Enumeration 2024: What We Know and What We Wish We Knew About the Governmental Public Health Workforce in a COVID-19 Recovery Landscape

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See also Public Health Enumeration in 2024, pp. 698–725.

Objectives. To expand on previous enumerations by assessing the size and composition of the governmental public health workforce in the wake of the COVID-19 pandemic, identifying workforce trends, occupational distributions, and potential gaps in staffing.

Methods. From 2023 to 2024, using 2022 data in the United States, we conducted 3 distinct analyses: (1) estimating the total workforce size, (2) profiling occupation-specific distributions, and (3) evaluating the role and prevalence of public health nurses using novel data sources. For total counts, we used multiple imputation by chained equations to develop robust agency-level estimates and address missingness from multiple data sets.

Results. State and local public health agencies grew to approximately 239 000 staff in 2022, up from an estimated 206 500 in 2019. The largest occupation groups included office and administrative support workers (37 576) and public health or community health nurses (29 387). We found that 73 478 (1.8%) of registered nurses nationwide served in governmental public health roles.

Conclusions. The size of the workforce during the COVID-19 response has returned to 2008 levels although temporary staff largely constitute the increase.

Public Health Implications. An undersized workforce leaves the United States vulnerable to future disasters and current challenges. (*Am J Public Health*. 2025;115(5):707–715. https://doi.org/10.2105/AJPH.2024.307960)

For decades, public health practitioners, policymakers, and, at times, the public, have asked how many people work in public health. Yet the federal government has never systematically answered this question; enumerations of the governmental public health workforce have long been left to nonprofits, academics, and others in the field.[1] The reasons for this are many but ultimately reduce to (1) lack of licensure data for public health officials, and (2) disagreement on how to define the taxonomies of public health workers.[2] The public health domain has attempted to resolve these 2 issues since 1908, when the first "limited enumeration" of the field was undertaken.[1]

In 1908, only 1 organization's employees were counted; by 1933, data for 569 organizations were collected.[1] These first enumerations, as well as the successive enumerations until 1964,

were undertaken using a direct counting technique.[1] These were direct federal surveys that hand counted employees. As the field grew, continuing to use this method became impractical, and synthetic enumeration became the preferred method for counting employees.[1] Synthetic enumerations use questionnaire data from hundreds of agencies from multiple data sets to produce informed estimates. Relatively recent synthetic enumerations have estimated that the public health workforce declined by roughly 10% between 1980 and 2000, from about 500 000[3] to 448 254[4] individuals. It is possible that discrepancies in the taxonomies of public health worker definitions as well as actual decreases in the workforce contributed to this decline.[1] More recently, in 2012, Beck et al. conducted a synthetic enumeration and estimated that approximately 290 988 individuals worked in governmental public health.[5] They used 6 data sources, focusing on various hierarchical levels, such as local, state, and federal workers.[5]

Although such synthetic enumerations are more pragmatic for characterizing large workforces, they are associated with their own issues.[1] In their enumeration report, Beck et al. recommended developing a "consensus-driven taxonomy of occupations and disciplines."[5(p7)] Other scholars have made similar recommendations, such as defining public health's scope of work.[6] Scholars also warned against Band-Aid solutions to address decades of neglect of public health systems research.[6,7] More recently, Leider et al. argued that public health needed to reach a consensus on how to define its workforce.[8]

The latest effort, Enumeration 2024,[9] sought to build on recommendations for addressing data challenges. We aimed to expand on previous enumerations by providing 3 distinct enumeration efforts: (1) total counts enumeration of the full governmental public health workforce; (2) occupation-specific enumeration; and (3) using novel data, analyses, and enumeration of public health nurses (PHNs).

METHODS

In our total counts enumeration, we sought to estimate the number of staff and full-time equivalents (FTEs) in the local, state, and federal governmental public health workforce.

Total Counts and Occupational Profile

Owing to the lack of direct, census-style data on this subject and the excessive burden required to collect such data, we performed a synthetic enumeration[1] by triangulating primary data sources. We took state central office, regional office, and occasionally local estimates from the Association of State and Territorial Health Officials (ASTHO) Profile 2022 census.[10] We used FEDSCOPE[11] to estimate federal workforce size. And we used data from the National Association of County and City Health Officials (NACCHO) Profile survey 2022[12] to identify local staffing and FTE levels.

