Jha, A., Minocha, R., Patel, H., Akhouri, S.S., Mishra, T., Barik, S., Firoz, S., Singh, M. K., Kashyap, A., Das, S., Sethi, A., Rajan, T., Gautam, D., Singh, M. K., Chakraborty, K., Reddy, N. S., Das, A., Varma, K., & Mahapatra, T. (2026). Fostering compassionate public healthcare leadership towards sustainability: Evidence from Bihar, India. *International Journal of Wellbeing*, *16*(2), 5605, 1-28. https://doi.org/10.5502/ijw.v16i2.5605

ARTICLE

Fostering compassionate public healthcare leadership towards sustainability: Evidence from Bihar, India

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Abstract: *Introduction.* Compassionate leadership, a critical driver for healthcare development, performance, service quality and citizen satisfaction, remains less cultivated in Indian public healthcare. Embedded in Piramal Foundation's philosophy of Sewa Bhaav (spirit of service), globally recognized models of compassion-based ethics were integrated in Compassionate Leadership & Personal Transformation Training (CL-PTT). Collaborating with Emory University, United States and the Government of Bihar State, India, this multi-pronged omnichannel approach facilitated leadership unlocking "Agency to Serve" among healthcare professionals.

Methods. The CL-PTT intervention was assessed in a cross-sectional study of 949 healthcare workers at 35 district hospitals, of which 18 received the intervention. Key objectives were: (1) to assess leadership competencies and correlate them with citizen experience; (2) to understand provider attitudes and behaviours; (3) to identify gaps and inform course correction. A co-designed, scenario-based, field-validated Leadership Assessment Tool measured 16 personal, social and people leadership competencies. The Citizen Experience Feedback Tool captured citizen-provider interactions from 702 citizens across both outpatient (OPD) and inpatient (IPD) departments. The development of both tools was guided by extensive literature review, established frameworks and tacit knowledge captured through iterative expert consultations.

Results. Significantly higher odds of 'good' (uppermost tertile) leadership competencies were found among healthcare professionals in the intervention facilities compared to non-intervention (adjusted odds ratios (aORs) for personal=3.7, social=6.0, people=6.5, and overall=5.4 categories), and measures of self-awareness, emotion management, non-violent communication, team development, and providing feedback were significantly higher. Compared to control facilities, citizen experiences in the OPD were better in intervention facilities for active listening (93.5% vs. 85.2%), adequate consultation time (90.6% vs. 76.5%), and encouragement for questioning (81.2% vs. 68.2%). Overall, CL-PTT was associated with better leadership competencies and improved citizen-provider interactions.

Conclusion. Findings validate the transformative potential of integrating compassion-based ethics into leadership development programs for healthcare delivery and citizen-centered care.

Keywords: Compassionate leadership, Sewa Bhaav, agency to serve, omnichannel approach, mixed-methods approach, citizen experience, health system performance

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1. Introduction

Leadership is one of the critical disciplines for fostering team well-being, effective service delivery, and organizational success transcending social, cultural and psychological contexts. Despite this, it remains a complex and evolving concept with a wide number of theoretical approaches. Previous studies have conceptualized leadership by considering it through various lenses: as a process, behavior or information-processing viewpoint (Da'as et al., 2021; Hoffman & Lord, 2013; Küpers, 2007; Lord et al., 2020). Traditional frameworks for leadership development emphasize strategic thinking, task orientation and technical competence (Hougaard & Carter, 2022). However, over time, there has been a growing shift towards incorporating soft skills, emotional intelligence, and relationship-centered or empathic approaches into leadership practice (Abid et al., 2023). Notably, compassion has emerged as a critical element of effective leadership, especially within healthcare systems, where human connection is pivotal to the caregiving process (Ahmed et al., 2024; Emirza, 2022; Hougaard & Carter, 2022; Ramachandran et al., 2023; West & Chowla, 2017).

Compassion has been explained as a four-part interpersonal process that involves: observing someone's suffering; understanding the reason behind it; feeling empathy and a sense of concern towards the sufferer; and taking purposeful action to alleviate the suffering (Dutton et al., 2014). Others have described compassion as a construct that integrates soft skills, emotional intelligence and ethical responsibility (Gilbert, 2009; Ramachandran et al., 2023; West & Chowla, 2017). From a public health perspective, compassion can also be viewed as a population-level determinant requiring both universal and targeted interventions within health systems to strengthen wellbeing and service responsiveness (Neilson & Syed, 2026). In a leadership context, compassion extends beyond responding to suffering alone. Here, it can be defined as a people-centered approach to improve team interaction, engagement and management, one that prioritizes respect, equity and psychological safety in the team. It encompasses the ability to engage meaningfully with team members by understanding and acknowledging the professional and emotional needs of each person (de Zulueta, 2016; Hewison et al., 2018; Hougaard & Carter, 2022). Recent work on epidemiology of compassion supports leadership focus by highlighting that compassion operates through emotionally meaningful interactions and shared experiences, which shape collective motivation and action within health systems (Aellah & Davey, 2026). At a broader level, this perspective encourages health systems towards greater relational accountability and ethical responsiveness to preventable suffering (Adiabu & Bemo, 2026). Compassionate leadership (CL) focuses on three key elements: understanding the team and team's strengths, increasing the positive culture as well as environment within the team, and supporting overall well-being of everyone (Östergård et al., 2023).

