

Predicting Quiet Quitting: Machine Learning Insights into Silent Resignations in Healthcare Industry

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Abstract

Quiet quitting, an increasingly widespread issue in healthcare, poses substantial problems to patient care and labor stability. This study presents a comprehensive review of quiet quitting in healthcare, addressing their ramifications and providing a machine learning model to predict and address this challenge. The technique adopted in this research involves decision trees, random forest, KNN, logistic regression, SVM (Support Vector Machine), Ensemble models, and neural networks. Based on organizations evolving in emerging markets, key results demonstrate a range of variables leading to quiet quitting, including, in this order of importance, fear of retribution, leadership styles, working conditions, meaningful jobs, level of bureaucracy, absence of career opportunities, and lack of trust. Surprisingly, salaries do not appear to be influential in quiet quitting, while paradoxically, years of experience are inversely correlated to silent quitting. Evaluating various machine learning models based on different metrics reveals notable performance differences. While Support Vector Machine (SVM) excels in precision and F1-score, Logistic Regression demonstrates high accuracy and performs well across multiple metrics, indicating its suitability for prediction.

Keywords: *Quiet Quitting, Machine Learning, Healthcare, AI Predictive Models, Working Conditions.*

Introduction

More and more health professionals are clinically attending or psychologically passing out, ringing very much in the health sector. It is a sudden or inexplicable reason for a healthcare worker to stop and leave without adequately informing the institution or the public of their intention to quit the profession. The quiet resignation carries within itself an appreciation of why it is done and serves as the source of any more profound understanding. Contrary to usual resignations denoted by proper employee announcements and procedures, a silent resignation is observed as a secret or covert departure without the organization's awareness. This results in continuous job vacancies and sudden departures (TURK et al., 2023; Jeon, 2022). Healthcare workers' motives for leaving the profession vary greatly. They may be dissatisfied with their working conditions, which might also result in emotional and professional burnout and the extinguishing of hope for the future (Lu et al., 2023; Atalay & Dağistan, 2023).

The numerous adverse effects of quiet resignations echo throughout the healthcare industry. First, the ED workforce faces complexity regarding quality and patient care efficiency. When the medical practitioners exit quietly and secretly, and the patients go through the whole process of discontinuity, there is an expected delay in treatment, which leads to the probable deterioration of the patient's health (Kang et al., 2023; Maria Hassan, 2023; Galanis et al., 2023). Furthermore, secret quitting leads to labour force instability with labour shortages, a significant problem for staff members who must take on extra work. These might affect group morale, employees' stress, and, eventually, the organization's operations.

Moreover, silent resignations typically reveal more significant problems with healthcare organizations. Thus, these could be toxic workplace environments, ineffective leadership approaches, or teams with insufficient support networks for healthcare professionals (Lee et al., 2023; Serenko, 2023). By resolving

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the issues underlying quiet resignations, attention should be paid to systematic difficulties, creating an environment that fosters workers' retention, well-being, and job fulfilment.

In this regard, our main objective is to explore the dimensions of stillness in choosing and address the depth of the motives and mode of appearance of a quiet resignation reflected within the healthcare setup. This research investigates diverse sides of the silent resignation outlook, discovering the wide variety of a less obvious phenomenon, thus going beyond obvious answers and revealing deeper problems. While this research aims to demonstrate the irrefutable importance of focusing on quiet resignations as a considerable problem that must be addressed in healthcare organizations by now, it is also meant to serve as a wake-up call to all leaders in these institutions. This study aims to create controversy by beaming the deleterious effects of the subtle quitting phenomenon in healthcare, personnel dynamics, and organizational success. Therefore, the debate should be continued with effective interventions for sustainable productivity improvements. Finally, this research assumes that real solutions and actions will be developed to lower the rates of quiet resignations and revitalize recessionary efforts targeted towards healthcare organizations. The research will provide managers, policy-makers, and diversified stakeholders with tools and knowledge to develop an institutional culture that supports health workers' engagement and well-being through a literature review and theoretical framework.

Literature Review

While silent resignments are often underplayed and ignored, their impact across the healthcare settings is quasi-endive; it remains evident and affects the provision of care, the dynamics among workers and organizational productivity. The following portion provides an expansive discussion of the causes and effects of quiet resignations in the healthcare sector that are experienced in patient care and safety, employee mood and productivity, and the healthcare companies' financials.

As opposed to traditional resignations, where the firm has to deal with departures which are well-defined and planned (Scheyett, 2022; Galanis et al., 2023), the silent ones take place without notice, hence leading to the business being shocked as it comes face to face with the abrupt and the unplanned vacancies. Clues for the silent resignation are presented with a need for adequate communication or disclosure channels. This mobs healthcare organizations with multiple issues, including care continuity, workforce stability, and organizational performance (Hamouche et al., 2023; Mosher & Henke, 2021). Healthcare professionals take this route for different reasons. For instance, it can be due to dissatisfaction at work, fatigue, and provision of services by the system they cannot work well with (Atalay & Dağistan, 2023; Gabelaia & Bagociunaite, 2024). This absence of transparency and collaboration will only worsen the staffing shortfall problems as the companies are faced with a rush to fill vacant positions and keep service delivery at an adequate level (Sin et al., 2020; Schiller et al., 2020). Silent resignations rarely happen in isolation, but the circumstances around the organization and interpersonal and individual levels are the factors. Getting grips with the hidden numbers is vital for designing efficient, quiet resignation measures and implementing targeted interventions to keep employees loyal to the job and reduce employee turnover.

