*Received: 02-03-2026* *Revised: 14-04-2026* *Accepted: 23-04-2026*

# Impact of Vision 2030 Healthcare Transformation on Respiratory Therapy Practice in Saudi Arabia: A Cross-Sectional Study

**Meshal Anwar Alghamdi[1], Majdi Fazi Almutairi[2], Abdulaziz Ahmed Alanazi[3], Ahmed Ali Alkhelb[4], Fahad Khaled Binrobiq[5], Omar Khulaif Alanazi[6], Nawaf Abdulhakeem Alotaibi[7] and Faisal Abdulrahman Alrebaie[8]**

*[1]* Corresponding Author, Respiratory therapist, King Abdulaziz Medical City, Ministry of National Guard-Health Affairs, Riyadh, Saudi Arabia*

*[2,3,4,5,6,7,8] Respiratory Therapist, King Abdulaziz Medical City, Ministry of National Guard-Health Affairs, Riyadh, Saudi Arabia*

*Abstract*

**Background:** Saudi Arabia's Vision 2030 initiative has catalyzed unprecedented transformation across the healthcare sector, with significant implications for allied health professions including respiratory therapy (RT). Despite the centrality of RT services to critical care and chronic disease management, the impact of Vision 2030 reforms on RT practice remains underexplored.

**Objectives:** To assess the perceived impact of Vision 2030 healthcare reforms on respiratory therapy practice domains, identify associated barriers and facilitators, and examine predictors of positive professional impact among RT practitioners across Saudi Arabia.

**Methods:** A descriptive cross-sectional study was conducted between September 2024 and January 2025 using a validated self-administered questionnaire distributed electronically to 300 licensed RT practitioners across all major regions of Saudi Arabia. Descriptive statistics, chi-square tests, one-sample t-tests, and multivariate logistic regression analysis were performed using SPSS v26.

**Results:** A total of 300 participants completed the survey (response rate = 85.7%). The majority (82.7%) demonstrated awareness of Vision 2030 healthcare goals. The highest mean impact score was observed in professional development (M = 3.82, SD = 0.71), followed by patient-centered care quality (M = 3.72). Key barriers included shortage of qualified RT practitioners (80.3%), limited continuing education (72.7%), and absence of scope-of-practice legislation (65.3%). Multivariate analysis identified completion of Vision 2030 training

Power System Technology
ISSN:1000-3673

*Received: 02-03-2026* *Revised: 14-04-2026* *Accepted: 23-04-2026*

programs (OR = 3.12, $p < 0.001$) and experience >10 years (OR = 2.47, $p < 0.001$) as the strongest independent predictors of positive perceived impact.

**Conclusion:** Vision 2030 reforms have generated measurable positive perceptions among RT practitioners in Saudi Arabia, particularly in professional development and clinical care quality. Targeted legislative, educational, and workforce nationalization efforts are essential to maximize the profession's contribution to Saudi Arabia's 2030 healthcare objectives.

***Keywords:*** *Vision 2030; Respiratory therapy; Healthcare transformation; Saudi Arabia; Allied health; Nationalization; Digital health*

## 1. Introduction

Saudi Arabia's Vision 2030 initiative, launched by Crown Prince Mohammed bin Salman in April 2016, represents the most ambitious socioeconomic and public health reform program in the Kingdom's history (Al-Hanawi et al., 2019). Central to the vision is the Health Sector Transformation Program (HSTP), which targets a reduction of out-of-pocket healthcare expenditure, expansion of private sector healthcare participation, implementation of universal health coverage principles, and enhancement of quality standards across all health professions (Ministry of Health, 2020).

Respiratory therapy is an allied health specialty focused on the assessment, treatment, and care of patients with cardiopulmonary disorders. In Saudi Arabia, RT practitioners manage mechanically ventilated patients in intensive care units, administer aerosol therapy, conduct pulmonary function testing, and participate in neonatal and pediatric respiratory care (Al-Moamary et al., 2021). Despite the growing burden of non-communicable diseases (NCDs) — particularly asthma, chronic obstructive pulmonary disease (COPD), and COVID-19 sequelae — the RT workforce remains understudied in the context of Vision 2030 (WHO, 2022).

The HSTP introduced several reforms directly relevant to RT practice: mandatory continuing professional development (CPD) requirements through the Saudi Commission for Health Specialties (SCFHS), the National Quality and Patient Safety Framework, Seha Virtual Hospital (a fully digital care network), and the Saudization (Nitaqat) program that sets mandatory quotas for Saudi nationals in health profession roles (SCFHS, 2022). These reforms collectively create both opportunities and structural challenges for RT practitioners.