Healthcare facilities, particularly in low-resource settings, face many challenges that emphasize the need for and importance of embedding compassion within the leadership development curriculum. Strict bureaucratic systems which largely focus on task completion, work overloads, and lack of adequate resources, reduce the scope for emotional engagement within the team. In India, the healthcare system persistently faces equity and equality gaps affecting both patients and staff (Silva et al., 2022). Many studies have documented patient dissatisfaction with overall delivery of public healthcare, particularly for women during childbirth and both the prenatal and postnatal periods (Jha et al., 2017; Kaur et al., 2020; Sharma et al., 2019). Patient dissatisfaction with healthcare services may culminate from several factors, such as power dynamics within the healthcare organization, hierarchical systems, and lack of compassionate leadership at the center of management systems, which ultimately influence the culture of the whole care-providing team (Ahmed et al., 2024; Almohaisen et al., 2023; de Zulueta,

2016; Fernandopulle, 2021; Kearns et al., 2021; McDonald et al., 2012; Rahayu et al., 2024). Such employment conditions can even trigger mental health issues such as depression or anxiety (Bohren et al., 2015; Shwetha, 2023). The COVID-19 pandemic also demonstrated how systemic challenges and increased burnout, stress and anxiety levels can negatively impact compassionate care (Ahmed et al., 2024; de Zulueta, 2016).

Compassionate healthcare leadership can help to address these challenges by fostering empathy, emotional intelligence, and people skills in leadership frameworks. There is much evidence in the literature that integrating compassionate leadership into training programs for healthcare providers improves job satisfaction and performance, reduces burnout, and promotes professional dignity among healthcare workers (de Zulueta, 2016; Lown et al., 2019; Östergård et al., 2023). This also supports a psychologically safe environment with better responsiveness and trust (Dutton et al., 2014; Ramachandran et al., 2023; World Health Organization, 2025). Embedding compassionate leadership in public health systems can thus lead to improvements in care quality, job satisfaction, and better citizen experience.

Several studies globally have demonstrated that CL is not just an abstract theory but a practical, measurable and quantifiable concept. In many high-income countries, there are examples which demonstrate that integration of CL into healthcare frameworks has helped to improve citizen outcomes and organizational resilience. For instance, the United Kingdom's National Health Service (NHS) has embedded compassionate leadership into its work culture by promoting the "*6Cs*": care, compassion, competence, communication, courage, and commitment (Baillie, 2017; Wang et al., 2024). Similarly, New Zealand implemented compassion-embedded interventions for healthcare professionals, leading to improved interconnectedness among healthcare workers (Pavlova et al., 2024). Evidence from low- and middle-income countries including Pakistan (Ahmed et al., 2024; Malik et al., 2025), Kenya (Nzinga et al., 2018), Nepal (Karki et al., 2023) and other countries showed improved team coordination as well as better care experiences for citizens (West & Chowla, 2017).

1.1 The need for compassionate leadership in public healthcare systems in Bihar, India

Bihar, one of the most populated and historically underserved states in India, has long struggled with systemic deficits in public health infrastructure, service delivery, and governance. This has led to low healthcare quality, poor implementation of health policies, and inadequate community outreach (Kamath et al., 2017; Karvande et al., 2016; Kaur et al., 2019; Kumar & Raj, 2013). Public hospitals face critical human resource shortages, leading to overburdened staff, which particularly affect vulnerable populations, especially women and children. This is further exacerbated by the state's socioeconomic deprivation, characterized by high multidimensional poverty, low literacy, caste hierarchies, sex inequity, and rural isolation (Kotwal et al., 2021; International Institute for Population Sciences, 2021; NITI Aayog, 2023). These issues over the years have deeply affected the trust in relationships between healthcare providers and care seekers, resulting in ineffective delivery of healthcare services. In such emotionally drained settings, compassionate leadership becomes particularly relevant to rebuild trust and improve quality of care through more responsive and people-centered care.

1.2 Aim and objectives of this study

Recognizing this need, a structured Compassionate Leadership and Personal Transformation Training (CL-PTT) intervention was implemented across 18 district hospitals in Bihar. Guided by the philosophy of *Sewa Bhaav* (spirit of service), CL-PTT aimed to foster a culture of empathy, self-reflection and collaboration to allow healthcare workers to meaningfully engage with their

teams and healthcare-seeking citizens. This study evaluated the impact of the CL-PTT intervention on leadership competencies and citizen experience. For this, we developed two tools: a leadership assessment for providers and a feedback tool for citizens. There were three specific objectives:

I. To assess *personal, social and people leadership* skills across different cadres of healthcare professionals using the leadership assessment tool, and to correlate these skills with citizen experience and satisfaction in the out-patient and in-patient departments (OPD and IPD, respectively) using the citizen feedback tool.

II. To gain insight into the attitudes, behaviors and perspectives of service providers in healthcare facilities towards compassionate leadership in clinical practice.

III. To identify implementation gaps as well as lessons and to generate evidence to inform course corrections that, in turn, could guide future adaptations and scale-up activities.

2. Methods

2.1 Design of the Compassionate Leadership and Personal Transformation Training (CL-PTT) intervention

The CL-PTT intervention was designed by the Piramal School of Leadership – the School of Health (PSL-SOH), a structurally-embedded unit of Piramal Foundation, India in collaboration with the Center for Contemplative Science and Compassion-Based Ethics at Emory University in the United States. It was conceptualized by combining tacit knowledge from in-depth discussions with global subject experts and collective wisdom around compassion-based ethics captured through a comprehensive literature review on leadership and compassion models, including Emory University's Cognitively-Based Compassion Training (CBCT). A multi-pronged omnichannel approach (OCA) – an integrated strategy using multiple interconnected communication and learning channels including in-person experiential workshops, peer learning modules, and reflective practice – was employed to promote holistic development of healthcare professionals. This equipped them with emotional, cognitive, and relational skills necessary for fostering compassionate, ethical, and patient-centered care, effective teamwork, and resilience in high pressure environments, thus unlocking their *"agency to serve"* (Blasiak et al., 2022; Moreira et al., 2023; Moreira et al., 2024).