The NACCHO data representing the staffing and FTEs of local health departments were incomplete. Therefore, we used multiple imputation by chained equations,[13,14] treating NACCHO Profile 2022 employees and FTEs as the data of interest. To assist the imputation algorithm in developing robust agency-level estimates, we incorporated previous NACCHO Profile data, population metrics by year,[12,15,16] 2017 and 2021 Public Health Workforce Interests and Needs fielding data,[17,18] state-level governance structure data, and a member check on staffing reports in 2021 and 2022 from 18 State Associations of County and City Health Officials (e-mail communications, February–April 2024). We ran the multiple imputation algorithm in R version 4.3.3 (RStudio, Boston, MA). We pooled the resulting set of imputed data sets, averaged them to develop a single agency-level estimate, and then aggregated the estimates by state.

Differences in state governance structures necessitated tailored approaches to developing state-level employee estimates.[19] Once we developed statewide estimates, we sought to model potential uncertainty in data reporting or data collection. We chose an error allowance of 20%, the reported value for each of the potential data sources. We conducted a nonparametric resampling strategy,[20] taking 10 000 draws for each reported value, with the sample distribution being a standard normal distribution with a mean equal to the reported value and SD equal to 20% of the reported value. We matched and aggregated the 10 000 draws for each source by state (according to the state calculation) to develop a set of 10 000 state-level estimates, which we subsequently aggregated into regional and national estimates. The 95% credible interval for each estimate represents the 2.5th to 97.5th percentile range of this set.

We drew occupational profiles of prominent public health occupation groups from ASTHO and NACCHO profiles, but for 2019 to 2021, as the 2022 editions of each were not available at the occupation level of detail at the time of our analyses. We examined 16 occupation groups based on available

data and definitions used among these sources. For the NACCHO Profile, which had a 59% response rate,[12,18] we used survey weights, accounting for nonresponse to create census-level estimates for each occupation category. ASTHO has a complete response rate from their state health agencies, although item-based nonresponse does occur.[10]

Public Health Nursing

PHNs are the largest occupational group in the public health workforce and are thought to be the most likely to be "countable" through alternative sources of data (e.g., licensure data sets, surveys).[21] We chose to examine this important component of the workforce for the sake of better characterizing PHNs themselves and as a means to consider alternative sources of workforce data that reflect the governmental public health workforce. We examined data obtained from the National Council of State Boards of Nursing (NCSBN) 2022 National Nursing Workforce Survey of Registered Nurses. These data reflected 2846 de-identified nurse respondents from 45 states and included information regarding their demographics, work setting, and primary specialty area of practice.

We used the literature[22,23] and expert review to identify the NCSBN items that would most closely define PHNs working in governmental public health settings. Our process resulted in a decision tree, using PHN "primary setting" and "primary specialty" variables that grouped respondents into a "broad government PHN" group and a "restricted government PHN" group, based on the setting and specialty they indicated. The broad government PHN group included all respondents indicating that their work setting was public health, school health, or correctional health, as we determined that these were likely government settings.

We combined these settings with respondents indicating their work was primarily in 1 of the 19 specialties we identified in the data set that could arguably include public health nursing work (e.g., family health, pediatrics, adult health). We devised the restricted government PHN group as a more narrowly defined set of specialties in the NCSBN data that consisted of public health, community health, maternal and child health, school health, and infectious diseases. Based on the literature[22,23] and expert review, we considered these to be the specialties most closely aligned with population-focused public health nursing practice. Applying the population weights provided in the data set, we calculated the total number of nurses in each of the setting and specialty combinations as well as the total count in each of the 2 groups.

RESULTS

State, local, and federal public health workforce estimates revealed notable trends in overall staffing levels and occupational composition.

Total Counts and Occupational Profiles

State and local public health agencies grew to approximately 239 000 staff in 2022, on par with total staffing in 2008. However, after we adjusted for population growth, state and local staffing totals decreased in the intervening period. Data indicated that local and regional employees made up slightly more than 70% of the total nonfederal workforce in 2022, with state central office employees constituting the remaining 30%.