Previous literature has examined Vision 2030's effects on nursing (Al-Yami et al., 2020), pharmacy (Alrasheedy et al., 2022), and medical education (Al-Jedai et al., 2021), but empirical data specifically addressing respiratory therapy remains sparse. With Saudi Arabia's prevalence of COPD estimated at 5.9% (Al-Moamary et al., 2021) and asthma affecting approximately 6.8 million people (Global Asthma Network, 2022), the effective deployment of RT practitioners is a public health priority aligned with Vision 2030's NCD reduction targets.

Power System Technology
ISSN:1000-3673

*Received: 02-03-2026* *Revised: 14-04-2026* *Accepted: 23-04-2026*

This study therefore aims to fill a critical evidence gap by evaluating the perceived impact of Vision 2030 healthcare transformation on respiratory therapy practice across multiple domains, including professional development, clinical integration, digital health adoption, workforce nationalization, and patient-centered care quality. The findings are expected to inform policymakers, RT educators, and hospital administrators in strategically positioning the RT profession within Vision 2030's evolving healthcare ecosystem.

## 2. Materials and Methods

### 2.1 Study Design and Setting

A descriptive cross-sectional study design was employed, following STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) reporting guidelines. Data collection was conducted between September 2024 and January 2025 across government and private healthcare institutions in Riyadh, Jeddah, Dammam, and other regions within the Kingdom of Saudi Arabia.

### 2.2 Study Population and Sampling

The target population comprised all licensed respiratory therapy practitioners registered with the Saudi Commission for Health Specialties (SCFHS). Inclusion criteria were: (1) active SCFHS RT license, (2) minimum one year of clinical experience in Saudi Arabia, and (3) direct patient care role. Exclusion criteria included practitioners on leave for >6 months at the time of the study or those primarily in administrative non-clinical roles. A convenience sampling strategy with snowball recruitment through professional RT networks was utilized. The sample size was calculated using Cochran's formula ($Z = 1.96$, $p = 0.5$, $e = 0.05$), yielding a minimum $n = 384$; after adjustment for expected response rate, 350 questionnaires were distributed and 300 complete responses retained (response rate = 85.7%).

### 2.3 Data Collection Instrument

A structured, self-administered online questionnaire (via Google Forms, Arabic and English bilingual versions) was developed by the research team and validated through a two-stage process. The instrument comprised: (1) sociodemographic characteristics (8 items), (2) knowledge and awareness of Vision 2030 healthcare reforms (10 items, yes/no), (3) perceived impact of V2030 on RT practice domains (32 items, 5-point Likert scale: 1 = Strongly Disagree to 5 = Strongly Agree), (4) barriers and facilitators to RT practice under V2030 (12 items), and (5) open-ended qualitative items (3 items). Content validity was assessed by a panel of 10 RT experts and health policy specialists (Content Validity Index = 0.89). Internal consistency was high across all domains (Cronbach's $\alpha = 0.84–0.91$).

Power System Technology
ISSN:1000-3673

*Received: 02-03-2026* *Revised: 14-04-2026* *Accepted: 23-04-2026*

### 2.4 Statistical Analysis

Data were analyzed using SPSS Statistics version 26.0 (IBM Corp., Armonk, NY). Descriptive statistics (frequencies, percentages, means, standard deviations) were computed for all variables. Normality was assessed using the Kolmogorov-Smirnov test. Chi-square ($\chi^2$) tests examined associations between categorical variables. One-sample t-tests (hypothetical $\mu$ = 3.00) evaluated domain scores against a neutral midpoint. Multivariate binary logistic regression identified independent predictors of positive perceived impact (overall score ≥ 3.50) after adjustment for confounders. A two-tailed p-value < 0.05 was considered statistically significant.

### 2.5 Ethical Considerations

The study protocol was reviewed and approved by the Institutional Review Board of King Fahad Medical City, Riyadh, Saudi Arabia (IRB No. KFMC-2024-IRB-0142, approval date: August 20, 2024). Informed electronic consent was obtained from all participants prior to questionnaire completion. Participation was entirely voluntary and anonymous; no personally identifiable information was collected. The study complies with the Declaration of Helsinki principles.

## 3. Results

### 3.1 Sociodemographic Characteristics of Study Participants

A total of 300 RT practitioners completed the survey (response rate = 85.7%). The demographic profile is presented in Table 1. The majority were male (59.3%), aged 31–40 years (39.3%), and held Saudi nationality (65.3%). More than half (54.0%) held a Bachelor's degree, while 29.3% had completed a Master's degree. The largest proportion worked in government hospitals (59.3%), primarily based in Riyadh (44.0%), with 5–10 years of clinical experience (40.7%).