Key components of the intervention included:

a. *Personal transformation and team building (PTTB):* A PTTB workshop (Supplementary 1 and 2a) was designed to foster self-awareness. Participants were asked to reflect on their life journeys, starting with their earliest memories, such as what they saw, heard, and felt, and who was a part of those experiences. The exercise helped bring participants into the present moment, seated in the training room, aware of their life journey, achievements, and expectations, fostering self-awareness and presence. Using principles of adult learning, role-playing activities were performed, and content was personalized to learners' pace through co-creation, continuous feedback and assessment. The role-playing activities were designed in consultation with our field staff, government stakeholders and personal experiences of healthcare providers in a way that reflected real-time experiences in the hospitals. A key addition to this was *CBCT (Cognitively-Based Compassion Training)* (Supplementary 2b), a scientifically grounded approach to increasing emotional regulation, empathy, and prosocial behavior (Ash et al., 2021; Kolchraiber et al., 2022).

b. *Live-action projects (LAPs):* LAPs included self-designed, outcome-based learning over a three-month period where participants designed their own projects by identifying areas

most relevant to their professional context. Rooted in experiential learning, LAPs emphasized the SMART (Specific, Measurable, Achievable, Relevant, Time-bound) framework along with regular self-reviews (Aghera et al., 2018; Bjerke & Renger, 2017; Tofade et al., 2012). LAPs promoted the practical application of functional and behavioral skills identified in the PTTB workshop in real-world settings. LAPs emphasize learning by doing, reflection, feedback, and peer learning as part of a process of transformation. This is based on experiential learning principles for adults (Collins, 2004; Russell, 2006). Thus, participants designed their LAPs within the OCA framework, using structured reflection and micro-milestones to apply knowledge gained from other channels into practice-based improvement projects (Victor et al., 2019).

c. *Peer learning communities (PLCs):* Each PLC, comprising of 25 to 30 people, met once every 6-8 weeks at the district hospitals, being guided by district hospital managers and Piramal Foundation project staff. These meetings emphasized reduced professional isolation by encouraging peer sharing, learning, reflection and motivation. Experiential learning was focused through context-specific, collectively driven learning groups, incorporating real-life examples.

d. *Online courseware, field support, and virtual field support*: Online courseware on competencies such as non-violent communication, active listening, self-awareness, empathy, influence without authority, and communication skills offered flexible, self-paced learning opportunities. Field support ensured regular guidance from on-ground intervention implementation teams, who also facilitated the healthcare providers in enrolling, and virtual field support offered on-call assistance with Learning Management System (LMS). LMS, developed by Piramal Foundation in collaboration with Enthralltech, is an online, self-paced learning portal designed to provide an interactive and engaging experience for learners.

2.2 Conceptual framework and tool development

To evaluate the intervention's impact, two primary tools were developed: (i) a scenario-based questionnaire to assess healthcare providers' compassionate leadership competencies (Supplementary 3a-3e) and (ii) an interview-based tool for assessing citizen experience (Supplementary 4). The scenario-based questionnaire incorporated into our existing Middle Managers Competency Framework and Assessment Tool (Russell, 2006; Victor et al., 2019), consisting of four core domains of leadership (personal, social, people, and organizational), divided across ten competencies with mapped meta-indicators (e.g., empathy, adaptability, active listening, conflict resolution, etc.) and three proficiency levels of good, average and poor. The tool design also included insights from Emory University's CBCT model (Ash et al., 2021; Kolchraiber et al., 2022) and Piramal Foundation's approach to personal transformation. Capturing the tacit knowledge gathered through compassionate leadership practices and on-ground challenges faced by healthcare providers was critical. It was also necessary to ensure that the intervention reflected practical realities. With these objectives, in-depth discussions were conducted with Piramal Foundation's *Leadership Development (PF-LD)* team engaged and responsible for conceptualization, design and implementation of the intervention on the ground. Field teams working directly with healthcare providers and other subject matter experts were also engaged. These discussions provided valuable insights into both anecdotal and documented experiences of the intervention. An extensive literature review was conducted in parallel to inform the tool's content and relevant constructs/domains were defined accordingly.

Additionally, 20-30 validated scales used previously in similar contexts or settings were reviewed, with 10 or more reliable scales per domain included in the tool. Specifically adopted were the Multifactor Leadership Questionnaire (MLQ) by Bass/Avolio (Bass, 2021) for *leadership*; the Self-Compassion Scale Short Form (SCS-SF) (Raes, 2011) for *self-compassion*; the Compassion Competence Scale (CCS) (Young, 2023) for *compassion for others*; and the Jefferson Scale of Empathy (Hojat, 2001) for *empathy*. The *resilience* section used two different scales, the CRTRQ (Crisis Rescue Team Resilience Questionnaire) and the HRSQ (Health Resiliency Stress Questionnaire) (Su et al., 2023). For *teamwork and collaboration*, the TeamSTEPPS® Teamwork Attitudes Questionnaire was used (King et al., 2008). The *motivation* section was based on the CTC Provider Motivation Scale (Sato et al., 2017). *Active listening* was based on Active-Empathic Listening Scale (AELS) (Keaton, 2017), and for *non-violent communication*, questions were developed based on the literature (Fernandopulle, 2021), as no ready-made tools were available.

Domain-specific scale items were contextualized into a draft questionnaire comprising closed-ended questions. To minimize social desirability bias, especially for domains with strong social appeal, such as empathy, compassion, and active listening, the tool was further refined using a mixed-method approach, which integrated both qualitative and quantitative approaches to gain comprehensive understanding and capture both measurable responses and nuanced experiences. Therefore, the revised version included a combination of closed-ended questions, real life scenarios reflecting professional roles, and open-ended questions on the perceptions and experience of the CL-PTT intervention. The tool was translated into the local language (Hindi) and cognitively tested during piloting in health facilities where the intervention was not implemented. This involved testing the questions with a small group of target respondents to ensure that each question was interpreted as intended and issues such as ambiguous wording, complex phrasing, and cultural relevance were addressed.