Our analysis of federal staffing data showed that up to 74 federal entities (departments and their subunits) performed some public health activities. With respect to the federal workforce, approximately 14 000 staff were employed by the Centers for Disease Control and Prevention or the Health Resources and Services Administration, excluding contractors. There are many additional federal agencies and subunits that perform public health functions or services to varying degrees or that have public health responsibilities. Depending on the extent that these entities are included in federal counts, there are between 2 and 74 federal entities employing 14 000 (2 agencies) and 237 000 (74 agencies) staff, excluding contractors.

The distribution of state and local public health departments varies by state and region (Figure 1; Figures A and B, available as a supplement to the online version of this article at http://www.ajph.org). Staff size largely aligns by size of population served, with swaths of the coasts and population centers in Texas, Florida, New York, and California having the largest number of employees associated with those geographies. State central office estimates have somewhat more variability than local estimates, after accounting for the population size served. The number of public health workers varied regionally from 59 per 100 000 population to 97 per 100 000. Per 100 000 population, the median was 62 and the mean was 151. In absolute terms, the estimated median local health departments staff size was 20 (mean = 66) across the United States. A quarter of local health departments had an estimated 12 or

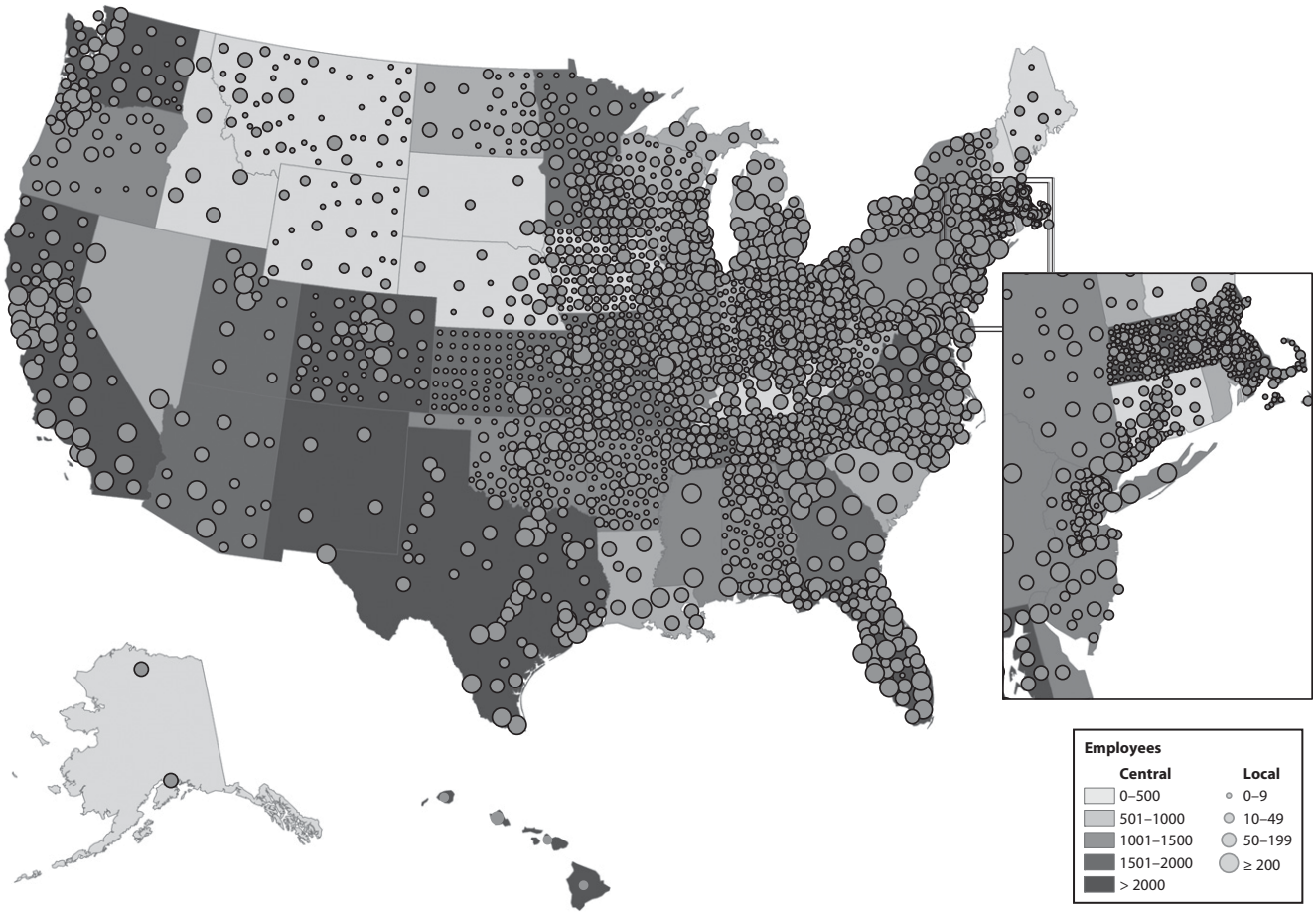

FIGURE 1— Public Health Employees in State Central Offices Versus Local Offices: United States, 2022

Note. Not pictured are US territories, freely associated states, and Tribal health organizations.

fewer staff and 11 or fewer FTEs. In absolute terms, the state health agency central office median was 1091, and the mean was 1328. A quarter of state health agency central offices had fewer than 470 staff, and a quarter had more than 1500.

Estimates of the state and local workforce in specific occupation groups can be found in Table 1. Among the occupation groups represented, the largest occupation groups included office and administrative support workers (37 576), public health or community health nurses (29 387), financial and operations business support workers (21 631), and environmental health workers (20 621). The smallest occupation groups were emergency preparedness and management workers (3468), information systems manager and information technology specialists (3009), oral health professionals (2551), public health physicians and other clinicians (2045), and public information specialists (616). Some occupations had larger total workforces at the state level (e.g., epidemiologists and statisticians, business support–financial and operations), whereas others had larger workforces at the local level (e.g., health educators, office and administrative support, environmental health workers).

