

2022

The Correlation Between Staffing Hours and Nursing Home Resident Fall Rate

Nduka Ikpo Eke
Walden University

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Walden University

College of Management and Human Potential

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Nduka Ikpo Eke

has been found to be complete and satisfactory in all respects,
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Walden University

2022

Abstract

The Correlation Between Staffing Hours and Nursing Home Resident Fall Rate

by

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MBA, Regis University, 2013

B. Eng., Enugu State University of Technology, 1993

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Healthcare Administration

Walden University

August 2022

Abstract

Healthcare administrators and researchers have had the burden of determining best practice protocols that minimize falls among older adults living in nursing homes for several years. Several studies have investigated, and identified intrinsic and extrinsic factors that lead to falls among other adults and made recommendations along the lines of their findings. However, researchers are yet to establish the impact of staffing hours on nursing home resident fall rate. The purpose of this study was to determine the correlation if any, between nursing home residents fall rate and the staffing hours they receive daily from certified nursing assistants (CNAs), licensed practical nurses (LPNs), and registered nurses (RNs). This correlational study was based on the systems theory framework. Using multiple regression analysis, data points containing the U.S. averages of nursing homes including rehabilitation services obtained from the CMS database were analyzed. The results of these analyses led to three key findings: (a) insufficient evidence to support the claim of linear correlation between nursing home residents fall rate and CNA staffing hours received per day, (b) there was a linear correlation between nursing home resident fall rate and LPN staffing hours received per day, and (c) there was a linear correlation between nursing home resident fall rate and RN staffing hours received per day. The results of this study may be used by nursing home administrators for positive social change by increasing their staffing of LPNs and RNs to provide the knowledge base required to properly guide the CNAs in providing quality care.

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Dedication

I dedicate this work to my loving wife, Grace, for her support and encouragement over the years; to my wonderful children, David, Nneoma, and Nwanne for their understanding and sacrifices; to the memory of my father, Mr. I. U. Eke who recognized the value of education and sponsored his first son to come from Nigeria to the United States (U.S.) in the 1950s to obtain a Ph.D. in Economics; to my mum and siblings who sacrificed their pleasure to help raise me from age 3 after the death of my dad.

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Section 1: Foundation of the Study and Literature Review

Fall rate of nursing home residents is increasingly becoming a reason for concern within the United States (U.S.) healthcare system. As high as the fall rate may be, multiple studies show that it is only a fraction of the actual total number of nursing home falls that are truly reported. Are there any significant roles that the nursing home caregivers could play in fall rate reduction? Is there any correlation between staffing hours and nursing home resident fall? Healthcare administrators must determine the best strategies for reducing falls among nursing home residents. Falls among older adults resident in nursing homes pose far greater danger than we know.

The U.S. Centers for Disease Control and Prevention (CDC) found that a nursing home with 100 beds reports 100 to 200 falls over a period of 12 months, with more falls left unreported. The CDC identified falls as the leading cause of fatal and nonfatal injuries among older people (CDC, 2020). Falls among adults 65 and older are common, costly, and preventable.

Available studies show that people who fall once have higher possibilities of falling again thereby increasing their fall risk factor. The CDC estimated that on average, about 36 million older adults fall each year and that these falls result in more than 32,000 deaths. According to the report, about 3 million older adults visit emergency rooms each year for fall related injuries. The report further shows that approximately one out of every five falls results in a broken bone or head injury, and that at least 300,000 older people are hospitalized each year for hip fractures resulting from falls (CDC, 2020). Falls have been identified as the leading cause of hospitalization among older adults (Huynh et al.,

2021). Falls are the leading cause of both fatal and nonfatal injuries among older adults (Burns et al., 2016).

Yearly costs associated with nonfatal falls among older adults run as high as \$50 billion, while costs associated with fatal falls run as high as \$75 billion (CDC, 2020). According to a study conducted by Burns et al. (2016), the total costs of fall increase with age and are higher among women. Falls among older adults come with very high price tag and trauma. There is, therefore, sufficient evidence that falls in nursing homes need to be properly studied in order to minimize or mitigate against them.

Healthcare administrators have limited options available to them as they strive to minimize or prevent falls. The results of this study show the effect of staffing hours on nursing home resident fall rate. It shows correlation between staffing hours and resident fall rate in some instances and not, in other instances. As such, increased staffing hours could be an effective approach to reducing resident fall rate. According to Haddad et al. (2018), at least 53% of older adults use at least one medication whose adverse effect is linked to fall. Could more staffing hours result in closer monitoring of the older adults who take such medications, thereby resulting in less falls? This study investigates the consequences of increased resident monitoring and supervision by caregivers.

The problem addressed by this study, the purpose of the study, research questions, theoretical framework, and nature of the study are highlighted below. In addition, the overview of the research strategy, and a review of recent literature on related topics are discussed. This study provides a deeper understanding of the implications of falls among

residents of nursing homes and suggests ways of reducing falls among older adults resident in nursing homes.

Problem Statement

Falls among older adults impact families as well as the U.S. healthcare system. Year after year, the system records a higher percentage of falls and more expenditures on fall related injuries and fatalities. Despite the high fall rates, a study conducted by Center for Medicare Advocacy (2020) still found that fall rates have been underreported and that many older adult falls go unreported by the care giving agencies. The implication of the findings by Center for Medicare Advocacy is that the U.S. healthcare system has greater problems resulting from nursing home resident falls than is known. Nursing home resident fall reduction is therefore an emergency that must be given every attention it deserves.

According to a study conducted by Matarese & Iyziku (2016), fall risk is one of the most frequent adverse events in hospitals. Unfortunately, even though the study identified intrinsic and extrinsic factors associated with falls among older adults, it concluded that there was no single tool available to identify all patients at risk of fall. However, the study showed that cases of fall are more frequent in nursing homes because a vast majority of the residents of nursing homes are frail.

Frail adults have greater chances of falling. Cheng & Chang (2017) performed a study in which they studied the relationship between the different stages of frailty and fall incidence rates of older adults and they found that frail adults have greater risk of fall. They determined that frailty is a crucial healthcare concern among older adults resident in

nursing homes. The operational problem faced by nursing home healthcare administrators is developing administrative protocols that reduce falls among residents.

There is limited information on how staffing hours in a nursing home on daily basis impact upon residents' chances of falling. Addressing this gap can result in knowledge regarding the relationship between staffing hours and nursing home residents fall rate. This understanding can effect scheduling, quality of care, and resident satisfaction. Overall, it could reduce operational costs by eliminating or reducing litigation charges while increasing income because of increased resident satisfaction and population.

Purpose of the Study

Identifying ways to decrease falls in nursing homes impacts not only the wellbeing of frail older adults in our nursing homes but also could reduce economic drain on the U.S. healthcare system and thus it is essential to identify best practice protocols for reducing falls. According to World Health Organization (WHO, 2021), a fall occurs when a person unintentionally comes to rest on the ground or floor or other lower level. The purpose of this study was to identify a relationship, if any, between staffing hours received by the residents of the nursing homes and their fall rates. To execute the purpose statement, the study evaluated the relationship between the dependent variable (DV), resident daily fall rate, and the three independent variables (IV) of certified nurses assistant (CNA) staffing hours per resident per day, licensed practical nurse (LPN) staffing hours per resident per day, and registered nurse (RN) staffing hours per resident per day. Identifying the relationship between the fall rates and staffing hours can guide

healthcare administrators in making scheduling decisions that reduce nursing home resident falls.

Research Questions and Hypotheses

Research Question (RQ1): Is there sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and CNA staffing hours received per day?

H_01 : There is not sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and CNA staffing hours received per day.

H_{a1} : There is sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and CNA staffing hours received per day.

Research Question (RQ2): Is there sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and LPN staffing hours received per day?

H_02 : There is not sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and LPN staffing hours received per day?

H_{a2} : There is sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and LPN staffing hours received per day?

Research Question (RQ3): Is there sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and RN staffing hours received per day?

H_03 : There is not sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and RN staffing hours received per day?

H_a3 : There is sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and RN staffing hours received per day?

Theoretical Foundation for the Study

The framework of this quantitative study was premised on the concept of systems theory. Systems theory is the concept of interdependence and interrelatedness of cohesive groups. It identifies the entire care system as an interconnected single unit with different component parts working together to accomplish a common objective (Real et al., 2018). Systems theory communalizes organization's goals and objectives. It makes providing best quality care that reduces the number of falls among the residents of a nursing home a responsibility that requires the working together of the different care providers in a facility.

Nursing homes aim to help their residents live longer and better by providing them with the care and support services that meet and exceed basic care standards. The wellbeing of the residents of nursing homes depends on the collective effort of all care givers. It is the goal of every nursing home to always provide the best quality

care/support services to their residents. As a result, ensuring that falls among residents are reduced to the barest minimum is a shared responsibility of all caregivers within the facility. Systems theory demands that all caregivers must always, see the interconnectedness of their respective roles in accomplishing organizational goals. RNs, LPNs, and CNAs who work in nursing homes have active roles to play in making sure that resident fall rates are reduced to the barest minimum.

Nature of the Study

The design of this study is correlational quantitative research. It was based on a secondary data that was not originally collected for this research. The dataset used to answer the research questions was pulled from state-level U.S. averages of nursing homes including rehabilitation services dataset in the CMS database. A correlational study design using multiple regression analysis was used to explore the relationship, if any, that existed between the variables.

This design allows for observation and statistical analysis only without the ability to determine cause and effect. This study concentrated on finding relationship, if any, between the nursing hours provided by RNs, LPNs, and CNAs to the residents of nursing homes and the rate of fall of the residents. In other words, the study attempted to show if the amount of care time provided by the different caregivers had any relationship with the rate of residents fall.

The IVs were RN staffing hours per resident per day, LPN staffing hours per resident per day, and CNA staffing hours per resident per day. The DV was the rate of fall of long stay residents experiencing one or more falls with major injury. Finding a

correlational relationship in this quantitative analysis could influence the way caregivers are scheduled and the amount of time each nursing home resident receives from their caregivers on daily basis.

Literature Review Search Strategy

Multiple databases from the Walden University Library were used in conducting the literature review of this study. Specifically, ProQuest Health and Medical Collection database contained most of the articles and journals used for this study. The keywords and phrases searched in finding the relevant articles were *falls, fall reduction, nursing homes, Nursing Aide Staffing Hours, LPN Staffing Hours, and RN Staffing Hours*. The literature review was based on peer-reviewed articles and journals published within the last 5 years. The study design of all the articles reviewed were similar, current, and relevant to this study. They provided context and showed gap in literature that this study attempted to fill. The following sections outline and summarize literature from prior studies.

Literature Review

This section is a brief overview of the variables that have been examined in this study. It shows the necessary background information and broad definitions of terms used in this research. Subsequent sections contain more detailed definitions of the variables that have been more closely examined. Also, prior studies done on the topic of this study, or related topics were briefly examined in this literature review. The examination highlights prior research processes and results or conclusions drawn. It also highlights the gap in the literature that this study aimed to fill.