In parallel, we designed a citizen experience tool aligned with National Quality Assurance Standards (NQAS) guidelines. Domains included infrastructure, basic amenities, interaction of citizens with healthcare providers, citizens' rights, privacy and confidentiality. The "interaction with provider" domain included respectful behaviour, adequate time, verbal/non-verbal gestures, empathy, openness, comfort, and language of communication. As with the leadership tool, literature-backed constructs were defined, and the tool was translated into Hindi, field-tested and revised based on feedback.

The final conceptual framework, presented as a directed acyclic graph (DAG) (Figure 1), illustrates the relationship between leadership training interventions and citizen experience outcomes, accounting for confounders (sex and years of work experience in current professional designation). This approach aligns with emerging work which proposes that epidemiologic frameworks traditionally used to study disease distribution can also be adapted to examine determinants and patterns of compassion across populations and institutional settings (Boyd et al., 2026). For this assessment, three core domains were prioritized. Under *Personal leadership,* the sub-domains of self-awareness (emotional self-awareness, self-compassion) and self-management (adaptability, emotional regulation) were assessed. *Social leadership* included the sub-domains of managing communication (active listening, non-violent communication, conflict management) and developing influence and collaboration (mutual goal-setting, inter-departmental coordination). *People leadership* encompassed coaching (team development) and giving feedback (facilitating meetings and sessions, continuous learning, and feedback culture).

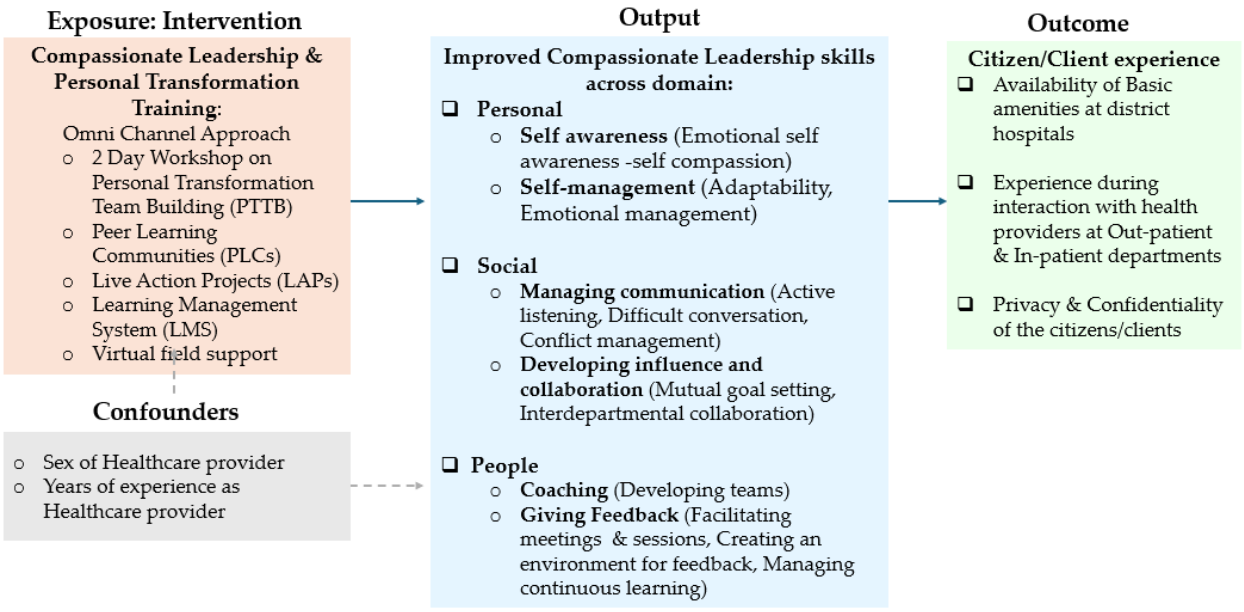

Figure 1. *Conceptual model of Compassionate Leadership & personal transformation and its impact on citizen experience*

2.3 Study design

The intervention was rolled out in 18 districts in Bihar, with the District Hospital (DH) serving as the intervention site (one DH per district). It engaged more than 2000 healthcare professionals (including deputy superintendents, hospital managers, doctors, nurses, paramedics and administrative staff) to initiate the journey of personal transformation and compassionate leadership in healthcare. Although each of the persons who were exposed to the intervention in the 18 intervention facilities did not have uniformly equal exposure to the intervention, still they were all considered as intervention-exposed if they were working at an intervention facility. Since the intervention focused on soft-skills development like compassionate leadership rather than technical or clinical training and these skills are expected to diffuse across staff within a facility by virtue of the team-building nature of the intervention, we considered all providers working in intervention facilities as exposed. Non-intervention facilities refer to the 17 district hospitals in other districts where no elements of the compassionate leadership program were implemented during the study period – neither in full nor in part. These facilities therefore serve as the reference group for the study. The assessments were conducted 3 months after the intervention activities had been completed in the respective intervention facilities, ensuring that providers had some degree of exposure before being evaluated.

A cross-sectional, mixed-method study was conducted in two phases:

Phase I: District hospitals: Assessed leadership competencies involving 949 healthcare workers from 35 district hospitals (238 trained and 711 non-trained participants for *Personal/Social domains*; 59 trained vs 89 untrained for *People Leadership*).

Phase II: Citizen experience interviews: 702 citizen interviews (20 per hospital: 10 each from outpatient and inpatient settings) conducted on the hospital premises as exit interviews after the patient had received care in the respective department (OPD or IPD).

2.4 Data collection and quality control

For data collection, *Kobo Toolbox* was used. To ensure quality control, regular review meetings with the field team, live interactions through a dedicated WhatsApp group, spot checks and hands-on support were provided with regular feedback and problem-solving. Additionally, a dedicated dashboard was used for overall monitoring of all data collection activities. Rigorous data cleaning was carried out to address duplicates, missing values, and outliers.