Public Health Nursing

In our enumeration of the public health nursing workforce using NCSBN data and our 2 definitions of broad and restricted government PHNs, we found that 73 478 (1.8%) of the NCSBN's registered nurses fit our restricted government PHN definition out of the 4 047 872 registered nurses in NCSBN's weighted sample. Even when we expanded on this more narrowly defined set of restricted specialties most closely aligned with population-focused public health nursing practice and considered the broad government PHN definition, the broad government PHNs still made

TABLE 1— State and Local Full-Time Equivalent (FTE) Counts by Occupation Group: United States, 2022

Occupation Title	State FTEs (%)	Local FTEs (%)	Total FTEs
Office and administrative support	14 456 (38)	23 121 (62)	37 576
Public/community health nurse	8150 (28)	21 237 (72)	29 387
Business support—financial and operations	12 728 (59)	8 903 (41)	21 631
Environmental health worker	6 105 (30)	14 516 (70)	20 621
Behavioral health professional	9 033 (58)	6 669 (43)	15 702
Health educator	2 724 (27)	7 475 (73)	10 199
Agency leadership	1 668 (22)	5 792 (78)	7 460
Epidemiologists and statisticians	4 341 (60)	2 876 (40)	7 217
Nutritionist or dietitian	1 750 (25)	5 108 (75)	6 857
Laboratory workers	4 200 (67)	2 092 (33)	6 292
Community health worker	NA	5 564 (100)	5 564
Emergency preparedness/management worker	1 196 (34)	2 272 (66)	3 468
Information systems manager/information technology specialist	849 (28)	2 161 (72)	3 009
Oral health professional	347 (14)	2 203 (86)	2 551
Public health physicians and other clinicians	760 (37)	1 285 (63)	2 045
Public information specialist	NA	616 (100)	616

Note. NA = not available.

up only 147 957 (3.7%) of the total registered nurse workforce in this NCSBN data set. The preponderance of the PHNs in the restricted group indicated that they were working in a public health setting and described themselves as having a public health specialty (n = 35 678; 49%). The next largest segment of those in this restricted group were registered nurses who indicated that they worked in a school health setting and had a specialty in school health (n = 31 340; 43%).

Similar to the distributions we have described regarding our total counts and occupational profiles, our regional comparisons of PHNs using the NCSBN data demonstrated wide levels of variation by US Department of Health and Human Services region. This variation was especially apparent in the percentage of PHNs in the restricted government PHN group who indicated that they worked in public health settings and had a public health specialty versus those working in school health settings who had a school health specialty (Table 2).