The workplace condition is of utmost importance in determining healthcare workers' views as far as they are concerned, for they will find the source of encouragement or disillusion to stay or leave the job. To list, workload, human capital, physical work conditions, and equipment may contribute to the dissatisfaction and burnout that the workers might experience (Calitz et al., 2014; Chowhan & Pike, 2022). Hospital workers are compelled to move on, leaving behind the hospital secretly due to pressure from overstress, insufficient support, and inadequate resources (Hom et al., 2019; Digby et al., 2020).

Organizational culture embraces standard value systems, informal norms, beliefs and rules, and formal patterns of life and communication that influence the conduct and interaction of organizational members. A healthy workplace culture that promotes employee well-being, rewards accomplishments, and supports

open communication may boost job satisfaction and retention (Aryanti et al., 2020; Lee et al., 2020). Conversely, a toxic or dysfunctional culture typified by micromanagement, lack of transparency, and punitive ways to tackle difficulties might lead healthcare personnel towards quiet resignations as a means of escape (Ugwu et al., 2023; Serenko, 2023). Similarly, leadership within healthcare businesses has a significant role in defining the work environment and affecting employee engagement and retention. Ineffective or authoritarian leadership styles that dismiss employee input fail to address problems and reinforce hierarchical systems, which may destroy morale and promote quiet resignations (Daniel, 2024; PREDA, & STAN, 2023).

Job satisfaction indicates the amount to which healthcare professionals gain fulfillment, purpose, and pleasure from their employment. Factors contributing to work satisfaction include opportunity for professional growth and development, autonomy and decision-making power, recognition and gratitude, and alignment with company values and purpose (Fitria, 2023; Said et al., 2020). When healthcare professionals regard their professions as important, influential, and linked with their personal and professional aspirations, they are more likely to stay committed to their positions and less motivated to pursue quiet resignations. However, Job satisfaction has been found to have a negative relationship with quiet quitting among healthcare workers, specifically nurses (Wu & Wei, 2024; Zuzelo, 2023; Salem, 2022). Nurses' job burnout was positively associated with quiet quitting, while job satisfaction was negatively associated (Galanis et al., 2023). Job satisfaction partially mediated the relationship between burnout and quiet quitting, suggesting that higher job satisfaction can help reduce the likelihood of quiet quitting (Boy & Sürmeli, 2023). A study conducted in Greece found that a score of 2.06 on the “Quiet Quitting Scale” (QQS) was the best cut-off point to discriminate quiet quitters from those with a low level of quiet quitting. The QQS was found to have good concurrent validity with job satisfaction and burnout measures (Galanis et al., 2023). Additionally, the same study stated that higher levels of job burnout and lower levels of job satisfaction were associated with higher levels of quiet quitting among healthcare workers, particularly nurses.

Burnout, a common problem within the healthcare industry, is characterized by emotional weariness, depersonalization, and diminished feelings of personal success. Healthcare workers are prone to the problem of burnout, which makes them feel dissociated from the job, mentally exhausted and overworked, which often leads to job dissatisfaction. It also raises the risk of quiet resignation at any time (Vidette Todaro-Franceschi, 2012 & Henke, 2023). Moreover, there are high chances of persistent exposure to stressful situations that may arise from work hours of long duration, demanding patient care needs and dealing with interpersonal interactions which are very complex; as a result, health personnel experience burnout and, consequently, become emotionally disengaged (Maslach & Leiter, 2016; Rotstein et al., 2019).

The quiet resignation in health care ranks, especially among dedicated caregivers, brings the worst standing regarding patient care and safety. A physician secretly admitting or retiring might be the source of hampered care continuations, leading to delays in treatment, mistakes in prescriptions, and dire health consequences (Lu et al., 2023; Atalay & Dağistan, 2023). There is also the aspect of personnel shortages that could be a challenge after personal midwives resign; this could lead to pressure on other staff members, and they might offer late and undesired services to patients (Liu et al., 2022; Han et al., 2023). A loud, long-term impact on patient care and safety was established as quiet resignations were evident at the point of contact between the patient and the healthcare worker and involved more grave structural issues of the whole healthcare system. For example, a few resigned followers instead of a whole team exiting could be more stressful for the rest of the coworkers, who may also be overworked and probably face burnout. (Srivastava et al., 2019; Abdallah Ali et al., 2022). That might also impact the management of the patient, cause incidents in communication or coordination of the treatments, and affect the results.

In addition, quitting knowledgeable healthcare professionals by force resignation can negate institutional knowledge and expertise in areas where specialized attention is required (Walton-Roberts et al., 2017;

Labonté et al., 2015). The loss is likely to lead to the cost-driven decisions of health facilities, which limits specialists' services and delays diagnoses and application of evidence-based methods, reducing the quality and effectiveness of patient care (Roussin et al., 2018). Both Geng (2015) agree with the effects of the financial crises on healthcare.

