worker (34)	numeric

5. MDS-Based Resident Census

The method used to calculate the daily resident census using MDS data is as follows:

1) Identify the reporting period (quarter) for which the census will be calculated (e.g., CY 2021 Q1: January 1 – March 31, 2021).
2) Extract MDS assessment data for all residents of a facility beginning one year prior to the reporting period to identify all residents that *may* reside in the facility (i.e., any resident with an MDS assessment may still reside in the facility). For example, for the CY 2021 Q1 reporting period, extract MDS data from January 1, 2020 through March 31, 2021.
3) Identify discharged residents using the following criteria:
   a) If a resident has a MDS discharge assessment, use the discharge date reported on that assessment and assume that the resident no longer resides in the facility as of the date of discharge on the last assessment. If there is a subsequent admission assessment, then assume that the resident re-entered the nursing home on the entry date indicated on the admission assessment.
   b) For any resident with an interval of 150 days or more with NO assessments, assume the resident no longer resides in the facility as of the 150th day from the last assessment. (This assumption is based on the requirement for facilities to complete MDS assessments on all residents at least quarterly.) If no assessment is present, assume the resident was discharged, but the facility did not transmit a discharge assessment.
4) For any particular date, residents whose assessments do not meet the criteria in #3 above prior to that date are assumed to reside in the facility. The count of these residents is the census for that particular day.

6. Data Limitations and Caveats

These Public Use Files are being made available to facilitate analysis and exploration of this richly detailed source of staffing information about US Nursing Homes. However, there are some limitations that are worth noting:

- There may be some instances where data submitted by a facility may not be a full representation of the hours staff actually worked. There may be some erroneous reporting as some providers continue to fine-tune their data submissions.

- The staffing measures previously displayed on the Nursing Home Compare website were derived from data reported on the CMS-671 and 672 forms. We do not expect data from these forms to exactly match the PBJ data for several reasons. (Note: Staffing data is no longer being collected on the CMS-671 form as of June 1, 2018).

  - The staffing data submitted on the CMS-671 captures only a two-week period prior to the facility's annual survey, whereas the PBJ data captures the staffing of a facility for each day in a quarter.
  - The definitions of certain job categories have been altered for PBJ data as compared to the instructions on the CMS-671 form. For example, when using data from the CMS-671 form, the total hours for registered nurses (RN) with administrative duties includes licensed practical/vocational nurses with administrative duties. However, the PBJ data have a separate category for licensed practical/vocational nurses with administrative duties.

- Staffing measures based on the data from the CMS-671 form used the census for a single date submitted by the facility on the CMS-672 form. Staffing measures based on PBJ data include the census for each day in a quarter based on MDS submissions.
- The PBJ system requires facilities to submit only those hours that staff are paid to work (in order for the data to be auditable). Facilities may have submitted unpaid hours on the CMS-671 form.

The PBJ data cannot be used to indicate noncompliance with other requirements for LTC facilities. For example, 42 CFR §483.35(b) requires facilities to use the services of a registered nurse for at least 8 consecutive hours a day, 7 days a week. Due to the factors stated above, it is possible a registered nurse worked some additional hours that were unpaid and therefore those hours were not reported in PBJ.

Similarly, we note that the number of hours reported for physicians and non-physician practitioners (e.g., nurse practitioners, physician assistants, and clinical nurse specialists) is low because the services they provide in a facility are typically paid by Medicare, Medicaid, or other medical insurance, and not the facility. For example, the services physicians provide through evaluating residents every 60 days are typically billed to Medicare. Therefore, the hours spent providing these services are not reportable.

7. **Limitations of Using Microsoft Excel® to open a large comma-separated value (CSV) file**

One of the file formats in which the PBJ PUFs can be downloaded from the data.cms.gov website is CSV. On many computers, if a user double-clicks on the filename for a CSV file, Microsoft Excel® will attempt to open the file. However, Excel cannot correctly load more than 1,048,576 rows. Each PBJ PUF has more than 1.2 million rows. Users may follow the Help provided by Excel or can use a statistical software package such as SAS® or Stata® to directly import the files. An alternative is to download the data for individual states or use filters to select a subset of states for download.

Appendix – Changes in PBJ Public Use File Specifications

When CMS makes changes to the staffing calculations on Nursing Home Care Compare, the same changes are applied to the PBJ PUFs. This section describes the changes that have been made since the first PUFs were posted for 2017Q1.

A. Changes made starting with the PBJ PUFs released in July 2023 (2023Q1 data)

Beginning with the PBJ PUFs released in July 2023 (data covering CY 2023Q1), exclusion criteria will be applied to administrator hours. The variable Hrs_Admin_fn was added to indicate hours for which exclusions were applied. A value of 1 indicates that the provider submitted invalid administrator hours. Hrs_Admin, Hrs_Admin_emp, and Hrs_Admin_ctr will be missing for facilities meeting this exclusion criteria.

B. Changes made that apply only to the PBJ PUFs released in April 2022 (2021Q4 data)

In 2021Q4, the staffing data for nearly 900 nursing homes was affected by a ransomware attack on a large, nationwide payroll provider. In response to the ransomware attack, the exclusion rules were applied differently for the affected providers. These providers can be identified through a variable that is present only in the 2021Q4 PUFs (incomplete = 1). For these providers,
- days 0 nursing hours reported were not included in calculations of hours per resident per day when determining whether to include the provider in the PUFs, and
- data from December 11 through December 31, 2021 were completely excluded from the calculations and from the PUFs.

C. Changes made starting with PBJ PUFs released in January 2022

For the PBJ PUFs released starting in January 2022 (data covering CY 2021 Q3), the exclusion criteria changed. These changes coincide with changes made to the exclusion rules for reporting nurse staffing levels on Nursing Home Care Compare and adding weekend nurse staffing measures to the website in January 2022.
- Providers submitting nursing data indicating very low nurse staffing (<1.5 hours per resident per day) are no longer excluded. Nursing homes submitting no nursing hours (i.e., 0 hours per resident per day) are still excluded.
- The same exclusion criteria applied to 7-day staffing are now also being applied for weekend staffing. Specifically, the following nursing homes are now excluded from the PUFs:
    - Providers submitting 0 nursing hours on weekends for the entire quarter are excluded, regardless of nursing hours submitted for weekdays.
    - Providers reporting total nurse staffing on weekends >12 hours per resident per day are excluded.
    - Providers reporting nurse aide staffing on weekends > 5.25 hours per resident per day are excluded.

D. Changes made starting with PBJ PUFs released in April 2019

The PBJ PUFs released prior to April 2019 (that is, the files covering the time periods from calendar 2017Q1 – 2018Q3) were constructed using a slightly different methodology. The two changes made at this time were:

- In earlier files, there was an additional exclusion criterion, which was that nursing homes with 5 or more days in the quarter with a non-zero census but no nursing hours (RN, LPN or CNA) were excluded.
- In earlier files, when staffing hours and census were aggregated (summed) across days in the quarter in order to calculate hours per resident per day for the purpose of applying the exclusion rules, only days with non-zero census and non-zero nursing hours were included. For 2018Q4 and later files, all days with non-zero census are included even if zero nursing hours are reported.

Taken together, these two changes allowed more nursing homes to be included in the PUF, while leading to a slight reduction in per resident per day nurse staffing levels. It should be noted that these changes affected the staffing levels ONLY of nursing homes that have any days with no reported nurse staffing, which is a very small number of nursing homes.