Falls in Older Adults

Falls are a major concern among older adults living in nursing homes and assisted living communities. It is projected that approximately 30 to 40% of older adults who are 65 or older fall at least once in a year (Coughlin et al., 2019). The same study found that there were 3 million emergency room visits resulting from older adult falls that cost the U.S. healthcare system approximately \$43 billion in 2015 alone. Coughlin et al. (2019) projected that healthcare expenditures resulting from older adult falls could reach \$100 billion by the year 2030. The high costs associated with older adult falls make it a major problem that deserves the attention of healthcare administrators and all healthcare providers.

According to Huynh et al. (2020), falls are the leading cause of death among older adults who are 65 years or more. Approximately 30,000 older adults aged 65 and above died from fall related injuries in the United States in 2016 (CDC, 2018). There are possibilities that the actual number of deaths could be higher since this number is based on the reported incidents only. Cheng & Chang (2017) identified frailty in older adults as a major cause of fall. People get frailer as they grow older and aging society is susceptible to higher fall rates and the ensuing consequences.

Falls and Gender

Falls have remained a major cause of unintentional injury among older adults all over the world. Older men and women alike have suffered the life-altering impact of falls. Unfortunately, there are limited studies that have been performed to study whether correlations exist between sex and fall rates. However, Gale et al. (2018) performed a

study which showed that women have a higher risk of fall than men. The result of the study further crystallized the need for the customization of fall prevention strategies by nursing home administrators. While not necessarily suggesting fall prevention measures that are gender based, it clearly shows that a one-size-fits-all approach for fall prevention in nursing homes and healthcare facilities is ineffective.

Nursing Homes

Nursing homes are residential facilities where the elderly or disabled people are housed for the purposes of receiving the care and support +required for daily living. Nursing homes are also known as skilled nursing facilities or long-term care facilities. States create the regulatory bodies and agencies that develop guidelines for the operation of nursing homes in their respective states. These regulatory guidelines spell out how the homes are expected to operate and what responsibilities are required of the residents and their relations or representatives. Depending on the health condition of the resident, the nursing home could be a short-term or long-term residence of the resident member (NIA, 2017). RNs, LPNs, and CNAs provide care for the residents. The quality of life of the residents of nursing homes is correlated with the quality of care provided by the RNs, LPNs, and CNAs employed by the nursing home. Decreasing falls in nursing home facilities is a shared responsibility that all the employees must effectively play their roles to achieve.

Registered Nurses (RNs)

RNs are caregivers who have earned the license to practice nursing in any given state, province, or country. They administer hands-on patient care in hospitals, medical

offices, nursing homes, or any other facility designed for the purpose of providing medical care (Nurses, 2020). RNs work in nursing homes at management and supervisory levels. RNs in nursing homes are care policy makers. They develop the organization's policies and procedures. It is also their responsibility to ensure that other caregivers within the organization follow organization's policies and procedures. Among many other things, nursing homes have fall prevention policies and procedures that the caregiving staff are expected to follow in order to mitigate against it.

RNs in nursing homes have the responsibility of developing and ensuring the implementation of safe drug use policies. The safe and appropriate use of medicines is increasingly becoming a major concern around the world (Johansson-Pajala et al., 2016). According to the CDC (2021), 70,630 Americans died of drug overdose in 2019. The elderly and older adults who often have multiple prescriptions due to life circumstances are always at greater risks of fall.

RNs in nursing homes play the role of pharmacovigilance personnel. Pharmacovigilance, the science and activities of detecting, assessing, understanding, and preventing adverse effects or any other drug-related problems among the population is of great importance especially in nursing homes (Johansson-Pajala et al., 2016). RNs have the responsibility of catching any incidences of polypharmacy. Polypharmacy, a situation whereby multiple drugs are simultaneously used to treat a single ailment, is prevalent among the elderly. RNs who work in nursing homes have the responsibility of handling pharmaceuticals to ensure the safety of residents. They have the ability to detect any drug

related problems such as adverse reactions and are trained on remedy steps (Johansson-Pajala et al., 2016).

Licensed Practical Nurses (LPNs)

LPNs are persons who have been duly trained and licensed to provide routine care for the sick. LPNs are mostly licensed by the state. They undergo shorter training periods than registered nurses. LPNs in nursing homes are care coordinators and they supervise the activities of the CNAs. LPNs work under the RNs to ensure that residents get the best care they need.

LPNs' training equips them to be capable of providing a reasonable percentage of the services RNs provide in a nursing home. They, like RNs, manage residents' medications. They work closely with the RNs in providing pharmacovigilance and in the control of polypharmacy. LPNs are hands-on caregivers, and it is their responsibility to ensure that residents of a nursing home receive the best quality care the facility could offer including resident fall reduction. LPNs guide the CNAs in implementing the organization's policies.

Certified Nursing Assistants (CNAs)

CNAs are people who have been trained and certified to provide assistance with activities of daily living and healthcare needs under the direct supervision of RNs or LPNs for patients. CNAs are also often referred to as Nursing Assistants (NAs), Patient Care Assistants (PCAs), or Nurse's Aids (NAs). CNAs provide 80% to 90% of the direct care required by nursing home residents and they spend three to four times more time

with the residents than RNs and LPNs (Halifax et al., 2018). Accordingly, CNAs make up approximately 80% of the nursing home workforce.

According to Halifax et al. (2018), some evidence exists that CNAs have the potential to understand residents' pain and relate better with residents than LPNs and RNs. This is because CNAs develop a level of emotional attachment with the residents that help them to detect residents' behavioral changes and moods more readily (Halifax et al., 2018). This conclusion finds justification from the fact that CNAs spend more time with residents than any other group of caregivers in the nursing home. The study suggests that CNAs' closeness with residents places them in a better position to know residents that have higher fall risks. It concludes that fall risk reduction requires a closer monitoring of the patients by the CNAs.

Previous Research

Gale et al. (2018), performed a study in which they investigated the risk factors for incident falls in older men and women based on the English longitudinal study of ageing. They determined that falls are a major cause of disability and death in older people and that it also comes with a high economic cost and burden. The study had 3298 participants with ages 60 and above. The study found that fear of fall among the elderly leads to activity restriction and decline in physical activity and function. Reduced physical activity accelerates ageing and negatively impacts upon quality of life.

The study performed by Gale et al. (2018), suggested that there may be some sex-specific factors associated with risks of fall. While suggesting further investigation by other cohorts, the study concluded that risk factors for fall differ between men and

women. It concluded that women have a higher risk of fall than men. This study was performed using the Poisson regression with robust variance estimation to derive relative risks (RR) for the correlation between baseline characteristics and incident falls. The study controlled for history of falls while older age was the only factor associated with increased risk of incident falls in both sexes. The results of this study provided more insight into the risks of fall for both sexes. It showed the need for nursing home caregivers to pay closer attention to the female residents as they have a higher risk of fall than their male counterparts.

A study done by Gray-Miceli et al. (2016) identified protecting patients from harm due to fall as a public health priority. According to the study, between 50% and 75% of the 1.4 million nursing home residents fall every year and they sustain more serious complications with 10% to 25% of the falls resulting in fracture injuries and lacerations. The study demonstrated that protecting older adults living in nursing homes from fall was the responsibility of the caregivers. Understanding why a fall occurred is paramount in developing an effective prevention plan.

Gray-Miceli et al. (2016) attempted to ascertain how knowledgeable the registered nurses and licensed practical nurses who work in nursing homes are about fall reduction strategies. The study used a sample size of 47 nurses selected from 3 nursing homes. They administered 8 validated vignettes (Environment, Acute medical, Chronic medical, Behavior, Unsafe environment, Medication, Environment and poor judgment, Multifactorial) representing multifactorial fall causes to the selected nurses. For lack of enough statistical power to compare RNs and LPNs on individual categories, the study

used ANOVA test for the determination while adjusting for nursing home type and educational level. The study found a statistically significant relationship between licensure (RN vs LPN) with RNs achieving better results than LPNs. The result of this study significantly showed that fall reduction is a shared responsibility of the nursing homes and its caregivers. It showed that the level of training and licensure of caregivers play significant roles in their capacity to detect and prevent falls among the older adults living in nursing homes.

Psychotropic medication could be a contributory factor in falls among older adults with dementia. Falls are a major cause of injury, disability, and death among the elderly with dementia who are 2 to 3 times more likely to fall as a result of gait and postural impairment, medications, neurocardiovascular instability, and environment. A study conducted by Cadwell et al. (2016) investigated the role of the use of psychotropic medication in fall among residents with dementia. The study found that an extensive body of evidence that the use of psychotropic medications increases the risk of fall among the elderly with dementia exists. It showed that psychotropic medications such as antipsychotics, antidepressants, mood stabilizers, and sedative/hypnotics increase the risk of fall among the elderly with dementia.

The study was based on a 33-bed Memory Care Unit (MCU). Twenty-seven residents, 92% women and 8% men participated in the 4-month trial. Prescribers used the 1A-ADAPT prescriber guide to tailor dosage reduction or discontinuation of the psychotropic medications. Results were monitored for a period of 3 months only. The result found a 10% reduction from baseline in the total percentage of psychotropic

medications used among the trial participants. However, despite the reduction in psychotropic medication use, the MCU failed to achieve a reduction in participant's fall compared with baseline for the period. Cadwell et al. (2016) recommended a further analysis to determine how psychotropic medications relate to falls among the elderly with dementia. This study relates to the current study because a good knowledge of the effect of medications will equip the caregivers with the right care approach each resident requires and aid in fall reduction.

Colon-Emeric et al. (2017) performed a fall prevention study in which they investigated the impact of bedrails on fall prevention in nursing homes. The use of bedrails for fall prevention in elderly residents has been controversial with some proponents and opponents to its role in decreasing or increasing falls in nursing homes. The study was based on a systematic review of academic databases. To eliminate bias in selecting the articles for review, the authors used the 2018 Mixed Methods Appraisal Tool (MMAT) to score each peer-reviewed record.

The study found that using alternative fall prevention measures, and bedrails are either beneficial, harmful, or do not influence falls. The use of bedrails or nonuse of it made no significant difference in fall prevention. The study recommended a further investigation of the ambiguity that exists regarding fall frequencies and bedrail use without using other fall prevention strategies. This study is relevant to the current study in a number of ways. It highlights the role of healthcare operations in fall reduction among nursing home residents and recommends a further investigation.

Another study was conducted by Coughlin et al. (2019) in which they evaluated the use of different fall prevention and risk assessment tools and implementation strategies in fall reduction among the older adults living in assisted living homes. The study was based on data obtained from the Wisconsin Coalition for Collaborative Excellence in Assisted Living (WCCEAL) which represented 26% of the state licensed assisted living beds. The study used a 13-item fall prevention questionnaire approach. The questions were designed to gauge the level of consistency in fall prevention and awareness across the participating assisted living homes.