TABLE 2— Percentage of Restricted Governmental Public Health Nurses by Health and Human Services Region, Overall and by Major Setting and Specialty: United States, 2022

US Department of Health and Human Services Region	% Restricted Governmental Public Health Nurses			
	Overall	Public Health Setting and Specialty	School Health Setting and Specialty	Other Settings and Specialties
1	1.6	0.7	0.7	0.2
2	2.6	0.6	1.9	0.1
3	1.7	0.8	0.6	0.3
4	1.5	0.7	0.6	0.1
5	1.6	0.9	0.6	0.1
6	1.7	0.5	1.0	0.2
7	1.9	0.9	0.8	0.3
8	2.1	1.2	0.6	0.3
9	2.2	1.7	0.5	0.1
10	1.6	1.0	0.4	0.2

DISCUSSION

Enumeration is essential if we are to gain an accurate understanding of the public health workforce. A count of public health workers facilitates knowledge of public health capacity and helps systems researchers understand trends and gaps in the workforce. This knowledge can then be translated into policy so that resources and funding can be triaged appropriately.

We estimated that there were approximately 239 000 state and local governmental public health workers as of 2022. In addition, approximately 14 000 individuals worked at the Centers for Disease Control and Prevention or the Health Resources and Services Administration. There are potentially hundreds of thousands more federal public health workers depending on which agencies are included in that count. The estimate of 239 000 is up from an estimated 206 500 in 2019. The 3-year increase amounted to 15.6%, placing staffing levels on par with pre-Great Recession numbers in 2008.[24]

Furthermore, the total count of 239 000 has increased since the 2012 enumeration,[5] but the increase is not enough to support the corresponding population increase during that time, let alone the rising needs of the population. The field is now approximately the same size it was before the onset of the Great Recession, which affected governmental workforces especially between 2010 and 2013.[24] Furthermore, our estimated total count is still less than half of the estimated 500 000 public health workers in 1980,[3] despite the vast increase in the US population in the past 40 years: in 1980, the US population was 226 545 805; in 2020, it had increased by 46% to 331 449 281.[25]

Although our estimates indicate that the public health field has gained workers in the past decade, a large proportion of workers are considering leaving the public health workforce in the near future, for retirement and other reasons.[26] Thus, attention to recruitment, onboarding, and retention must be ongoing, and generating related evidence regarding these practices should be a focus for public health systems researchers. More generally, it is worth noting that agencies were able to increase staffing before, during, and after the COVID-19 pandemic because of American Rescue Plan Act of 2021 funding (now expired) and the Public Health Infrastructure Grant program (a 1-time, 5-year award expiring in 2027); it is unclear whether monies from this program will be sustained.

It is important to note that this increase in staffing in state health agency central offices, alongside increases in staffing in local and regional health departments, was measured during the COVID-19 response and includes a substantial number of part-time or temporary workers. So although current staffing reflects an effort to fortify the nation's health defenses and amplify the public health system's capacity for service delivery and emergency readiness in the face of the COVID-19 pandemic, it is less clear whether these staffing levels will continue—and what the public health consequences of an again-reduced workforce might be.

The variation we identified in the distribution of the workforce suggests the need for a strategic and focused approach in policy development and resource allocation. As the population ages, changes, and migrates, the number of public health workers should be viewed not merely as a measure of potential capacity but also as a key performance indicator for future planning.

Our enumeration of occupation groups demonstrates the difference in size of each key public health occupation and the difference in their distribution between the state and local levels. In the PHN enumeration effort specifically, we found that PHNs made up less than 2% of the number of registered nurses in the country. Furthermore, about 90% of these PHNs work in either public health or school health.

It is worth highlighting the importance of a whole workforce enumeration when considering the needs of future governmental public health enterprises. The field is at an inflection point in a COVID-19 recovery environment: questions have shifted from how many staff do we have? to how many staff do we need? Before the COVID-19 pandemic, at least 80 000 additional staff were needed to ensure the delivery of the Foundational Public Health Services.[24] In a COVID-19 recovery environment, it is challenging to determine how many staff the field might need until we know how many we have.