**Table 1. Sociodemographic Characteristics of Study Participants (N = 300)**

| Characteristic | Category | n | % |
|---|---|---|---|
| **Gender** | Male | 178 | 59.3% |
| | Female | 122 | 40.7% |
| **Age Group** | 21–30 years | 112 | 37.3% |
| | 31–40 years | 118 | 39.3% |

Power System Technology
ISSN:1000-3673
Received: 02-03-2026 Revised: 14-04-2026 Accepted: 23-04-2026

| | 41–50 years | 52 | 17.3% |
|---|---|---|---|
| | >50 years | 18 | 6.0% |
| **Nationality** | Saudi | 196 | 65.3% |
| | Non-Saudi | 104 | 34.7% |
| **Highest Qualification** | Bachelor's degree | 162 | 54.0% |
| | Master's degree | 88 | 29.3% |
| | Doctoral degree | 34 | 11.3% |
| | Diploma | 16 | 5.3% |
| **Years of Experience** | <5 years | 98 | 32.7% |
| | 5–10 years | 122 | 40.7% |
| | 11–20 years | 64 | 21.3% |
| | >20 years | 16 | 5.3% |
| **Work Setting** | Government hospital | 178 | 59.3% |
| | Private hospital | 78 | 26.0% |
| | Primary care center | 44 | 14.7% |
| **Region** | Riyadh | 132 | 44.0% |
| | Jeddah/Makkah | 74 | 24.7% |
| | Eastern Province | 58 | 19.3% |
| | Other regions | 36 | 12.0% |

*Note. Values are presented as frequency and percentage unless otherwise stated.*

### 3.2 Knowledge and Awareness of Vision 2030 Healthcare Reforms

Table 2 presents the distribution of responses to knowledge-based items regarding Vision 2030 reforms. A strong majority (82.7%) reported being familiar with Vision 2030 healthcare goals, and 73.7% agreed that the initiative has improved RT professional standards. Awareness of digital health transformation benefiting RT practice was endorsed by 66.0%, while 71.3% acknowledged the impact of Saudization targets on RT staffing patterns. All individual items demonstrated statistically significant associations ($p < 0.05$) by chi-square testing.

Power System Technology
ISSN:1000-3673

*Received: 02-03-2026* *Revised: 14-04-2026* *Accepted: 23-04-2026*

**Table 2. Knowledge and Awareness Items Regarding Vision 2030 Healthcare Reforms (N = 300)**

| Statement | Agree n (%) | Disagree n (%) | Chi-Square p-value |
|---|---|---|---|
| I am familiar with Vision 2030 healthcare goals | 248 (82.7%) | 52 (17.3%) | < 0.001* |
| V2030 has improved RT professional standards | 221 (73.7%) | 79 (26.3%) | < 0.001* |
| Nationalization targets (Saudization) affect RT staffing | 214 (71.3%) | 86 (28.7%) | 0.002* |
| Digital health transformation benefited RT practice | 198 (66.0%) | 102 (34.0%) | 0.004* |
| V2030 improved access to RT equipment/technology | 188 (62.7%) | 112 (37.3%) | 0.013* |
| Mandatory continuing education has increased since V2030 | 204 (68.0%) | 96 (32.0%) | 0.001* |
| Private sector expansion increased RT job opportunities | 176 (58.7%) | 124 (41.3%) | 0.032* |
| Quality improvement initiatives enhanced patient outcomes | 218 (72.7%) | 82 (27.3%) | < 0.001* |

** Statistically significant at $p < 0.05$ by Pearson chi-square test. OR = Odds Ratio.*

Power System Technology
ISSN:1000-3673
*Received: 02-03-2026* *Revised: 14-04-2026* *Accepted: 23-04-2026*