Silent resignations are one factor that damages the overall morale of hospital staff and contributes to the decline in productivity. It is comparable with the first domino stone noticeable drone of a vast domino block collapse. The secret departure of colleagues strictly causes negative feelings among the staff who are left behind and may be the source of uncertainty, worry, and regret; this is due to the consequent effect of low morale and work satisfaction (Formica & Sfodera, 2022; Zieba, 2023). Applying chilling effects as a symbol of deep-rooted symptoms of fallen work cultures, such as toxic workplace culture, poor leadership and lack of a decision-maker, may worsen morale and fuel the erosion of trust among the leaders. When grunts perceive their contributions stealthily disregarded and unappreciated, they might feel withdrawn, attracting less output performance. The impact of team morale on an organization and staff members' well-being is much more significant than that of individual employees; instead, it influences team dynamics in the health sector (Yıldız, 2023; Hamouche et al., 2023). When teams, particularly those in small organizations, are depleted due to quiet resignations, those surviving team members might be asked to take on more responsibilities over and above their current duties, worsening the strain and stress they have already experienced. These are associated with a potential loss of interpersonal relationships, decreased communication, and poor cooperation. This is dangerous because it jeopardizes patient care delivery (Hojat, 2016; Penberthy et al., 2018).

Along with the emotional consequences, the loss of loyalty and trust financially hit healthcare organizations because now they have to plan the expenses budget, reconsider the operational process, and consume and consume resources. The quick decline of healthcare professionals through the quitter's method may involve indirect costs such as expenditures for identifying, hiring, and training new doctors (Coughlan & Wilson, 2024; Galanis et al., 2023). These costs might be high, especially when recruiting may remain challenging, especially when hiring personnel for particular branches of the service. Plus, some extra training will be needed to replace departed workers. Quiet resignations could also have a detrimental economic effect from reduced productivity, the need to work overtime, and increased workplace turnover. The human capital losses created by the so-called "silent resignations" will force the organization to use private staffing agencies or overtime instead of asking the employees to cover the shifts. This will increase payroll expenses and inefficiencies (Formica & Sfodera, 2022; Serenko, 2023).

Moreover, disruption of workflow and service flow by quiet resignations creates deficiencies in production that can be more manifest in settings where the revenue generation is directly proportional to the number of patients or speed of throughput. Reputation problems are another necessary matter following a secret resignation that can utterly eliminate goodwill or credibility by medical institutions to the community and other stakeholders (Gabelaia & Bagociunaite, 2024; Wu & Wei, 2024). People may be turned off by the negative perception of the organizational instability, turnover rates, and morale which is attached to the healthcare companies, and it results in lower patronage and revenue streams that will harm the long-term growth and sustainability of the company (Galanis et al., 2023; Yıldız, 2023; Hamouche et al., 2023).

Quiet Quitting in Emerging Markets

The results of absenteeism are devastating in the health industry, where the stability of the workforce is needed for the smoothness of patient care and to make an organization efficient. The proportion of extenders of not their health workers rapidly increases, evoking static quitting managements that worsen the standard of patient care accorded (Suhendar et al., 2023; Xueyun et al., 2023). The events where silent quitters quit their jobs contribute to increased stress, exhaustion, and turnover among medical providers who, without the infected health workers, only provide the patient with minimal care, which escalates staff

shortages, especially in organizations with the stability of the organization at stake (Nimmi et al., 2024; Karrani et al., 2023). The acceptance evident in the quiet resignation of employees is a critical factor in the deterioration of organizational performance markers such as patient satisfaction scores, financial indicators, and overall output (Choi, 2023; Anand et al., 2023). Not having sufficient resources, such as staff, equipment, and support from management, makes healthcare workers feel frustrated and disheartened, causing them to quietly resign from their roles (Maria Hassan, 2023; Galanis et al., 2023). Leadership, communication gaps, and a lack of responsiveness, to employee issues result in healthcare professionals feeling disconnected and isolated leading them to leave their positions (Daniel, 2024; PREDA, & STAN, 2023).

Research Methodology

This study employs a machine learning approach to predict quiet quitting or silent resignation within organizations. Leveraging a dataset comprising employee behavior, performance metrics, and engagement indicators, various machine learning algorithms such as logistic regression, decision trees, and neural networks are trained and tested. Feature engineering techniques are applied to extract relevant predictors of quiet quitting. Cross-validation methods and metrics like precision, recall, f1-score, accuracy, RMSE, MSE, and MAE are employed to evaluate model performance. The resulting predictive model aims to detect potential quiet quitting instances early, enabling proactive intervention and retention strategies within organizations.

This study employs a rigorous research design to evaluate machine learning models for predicting quiet quitting in the workplace, aligning with the scholarly approach demonstrated in the analyzed article. The research design incorporates cross-validation methods and various metrics to assess the performance of the models. To ensure robustness and generalizability of the predictive models, k-fold cross-validation will be employed. This technique involves dividing the dataset into k subsets, training the model on k-1 subsets, and validating it on the remaining subset. This process is repeated k times, with each subset serving as the validation set once.

Table 1 shows multiple metrics that are used to evaluate the performance of the machine learning models, including precision, recall, F1-score, accuracy, root mean squared error (RMSE), mean squared error (MSE), and mean absolute error (MAE).

Table 1: Definitions and Formulas of Evaluation Metrics

Metric	Definition	Formula
Precision	Proportion of true positive predictions	$TP / (TP + FP)$
Recall	Proportion of actual positives correctly identified	$TP / (TP + FN)$
F1-score	Harmonic mean of precision and recall	$2 * (Precision * Recall) / (Precision + Recall)$
Accuracy	Proportion of correctly predicted instances	$(TP + TN) / (TP + TN + FP + FN)$
RMSE	Square root of the average squared difference between predicted and actual values	$\sqrt{\frac{1}{n} \sum_{i=1}^n (predicted_i - actual_i)^2}$
MAE	Average of the absolute differences between predicted and actual values	$\frac{1}{n} \sum_{i=1}^n predicted_i - actual_i $

R ²	Coefficient of determination on how well the independent variables explain the variability of the dependent variable.	$R^2 = 1 - \frac{SS_{res}}{SS_{tot}}$
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- SS_{res} is the sum of squares of residuals (also known as the residual sum of squares or SSR), which represents the difference between the observed values and the predicted values by the model.
- SS_{tot} is the total sum of squares, which represents the difference between the observed values and the mean of the dependent variable.