2.5 Data analysis

Quantitative analysis was conducted on the data collected from both healthcare staff and citizens. For healthcare staff, the analysis focused on leadership competencies by scoring responses from closed-ended and scenario-based questions. For each healthcare staff, scores were added for each leadership sub-domain to calculate total scores for *personal, social, and people leadership.* The scores were further categorized into tertiles representing poor (lowest tertile), average (middle tertile) and good (upper tertile) performers with poor/average/good leadership skills. For citizens, quantitative analysis involved scoring citizen experience responses from closed-ended questions. Descriptive statistics were used to observe overall trends, while ordinal logistic regression analyses determined the association between intervention, leadership scores, and citizen experience outcomes. The adjusted odds ratios (aORs) reported were adjusted for sex and years of work experience at the provider's current designation to control for confounders as identified in DAG (Figure 1). The Relative Improvement Index (RII) for each domain was calculated as: [(the percentage of positive experiences of citizens during their interaction with healthcare providers who received intervention minus that for providers who didn't receive intervention)/(the percentage of positive experiences of citizens during their interaction with healthcare providers who didn't receive intervention)]*100. This was used to quantify the relative difference in scores among intervention vs. non-intervention participants as a proportion of score among nonparticipants, allowing for comparison across domains or participant groups. Qualitative exploration was done to understand details of the pathways of change (reflections on personal transformation, recognition of empathy, greater self-awareness, better self-management and embracing the principles of *"Sewa Bhaav"* and self-change). These reflections in the form of narratives/verbatims were collated and thematic extraction of information was done to triangulate with the quantitative findings. These were shared as recommendations with the intervention implementation team as well as with government stakeholders to inform future course corrections (not included in this paper).

3. Results

Of 949 healthcare providers assessed in this study, 51.8% were male and 48.2% were female. Overall, mean age was 41.4 years and mean work experience was 9.5 years. The sex distribution, average age, and average work experience varied across cadres. Nurses were predominantly female (89.8%), with an average age of 39.0 years and mean experience of 9.8 years. In contrast, 75.7% doctors were male, with an average age of 43.2 years and 9.0 years of experience. The pharmacists and drug storekeepers were the oldest group (mean age: 51.3 years; 86.6% male) with the longest work experience (mean: 13.6 years). Deputy superintendents and hospital managers had a mean age of 47.6 years and were also predominantly male (92.2%) with an average of 7.9 years of work experience. Laboratory and operation theatre technicians (88% male) were the youngest group, with a mean age of 37.1 years and an average of 8.0 years of experience. Among citizens, 350 respondents sought OPD care (mean age: 32.9 years) and 352 sought care

from IPDs (mean age: 32.6 years). In both groups, nearly three-quarters of respondents were female (74.3% among OPD patients and 73.6% among IPD patients) (Table 1). A total of 238 respondents were from intervention facilities and 711 from non-intervention facilities. The mean age of respondents was almost similar in both groups (41 years). In terms of sex distribution, intervention facilities had 53.4% males (95% CI: 47.0-59.7) and 46.6% females (95% CI: 40.3-53.0), which was comparable to non-intervention facilities (51.3% and 48.7%, respectively). For work experience, intervention facilities had 38.2% with <5 years, 25.2% with 5-<10 years, and 36.6% with ≥10 years, similar to non-intervention facilities (40.1%, 21.5%, and 38.4%). Mean years of experience were also very similar between the two groups (9.4 and 9.5 years). Intervention and non-intervention facilities had comparable delivery loads, with mean deliveries of 575.2 (95% CI: 422.5-727.9) and 524.1 (95% CI: 428.5-619.7), respectively. (Table 2).

Multivariable logistic regression analysis showed a positive association between training and leadership competencies. Trained healthcare workers were more likely to be in the good performer category for the *personal leadership* skills as compared to untrained workers (52.9% vs 34.2%; adjusted odds ratio (aOR) =3.7, p<0.0001). This trend was consistent across all *personal leadership* competencies. Specifically, intervention participants had four-fold higher odds of demonstrating good *self-awareness* (58.0% vs 37.1%; aOR=4.0, p<0.0001). Similarly, for the self-management competency, *emotion management* (55.5% vs 35.6%; aOR=4.5, p<0.0001), *adaptability* (58.4% vs 42.3%; aOR=3.1, p<0.0001) and the overall s*elf-management index* (53.8% vs 35.3%; aOR=3.8, p<0.0001) were significantly higher among intervention participants (Table 3).

The intervention was also significantly associated with better *social leadership* skills with 61.0% of the intervention staff demonstrating good overall *social leadership* skills as compared to 34.7% of non-intervention (aOR=6.0, p<0.0001). Within the *communication management* competency, *active listening* (57.1% vs 34.2%, aOR=3.8, p<0.0001), c*onflict management* (58.8% vs 39.7%, aOR=3.2, p<0.0001) and *difficult conversation-non-violent communication* (63.9% vs. 40.6%, aOR=5.1, p<0.0001) showed better competencies among the intervention-trained staff. The overall index for *managing communication* showed the biggest differences with more than six-fold higher likelihood of good performance among intervention staff (54.6% vs 30.9%; aOR=5.4, p<0.0001). The *developing influence & collaboration* competency showed overall non-significant differences. In its sub-competencies, *mutual goal setting* (57.6% vs 30.3%; aOR=3.1, p=0.02) was higher among trained staff, however, *interdepartmental collaboration* and *developing influence & collaboration* did not show statistically significant differences (Table 4).