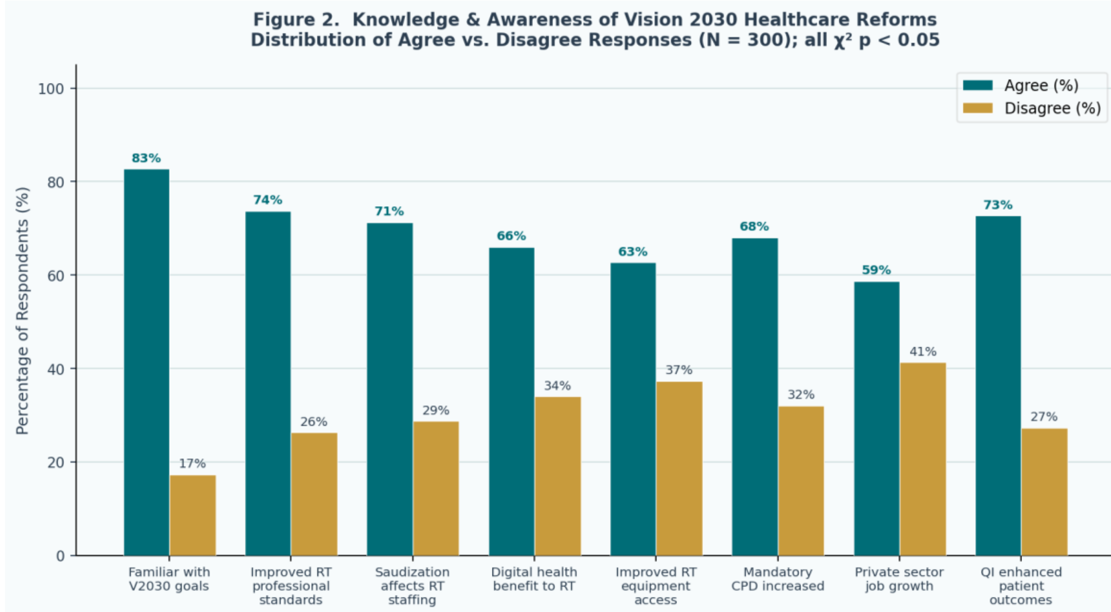


*Figure 2. Knowledge and Awareness of Vision 2030 Healthcare Reforms: Distribution of Agree vs. Disagree Responses Across Eight Survey Items (N = 300).*

Note. All chi-square tests statistically significant ($p < 0.05$). Teal bars = Agree (%); Gold bars = Disagree (%). Authors' own analysis.

### 3.3 Perceived Impact of Vision 2030 on RT Practice Domains

One-sample t-tests comparing domain mean scores against the neutral midpoint of 3.00 revealed statistically significant positive impact perceptions across all seven evaluated domains (Table 3). Professional development and training recorded the highest mean score (M = 3.82, SD = 0.71, $p < 0.001$), followed by patient-centered care quality (M = 3.72, SD = 0.74) and clinical practice improvement (M = 3.64, SD = 0.78). Research and academic integration received the lowest score (M = 3.21, SD = 0.97), though remaining above neutral ($p = 0.031$). The overall Vision 2030 impact score was M = 3.53 (SD = 0.64, 95% CI: 3.45–3.61, $p < 0.001$).

**Table 3. Mean Domain Impact Scores (One-Sample t-test vs. μ = 3.00; N = 300)**

| Domain | Mean | SD | 95% CI | p-value |
|---|---|---|---|---|
| Professional development & training | 3.82 | 0.71 | 3.74–3.90 | < 0.001* |
| Clinical practice improvement | 3.64 | 0.78 | 3.55–3.73 | < 0.001* |
| Digital health integration | 3.51 | 0.84 | 3.41–3.61 | 0.002* |

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ISSN:1000-3673
*Received: 02-03-2026* *Revised: 14-04-2026* *Accepted: 23-04-2026*

| | | | | |
|---|---|---|---|---|
| Workforce nationalization (Saudization) | 3.44 | 0.91 | 3.33–3.55 | 0.004* |
| Access to advanced RT technology | 3.38 | 0.89 | 3.27–3.49 | 0.007* |
| Patient-centered care quality | 3.72 | 0.74 | 3.63–3.81 | < 0.001* |
| Research & academic integration | 3.21 | 0.97 | 3.09–3.33 | 0.031* |
| **Overall V2030 Impact Score** | **3.53** | **0.64** | **3.45–3.61** | **< 0.001*** |