The study found that many of the assisted living homes lacked structure and consistency in their fall prevention approach. It also found that periodic fall risk assessment of residents was not implemented in many of the assisted living homes even on admission in some cases. The results of this study revealed the need for assisted living homes and nursing homes to put structures in place for caregivers to follow in providing care that mitigates against falls among the older adult residents. Systems theory is better applied in nursing homes when caregivers know their roles and responsibilities in the chain of care.

Boscart et al. (2018) conducted a study in which they attempted to see if a correlation exists between staffing hours and the quality of care received by the residents of Long-Term Care homes (LTCs). The cross-sectional study was based on data collected from administrative records and resident assessments in the selected homes. In all, 11 homes, 69 Registered Nurses (RNs), 183 Licensed Practical Nurses (LPNs), 858 Certified Nursing Assistants (CNAs), and 2173 residents were selected for the study. The study

used multilevel regression analysis model to estimate the association between staffing characteristics and quality of care.

Boscart et al. (2018) found that CNAs provide 76.5% of the direct care in LTCs and that nursing assistant care hours per resident per day was significantly correlated with higher quality of resident care. The result of this study showed that care hours per day per resident influences the quality of care. This study forms a good backdrop against which to conduct a new study that investigates the correlation between staffing hours and nursing home resident fall rate. A low fall rate is a characteristic of quality care.

Another study conducted by Cheng & Chang (2017) investigated the relationship between different frailty stages and fall incident rates. The study identified frailty as a risk of fall factor among community dwelling people and attempted to examine the evidence from different independent studies. Literature for review were selected from Cochrane Library, CINAHL, PubMed, and MEDLINE.

The result of the study found that frailty and successful aging were intertwined, and that frailty leads to recurrent falls in older adults. It showed evidence that older adults who entered the prefrail stage were more likely to experience falls. Cheng & Chang (2017) recommended that caregivers should conduct frailty assessment early to determine the possibility of frailty among community dwelling adults. Recognizing frailty as a fall risk factor is relevant in determining nursing home staffing hours assignment per resident. More frail residents would get more attention from the caregivers. A well conducted frailty assessment will be helpful in nursing home fall rate reduction and management.

Matarese & Ivziku (2017) performed a study that aimed to provide an overview of risk assessment tools used to identify risk factors for fall among inpatient older adults 65 years and over. The study identified falls as the most frequent adverse event against older adults reported in hospitals. According to the study, there are more than 400 factors associated with falls among older adults and they are classified into intrinsic and extrinsic factors. The research used St Thomas Risk Assessment Tool in Falling elderly patients (STRATIFY), the Conley scale, the Morse Fall scale, the Falls Risk Assessment Tool (FRAT), and the NPSA scale as fall assessment tools.

Matarese & Ivziku (2017) concluded that no single tool can identify all patients that are at risk of falls. Nursing homes and assisted living homes must use every available tool to assess residents' risk of fall to be better positioned to mitigate against falls. This study buttressed the need for caregivers to assess residents' fall vulnerabilities promptly upon admission and to repeat the assessment at regular intervals in the course of their stay in the facility. A good knowledge of residents' fall risk will influence the nursing hour assignment per resident per day. Residents with greater vulnerabilities would receive greater monitoring per day.

Another study conducted by Cary et al. (2018) studied the fall prevention strategies adopted by nursing home managements to prevent falls among short-stay nursing home patients. The study was based on data collected through semi structured interview of selected nursing home administrators, DONs, DORs and MDs in 4 nursing homes in Central North Carolina. Researchers applied the Donabedian model of structure, process, and outcomes in the data analysis.

Cary et al. (2018) proposed three interventions that might be helpful in fall prevention and recommended a further study on them. They include: (a) Clustering short-stay patients within a physical location to permit higher staff-patient ratios and surveillance, (b) population-based prevention interventions to supplement existing individually tailored prevention strategies (e.g., toileting schedules, medication review for all), and (c) transitional care interventions that transmit key information from hospitals to nursing homes. The staff and management of nursing homes and assisted living homes must have viable strategies that are proven to be able to mitigate against fall of residents. This study showed the importance of maintaining an effective staff-patient ratio and enhanced surveillance.

Huynh et al. (2021) carried out a study that reviewed the impact of the use of bedrails in fall reduction of older adults living in nursing homes. The study was a systematic review of databases including HealthStar, Cumulative Index in Nursing and Allied Health, MEDLINE provided peer-reviewed records and more. The researchers used the 2018 Mixed Methods Appraisal Tool (MMAT) in scoring each of the 14 peer-reviewed articles selected for the review.

Huynh et al. (2021) found that evidence was inconclusive as to whether use of bedrails alone reduces the occurrence of older adult falls in nursing homes. They came to this conclusion because some of the reviewed articles were vague on the direct impact of bedrails on fall reduction. The study recommended a further investigation on the use of bedrails in fall reduction in nursing homes. The inconclusive outcome of this study means that caregivers and nursing home managers may not depend on bedrails as a sure method

of residents' fall reduction. This study contributes to a list of possible steps to fall reduction that nursing homes administrators, RNs, LPNs, and CNAs may consider as they collaborate to lower older adult fall rates.

Granger et al. (2019) performed a study in which they explored the use of simulation-based training as an educational tool in enhancing fall assessment and prevention skills for nurses. The study used manikins with palpable pulse and capable of simulating basic observation changes like respiration rate and pupillary reactions and was carried out in a simulation center that imitated a ward environment. Feedback from study participants was gathered by the means of a questionnaire.

The researchers found that simulation-based training was an effective tool in improving nursing skills and that it built nursing confidence in the assessment and prevention of falls in older adults. They recommended a further development of the simulation training taking into cognizance shortage of nursing time. This study provided for educational opportunity for nurses in fall reduction and further highlighted on fall reduction as a collective responsibility of all caregivers in a healthcare organization.

Altinas et al. (2018) performed a study that examined the impact of pain and sleep quality on falls among older adults in nursing homes. The cross-sectional study was based on six nursing homes across Turkey with 333 participants and final consent rate of 87.4% or 291 sample size. Collected data was analyzed using SPSS version 18.0.

Altinas et al. (2018) found that while pain, poor quality of sleep and fall may occur together, pain was more likely to result in fall among older adults. According to the study, the correlation between poor sleep quality and fall remains to be researched

further. This study presented an important knowledge in fall reduction among the older people resident in nursing homes. Residents with greater complaints of pain should be given greater attention by caregivers as a way of mitigating against fall.

A different study conducted by Haddad et al. (2018) investigated the impact of medication management on fall reduction in older adults. This research was based on unpublished data from the CDC. Haddad et al. (2018) found that about 53% of older adults used at least one medication whose adverse effect was linked to falls in 2013. The study concluded that nurses could play a key role in fall reduction by identifying medications associated with high fall risk and paying closer attention to the patients who take them. The result of this study showed medication management by nurses as an effective fall reduction strategy in nursing homes.

Definitions

Fall: Fall occurs when a person comes to rest on the ground or a lower level because of a slip, trip, stumble, or misstep. Fall could also occur as a result of loss of grip or balance; from jumping or from being pushed, bumped, or involuntarily moved by someone else, animal or object; loss of consciousness or as a result of medical complication (Coughlin et al., 2019). Falls have been identified as a major cause of death among older men and women in the U.S. and around the world.

Fall Rate: Measurement is a power quality improvement tool. Only what can be measured can be improved. Knowing an organization's fall rate is vital to reducing it. Fall rate measurement implies knowing the number of falls per 1,000 occupied bed days.

It is calculated as the Number of Patient Falls x 1,000 divided by the Number of Patient Days (AHRQ, 2015).

Older adults: Various geriatric studies have varying ways of classifying older adults but most of them seem to agree that older adult age starts at age 65. According to some studies, people with ages between 65 and 74 are classified as youngest-old, those between 75 and 84 are classified as middle-old, while those 85 years and older are classified as oldest-old adults (Lee et al., 2018). As people get older, they are frail and their immune systems get weaker and less able to combat diseases and infections.

Nursing home: Nursing home, also called skilled nursing facility, or long-term Care Facility is a place where older adults or people with health challenges reside for the purposes of receiving the care they need to live well and longer. Nursing homes provide a very wide range of services ranging from personal support services to skilled nursing care services and more (NIH, 2017). While some residents of the nursing homes have a short stay, most residents live in the nursing homes over a long period.

Assisted living homes: A facility for people who need some level of help with daily care as a result of age, disability, or health challenge and choose not to live alone. They prefer to stay in assisted living homes rather than being checked into nursing homes. Assisted living homes often house as few as 25 residents or as much as 120 residents (NIH, 2017).

Assumptions

This study was based on a secondary data source obtained from The CMS - nursing homes and rehabilitation services. The data is a reflection of State U.S. Averages

of quality measure, staffing, fine amount and number of deficiencies. The first assumption is the validity of instruments used by the researchers to gather data from participating nursing and rehabilitation homes. The second assumption is that data was fairly gathered without any form of bias or prejudice. The third assumption is that the participating states' nursing and rehabilitation homes were honest about their numbers and reporting. The fourth assumption is that the size and scope of the data is a valid reflection of the true population of the U.S. nursing homes thereby making generalization of the result of this analysis possible.

Scope and Delimitations

Multiple studies have shown fall among older adults to be a leading cause of hospitalization and death in the U.S. and around the world. Older adult falls in 2015 alone resulted to 3 million emergency room visits with 28% of those visits leading to hospitalization at a whopping cost of \$43 billion (Coughlin et al., 2019). The same study projected that healthcare expenditure resulting from fall of older adults could reach \$100 billion by the year 2030. This is a major healthcare concern that must be seriously addressed if healthcare providers and administrators are serious about reducing the U.S. healthcare cost over the years. The purpose of this study was to identify the relationship, if any, between staffing hours and resident fall rate using multiple regression analysis.

There are a few limitations that should be considered when interpreting the result of this study. The design of this study is correlational. The study, therefore, attempted to prove an inferred association not causation. The data used for the multiple regression analysis in this study was pulled from a secondary data source that was not originally

collected for this study. The accuracy of the result of this study is dependent on the accuracy of the data source.

Significance

Fall prevention among older adults living in nursing homes involves studying the different contributing factors to falls. Staffing hours per resident, as a factor of fall prevention is key, and could potentially play significant role in older adult fall rate reduction (Colon-Emeric et al., 2017). As several studies have shown, older adult falls are a leading cause of hospitalization and death in the U.S. (Coughlin et al., 2019). Falls among older adults resident in nursing homes are a major healthcare concern that require more study to curtail them.

This study adds to the available body of knowledge on staffing strategies that effectively reduce the fall rate of nursing home residents. The result of this study could be the basis for further studies on RN, LPN, CNA to nursing home resident ratio for quality care giving. A lower resident fall rate potentially increases resident satisfaction rate and improves quality of life of the residents. In addition, fall rate reduction also benefits the nursing homes in several ways including the reduction of lawsuits arising from falls.