Among providers in intervention facilities, 52.5% had good competencies regarding overall *people leadership*, as compared to 29.2% among non-intervention participants (aOR=6.5, p<0.0001). Within this domain, trained staff demonstrated more than six times higher odds of good performance in *developing teams* (50.8% vs. 28.1%, aOR=6.3, p=0.0025). Among the sub competencies, *giving feedback* was higher among trained, including *managing continuous learning* (71.2% vs. 46.1%, aOR=3.6, p=0.002), *facilitating meetings & sessions* (54.2% vs. 30.3%, aOR=3.7, p=0.005), *creating an environment for feedback* (52.5% vs 29.2%, aOR=4.0, p=0.004), improving the overall score for *giving feedback* (50.8% vs 30.3%, aOR=4.7, p=0.001). For overall compassionate leadership competencies, intervention participants demonstrated 5.4 times higher odds of good performance (53.3% vs. 29.8%; aOR=5.4, p<0.001) (Table 5).

Table 1. *Sociodemographic profile of healthcare providers across cadres and citizens from district hospitals of Bihar during July-August*

Respondent category	Cadres/Departments	Age			Sex						Years of work experience		
					Male			Female					
		N	Mean (95% CI)	St. Dev	N	Frequency	Percent (95% CI)	N	Frequency	Percent (95% CI)	N	Mean (95% CI)	St. Dev
Healthcare providers	Deputy Superintendent/ Hospital Manager	64	47.6(44.9-50.3)	10.4	64	59	92.2 (85.4-98.9)	64	5	7.8 (1.1-14.6)	64	7.9(5.9-9.9)	8.6
	Doctors (MOIC, HOD of all department and all doctors)	239	43.2(42-44.4)	10.9	239	181	75.7(70.3-81.2)	239	58	24.3 (18.8-29.7)	239	9(7.9-10.1)	8
	Nurses (Head Nurse, Matron, Staff Nurse, GNM/ANM)	371	39(38-40)	9.5	371	38	10.2 (7.1-13.3)	371	333	89.8 (86.7-92.9)	365	9.8(8.9-10.7)	8.7
	Pharmacist and Drug Storekeeper	67	51.3(49.2-53.5)	10	67	58	86.6 (78.2-95.0)	67	9	13.4 (5.1-21.9)	67	13.6(11-16.3)	8.9
	Laboratory and Operation Theatre Technician	68	37.1(35.5-38.7)	8.9	68	60	88.2 (80.4-96.1)	68	8	11.8 (3.9-19.6)	68	8(6.9-9)	10.9
	Paramedical Staff (Pharmacist, Drug Storekeeper, Laboratory and Operation Theatre Technician)	64	47.6(44.9-50.3)	10.4	64	59	92.2 (85.4-98.9)	64	5	7.8 (1.1-14.6)	64	7.9(5.9-9.9)	8.6
	Administrative staff	70	35.6(33.7-37.5)	8.0	70	58	82.9(73.8-91.9)	70	12	17.1(8.1-26.1)	70	8.6(7.3-9.9)	5.4
	Support staff (security guard, cleaning staff, Dai) and admin staff (accountant and Data entry Operator	140	41.4(39.4-43.4)	9.8	140	96	68.6 (60.8-76.4)	140	44	31.4 (23.6-39.2)	138	10(8-11.9)	6.3
	All health cadres from District Hospitals	949	41.4(40.7-42.1)	8.3	949	492	51.8 (48.7-55.0)	949	457	48.2 (44.9-51.3)	949	9.5(8.9-10.1)	8.1
Citizens	Out-patient department	350	32.9 (30.8-35.0)	20.2	350	90	25.7 (21.1-30.3)	350	260	74.3 (69.7-78.9)		NA	
	In-patient department	352	32.6 (31.0-34.1)	14.8	352	93	26.4 (21.8-31.0)	352	259	73.6 (69-78.2)		NA	

Table 2. *Sociodemographic profile of healthcare providers and facility delivery load across intervention and non-intervention facilities (from district hospitals of Bihar) during July-August 2024*

Variables	Categories	Intervention facilities			Non-intervention facilities		
		N	frequency	Percent (LCL- UCL)*	N	frequency	Percent (LCL - UCL)*
Sex	Male	238	127	53.4 (47.0–59.7)	711	365	51.3 (47.7–55.0)
	Female		111	46.6 (40.3–53.0)		346	48.7 (45.0–52.3)
Years of work experience	Less than 5 years		91	38.2 (32.1–44.4)		285	40.1 (36.5–43.7)
	>=5 years and <10 years		60	25.2 (19.7–30.7)		153	21.5 (18.5–24.5)
	>= 10 years		87	36.6 (30.4–42.7)		273	38.4 (34.8–42.0)
Variables			Mean	LCL - UCL		Mean	LCL - UCL
Age			41.1	39.8-42.4		41.5	40.7-42.3
Years of work experience			9.4	8.4-10.5		9.5	8.9-10.2
Facility delivery load		18	575.2	422.5-727.9	17	524.1	428.5-619.7

* LCL: Lower 95% Confidence Limit, UCL: Upper 95% Confidence Limit

Table 3. *Distribution of personal leadership competencies among non-intervention and intervention healthcare providers and association of intervention with competencies in Bihar during July-August 2024*