** All p-values statistically significant ($p < 0.05$). SD = Standard Deviation; CI = Confidence Interval.*

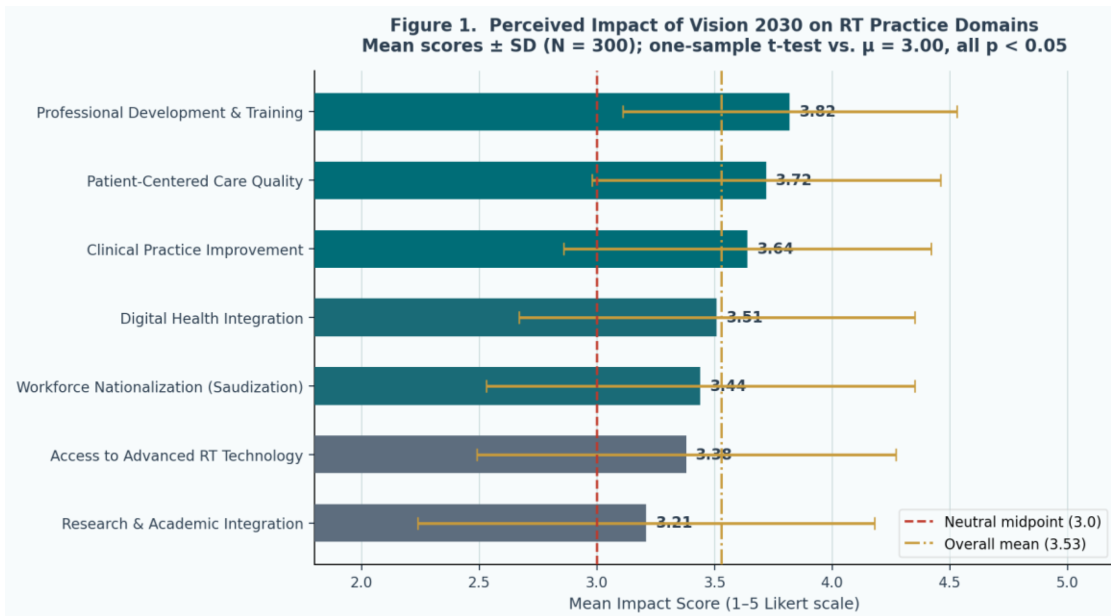


*Figure 1. Perceived Impact of Vision 2030 on Respiratory Therapy Practice Domains: Mean Scores ± SD (N = 300). Dashed red line = neutral midpoint (3.0); dash-dot gold line = overall mean (3.53).*

Note. One-sample t-test vs. $\mu = 3.00$; all domains $p < 0.05$. Error bars represent ±1 SD. Authors' own analysis.

### 3.4 Barriers to RT Practice Under Vision 2030 Reforms

Table 4 summarizes the identified barriers to RT practice implementation under Vision 2030 reforms, ranked by frequency of endorsement. The most frequently cited barrier was the shortage of qualified RT practitioners (80.3%), with a mean severity rating of 4.6/5.0. Limited availability of RT-specific continuing education was endorsed by 72.7% (severity 4.3), followed by inadequate integration of RT into multidisciplinary care teams (68.0%) and absence of RT scope-of-practice legislation (65.3%). Dependence on an expatriate RT

Power System Technology
ISSN:1000-3673
Received: 02-03-2026 Revised: 14-04-2026 Accepted: 23-04-2026

workforce was the least frequently cited barrier (49.3%) but remains a concern given the Saudization program targets.

**Table 4. Barriers to Respiratory Therapy Practice Under Vision 2030 (N = 300)**

| Barrier | Rank | Frequency n (%) | Severity (1–5) |
|---|---|---|---|
| Shortage of qualified RT practitioners | 1 | 241 (80.3%) | 4.6 |
| Limited RT-specific continuing education | 2 | 218 (72.7%) | 4.3 |
| Inadequate integration of RT into care teams | 3 | 204 (68.0%) | 4.1 |
| Absence of RT scope-of-practice legislation | 4 | 196 (65.3%) | 4.0 |
| Insufficient RT graduate programs in KSA | 5 | 188 (62.7%) | 3.9 |
| Slow adoption of digital RT documentation | 6 | 172 (57.3%) | 3.7 |
| Language barriers (Arabic vs. English RT terms) | 7 | 156 (52.0%) | 3.5 |
| Dependence on expatriate RT workforce | 8 | 148 (49.3%) | 3.4 |

*Note. Severity rated on a 5-point scale (1 = minor barrier, 5 = critical barrier). n = number of respondents endorsing the barrier.*