Summary

The literature review shows that a lot of work has been done to mitigate against fall of older adults living in nursing homes. There have been studies on management perceptions of risks and strategies of fall prevention, factors associated with risks of fall, simulation-based training on fall prevention, fall prevention processes, and a lot more. However, a gap in literature exists on the relationship between staffing hours and resident

fall rate of nursing homes. Increased resident fall rate not only has negative impact on residents' quality of life but also negatively impacts upon organizations' bottom line as well as the nation's per capita expenditure on healthcare.

Conclusion

Existing literature indicates that fall among older adults living in nursing homes is common and reoccurring but preventable. While several previous studies have focused on varying approaches to fall prevention, the purpose of this study was to analyze the impact of staffing on nursing home resident fall rate. This topic, as expanded, provides healthcare administrators and managers with an effective decision-making tool. Decisions involving resident to staff ratio and staffing hours per resident per day. It also provides a guide on RN, LPN, and CNA staffing hours combination for effective patient care and fall reduction.

Moreover, this study addressed the gap in literature concerning the relationship between staffing hours and resident fall rate in nursing homes. The analysis in this study was based on a secondary dataset pulled from the CMS. Subsequent sections provide detailed information on the research design and rationale, methodology, and data collection.

Section 2: Research Design and Data Collection

There is a gap in literature on the relationship between staffing hours and resident fall rate in nursing homes and this study attempted to address that gap. Reducing nursing home resident fall rate is an operational problem that nursing home administrators and managers are constantly challenged with. Resident fall rate reduction is a care quality improvement challenge. A reduction in nursing home resident fall rate significantly contributes to a reduction in healthcare costs by reducing emergency room visits and admissions resulting from residents' fall. It also results to a reduction of older adults' deaths related to fall. While previous studies have looked at different causes of nursing home resident falls and made several recommendations, a gap exists on the role of staffing hours and its relationship with resident fall rate. This research attempted to fill that gap.

Research Design and Rationale

The design of this quantitative study is correlational. It utilized data from a secondary data source, the CMS. The research aimed to measure the presence of a correlation, if any, and the significance of a relationship between the variables. The study had one DV, nursing home resident fall rate per day, and three IVs, CNA staffing hours per resident per day, LPN staffing hours per resident per day, and RN staffing hours per resident per day.

Data for this research were analyzed using the MS Excel software. A one-way ANOVA was used to test the statistical differences of the means of CNA, LPN, and RN nursing hours per resident per day on resident fall rate per day. It was also used to test for

a variation among the IVs and to determine the presence of a correlation. The study used a *t*-test to compare the impact of the IVs on resident fall rate. Multiple regression analysis was used to answer the research questions.

Methodology

Population and Sampling

The dataset used to answer these research questions is in the public domain and made available by the CMS. The data point consists of data contained in the file called NH_StateUSAverages_May2021. The data is reflective of the U.S. average national nursing home resident fall rate and the hours of staffing per day of CNAs, LPNs, and RNs. It contains data from the 50 States, U.S. territories, and the national averages. The wide reach of the data allows for the generalization of results of this study.

Instrumentation and Operationalization on Constructs

The CMS periodically gathers, and stores elaborate healthcare data that provide basis for effective healthcare improvement research. The secondary data that was used for this study contains useful insight into other areas of the U.S. nursing home residents' health status. These additional data in some ways provide insight into statewide nursing home resident fall rates and the contributing risk factors.

Several factors contribute to the risk of fall among older adults and the survey that captured nursing home resident fall rates captured some of them. According to Moncada & Mire (2017), balance impairment, muscle weakness, gait impairment, and medication use are some of the more prominent fall risk factors. The NH-States US Averages data point used for this study captured the “percentage of long stay residents who were

physically restrained”, “percentage of long stay residents whose ability to move independently worsened”, “percentage of residents who received an antianxiety or hypnotic medication” within the period under investigation among others. However, the respective influences of these separate factors of falls on the overall percentage fall rate of the nursing home residents were beyond the scope of this study and would therefore, be the subject of further research.

Threats to Validity

The dataset used for this research contains national averages and therefore the results would be nationally generalizable. The CMS gathered the data in use based on standard procedures and practices. There are no known threats to the validity of the dataset used for this research.

Ethical Procedures

The secondary dataset used for this study was made available to the public domain by the CMS. As a result, there was no need for any special agreements or permissions to use the dataset for this study. There were no human participants involved in the data gathering process of this study since it was based on a secondary data source. Also, the absence of human participants meant that the Health Portability and Accountability Act (HIPAA) requirements for regulating ethical issues as well as the regulations from the Office for Human Research Protections (OHRP) were not applicable to this research. The collection and analysis of the data used for this study adhered to the ethical requirements of the IRB and thus were approved as number 09-15-21-0729624.

Summary

This correlational quantitative study was based on a secondary data pulled from the CMS. Multilevel regression analysis, *t-test* and One-way ANOVA were used for the data analysis. A multilevel regression analysis model was used to estimate the correlation, if any, between staffing hours per day per resident and the resident fall rate. The DV, nursing home resident fall rate per day and the IVs of CNA staffing hours per resident per day, LPN staffing hours per resident per day, and RN staffing hours per resident per day were analyzed.

Section 3: Presentation of the Results and Findings

Older adult falls are a threat to not only the wellbeing of older adults in nursing homes but also a source of economic drain on the U.S. healthcare system. CNAs, LPNs, and RNs are the primary caregivers in nursing homes. These groups of caregivers distribute their worktime among the patients in different proportions based on varying factors. This study was designed to investigate the impact of staffing hours received per day by the residents of nursing homes from these groups of caregivers on the nursing home residents daily fall rate. The data analysis contained in this section attempted to answer the question: Is there any correlation between staffing hours received by nursing home residents and their fall rate? The secondary data used for this study was retrieved from the CMS.

The dataset used for this study contained sufficient data to answer the research questions, as well as to address the hypothesis propounded by the research. The questions and hypothesis were:

Research Question (RQ1): Is there sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and CNA staffing hours received per day?

H_0 1: There is not sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and CNA staffing hours received per day.

H_{a1} : There is sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and CNA staffing hours received per day.

Research Question (RQ2): Is there sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and LPN staffing hours received per day?

H_{02} : There is not sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and LPN staffing hours received per day?

H_{a2} : There is sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and LPN staffing hours received per day?

Research Question (RQ3): Is there sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and RN staffing hours received per day?

H_{03} : There is not sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and RN staffing hours received per day?

H_{a3} : There is sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and RN staffing hours received per day?

Answers to the research questions and hypotheses are included in this section of the study using tables and figures. The original dataset obtained from CMS and the data analysis results are also contained in this section. The dataset used for the analysis reflected the national and state averages of CNA, LPN, and RN daily staffing hours and nursing home residents daily fall rate. The statistical summary of the original dataset, and the descriptive statistics of CNA, LPN, RN, and resident daily fall rate were shown in tables. Regression analysis was used to determine the coefficient of relation between the dependent variable and the independent variables. Scatter plots were used for visual display of results while a single factor one-way ANOVA was used to test the equality of the mean of the samples.

Data Collection of Secondary Dataset

This quantitative study was based on a secondary dataset retrieved from CMS (<https://data.cms.gov/provider-data/search?page=5>). The dataset contained elaborate data on nursing homes across the 50 states and the national averages. It reflected data on state nursing home staffing hours and fall rate averages as reported by CMS in May 2021.

Discrepancies in the Use of Secondary Dataset from the Plan Presented in Section 2

The original plan, as discussed in Section 2 of this study, was to make use of SPSS in the data analysis, but Excel later proved to be more suitable for the analysis. The research design and rationale, and methodology remained as discussed in Section 2. The interpretation of results is consistent with the plan in Section 2. Also, CMS periodically updates databases in keeping with the findings of recent surveys and studies. The secondary dataset proposed in Section 2 was based on CMS January 2021 findings but

the most recent dataset available at the time of analysis, May, 2021 was used. Finally, the original research questions and hypotheses in section 2 were framed to be looking for a negative correlation between the dependent variable and independent variables, but in Section 3, they were reframed to look for any correlation.

Time Frame and Response Time

This study was based on a secondary dataset that was precollected by CMS and updated in May 2021. The data was reflective of responses received from the nursing homes in the 50 states and the national averages. The May 2021 update was the most recent dataset available to the general public at the time of this study.

Demographic Characteristics of the Sample Group

The dataset used for this study did not contain any demographic information on the nursing home residents. A typical U.S. nursing home accommodates residents that cut across different demographics. Therefore, the findings of this research will be generalizable across all U.S. nursing homes. The sample dataset was a good and credible representation of the general U.S. population.

Descriptive Statistics

Nursing home residents' falls have remained a big healthcare challenge that must be solved. Periodically, CMS conducts surveys and data gathering of reported nursing homes residents fall rates per day as well as RNs, LPNs, and CNAs, staffing hours per resident per day across the nursing homes in the U.S. The dataset helps CMS to determine state performance and to carry out other studies necessary to make policies that are aimed at improving nursing home care quality and performance.

The dataset, represented in Table 1, formed the background of this study. It reflects reported nursing home residents' fall rates in the states and territories of the U.S as well as the RN, LPN and CNA staffing hours and national averages.

Table 1*Nursing Home State U.S averages data*

States	Nurse Aide Staffing Hours Per Resident Per Day	LPN Staffing Hours Per Resident Per Day	RN Staffing Hours Per Resident Per Day	Nursing Home Resident Fall Rate Per Day
Nation	2.36	0.96	0.77	3.408504
AK	5.01	0.77	2.37	3.698567
AL	2.37	1.01	0.66	3.333881
AR	2.68	1.15	0.44	3.752780
AZ	2.37	1.17	0.84	2.645427
CA	2.66	1.30	0.70	1.666937
CO	2.49	0.75	1.08	3.682961
CT	2.29	0.87	0.84	3.557627
DC	2.77	0.71	1.86	1.096696
DE	2.43	1.02	1.32	3.134904
FL	2.68	0.87	0.82	2.805419
GA	2.03	1.17	0.49	3.235276
GU	4.26	1.71	2.98	0.000000
HI	3.00	0.34	1.67	2.370461
IA	2.51	0.65	0.83	3.714431
ID	2.72	0.91	1.00	2.841601
IL	2.05	0.69	0.85	3.334240
IN	2.17	0.95	0.73	4.035631
KS	2.74	0.75	0.82	5.042792
KY	2.34	0.94	0.86	4.180367
LA	2.26	1.25	0.33	3.349567
MA	2.27	1.02	0.81	3.504258
MD	2.26	0.98	0.97	2.971371
ME	3.10	0.54	1.13	4.072139
MI	2.33	0.93	0.89	3.059299
MN	2.67	0.69	1.19	4.232220
MO	2.34	0.79	0.53	4.083298
MS	2.31	1.16	0.71	3.281837
MT	2.56	0.57	0.94	4.790450
NC	2.31	1.03	0.68	3.625517
ND	3.05	0.63	1.01	4.720790
NE	2.75	0.72	0.84	4.634435
NH	2.55	0.87	0.81	4.765694
NJ	2.18	0.98	0.94	2.542447
NM	2.45	0.77	0.74	3.340591
NV	2.44	1.02	0.98	1.731656
NY	2.19	0.85	0.77	3.014603
OH	2.11	1.02	0.70	3.685791
OK	2.67	1.04	0.39	4.648047
OR	3.22	0.93	0.90	2.586655
PA	2.15	0.94	0.93	3.513053
PR	0.00	2.13	3.43	0.000000
RI	2.42	0.45	0.94	3.852139
SC	2.37	1.12	0.76	3.579695
SD	2.39	0.47	0.89	5.274768
TN	2.14	1.20	0.65	3.357153
TX	2.07	1.16	0.45	3.407424
UT	2.53	0.58	1.22	3.009286
VA	2.12	1.12	0.71	3.685068
VT	2.59	0.96	0.87	4.717730
WA	2.71	0.80	1.09	2.970912
WI	2.5	0.63	1.10	3.462993
WV	2.34	1.04	0.75	4.223221
WY	2.67	0.57	1.01	4.458429

Note. Table 1 is the raw dataset from CMS.