Competencies	Sub-competencies	Category	Non-Intervention participants (N=711)		Intervention participants (N=238)	Intervention participants (Ref: Non-Intervention participants)		
			Frequency	Percent (95% CI)	Frequency	Percent (95% CI)	aOR* (LCL-UCL) †	p-value
Self-Awareness	**Self-Awareness Index**	Poor	223	31.4 (27.9-34.8)	29	12.2 (8-16.3)	Ref	
		Average	224	31.5 (28.1-34.9)	71	29.8 (24-35.7)	**2.4 (1.5-3.9)**	**0.0002**
		Good	264	37.1 (33.6-40.7)	138	58 (51.7-64.3)	**4.0 (2.6-6.2)**	**<.0001**
Self-Management	**Adaptability Index**	Poor	237	33.3 (29.9-36.8)	35	14.7 (10.2-19.2)	Ref	
		Average	173	24.3 (21.2-27.5)	64	26.9 (21.2-32.5)	**2.5 (1.6-4.0)**	**<.0001**
		Good	301	42.3 (38.7-46.0)	139	58.4 (52.1-64.7)	**3.1 (2.1-4.7)**	**<.0001**
	Emotion Management	Poor	222	31.2 (27.8-34.6)	26	10.9 (7.0-14.9)	Ref	
		Average	236	33.2 (29.7-36.7)	80	33.6 (27.6-39.6)	**2.9 (1.8-4.7)**	**<.0001**
		Good	253	35.6 (32.1-39.1)	132	55.5 (49.1-61.8)	**4.5 (2.8-7.0)**	**<.0001**
	Self-Management Index	Poor	237	33.3 (29.9-36.8)	32	13.4 (9.1-17.8)	Ref	
		Average	223	31.4 (27.9-34.8)	78	32.8 (26.8-38.7)	**2.6 (1.7-4.1)**	**<.0001**
		Good	251	35.3 (31.8-38.8)	128	53.8 (47.4-60.1)	**3.8 (2.5-5.8)**	**<.0001**
Overall Personal Leadership		Poor	247	34.7 (31.2-38.2)	35	14.7 (10.2-19.2)	Ref	
		Average	221	31.1 (27.7-34.5)	77	32.4 (26.4-38.3)	**2.5 (1.6-3.8)**	**<.0001**
		Good	243	34.2 (30.7-37.7)	126	52.9 (46.6-59.3)	**3.7 (2.4-5.5)**	**<.0001**

* Adjusted for sex and years of work experience of the providers at their current designation

† LCL: Lower 95% Confidence Limit, UCL: Upper 95% Confidence Limit

Table 4. *Distribution of social leadership competencies among non-intervention and intervention healthcare providers and association of intervention with competencies in Bihar during July-August 2024*

Competencies	Sub-competencies	Category	Non-Intervention participants			Intervention participants			Intervention participants (Ref: Non-Intervention participants)	
			N	Frequency	Percent (95% CI)	N	Frequency	Percent (95% CI)	aOR* (LCL-UCL)#	p-value
Communication Management	**Active Listening**	Poor	711	223	31.4 (27.9-34.8)	238	37	15.5 (10.9-20.2)	Ref	
		Average		245	34.5 (31.0-38.0)		65	27.3 (21.6-33.0)	**1.6 (1.0-2.5)**	**0.04**
		Good		243	34.2 (30.7-37.7)		136	57.1 (50.8-63.4)	**3.8 (2.2-5.1)**	**<.0001**
	Difficult conversation- (Non-Violent Communication)	Poor		221	31.1 (27.7-34.5)		23	9.7 (5.9-13.4)	Ref	
		Average		201	28.3 (25-31.6)		63	26.5 (20.9-32.1)	**3.0 (1.8-5.0)**	**<.0001**
		Good		289	40.6 (37-44.3)		152	63.9 (57.8-70.0)	**5.1 (3.2-8.1)**	**<.0001**
	Conflict Management	Poor		214	30.1 (26.7-33.5)		33	13.9 (9.5-18.3)	Ref	
		Average		215	30.2 (26.9-33.6)		65	27.3 (21.6-33.0)	**2.0 (1.2-3.1)**	**0.0041**
		Good		282	39.7 (36.1-43.3)		140	58.8 (52.6-65.1)	**3.2 (2.1-4.9)**	**<.0001**
	Communication management-Overall index	Poor		261	36.7 (33.2-40.3)		25	10.5 (6.6-14.4)	Ref	
		Average		230	32.3 (28.9-35.8)		83	34.9 (28.8-40.9)	**4.3 (2.0-9.1)**	**<.0001**
		Good		220	30.9 (27.5-34.3)		130	54.6 (48.3-61)	**5.4 (2.6-11.3)**	**<.0001**
Developing influence & collaboration†	**Mutual goal setting**	Poor	89	22	24.7 (15.7-33.8)	59	9	15.3 (6-24.5)	Ref	
		Average		40	44.9 (34.5-55.4)		16	27.1 (15.6-38.6)	1.0 (0.4-2.6)	0.96
		Good		27	30.3 (20.7-40)		34	57.6 (44.9-70.4)	**3.1 (1.2-7.8)**	**0.02**
	Interdepartmental collaboration	Poor		23	25.8 (16.6-35)		12	20.3 (9.9-30.7)	Ref	
		Average		33	37.1 (26.9-47.2)		16	27.1 (15.6-38.6)	1.0 (0.4-2.3)	0.88
		Good		33	37.1 (26.9-47.2)		31	52.5 (39.7-65.4)	1.8 (0.8-4.2)	0.18
	Developing influence & collaboration-Overall Index	Poor		30	33.7 (23.8-43.6)		12	20.3 (9.9-30.7)	Ref	
		Average		30	33.7 (23.8-43.6)		21	35.6 (23.2-48)	1.8 (0.7-4.3)	0.21
		Good		29	32.6 (22.7-42.4)		26	44.1 (31.3-56.9)	2.2 (1.0-5.3)	0.06
Overall Social Leadership		Poor	711	245	34.5 (31.0-38.0)	238	24	10.1 (6.3-13.9)	Ref	
		Average		219	30.8 (27.4-34.2)		69	29 (23.2-34.8)	**3.2 (2.0-5.3)**	**<.0001**
		Good		247	34.7 (31.2-38.2)		145	60.9 (54.7-67.1)	**6.0 (3.8-9.6)**	**<.0001**

*Adjusted for sex and years of experience of the providers at their current designation

†Domain specific questions administered to cadres with administrative leadership roles (Deputy Superintendents, Hospital Managers, Head Nurse, Head of Departments)