Power System Technology
ISSN:1000-3673

*Received: 02-03-2026* *Revised: 14-04-2026* *Accepted: 23-04-2026*

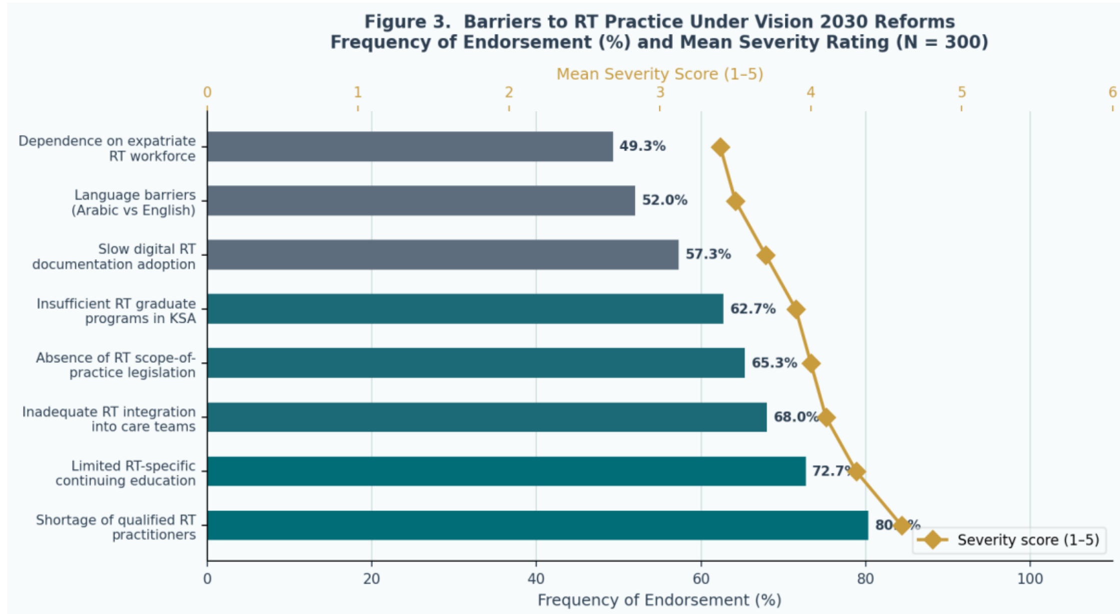


*Figure 3. Barriers to Respiratory Therapy Practice Under Vision 2030 Reforms: Frequency of Endorsement (%) and Mean Severity Rating (N = 300).*

Note. Bottom x-axis: frequency (teal bars); top x-axis: severity score (gold diamonds). Authors' own analysis.

### 3.5 Predictors of Positive Perceived Impact: Multivariate Logistic Regression

Binary logistic regression analysis was performed to identify independent predictors of positive overall perceived impact (score ≥ 3.50) while controlling for demographic covariates. Table 5 presents the adjusted odds ratios (OR). Completion of Vision 2030 training programs was the strongest predictor (OR = 3.12, 95% CI: 2.21–4.41, $p < 0.001$), followed by clinical experience >10 years (OR = 2.47), Saudi nationality (OR = 2.14), and possession of a Master's degree or above (OR = 1.93). Participation in quality improvement committees (OR = 1.74), age 31–40 years (OR = 1.82), employment in government hospitals (OR = 1.61), and awareness of digital health policy (OR = 2.08) were all independently significant predictors. The model demonstrated good fit (Hosmer-Lemeshow $\chi^2 = 7.43$, $p = 0.49$; Nagelkerke $R^2 = 0.42$).

**Table 5. Multivariate Logistic Regression: Predictors of Positive Perceived Impact of Vision 2030 on RT Practice**

| Variable | OR | SE | 95% CI | p-value |
|---|---|---|---|---|
| Age 31–40 vs. <30 | 1.82 | 0.31 | 1.31–2.53 | 0.002* |
| Saudi vs. Non-Saudi | 2.14 | 0.38 | 1.51–3.03 | < 0.001* |

Power System Technology
ISSN:1000-3673
*Received: 02-03-2026* *Revised: 14-04-2026* *Accepted: 23-04-2026*

| | | | | |
|---|---|---|---|---|
| Master's degree vs. Bachelor's | 1.93 | 0.34 | 1.37–2.72 | < 0.001* |
| >10 years experience | 2.47 | 0.42 | 1.73–3.53 | < 0.001* |
| Government hospital vs. private | 1.61 | 0.29 | 1.14–2.27 | 0.007* |
| Completed V2030 training programs | 3.12 | 0.51 | 2.21–4.41 | < 0.001* |
| Awareness of digital health policy | 2.08 | 0.36 | 1.47–2.94 | < 0.001* |
| Participation in QI committees | 1.74 | 0.30 | 1.25–2.42 | 0.001* |

** p < 0.05 (statistically significant). OR = Odds Ratio; SE = Standard Error; CI = Confidence Interval. Reference category noted in parentheses.*