Table 2 is the descriptive quantitative statistics of the original dataset.

Table 2

Comparison of Means, Median, Variance, Standard Deviation of the DV and IVs.

All States	Nurse Aide Staffing Hours Per Resident Per Day	LPN Staffing Hours Per Resident Per Day	RN Staffing Hours Per Resident Per Day	Nursing Home Resident Fall Rate Per Day
Total	132.59	48.69	52.22	180.2825
Mean	2.501698	0.918679	0.985283	3.401557
Median	2.430000	0.930000	0.850000	3.504258
Minimum	0.000000	0.340000	0.330000	0.000000
Maximum	5.010000	2.130000	3.430000	5.274768
Sample Variance	0.3748259	0.0910578	0.3150177	1.167476
Standard Deviation	0.6122303	0.3017578	0.5612643	1.080498

Note. Table 2 was obtained by implementing the data analysis command in Excel.

Table 2 above provided a detailed information for comparing the statistics of the DV, nursing home resident fall rate per day, and the IVs: CNA, LPN, and RN staffing hours per resident per day. It showed discrepancies in statistics between the variables.

Table 3 is a table of the statistical measure of the dependent and independent variables showing the confidence levels.

Table 3*Dependent and independent variables Descriptive Statistics*

Descriptive statistics	CNA	LPN	RN	Fall rate
Mean	2.501698113	0.918679245	0.985283019	3.401557245
Standard Error	0.084096296	0.041449637	0.077095592	0.148417838
Median	2.43	0.93	0.85	3.504258
Mode	2.37	1.02	0.84	0
Standard Deviation	0.612230273	0.301757912	0.561264382	1.080498168
Sample Variance	0.374825907	0.091057837	0.315017707	1.167476291
Kurtosis	10.51196491	4.372724451	9.154166213	2.461647503
Skewness	0.510004943	1.303347159	2.818916949	-1.199871328
Range	5.01	1.79	3.1	5.274768
Minimum	0	0.34	0.33	0
Maximum	5.01	2.13	3.43	5.274768
Sum	132.59	48.69	52.22	180.282534
Count	53	53	53	53
Confidence Level (95.0%)	0.168751563	0.083174782	0.154703624	0.29782218

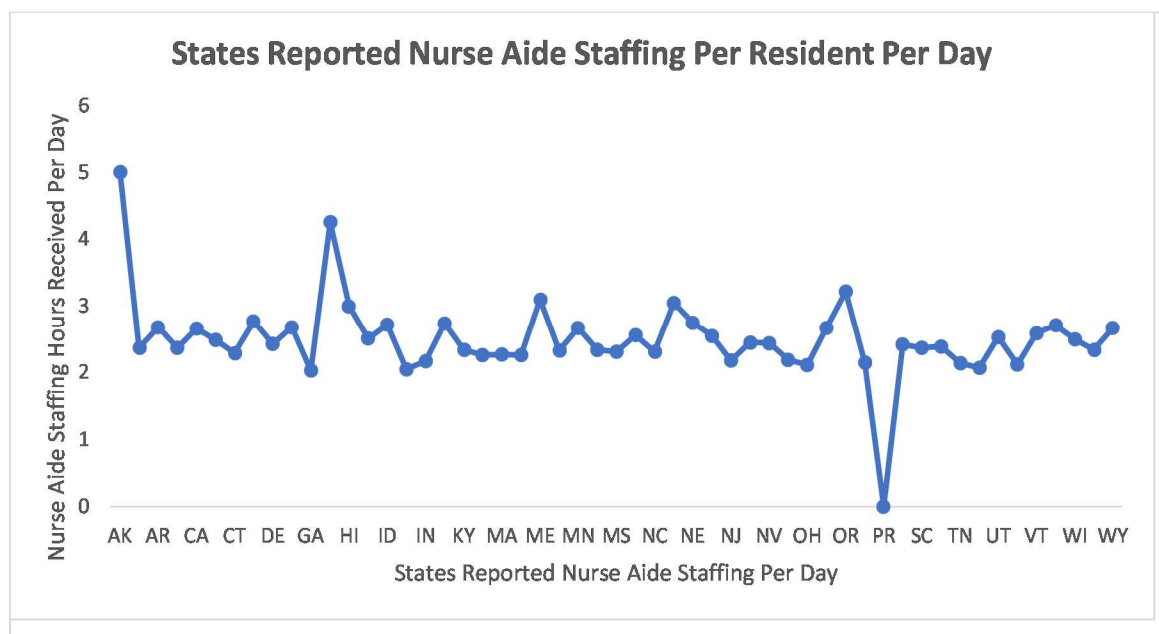
Note. Table 3 was obtained by implementing the data analysis command in Excel.

Table 3 above is an Excel analysis output showing the measures of center (mean, median and mode), measures of variation (sample variances, standard deviation and range, minimum and maximum), distribution, and confidence levels (95%) of the depend and independent variables: CNA 0.16, LPN 0.08, RN 0.15, Fall rate 0.29.

Figure 1 is a graphical representation of the 50 states and territories of the U.S. and the reported CNA staffing hours per resident per day.

Figure 1

Line Graph of CNA Staffing Hours per Resident per Day

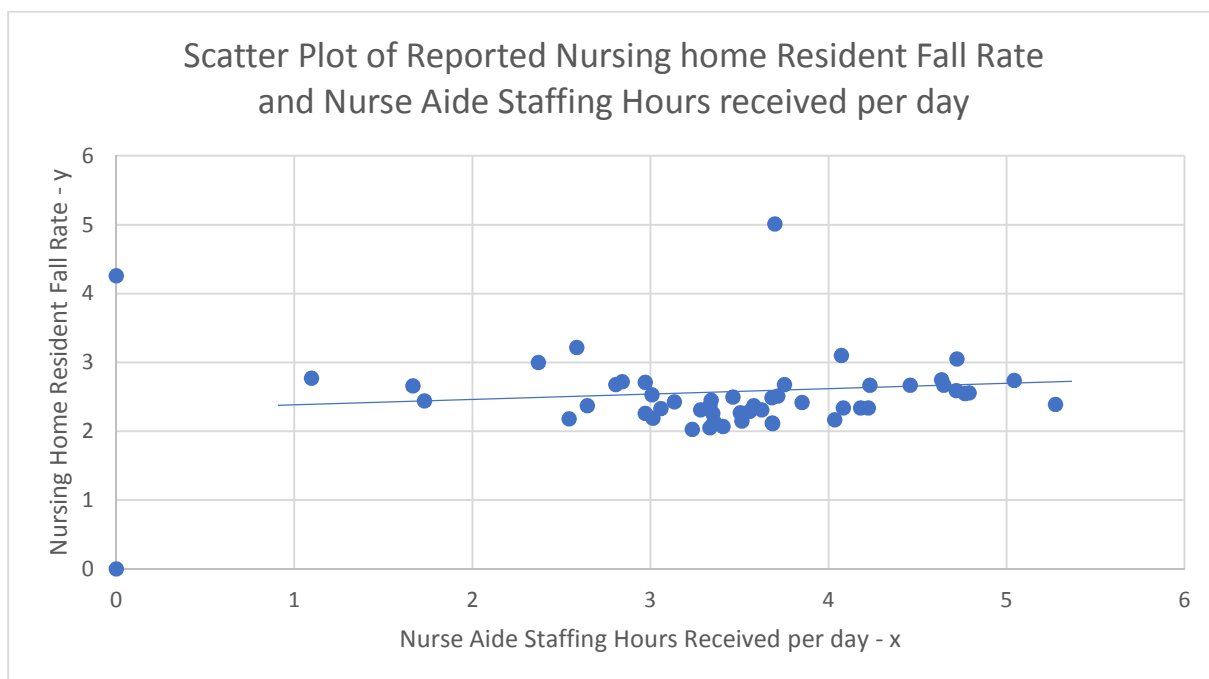


Note. Figure 1 is an Excel line chart representation of the states reported nursing aide staffing hours per resident per day.

Figure 2 is a scatter plot graphical representation of the 50 states and territories of the U.S. and the reported CNA staffing hours per resident per day and the resident fall rate per day. The graph shows no distinct pattern, which suggests that there is no correlation between the nursing home resident fall rate and CNA staffing hours received per day. It showed no correlation: $r = 0.098$.

Figure 2

Scatter Plot of Reported Nursing Home Resident Fall Rate and CNA Staffing Hours per Day



Alternative Hypothesis $H_1: \rho \neq 0$ (There is a linear Correlation)

Table 4

A table of the regression analysis output showing the regression statistics of resident fall rate (y-axis) against CNA staffing hours (x-axis).

CNA regression analysis

<i>Regression Statistics</i>	
Multiple R	0.09798
R Square	0.0096
Adjusted R Square	-0.0098
Standard Error	1.08579
Observations	53

Note. Output shows R Square value of 0.0096 which suggests that only about 9.6% of resident fall rate may be explained by CNA staffing hours.

Table 5 is the ANOVA table which shows the significance level of the analysis.

To reject the null hypothesis, a p-value ≤ 0.05 is required.

Table 5

A table of the regression analysis showing the One-Way ANOVA of the relationship between resident fall rate and CNA staffing hours.

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.582813232	0.582813232	0.494353485	0.485189108

Residual	51	60.12595388	1.178940272
Total	52	60.70876711	

Note. The ANOVA table shows the Significance F-value of 0.5 which is much higher than the 0.05 p-value required to reject the null hypothesis.

Table 6 is a table of coefficients, it gives the details of the linearity of the correlation between resident fall and CNA staffing hours.

Table 6

A table of the regression analysis showing the coefficients of linearity - intercept and slope.