The model with the highest accuracy and performance metrics, including precision, recall, and F1-score, will be selected as the best predicting model. This approach ensures that the chosen model effectively identifies instances of quiet quitting while minimizing false positives and negatives. Recall metric is critical in predicting quiet quitting as it measures the proportion of actual instances of quiet quitting correctly identified by the model. High recall indicates that the model effectively captures most cases of quiet quitting, minimizing the risk of overlooking potential resignations and enabling proactive intervention strategies.

Research Design

In our study on quiet quitting, we examine various independent variables as features to discern their influence and predictive accuracy regarding this phenomenon. These variables encompass diverse aspects such as gender, age, years of experience, salary, communication patterns, leadership styles, workload, working conditions, training opportunities, trust levels, fear of retribution, sense of purpose, bureaucracy, undermining behavior, and organizational support. Quiet quitting, our dependent variable, refers to employees leaving their jobs without overtly notifying their employers, often due to dissatisfaction or disillusionment, posing challenges for organizational retention strategies and workplace dynamics (Table 2)

Table 2: Variables Definitions

Independent Variables		Definition	Measurement
1	Gender	The classification of individuals as male or female	0. Male 1. Female
2	Age	The chronological age of individuals measured in years.	1. 18 - 25 years 2. 26 - 35 years 3. 36 - 45 years 4. 46 - 55 years 5. 56+ years
3	Year of Experience	The number of years individuals have worked in their current field or industry.	1. 0 - 5 years 2. 6 - 10 years 3. 11 - 15 years 4. 16 - 20 years 5. 21+ years
4	Salary	The extent to which participants consider their salary conditions	Likert Scale: 1 (Very unsatisfied) to 5 (Very satisfied)
5	Communication	The exchange of information, ideas, and thoughts between individuals or groups.	Likert Scale: 1 (Poor) to 5 (Excellent)

6	Leadership Style	The approach or manner in which individuals lead, guide, or influence others within an organization.	<ol style="list-style-type: none"> 1. Autocratic: Leaders dictate decisions without input. 2. Laissez-faire: Leaders provide minimal guidance. 3. Democratic: Leaders involve employees in decisions. 4. Transformational: Leaders inspire and foster innovation. 5. Servant: Leaders prioritize team growth and development
7	Overload	The extent to which individuals feel overwhelmed or burdened by their workload.	Likert Scale: 1 (Extremely Overloaded) to 5 (No Overloaded)
8	Working Conditions	The physical, environmental, and social factors present in the workplace.	Likert Scale: 1 (Poor) to 5 (Excellent)
9	Training & Development	Adequacy of skills, knowledge, or competencies with job requirements	Likert Scale: 1 (Inadequate) to 5 (Excellent)
10	Trust	The belief or confidence individuals have in the reliability, integrity, and honesty of others.	Likert Scale: 1 (Very Low Trust) to 5 (Very High Trust)
11	Fear of Retribution	Individuals' concern or apprehension regarding potential punishment or retaliation for their actions or decisions.	Likert Scale: 1 (Extreme Fear) to 5 (No Fear)
12	Purpose	The sense of meaning, fulfilment, or significance individuals derive from their work.	Likert Scale: 1 (No Purpose) to 5 (High Purpose)
13	Bureaucracy	The presence of complex and rigid administrative procedures and regulations within an organization.	Likert Scale: 1 (Very High Bureaucracy) to 5 (Very Low Bureaucracy)
14	Undermining Behavior	Actions or behaviors that intentionally weaken or sabotage the efforts or achievements of others.	Likert Scale: 1 (Very Frequent) to 5 (Never)
15	Organizational Support	The extent to which individuals perceive they receive assistance, resources, and encouragement from their organization.	Likert Scale: 1 (Low Support) to 5 (High Support)
16	Job Meets Expectations	The degree to which individuals feel their job aligns with their expectations and needs.	Likert Scale: 1 (Strongly Disagree) to 5 (Strongly Agree)
17	Promotion	The degree to which participants perceive promotion opportunities	Likert Scale: 1 (Very low Opportunities) to 5 (Very High Opportunities)

Sampling

Sampling approaches were adopted to guarantee the representativeness and variety of the research sample, including diverse healthcare professions, specializations, and practice environments. A mix of purposive and snowball sampling approaches was applied to recruit participants, targeting persons with direct experience in healthcare. Participants were recruited from broad demographic backgrounds, including different age groups, genders, races, and professional professions, to capture various opinions and experiences. Efforts were made to involve healthcare workers from diverse levels of seniority, ranging from frontline personnel to senior leadership roles, to highlight the varied characteristics of quiet resignations across healthcare organizations. Participants in the study were invited to complete a questionnaire voluntarily, ensuring their freedom to contribute and withdraw at any time without consequence. They were assured of the confidentiality and secure storage of their data. A total of 856 participants, comprising 56% male, were recruited from hospitals, clinics, and healthcare centers across Morocco. The region selected represented a midlist of social and reclamations of healthcare employees advocating for enhancements such as increased fixed salaries, improved promotion conditions, better working conditions, and equitable compensation. Results

Results

Univariate Analysis

Results focus on the most significant finding, spotlighting the relevant outcomes to provide clear insights into the subject matter. In exploring quiet quitting, gender distribution shows that males represent 56.5% and females 43.5%. Notably, the highest frequency for the years of professional experience reveals that the 0-5 years experience bracket constitutes 40.8% of respondents. This substantial percentage highlights the prevalence of individuals in the early stages of their careers. A notable proportion of respondents express dissatisfaction when assessing salary expectations, with 35.5% indicating they are either very unsatisfied or unsatisfied, while 45.5% report being satisfied or very satisfied. While 42.9% of the participants expressed a high or a very high sense of purpose, nearly 39% indicated either low or shallow job purpose. Analyzing the overload levels reported by participants reveals a varied distribution across different categories. Nearly 49% of respondents said they have low or no overload. In contrast, 26.1% indicate either very high or high overload.