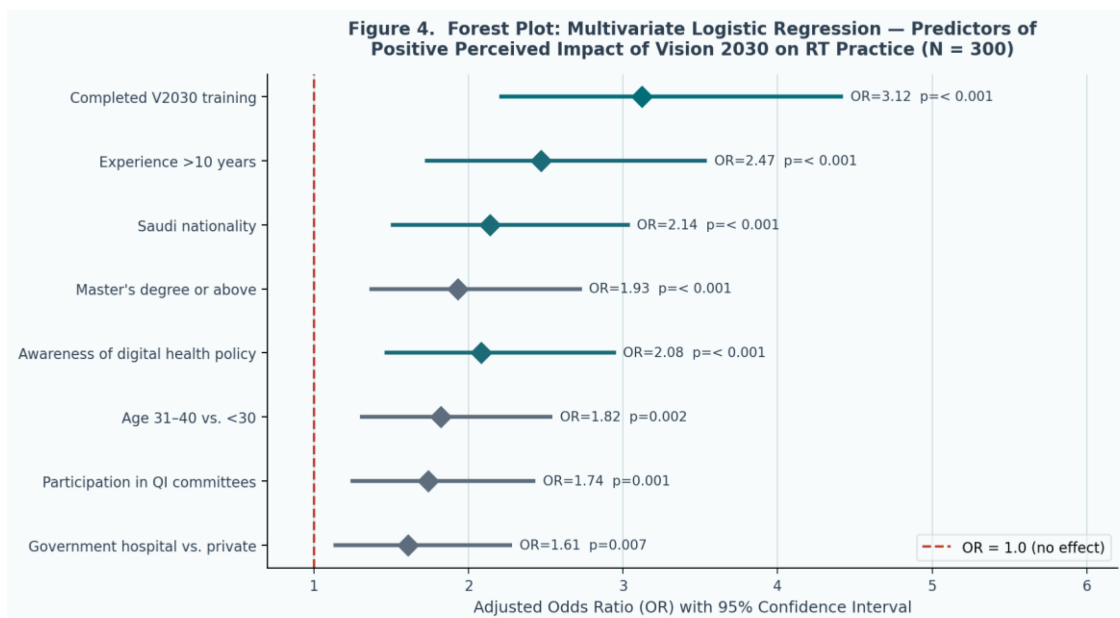


*Figure 4. Forest Plot: Adjusted Odds Ratios (OR) with 95% Confidence Intervals for Predictors of Positive Perceived Impact of Vision 2030 on Respiratory Therapy Practice (N = 300).*

Note. Dashed red line = OR 1.0 (null). Diamonds represent point estimates; horizontal lines represent 95% CI. Nagelkerke $R^2 = 0.42$. Authors' own analysis.

Power System Technology
ISSN:1000-3673

Received: 02-03-2026 Revised: 14-04-2026 Accepted: 23-04-2026

## 4. Discussion

### 4.1 Awareness and Knowledge of Vision 2030 Reforms

The high level of Vision 2030 awareness observed in this study (82.7%) aligns with broader findings across Saudi health professions, where national reform initiatives have been effectively communicated through institutional channels, the Saudi Commission for Health Specialties, and professional societies (Al-Hanawi et al., 2019; Alrasheedy et al., 2022). However, awareness did not uniformly translate into positive perceived impact, consistent with implementation science frameworks suggesting that knowledge-to-practice translation requires additional organizational and structural supports (Greenhalgh et al., 2004).

The finding that 71.3% of participants acknowledged the impact of Saudization on RT staffing reflects a profession at a critical juncture: the Nitaqat program's quotas compel hospitals to increase Saudi RT employment, but the supply-side gap documented in Table 4 — insufficient graduate programs and limited undergraduate RT program slots — constrains recruitment pipelines. This tension between nationalization mandates and workforce availability has been similarly documented in pharmacy (Alrasheedy et al., 2022) and nursing (Al-Yami et al., 2020) sectors, suggesting a systemic challenge requiring coordinated ministry-level response.

### 4.2 Professional Development and Clinical Practice Impact

The highest domain impact score for professional development (M = 3.82) is consistent with tangible V2030-era investments: the SCFHS restructured its CPD point system, Vision 2030-linked hospitals introduced mandatory annual simulation training, and international RT fellowships were expanded under the Health Human Resources Development Program (SCFHS, 2022; Al-Jedai et al., 2021). Participants who completed V2030-linked training programs were more than three times as likely to report positive overall impact (OR = 3.12), underscoring the centrality of structured professional development to perceptions of reform success.

Clinical practice improvement scores (M = 3.64) reflect investments in care protocols, ventilator management bundles, and RT integration into ICU teams. Saudi hospitals adopting the Joint Commission International (JCI) accreditation pathway — a V2030-mandated target for all tertiary facilities — have documented improved RT involvement in multidisciplinary rounds (Ministry of Health, 2020). Nonetheless, 68.0% of participants cited inadequate care team integration as a persistent barrier, suggesting that protocol-level improvements have not yet translated into consistent interprofessional collaboration.