Coefficients

	Coefficients		Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	2.9689606	0.633086781	4.689658205	2.08249E-05	1.69798587	4.23993536	1.69798587	4.23993536	1.69798587
	2.36	0.1729212	0.245940148	0.703102756	0.485189108	-0.32082425	0.66666664	-0.32082425	0.66666664

Note. The coefficients table shows a positive slope of 0.17 and a p-value of 0.5 (0.48)

Analysis of the multiple regression:

1. The regression equation model: $\hat{y} = 0.1729212 x + 2.96896062$
2. The $P - value = 2.0825E - 0.5 < 0.0001$
3. The value of the multiple coefficient of determination $R^2 = 0.0096$
4. The adjusted value of $R^2 = 0.0098$
5. The Linear Correlation Coefficient $r = 0.09798083$
6. Critical Values from Pearson's Correlation Coefficient r Table yields critical values of $r = \pm 0.2681$;

The Excel Linear Correlation coefficient ($r = 0.098$) lies between the two critical values ($r = \pm 0.2681$), since $|r| = 0.098 < \text{critical value} = 0.2681$, there is not sufficient evidence to support the claim that there is a linear correlation between Nursing Home Resident Fall Rate and Nurse Aide staffing hours received per day. Therefore, there is No Correlation.

Table 7 is the Excel output of the CNA t -test. A t -test was run for inferential purposes, and it aimed to determine if there was a statistical difference between the two variables (nursing home resident fall rate and CNA staffing hours). To claim that there is a linear correlation is to claim that the population linear correlation coefficient ρ is different from 0. I therefore have the following hypotheses:

Null Hypothesis $H_0: \rho = 0$ (*There is No linear Correlation*)

Alternative Hypothesis $H_1: \rho \neq 0$ (*There is a linear Correlation*)

Table 7

A t -test analysis was performed for inferential purposes and table 7 is the output showing difference in means.

Output of t -test: *Paired Two Sample for Means for CNA*

	Variable 1	Variable 2
Mean	3.401557245	2.501698113
Variance	1.167476291	0.374825907
Observations	53	53
Pearson Correlation	0.097980352	
Hypothesized Mean Difference	0	
Df	52	
t Stat	5.511779941	
P(T<=t) one-tail	5.615E-07	
t Critical one-tail	1.674689154	

P(T<=t) two-tail	1.123E-06
t Critical two-tail	2.006646805

Note. Table 7 is an Excel output Result of t – test.

The linear correlation coefficient is $r = 0.098$ (from Excel table 4 above) and $n = 53$ (because there are 53 pairs of sample data), so the test statistic is:

$$t = \frac{r}{\sqrt{\frac{1-r^2}{n-2}}} = \frac{0.098}{\sqrt{\frac{1-0.098^2}{53-2}}} = 0.705$$

From the Excel output:

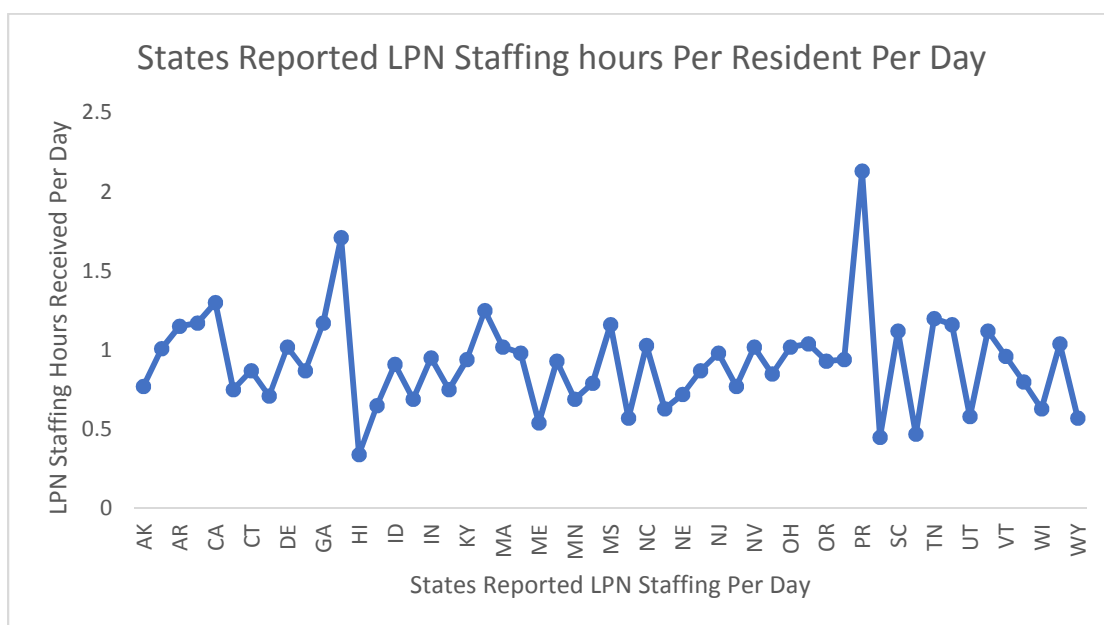
1. The t – *Critical values for two – tail Test* is ± 2.007
2. The P – *value fot two – tail Test* $\leq t$

Therefore, the answer is no, there is no linear correlation between Nursing Home Resident Fall Rate and Nurse Aide staffing hours received per day. Since the statistical t (0.705) computed lies between the critical values of ± 2.007 . Based on the results obtained from the Excel regression analysis and the t test, I can comfortably conclude that based on the CMS dataset, there is no sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and CNA staffing hours received per day.

Figure 3 is a graphical representation of the 50 states and territories of the U.S. and the reported LPN staffing hours per resident per day.

Figure 3

Line Chart of Reported LPN Staffing Hours per Resident per Day

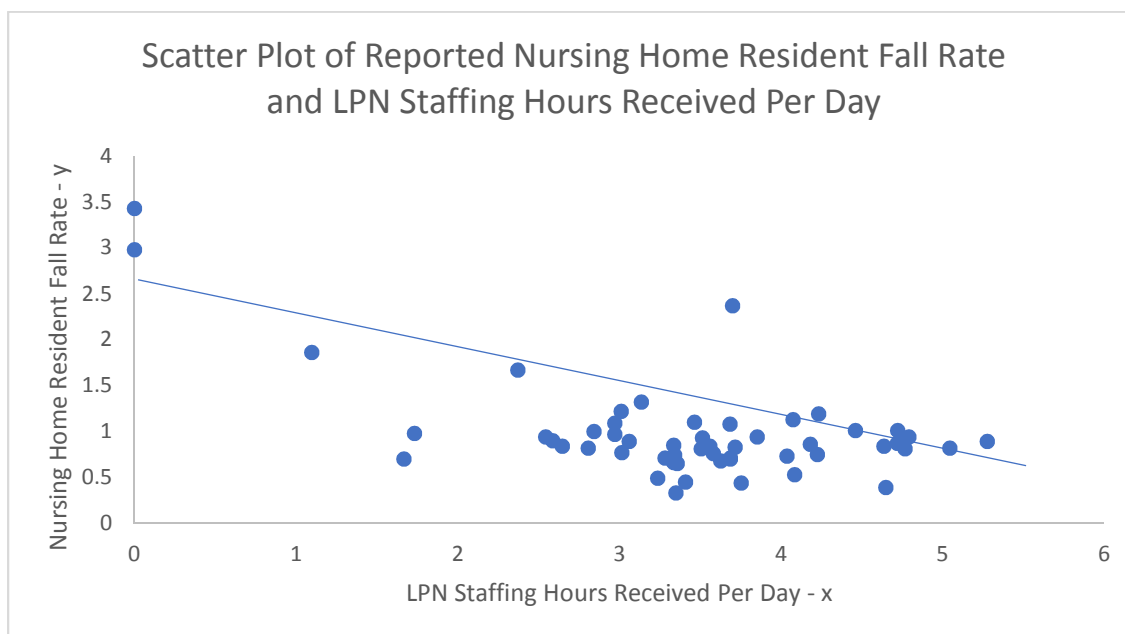


Note. Figure 3 is an Excel line chart representation of the states and territories reported LPN staffing hours per resident per day.

Figure 4 is a scatter plot graphical representation of the 50 states and territories of the U.S. and the reported LPN staffing hours per resident per day and the resident fall rate per day. The straight-line, or linear pattern shows that there is a negative correlation between the nursing home resident fall rate and LPN staffing hours received per day. It implies that, as the LPN staffing hours received per day increases, the nursing home resident fall rate decreases. Negative Correlation: $r = -0.5741$.

Figure 4

Graph of Reported Nursing Home Resident Fall Rate and LPN Staffing Hours per Day



Note. Figure 4 is an Excel generated scatter plot.

Table 8 is the output of an Excel regression analysis performed to see if the linear correlation coefficient, r indicates that there is a linear correlation between the two variables, nursing home resident fall rate and LPN staffing hours received per day. The analysis aimed to provide an answer to the second research question, Q2: Is there sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and LPN staffing hours received per day?

Null Hypothesis $H_0: \rho = 0$ (There is No linear Correlation)

Alternative Hypothesis $H_1: \rho \neq 0$ (There is a linear Correlation)

Table 8

A table of the regression analysis output showing the regression statistics of resident fall rate (y-axis) against LPN staffing hours (x-axis).

LPN regression analysis

<i>Regression Statistics</i>	
Multiple R	0.57414
R Square	0.32963
Adjusted R Square	0.31649
Standard Error	0.8933
Observations	53

Note. Output shows R Square value of 0.33 which suggests that about 33% of resident fall rate may be explained by LPN staffing hours.

Table 9 is the ANOVA table which shows the significance level of the analysis. To reject the null hypothesis, a p-value ≤ 0.05 is required.

Table 9

A table of the multiple regression analysis showing the ANOVA of the relationship between resident fall rate and LPN staffing hours.

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	20.011649	20.0116	25.0778	6.9602E-06
Residual	51	40.697119	0.79798		
Total	52	60.708767			

Note. The ANOVA table showing the significance F-value that is much lower than the 0.05 p-value required to reject the null hypothesis.

Table 10 is a table of coefficients, it gives details of the linearity of correlation between resident fall rate and the LPN staffing hours.

Table 10

A table of the regression analysis showing the coefficients of linearity - intercept and slope.

Coefficients

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	5.2901791	0.396597	13.3389	2.9E-18	4.4939769	6.086381	4.493977	6.0863812
LPN	-2.055801	0.410522	-5.0078	6.9E-06	2.8799584	-1.23164	-2.87996	-1.231644

Note. Excel output result showing the coefficients of linearity.

Analysis of the multiple regression:

1. The regression equation: $\hat{y} = -2.0558011x + 5.2901791$
2. The $P - value = 2.946E - 18 < 0.0001 < \alpha = 0.05$
3. The value of the multiple coefficient of determination $R^2 = 0.3296336$
4. The adjusted value of $R^2 = 0.3164891$
5. The Linear Correlation Coefficient $r = -.5741373$
6. Critical Values from Pearson's Correlation Coefficient r Table yields critical values of $r = \pm 0.2681$;

The answer to Q2 is yes, there is a linear correlation. As such, I can reject the null hypothesis. Since the Excel output of $r = -0.57414 < -0.2681$ lies in the left tail region below the critical value for that tail, I conclude that there is sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate – y and LPN staffing hours received per day- x . 0.3296 (or 33%) of the variation in numbers of nursing home resident fall rate can be explained by the linear relationship between nursing home fall rate and LPN staffing hours received per day. This implies that about 67% of the variation in

numbers of LPN staffing hours received per day cannot be explained by the nursing home fall rate.