Statistics reveal that 22.8% of respondents have chosen transformational leadership as a managerial style, followed by 19.5% each for autocratic and servant leadership. Additionally, 18.9% mentioned democratic leadership, while 19.6% mentioned laissez-faire leadership. Overall, 38.8% of participants declared that their line management leadership style is autocratic or laissez-faire, while 61.2% stated that leadership styles are democratic, transformational, or servant (Table 3)

Table 3: Leadership Style

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Autocratic	165	19.3	19.3	19.3
	Laissez-Faire	167	19.5	19.5	38.8
	Democratic	162	18.9	18.9	57.7
	Transformational	195	22.8	22.8	80.5
	Servant	167	19.5	19.5	100.0
	Total	856	100.0	100.0	

The distribution of responses showcases in Table 4 the diverse sentiments regarding retribution fears within the workplace. Notably, 16.4% report extreme fear, while 28% express low fear, indicating varying levels of concern among employees regarding potential consequences for their actions or expressions within the organizational context.

Table 4: Fear of Retribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Extreme Fear	140	16.4	16.4	16.4
	Fear	140	16.4	16.4	32.7
	Neutral	156	18.2	18.2	50.9
	Low Fear	240	28.0	28.0	79.0
	No Fear	180	21.0	21.0	100.0
	Total	856	100.0	100.0	

Table 5 shows a significant portion (27.5%) reporting very low trust, contrasting with 16.8% expressing very high trust, illustrating the heterogeneous nature of workplace relationships shaped by varying degrees of confidence and interpersonal interactions

Table 5: Trust in Workplace

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Low Trust	235	27.5	27.5	27.5
	Low Trust	217	25.4	25.4	52.8
	Neutral	137	16.0	16.0	68.8
	High Trust	123	14.4	14.4	83.2
	Very High Trust	144	16.8	16.8	100.0
	Total	856	100.0	100.0	

Examining responses concerning working conditions unveils a spectrum of employee experiences and perceptions. Of participants, 29% perceive their conditions as very poor working conditions, while 14.1% report very good conditions, highlighting the diverse range of experiences from highly unfavorable to highly favorable within the organizational milieu (table 6)

Table 6: Working Conditions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Poor	248	29.0	29.0	29.0
	Poor	254	29.7	29.7	58.6
	Neutral	118	13.8	13.8	72.4

	Good	115	13.4	13.4	85.9
	Very Good	121	14.1	14.1	100.0
	Total	856	100.0	100.0	

Regarding bureaucracy levels, table 7 highlights the varied organizational landscapes perceived by employees. While 30.5% identify high bureaucracy, 21.6% report very low bureaucracy, showcasing the diversity in organizational structures and processes, with implications for employee autonomy and organizational agility.

Table 7: Level of Bureaucracy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very High Bureaucracy	119	13.9	13.9	13.9
	High Bureaucracy	261	30.5	30.5	44.4
	Neutral	139	16.2	16.2	60.6
	Low Bureaucracy	152	17.8	17.8	78.4
	Very Low Bureaucracy	185	21.6	21.6	100.0
	Total	856	100.0	100.0	

The data unveils that 41.4% exhibit quiet quitting behavior, while the majority, comprising 58.6%, demonstrate engaged behavior, highlighting diverse attitudes towards silent resignation (Table 8)

Table 8: Quite Quitting

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Quiet Quitting Behavior	354	41.4	41.4	41.4
	Engaged Behavior	502	58.6	58.6	100.0
	Total	856	100.0	100.0	

Bivariate Analysis

Significant correlations among variables have been prioritized workplace (Table 9). This selective approach ensures that the examination concentrates solely on significant associations, enabling a more targeted exploration of the intricate interplay between different factors influencing quiet quitting behavior within the

Table 9: Correlations

	Quite Quitting Purpose	Leadership Style	Fear of Retribution	Working Conditions	Salary Expectations	Job Expectations

Quite Quitting	Pearson Correlation	1	.195**	.487**	.550**	.389**	.236**	.458**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000
	N	856	856	856	856	856	856	856
Purpose	Pearson Correlation	.195**	1	.104**	.398**	.019	.104**	.126**
	Sig. (2-tailed)	.000		.002	.000	.577	.002	.000
	N	856	856	856	856	856	856	856
Leadership Style	Pearson Correlation	.487**	.104**	1	.297**	.116**	.112**	.243**
	Sig. (2-tailed)	.000	.002		.000	.001	.001	.000
	N	856	856	856	856	856	856	856
Fear of Retribution	Pearson Correlation	.550**	.398**	.297**	1	.208**	.417**	.296**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000
	N	856	856	856	856	856	856	856
Working Conditions	Pearson Correlation	.389**	.019	.116**	.208**	1	.117**	.208**
	Sig. (2-tailed)	.000	.577	.001	.000		.001	.000
	N	856	856	856	856	856	856	856
Salary Expectations	Pearson Correlation	.236**	.104**	.112**	.417**	.117**	1	.114**
	Sig. (2-tailed)	.000	.002	.001	.000	.001		.001
	N	856	856	856	856	856	856	856
Job Expectations	Pearson Correlation	.458**	.126**	.243**	.296**	.208**	.114**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.001	
	N	856	856	856	856	856	856	856