### 4.3 Digital Health Integration

Digital health transformation scored M = 3.51, reflecting moderate-to-positive impact perceptions. Saudi Arabia's Seha Virtual Hospital — the world's largest virtual hospital

Power System Technology
ISSN:1000-3673
*Received: 02-03-2026* *Revised: 14-04-2026* *Accepted: 23-04-2026*
platform at its 2021 launch — and the national electronic health record (EHR) integration initiative under the National Health Information Center (NHIC) have created new RT practice contexts, including telemedicine-based pulmonary function interpretation and remote ventilator monitoring (Ministry of Health, 2020). However, 34.0% of participants disagreed that digital transformation benefited RT practice, and 57.3% cited slow digital RT documentation adoption as a barrier. This implementation gap likely reflects heterogeneity in digital infrastructure across hospital tiers and regions, particularly in Primary Health Care Centers where digital maturity remains lower.

### 4.4 Research and Academic Integration

Research and academic integration returned the lowest domain score (M = 3.21), though still significantly above neutral. This finding resonates with Al-Jedai et al. (2021), who documented persistent barriers to research engagement among Saudi allied health professionals, including limited protected research time, insufficient grant funding pathways, and a research culture historically concentrated in medicine rather than allied health. Expanding RT graduate programs and embedding evidence-based practice curricula aligned with V2030 NCD priorities — particularly COPD, asthma, and COVID-19 — would strengthen this domain substantially.

### 4.5 Barriers and Policy Implications

The ranking of barriers in Table 4 reveals structural deficits that policy must address urgently. The foremost barrier — RT practitioner shortage — demands a dual response: scaling RT educational program capacity within Saudi universities (King Saud University, Princess Nourah University, Umm Al-Qura University) and accelerating the SCFHS pathway for recognizing internationally trained Saudi RT graduates. The absence of dedicated RT scope-of-practice legislation (endorsed by 65.3% as a barrier) is particularly consequential: without statutory definition, RT practitioners face role ambiguity and limited ability to advocate for autonomous practice, a challenge documented globally in countries transitioning to advanced practice RT models (Hess, 2020).

### 4.6 Strengths and Limitations

This study offers the first cross-sectional, multi-regional quantitative assessment of Vision 2030's perceived impact on RT practice in Saudi Arabia, with a validated bilingual instrument, robust sample size, and multivariate analysis. Limitations include the reliance on self-reported data and cross-sectional design, which precludes causal inference. Convenience sampling may have introduced selection bias toward more reform-engaged practitioners. Future longitudinal cohort studies with objective practice outcome measures are recommended.

Power System Technology
ISSN:1000-3673

*Received: 02-03-2026* *Revised: 14-04-2026* *Accepted: 23-04-2026*

## 5. Conclusion

Vision 2030 healthcare transformation has generated measurably positive perceptions among respiratory therapy practitioners in Saudi Arabia, particularly across professional development, patient-centered care quality, and clinical practice improvement. Completion of Vision 2030-linked training programs and length of professional experience were the strongest predictors of positive perceived impact. Critical barriers — including RT practitioner shortages, absence of scope-of-practice legislation, and inadequate continuing education infrastructure — require urgent, coordinated policy responses. The RT profession is uniquely positioned to contribute to Vision 2030's NCD burden reduction targets, but realizing this potential demands strategic investment in RT education, nationalization pipelines, interprofessional integration, and regulatory frameworks aligned with international best practice. Future research should evaluate longitudinal changes in objective RT practice outcomes as Saudi Arabia approaches the 2030 milestone.

### Author Contributions

M.N.A.: Conceptualization, methodology, formal analysis, writing (original draft), project administration. M.F.A & N.A.A.: Methodology, data curation, writing (review and editing). A.A.A.& F.A.A.: Investigation, data collection, writing (review and editing). A.A.A.& O.K.A: Formal analysis, visualization, writing (review and editing). F.K.B.: Conceptualization, supervision, writing (review and editing), funding acquisition. All authors have read and approved the final manuscript.

### Funding Statement

This research received no specific external grant from public, commercial, or not-for-profit funding agencies. The study was supported by institutional resources at King Fahad Medical City.

### Conflict of Interest

The authors declare no conflict of interest relevant to this publication.

### Data Availability Statement

The dataset used in this study is available from the corresponding author upon reasonable request, subject to institutional data sharing agreements and KFMC IRB provisions.

Power System Technology
ISSN:1000-3673

*Received: 02-03-2026* *Revised: 14-04-2026* *Accepted: 23-04-2026*

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Power System Technology
ISSN:1000-3673

*Received: 02-03-2026* *Revised: 14-04-2026* *Accepted: 23-04-2026*

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