Table 11 is the Excel output of LPN t-test. A t-test was run for inferential purposes to determine if there was a statistical difference between the two variables (nursing home resident fall rate and LPN staffing hours). To claim that there is a linear correlation is to claim that the population linear correlation coefficient ρ is different from 0. I therefore have the following hypotheses:

Null Hypothesis $H_0: \rho = 0$ (*There is No linear Correlation*)

Alternative Hypothesis $H_1: \rho \neq 0$ (*There is a linear Correlation*)

Table 11

A t-test analysis was performed for inferential purposes and table 11 is the output showing the critical values and more.

Output of t-test: *Paired Two Sample for Means for the LPN*

	Variable 1	Variable 2
Mean	3.401557245	0.918679245
Variance	1.167476291	0.091057837
Observations	53	53
Pearson Correlation	-0.574137252	
Hypothesized Mean Difference		0
df		52
t Stat	14.14522411	
P(T<=t) one-tail	9.21889E-20	
t Critical one-tail	1.674689154	
P(T<=t) two-tail	1.84378E-19	
t Critical two-tail	2.006646805	

Note. Table 11 is the Excel output Result of t – test.

The linear correlation coefficient is $r = 0.098$ and $n = 53$ (because there are 53 pairs of sample data), so the test statistic is:

$$t = \frac{r}{\sqrt{\frac{1-r^2}{n-2}}} = \frac{-0.574}{\sqrt{\frac{1-(-0.574)^2}{53-2}}} = -5.006$$

From the Excel output:

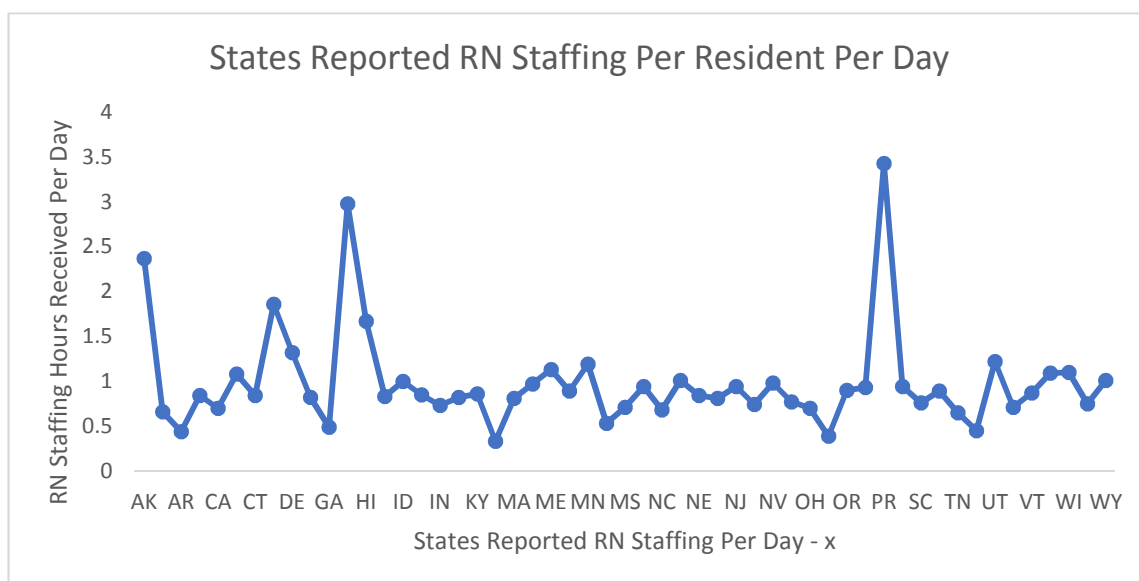
1. The t – *Critical values for two – tail test* is ± 2.007
2. The P – *value for two – tail test* = 0.000 when rounded.

Result of the analysis shows that there is a linear correlation between nursing home resident fall rate and LPN staffing hours received per day. The statistical t (-5.006) computed lies in the left tail region below the critical value for that tail. Also, the P – value of 0.000 is less than the significant level of 0.05. Therefore, I reject the null hypothesis and conclude that there is sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and LPN staffing hours received per day. For the CMS dataset, there is sufficient evidence to support the claim of linear correlation between nursing home resident fall rate and LPN staffing hours received per day.

Figure 5 is a graphical representation of the 50 states and territories of the U.S. and the reported RN staffing hours per resident per day.

Figure 5

Line Chart of States Reported RN Staffing Hours per Resident per Day

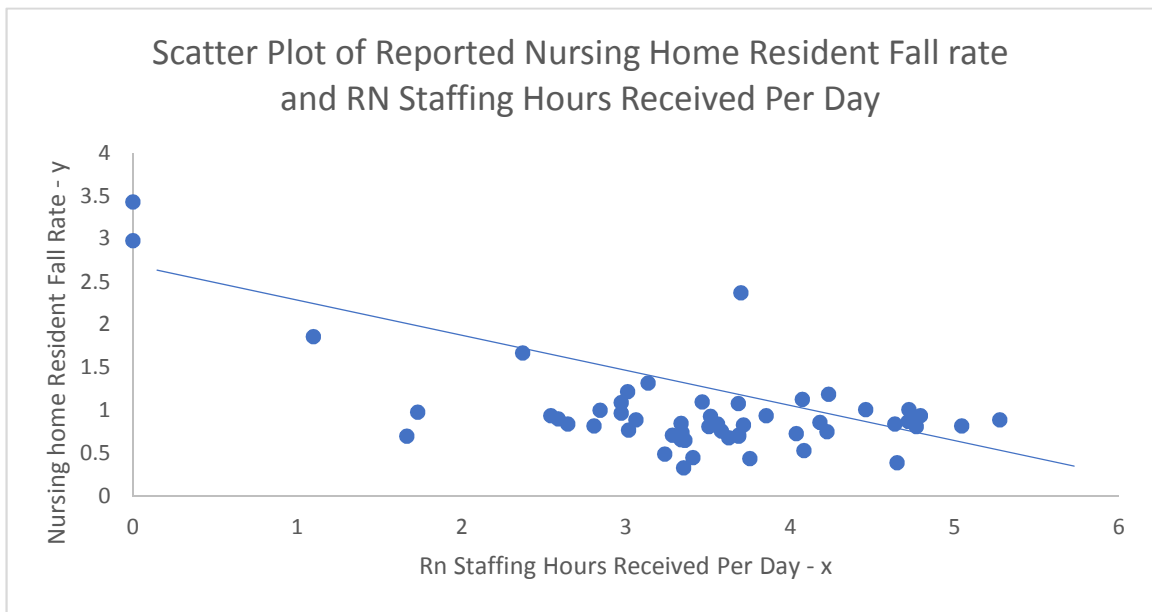


Note. A graphical representation of the states reported RN staffing hours per resident per day.

Figure 6 is a scatter plot showing a straight-line, or linear pattern that indicates that there is a negative linear correlation between the reported nursing home resident fall rate and staffing hours received per day. A negative correlation ($r = -.6120$) implies that as the RN staffing hours received per day increases, the nursing home resident fall rate decreases.

Figure 6

Reported Nursing Home Resident Fall Rate and RN Staffing Hours per Day



Note. Figure 6 is Excel output showing a negative correlation.

Table 12 is the output of an Excel regression analysis performed to determine if the linear correlation coefficient r indicates that there is a linear correlation between the two

variables, nursing home resident fall rate and RN staffing hours received per day. The analysis aimed to provide an answer to the third research question, RQ3: Is there sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and RN staffing hours received per day?

Null Hypothesis $H_0: \rho = 0$ (*There is No linear Correlation*)

Alternative Hypothesis $H_1: \rho \neq 0$ (*There is a linear Correlation*)

Table 12

A table of the regression analysis output showing the regression statistics of resident fall rate (y-axis) against RN staffing hours (x-axis).

RN regression analysis

<i>Regression Statistics</i>	
Multiple R	0.612001197
R Square	0.374545465
Adjusted R Square	0.362281651
Standard Error	0.862856334
Observations	53

Note. Output shows R Square value of 0.37 which suggests that about 37% of resident fall rate may be explained by LPN staffing hours.

Table 13 is the ANOVA table showing the significance level of the analysis. To reject the null hypothesis, a p-value ≤ 0.05 is required.

Table 13

A table of the regression analysis showing the ANOVA of the relationship between resident fall rate and RN staffing hours per resident.

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	22.73819342	22.7381934	30.540699	1.1207E-06
Residual	51	37.9705737	0.74452105		
Total	52	60.70876711			

Note. Above is an Excel output of the ANOVA table

Table 14 is a table of the coefficients that gives details of the linearity of correlation between the variable.

Table 14

A table of the regression analysis showing the coefficients of linearity – intercept and slope

Coefficients								
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	4.5623905	0.2411848	18.9166	1.1E-24	4.078192	5.046589	4.078192	5.046589
X Variable 1	-1.1781723	0.2131912	-5.5263	1.1E-06	-1.60617	-0.75017	-1.60617	-0.75017

Note. The Excel output result of regression analysis.

Analysis of the multiple regression:

1. The regression equation model: $\hat{y} = -1.17817234x + 4.562390448$
2. The $P - value = 1.0527E - 24 < 0.0001 < \alpha = 0.05$
3. The value of the multiple coefficient of determination $R^2 = 0.374545465$
4. The adjusted value of $R^2 = 0.362281651$
5. The Linear Correlation Coefficient $r = -0.612001197$

6. Critical Values from Pearson's Correlation Coefficient r Table yields critical values of $r = \pm 0.2681$;

The answer is yes, there is a linear Correlation allowing me to reject the null hypothesis. Because the Excel output of $r = -0.61200 < -0.2681$ lies in the left tail region below the critical value for that tail, I conclude that there is sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and RN staffing hours received per day. The result shows that 0.3745 (or 37%) of the variation in numbers of nursing home resident fall rate can be explained by the linear relationship between nursing home fall rate and RN staffing hours received per day. This implies that about 63% of the variation in numbers of RN staffing hours received per day cannot be explained by the nursing home fall rate.

Table 15 is the Excel output of a t-test. A t-test was run for inferential purposes to determine if there is a statistical difference between the two variables (nursing home resident fall rate and RN staffing hours). To claim that there is a linear correlation is to claim that the population linear correlation coefficient ρ is different from 0. I therefore have the following hypotheses:

Null Hypothesis $H_0: \rho = 0$ (*There is No linear Correlation*)

Alternative Hypothesis $H_1: \rho \neq 0$ (*There is a linear Correlation*)

Table 15

A t-test analysis was performed for inferential purposes and table 15 is the output showing the critical values and more.