** . Correlation is significant at the 0.01 level (2-tailed).

The most significant correlations in the analysis of quiet quitting behavior reveal significant relationships between various factors. There is a strong positive correlation between quiet quitting and fear of retribution ($r = 0.550$, $p < 0.01$), indicating that individuals exhibiting quiet quitting behavior often do so due to apprehensions about potential repercussions. Additionally, quiet quitting demonstrates significant positive correlations with leadership style ($r = 0.487$, $p < 0.01$) and job expectations ($r = 0.458$, $p < 0.01$), suggesting that these factors play pivotal roles in influencing employees' decisions to quietly exit their roles.

Moreover, a significant positive correlation emerges between quiet quitting and high bureaucracy levels ($r = 0.487$, $p < 0.01$), indicating that excessive bureaucratic environments may foster tendencies towards silent disengagement. Additionally, quiet quitting exhibits low significant positive correlations with poor working conditions ($r = 0.389$, $p < 0.01$) and low trust in the workplace ($r = 0.195$, $p < 0.01$), suggesting that organizational climates may drive employees towards discreetly leaving their positions. Furthermore, there's a notable low correlation between quiet quitting and a sense of purpose ($r = 0.195$, $p < 0.01$), implying that individuals lacking a clear sense of purpose may be more inclined towards quietly exiting their roles. Overall,

correlation analysis does not show clear and straightforward patterns of the dynamics influencing employees' disengagement. However, it reveals the multifaceted interplay between variables.

Machine Learning Analysis

Machine learning explored the relationships between variables. This different approach allows for the identification of significant factors contributing to quiet quitting. Various machine learning techniques, including Decision Trees, Random Forest, Support Vector Machine (SVM), K-Nearest Neighbors (KNN), Logistic Regression, Ensemble Models (Voting Classifier), and Neural Networks, were employed to predict quiet quitting based on relevant variables. Each algorithm was utilized to analyze the dataset and identify patterns that contribute to quiet quitting behavior. This comprehensive approach allowed for a thorough exploration of potential predictors to minimize bias or subjective interpretation.

Table 10 shows the evaluation of different metrics broken down into machine learning models.

Table 10: Machine Learning Models Metrics

Metric	Decision Trees	Random Forest	SVM	KNN	Logistic Regression	Ensemble Models	Neural Network
Precision	0.804	0.867	0.874	0.838	0.865	0.852	0.824
Recall	0.807	0.850	0.853	0.798	0.869	0.842	0.898
F1-score	0.827	0.880	0.889	0.857	0.892	0.846	0.841
Accuracy	0.808	0.859	0.866	0.819	0.872	0.820	0.834
RMSE	0.438	0.374	0.365	0.262	0.357	0.424	0.417
MSE	0.191	0.140	0.133	0.180	0.127	0.179	0.1744
R2	0.219	0.432	0.452	0.424	0.467	0.258	0.286

Based on the provided metrics, the model with the highest values for each metric is as follows:

Precision: Support Vector Machine (SVM) with a precision of 0.874.

Recall: Neural Network with a recall of 0.898.

F1-score: Support Vector Machine (SVM) with an F1-score of 0.889.

Accuracy: Logistic Regression with an accuracy of 0.872.

RMSE: K-Nearest Neighbors (KNN) with an RMSE of 0.262.

MSE: Logistic Regression with an MSE of 0.127.

R2: Logistic Regression with an R2 score of 0.467.

Logistic Regression appears to perform consistently well across multiple metrics and could be a suitable prediction choice based on these metrics. However, the choice of model ultimately depends on the specific requirements and characteristics of the dataset and problem at hand. Table 11 shows the importance of each independent variable in influencing the prediction of the dependent variable.

Table 11: Logistic Regression Features Importance

Feature (Independent Variables)	Coefficient
Fear of Retribution	1.251
Leadership Style	1.097
Working Conditions	0.989
Purpose	0.718
Bureaucracy	0.632
Promotion	0.597
Trust	0.507
Overload	0.306
Communication with Peers	0.238
Organizational Support	0.154
Training and Development	0.122
Gender	0.116
Salary	0.056
Undermining Behaviour	-0.005
Age	-0.079
Years of Experience	-0.191

In the Logistic Regression analysis, the ranking of feature importance is crucial for understanding the predictors of the outcome variable. Fear of Retribution and Leadership Style emerge as the most influential factors, with coefficients of 1.251 and 1.097, respectively, indicating their significant impact on the outcome. Working Conditions and Purpose also exhibit considerable influence, with coefficients above 0.7. Interestingly, underlying behavior shows a negative coefficient, suggesting its inverse relationship with the outcome. This ranking provides valuable insights for decision-making and intervention strategies. A negative coefficient in logistic regression indicates an inverse relationship between the predictor variable and the outcome variable. In other words, as the value of the predictor variable decreases, the likelihood of the outcome variable occurring increases. In the context of the provided feature coefficients, a negative coefficient for "Years of experience" suggests that as the professional experience increases, the likelihood of the outcome (quiet quitting) occurring decreases.