In addition to the 14 000 federal and 240 000 state and local workforces, open questions remain about the Tribal and territorial workforces. These agencies often look different from state and local health departments, both in service mix and revenue streams. Available data suggest that at least 5600 staff work in territories and freely associated states as of 2022 (with missing data from 1 territory).[10] A Tribal workforce enumeration has not been conducted, but the most recently available information suggests that Tribes with Tribal Health Organizations have a median of 5 staff (mean = 13.4) working at agencies, with substantial variability in staffing totals.[27] To fully understand the US governmental public health

workforce, robust data collection efforts should be supported across all settings—federal, state, local, Tribal, and territorial.

Limitations

Our enumeration is limited in certain aspects. The COVID-19 pandemic affected data collection, for example, response rates of the surveys used as our main data sources. The pandemic also resulted in fluctuating workforce numbers, as temporary workers were brought in to boost the response and then let go as funding streams ended.

We attempted to include contract workers in this enumeration, but we may have undercounted them if agencies underreported their contractual staff or, as in FEDSCOPE, contractors were excluded from available data. We also attempted to use licensure-related data from individual states to enumerate the number of PHNs, but we were able to obtain these data for only 4 states. Although we used FEDSCOPE data to count federal public health workers, there is no standardized definition of federal public health worker, so we created estimates of workers at various "tiers" of agencies ranked based on their relatedness to public health. Future enumeration work could more directly describe the US Public Health Service's workforce. These 6000 or more officers are represented in the federal analysis but could be described more precisely with other federal data.

Furthermore, the data we used were collected in 2021 and 2022; much has changed since they were collected. The occupation groups we identified were based on the definitions used by the available data sets. Occupation groups available in these data sets were not always defined in the same way, and occupations in public health are evolving, making estimates over time difficult to compare.

An additional major limitation of previous enumerations is that territorial and Tribal public health workers tend to not be counted.[9] This contributes to the "data genocide" and historical invisibility of Indigenous peoples.[28] There are 574 federally recognized Tribes in the United States, as well as many state-recognized Tribes in addition to unrecognized Tribal Nations. Furthermore, the public health work done in the US territories—American Samoa, Guam, the Commonwealth of the Northern Mariana Islands, Puerto Rico, and the US Virgin Islands—and freely associated states—the Federated States of Micronesia, the Republic of the Marshall Islands, and the Republic of Palau—is significant, and their workers need to be counted to give the discipline a more accurate understanding of the infrastructure in place.[4] Although we included estimates from the Tribes and territories from other sources, future enumerations would do well to more directly include these organizations in a common count.

Conclusions

This 2024 enumeration had the advantage of considering the recommendations of scholars who conducted previous enumerations,[4] and we continue to advocate similar recommendations. In particular, we call for more funding for reporting workforce numbers for public health agencies. Furthermore, we strongly advise that public health systems researchers adopt a standard taxonomy of public health workers, including a definition of what is considered public health work.

This enumeration serves as a baseline count of public health workers during the COVID-19 response. Part of this response involved focusing federal funding on public health infrastructure, including the workforce.[29] However, funding for these endeavors will expire in the near future, and there is no guarantee that additional funding will be authorized. Further enumeration in future years would enable comparisons to this baseline COVID-19 era estimate and facilitate the evaluation of whether recent funds allocated to the public health infrastructure contributed to stable or ongoing increases in public health staffing.

Evaluating the sufficiency of staffing and FTE growth is a separate matter from enumeration and requires consideration of the evolving and emerging demands on the public health system, the impact of domestic and global health challenges, and the specific needs of local and regional communities. Although the overall increase in workers is a positive step toward strengthening public health infrastructure, continuous assessment and strategic planning are essential with a goal to ensure that the public health system is resilient, responsive, and equipped to protect and promote the health of all communities against both current and future health threats.

Public Health Implications

As of 2022, the governmental public health workforce has returned to staffing levels last seen during the Great Recession. Approximately 240 000 staff are employed at the state and local levels—although a large proportion of new positions are temporary, term limited, or contractual. It is not clear whether increased staffing levels will remain as federal funds contract during COVID-19 recovery. AJPH

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to disclose.

HUMAN PARTICIPANT PROTECTION

No protocol approval was necessary because the project involved only a secondary data analysis of publicly available data.

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