Output of t-test: Paired Two Sample for Means for the RN

	Variable 1	Variable 2
Mean	3.401557245	0.985283019
Variance	1.167476291	0.315017707
Observations	53	53
Pearson Correlation	0.612001197	-
Hypothesized Mean Difference	0	
Df	52	
t Stat	11.79343183	
P(T<=t) one-tail	1.2913E-16	
t Critical one-tail	1.674689154	
P(T<=t) two-tail	2.58261E-16	
t Critical two-tail	2.006646805	

Note. The Excel output result of t – test to determine the coefficient of correlation.

The linear correlation coefficient is $r = -0.612$ (from Excel table 18 above) and $n = 53$ (because there are 53 pairs of sample data), so the test statistic is:

$$t = \frac{r}{\sqrt{\frac{1-r^2}{n-2}}} = \frac{-0.612}{\sqrt{\frac{1-(-0.612)^2}{53-2}}} = -5.526$$

From the Excel output:

1. The t – *Critical values for two – tail test* is ± 2.007
2. The P – *value for two – tail test* = 0.000 when rounded.

The answer is yes, there is a linear correlation between nursing home resident fall rate and RN staffing hours received per day. Since the statistical t (-5.526) computed lies in the left tail region below the critical value for that tail and the P – value of 0.000 is less than the significant level of 0.05, I reject the null hypothesis and conclude that there is sufficient evidence to support the claim that there is a linear correlation between nursing home resident

fall rate and RN staffing hours received per day. For CMS, there is sufficient evidence to support the claim of linear correlation between nursing home resident fall rate and RN staffing hours received per day.

To check for the quality of group means and to control for false positives, a one-way ANOVA was performed as shown in Tables 19 and 20. The claim test was: Do the three samples come from populations with means that are equal?

The null hypothesis and the alternative hypothesis are as follows:

Null Hypothesis $H_0: \mu_1 = \mu_2 = \mu_3$

Alternative Hypothesis: H_1 : *At least one of the means is different from the others*

μ_1 = Mean of the Nurse Aide Staffing per Resident per Day

μ_2 = Mean of the LPN Staffing Hours per Resident per Day

μ_3 = Mean of the RN Staffing per Resident per Day

Table 16 is the Single Factor descriptive statistics of the dependent and independent variables.

Table 16

Descriptive Statistics of the ANOVA: Single Factor

One-Way ANOVA

ANOVA: Single Factor				
CNA, LPN, and RN Staffing Per Resident Per Day				
SUMMARY				
<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>
Column 1	53	132.59	2.501698113	0.3748259
Column 2	53	48.69	0.918679245	0.0910578
Column 3	53	52.22	0.985283019	0.3150177

Note. Table 16 above was an Excel output of the statistics of the variables.

Table 17 is the ANOVA analysis performed to check for equality of means and to check for false positives.

Table 17

Analysis of the variables, within and between groups indicating $p\text{-value} \leq 0.05$

ANOVA						
<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	84.97489182	2	42.48744591	163.22461	5.6E-39	3.0540042
Within Groups	40.60687547	156	0.260300484			
Total	125.5817673	158				

Note. Single factor one-way ANOVA of CNA, LPN, and RN Staffing per resident per day.

The significant level is $\alpha = 0.05$. $F = 163.2246$. $P\text{-value} = 5.682 \cdot 10^{-39} < 0.0001$. I reject $H_0: \mu_1 = \mu_2 = \mu_3$. There is sufficient evidence to warrant rejection of the claim that; CNA, LPN and RN staffing per resident per day have the same mean staffing hours per resident per day. Even though CNA (nurse aide staffing per resident per day) has the highest mean, the results from ANOVA as shown above do not allow me to conclude that any one specific population mean is different from the others, so I cannot conclude that the nurse aide staffing per resident per day has the lowest fall rate.

Study Summary

Section 3 described the analysis of a dataset on the U.S. nursing home residents daily fall rate and the daily staffing hours they received from CNAs, LPNs, and RNs. Three sets of Excel regression analysis were performed. In each case, the goal was to see if the linear correlation coefficient r indicates that there is a linear correlation between the two variables; to

see if the graph of the regression line on the scatterplot confirms that the regression line fits the points reasonably well; and to determine whether the results could be used to make future predictions about the same population. A t-test Paired Two Sample analysis was subsequently performed in each case for inferential purposes to determine if there were statistical differences between two variables.

Lastly, a One-Way ANOVA was used to test the claim that three populations (CNAs, LPNs, and RNs as to home residents daily fall and daily staffing hours received) have the same mean; show that the samples are random samples of quantitative data; show that the samples are independent of each other; and confirm that the populations have distributions that are approximately normal.

The summary of the analysis showed that based on the CMS dataset, for the nursing home resident fall rate and CNA staffing hours per resident per day, the linear correlation coefficient, $r = 0.098$ lies between the two critical values ($r = \pm 0.2681$), since $|r| = 0.098 < \text{critical value} = 0.2681$. there is no correlation. There is no linear Correlation (Reject H_1).

For the nursing home resident daily fall rate and LPN staffing hours per resident per day, the Excel output of $r = -0.57414 < -0.2681$ lies in the left tail region below the critical value for that tail. 0.3296 (or 33%) of the variation in numbers of nursing home resident fall rate can be explained by the linear relationship between nursing home fall rate and LPN staffing hours received per day. There is a linear correlation (Reject H_0).

The result of the regression analysis showed that for the nursing home resident fall rate and the RN staffing hours per resident per day, $r = -0.61200 < -0.2681$ lies in the left tail region below the critical value for that tail. This implies that 0.3745 (or 37%) of the

variation in numbers of nursing home resident fall rate can be explained by the linear relationship between nursing home fall rate and RN staffing hours received per day. There is a linear correlation (Reject H_0).

Section 4: Application to Professional Practice and Implications for Social Change

Purpose of the Study

Nursing home resident falls are a threat to the wellbeing of residents and to the entire U.S. healthcare system. It results in early death, or incapacitation of residents, and increased cost of healthcare. As governments (federal, state, and local) and organizations continue to study ways of reducing nursing home resident fall rates, this study investigated the impact of the respective caregivers' staffing hours received by the residents per day on their fall rates.

The overarching research question was: Is there any relationship between staffing hours received by the residents of nursing homes from Certified Nursing Assistants (CNAs), Licensed Practical Nurses (LPNs), and Registered Nurses (RNs) and their fall rates?

Key Findings and Interpretation of Findings

Based on the dataset obtained from the CMS, three key findings were observed for CNAs, LPNs, and RNs respectively:

1. The Excel Linear Correlation coefficient ($r = 0.098$) lies between the two critical values ($r = \pm 0.2681$), since $|r| = 0.098 < \text{critical value} = 0.2681$, there is not sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and CNA hours received per day. Since the statistical t (0.705) computed lies between the critical values of ± 2.007 . I conclude that for CMS, there is no sufficient evidence to support the claim of linear correlation between nursing home resident fall rate and CNA staffing hours received per day.
2. The Excel output of $r = -0.57414 < -0.2681$ lies in the left tail region below the critical value for that tail. I concluded that there is sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate – y and LPN staffing hours received per day- x . I conclude that 0.3296 (or 33%) of the variation in numbers of nursing home resident fall rate can be explained by the linear relationship between nursing home fall rate and LPN staffing hours received per day. This implies that about 67% of the variation in

numbers of LPN staffing hours received per day cannot be explained by the nursing home fall rate.

3. The Excel output of $r = -0.61200 < -0.2681$ lies in the left tail region below the critical value for that tail, I concluded that there is sufficient evidence to support the claim that there is a linear correlation between nursing home resident fall rate and RN staffing hours received per day. I conclude that 0.3745 (or 37%) of the variation in numbers of nursing home resident fall rate can be explained by the linear relationship between nursing home fall rate and RN staffing hours received per day. This implies that about 63% of the variation in numbers of RN staffing hours received per day cannot be explained by the nursing home fall rate.

Limitations of the Study

Like most research works, this study has a few limitations. One limitation is the data sampling method. The dataset used for this study was not originally collected for this study. It is a secondary dataset that happened to contain both the dependent and independent variables that needed to be analyzed for the purposes of this study. The dataset contains no gender, age, demographics, or any other specific information that could have made the findings of this study more particular in application and generalization. Gale et al. (2018) and some other researchers have suggested that gender and age play active roles in nursing home resident fall rates. However, this study is unable to show how those factors have impacted the results of this study since our dataset did not contain those data.

Also, a study performed by Boscart et al. (2018) in which they found a correlation between the quality of care received by the residents of nursing homes and the staffing hours,

was the closest study to this. As a result, lack of previous studies on the topic of this research limited the ability to adequately measure and compare the findings of this study against the results of any previous ones. It is my hope that this study will form the basis for further research on this topic.

Recommendations for Professional Practice

It is evident from the results of this study that was based on the CMS dataset that LPN and RN staffing hours per resident per day are directly correlated to resident fall rates per day while the CNA staffing hours per day did not show any correlation. Not much has been done to determine other contributing factors to the results obtained. More study must be done to determine both the extent of the contribution of other contributing variables and the equilibrium RN and LPN staffing hours per resident per day. An arbitrary increase in RN and LPN staffing hours may result in unnecessary higher operating cost and staff redundancy. However, the study suggests that adequate LPN and RN staffing hours per resident per day could contribute to a reduced resident fall rate.

Positive Social Change

A study performed by Boscart et al. (2018) determined that the quality of care received by residents of nursing homes was correlated to the staffing hours they received. The findings of this present study have shown that nursing home resident daily fall rates are correlated to the LPN and RN staffing hours they receive per day but not so much to the CNA staffing hours received per day. Falls are the leading cause of hospitalization among older adults resulting in death and life-threatening injuries in the U.S. (Huynh et al., 2021). The application of the knowledge of the positive impact of adequate LPN and RN staffing hours per resident

per day will have a positive impact on the reduction of nursing home residents fall rate and improved quality of care of residents.

A reduced nursing home residents fall rate may contribute to residents living longer and better. It may reduce organization operating costs by eliminating or reducing costs associated with litigations because of resident falls. It may also reduce the high cost of the U.S healthcare system. Coughlin et al. (2019) projected that healthcare expenditure resulting from older adults' falls could reach \$100 billion by year 2030. The results of this study, if applied, may drastically reduce that projection and make funds available for other areas of healthcare need.

Conclusion

Falls of older adults in nursing homes is a threat to the residents' wellbeing, to the care-giving organization, and to the entire healthcare system. Families send their loved ones to nursing homes to help them live better and longer but just one fall is all it takes to change the narrative. Older adult falls are costly but mostly preventable. Fall prevention in a nursing home is a shared responsibility to which the management, as well as the respective caregivers must contribute. The results of this study show that LPN and RN staffing hours received by nursing home residents per day have a linear correlation with the residents' daily fall rate.

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