Discussion

The investigation into this area brings insights that spotlight the various factors that contribute to quiet resignation behavior. Regarding gender breakdown, there is a mix, with males making up 56.5% and females accounting for 43.5% of the survey participants. Furthermore, a significant portion of respondents (40.8%) fall within the 0-5 years of work experience category, highlighting the prevalence of professionals navigating their career paths. Amidst concerns in the workplace, 35.5% expressed dissatisfaction with their salary expectations. On the side, 45.5% indicate varying levels of contentment, showcasing a range of feelings that include desires for better salary conditions. The landscape of job purpose generates uneven feelings as exactly 42.9% are deeply associated with their career, while 39% are having difficulties finding meaning or purpose in their daily business. This polarization reminds us of the endeavour to find meaning amidst the

multitude of job satisfaction. This purposefulness will play an essential role in shaping the emerging ecosystem. The institutional setting also varies, wherein 30.5% of institutions experience a high degree of bureaucratization while 21.6% of organizations enjoy freedom with low bureaucratization. This draws to the conscience of how managerial arrangements influence workers' autonomy. While the boundaries of organizations are hard to decipher, one can observe the signs of quiet resignation in 41.4% of such cases, which demonstrates the attitude of silently leaving the organization. This examination is based on cross-variations that characterize the silent choice between continuing and termination acts. Factors such as an existential threat to position, regimental leadership, job expectations and bureaucracy help to mold cover-up behaviour.

In contrast to the conventional correlation analysis approach, machine learning models dig deep into complex data systems to identify intricate but strong relations among the variables. These complicated algorithms address such sophisticated tasks as nonlinear patterns and interactions that correlation may miss. Machine learning, which operates through a variety of methods including decision trees, neural networks and ensemble methods that are unravelling more complex interdependencies, can, for example, lead to a better understanding of multi-layered structures of social interactions, which is one reason behind the growth of the phenomenon of quiet quitting behaviour. Naturally, both correlations revealed Fear of Retribution, Leadership Style, Job Expectations, Working Conditions, Salary, and Purpose as the highest coefficients in the analysis. In contrast, machine learning prioritized Fear of Retribution, Leadership Style, Working Conditions, Purpose, Bureaucracy, Promotion, and Trust as the most influential factors influencing quitting. Machine learning serves as a technique through which the power of algorithms, with a standout among algorithmic approaches being logistic regression, is revealed. Fear of the alternative course of action and leadership style can act as the factors that lead to the additional result.

Finding and logistic regression are the most widely spread technical tools, which are more potent than other analogues and let us explore the depth of satisfaction and enthusiasm in workplace processes. While we are locating the place of importance to particular features, ranking feature importance becomes extremely important for us because it can interpret silent resignation land more efficiently. The force of fear of punishment fluctuating from -1.12 to -1.10, with a coefficient of 1.251, is a primary factor. This implies that this effect is quite strong and can be applied as a disincentive for engaging in problematic behaviour or as a positive energy to inspire the quitting of such behaviour. Workers fearing repercussions or retribution are likelier to opt for the inactive silent breadwinner mode than for expressions of their discomfiture. Authoritarian and narrow-minded leaders are also viewed as one of the decisive factors for quitting, with a high coefficient of 1.097.

Regarding the internal outlook of an organization, it is a leadership style that is quite crucial for leadership. It helps determine the employees' attitudes and behaviours. Utilizing an autocratic style, leadership creates the precedent for the organizational climate that helps managers detect signs of quiet quitting behaviour. Working environment and purpose are agreed significant correlates that go above the 0.7 mark on the steepness of the slope. Flagging of working conditions reflects a yardstick for changing the attitude to hard work. By keeping in touch with these people, individuals who dig into purpose and essence through work may hear questions about the issues of purpose and the imperfection of goals and objectives. As personnel cannot have solid reasons for making a life sacrifice and spending much time with death and dying, they will be much more likely to give up their work quietly.

What initially seems to be a simple positive/negative effect is, in fact, very intricate, and the experience with a negative coefficient adds a complementary relationship between the outcome variable. The fact of more experience the professionals and additional responsibilities, thus partially personal issues, might lead to their inflexibility to leave quietly. As workers learn over time to cope with all those vicissitudes of working life, they become less in safe mode; therefore, job-related issues are less likely to result in quitters. Furthermore, senior employees may be more invested in their role than their newer colleagues. As a result, they may

prefer not to walk away silently while remaining quiet no matter where they are in the health workforce, which is the high turnover rate among young healthcare professionals.

Implications for Healthcare Organizations

Based on the study results, implications for delivering healthcare patient services necessitate providing a detailed view of the insights required to undertake these roles effectively. This section explains the consequences of silent resignations on patient care, workforce dynamics, and organizational efficiency. By doing so, it aims to begin a process of educating strategic decision-making and, in turn, identify the measures to be taken to reduce the prevalence of silent resignations in healthcare environments. Lockdown, furlough, and possibly layoffs can create feelings of ambiguity, financial insecurity, and loneliness. Due to this, the providers themselves may feel negatively and become dissatisfied with their jobs, which can directly impact the patients. Overcoming fear, developing leadership styles, granting purpose and meaningfulness, and setting up organizational support define the strategy of retaining people at work. Therefore, the silence of resigned employees would be prevented more than in ordinary cases.

Healthcare organizations have a workforce comprising both genders but with a male slant, trending towards entry-level to junior-level positions. Therefore, the prime focus should be understanding the career-related obstacles faced by workers progressing in their field. A conspicuous portion of dissatisfaction here overwhelms questions about pay expectations, which elucidates a vital point that must consider fair salary structures to recruit and retain talent and please employees to work with enthusiasm. In addition, the diverse sentiments regarding job resolution clarify that it is a need for healthcare organizations to develop environments that establish a sense of meaning and satisfaction in the roles that the employees play. The bureaucratic structures are one of the things that have to be looked at if agility and autonomy of the health institution are required, according to the examples of the various respondents. Resignation behaviour exists in every 2 or 3 cases, so it becomes clear that to ameliorate this situation, we must explore its roots. The lack of support and the absence of a supportive climate are the most critical factors affecting employees in the event of quitting the job. In addition, the leader's style will ultimately determine the ultimate resignation results. Healthcare institutions, therefore, must thoughtfully fashion environments where workers will not be disempowered but, instead, create employees who are transparent and improve leadership issues. These steps do not enforce the fear of facing consequences like the loss of jobs on the workers. Logistic regression algorithms and machine learning techniques can significantly shed light on the intricate sets of factors and conditions working in a quiet, quiet atmosphere in the healthcare business. Through the revelation of these fundamentals, like intimidation, inequality and leadership, the company can direct its unique programs to zero in on silent disengagement.

More so, this function not only focuses on one business but on the level of the entire health care system, which goes more profound in the way of doing health care differently. As this governing entity's law and administrative body, policymakers, lawmakers, and professional orders create and implement these regulations. The government will be the chief body in the fight against the healthcare workforce issues. They will influence the policies which will focus on taking care of employees and their lives in general by being lenient on working policies so that workers can be able to balance family and work, as well as being fair enough to address the causes of burnout and so that the case of stress and job dissatisfaction are minimized to maximum and the effect.

However, the results reveal that strict interventions, partaking and post-questioning are not the best choices for dealing with the consequences. One of the main strategies to reduce quitting in the healthcare industry is to pay enough attention to different factors of workload, organizational culture, and leadership effectiveness to create the best contexts for the employees. This might involve finding solutions such as workload management, leadership training courses, and cultural sensitivity efforts to develop a working environment for keeping specialists and their engagement.

Identification of Potential Limitations

Alongside undertaking a thorough and holistic study, there are limitations to the generalisability and objectivity of the findings. The generalizability of outcomes varies between the different healthcare systems and demographics, which may constitute one possible barrier. The research sample may need to be clarified regarding different healthcare professionals and organizations' environments, limiting the extent to which one can apply the result to other settings. Then, the reliance on self-reported data and subjective experiences may lead to allocating biases and uncertainties in the frameworks. Participants might exaggerate or overestimate their experiences or, on the contrary, might also underreport their introspections, misleading the researchers consequences. Also, the lack of causal relationships among the variables because of the cross-sectional research design reveals that limits have been placed on the capacity to draw final, conclusive results.

Besides, the research may be at risk of social desirability bias, where the respondents give answers that they consider a socially desirable response rather than an actual image of the situation and their feelings and thoughts on the matter. The individuals who took the questionnaire anonymously and pledged confidentiality were asked about the influence of the social desirability bias in the results; we must consider the possibility of such bias. Furthermore, the research can be vulnerable to the limitations associated with qualitative and quantitative research processes, including sample bias, measurement errors, and researcher subjectivity. The research gives more details on these barriers by implementing rigorous statistics and analytics. However, it is worth noting that this can affect the accuracy and honesty of the study outcomes.

In conclusion, these findings have shed light on informal dismissal syndrome in healthcare. However, it is essential to consider certain restrictions this study may have while examining other reasons. This future research may deal with these drawbacks through longitudinal studies, mixed-method technical findings, and different populations, overcoming limitations and making the results more robust and generalized.

Conclusion

The reports on the quiet resignation syndrome of healthcare institutions show different causes that impact staff retention and the organization's culture. The mixed genders, different job levels, salary expressions, and contradicting works in purpose illustrate the general goofiness within the medicinal environment. The existence of passive resignations, the unique environment each organization creates and mixed interaction between the variables reiterates the need for a multidisciplinary methodology to address employee disengagement. The Machine learning models, especially Logistic Regression, not only address these causal factors but also present great predictions about the causes of quitting, such as fear of retribution, leadership style, working conditions, purpose, red-tapism, promotion, and trust. This knowledge is the road map of healthcare organizations, and these organizations come up with interventions and strategies that can reduce silent disengagement. Effects of working in healthcare require creating conditions that ensure the safety and satisfaction of team members, paying fairly, and establishing a meaningful environment with supportive leaders. However, contemplating bureaucratic obstacles and allowing autonomy amongst employees is the perspective of fundamental elements in combating the construction of quiet resignations. Notwithstanding, the outcomes underline that there is also a need for more comprehensive structural changes across the healthcare industry, including policies that tackle both employee wellness and address the structural weaknesses leading to burnout and retention. A salutary approach to the management of quiet quitting and a culture of retention and engagement in healthcare institutions is a prerequisite for a successful and sustainable future.

Nevertheless, these rigorous methods also bring challenges, like sample biases, measurement mistakes, and a cross-sectional observation that Y designs. These come with room for further development, and researchers should strive to overcome the limitations above and increase our knowledge of quiet resignation

behaviours within healthcare systems. This study offers ready-made data to note that most healthcare organizations are a target of patient-supposed prioritization and can help future findings and organization interventions.

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