LCL: Lower 95% Confidence Limit, UCL: Upper 95% Confidence Limit

Table 5. *Distribution of people leadership and overall compassionate leadership competencies among non-intervention and intervention healthcare providers and association of intervention with competencies in Bihar during July-August 2024*

Competencies	Sub-competencies	Category	Non-Intervention participants			Intervention participants			Intervention participants (Ref: Non-Intervention participants)	
			N	Frequency	Percent (95% CI)	N	Frequency	Percent (95% CI)	aOR* (LCL-UCL)#	p-value
Coaching†	**Developing Teams**	Poor	89	21	23.6 (14.7-32.5)	59	4	6.8 (0.3-13.3)	Ref	
		Average		43	48.3 (37.8-58.8)		25	42.4 (29.6-55.1)	3.1 (0.9-9.9)	0.06
		Good		25	28.1 (18.6-37.5)		30	50.8 (37.9-63.8)	**6.3 (1.9-20.8)**	**0.0025**
Giving feedback†	**Facilitating Meetings & Sessions**	Poor		28	31.5 (21.7-41.2)		9	15.3 (6.0-24.5)	Ref	
		Average		34	38.2 (28-48.4)		18	30.5 (18.6-42.4)	1.6 (0.6-4.2)	0.30
		Good		27	30.3 (20.7-40)		32	54.2 (41.4-67.1)	**3.7 (1.5-9.2)**	**0.0049**
	Creating an environment for feedback	Poor		27	30.3 (20.7-40)		8	13.6 (4.7-22.4)	Ref	
		Average		36	40.4 (30.1-50.8)		20	33.9 (21.7-46.1)	1.9 (0.7-4.9)	0.20
		Good		26	29.2 (19.7-38.8)		31	52.5 (39.7-65.4)	**4.0 (1.6-10.4)**	**0.0039**
	Managing Continuous Learning	Poor		35	39.3 (29.1-49.6)		10	16.9 (7.3-26.6)	Ref	
		Average		13	14.6 (7.2-22.0)		7	11.9 (3.5-20.2)	1.9 (0.6-6.0)	0.28
		Good		41	46.1 (35.6-56.5)		42	71.2 (59.5-82.9)	**3.6 (1.6-8.2)**	**0.0024**
	Giving feedback	Poor		34	38.2 (28-48.4)		8	13.6 (4.7-22.4)	Ref	
		Average		28	31.5 (21.7-41.2)		21	35.6 (23.2-48)	**3.2 (1.2-8.3)**	**0.02**
		Good		27	30.3 (20.7-40)		30	50.8 (37.9-63.8)	**4.7 (1.9-12.0)**	**0.0011**
Overall People Leadership†		Poor		38	42.7(32.3-53.09)		7	11.9 (3.5-20.2)	Ref	
		Average		25	28.09(18.64-37.54)		21	35.6 (23.2-48)	**4.6 (1.7-12.3)**	**0.0028**
		Good		26	29.21(19.66-38.77)		31	52.5 (39.7-65.4)	**6.5 (2.5-16.9)**	**0.0001**
Overall Compassionate leadership competencies		Poor	711	268	37.7 (34.1-41.3)	238	30	12.6 (8.4-16.8)	Ref	
		Average		231	32.5 (29.0-35.9)		81	34.0 (28.0-40.1)	**3.1 (2.0-4.9)**	**<.0001**
		Good		212	29.8 (26.4-33.2)		127	53.3 (47.0-59.7)	**5.4 (3.5-8.3)**	**<.0001**

*Adjusted for sex and years of experience of the providers at their current designation

†Domain specific questions administered to cadres with administrative leadership roles (Deputy Superintendents, Hospital Managers, Head Nurse, Head of Departments)

LCL: Lower 95% Confidence Limit, UCL: Upper 95% Confidence Limit

Table 6. *Distribution of Citizens' experience during interaction with doctors at out-patient and in-patient departments of district hospitals in Bihar during July-August 2024*

Department	Citizen's experience during interaction with doctor	Non-Intervention participants			Intervention participants			Relative improvement index‡	Intervention participants (Ref: Non-Intervention participants)	
		N	Frequency	Percent (95% CI)	N	Frequency	Percent (95% CI)		aOR* (LCL-UCL) #	p-value
Out-patient department	Treated with respect	162	155	95.7 (92.5–98.8)	168	164	97.6 (95.3–99.9)	2.0	1.9 (0.5-6.4)	0.33
	Enquired about emotional state	161	107	66.5 (59.1–73.8)	165	115	69.7 (62.6–76.7)	4.9	1.2 (0.7-1.9)	0.53
	Health problems and main complaints listened actively	162	138	85.2 (79.7–90.7)	169	158	93.5 (89.8–97.2)	**9.8**	**2.5 (1.2-5.3)**	**0.02**
	Provided appropriate time	162	124	76.5 (70.0–83.1)	170	154	90.6 (86.2–95.0)	**18.3**	**3.0 (1.6-5.5)**	**0.0008**
	Opportunities given to ask questions and clarify doubts	88	60	68.2 (58.4–78.0)	101	82	81.2 (73.5–88.9)	**19.1**	**2.0 (0.1-3.9)**	**0.04**
	Safe atmosphere provided to openly disclose difficulties	150	75	50.0 (42.0–58.0)	162	99	61.1 (53.6–68.7)	**22.2**	**1.6 (1.0-2.5)**	**0.05**
	Treatment provided for medical ailments and emotional state	162	127	78.4 (72.0–84.8)	167	140	83.8 (78.2–89.4)	6.9	1.43 (0.8-2.5)	0.21
	Agony and alleviation discussed with empathy	162	120	74.1 (67.3–80.9)	163	132	81.0 (74.9–87.0)	9.3	1.5 (0.9-2.5)	0.14
	Attempts made to create a positive or cheerful atmosphere throughout interaction	162	88	54.3 (46.6–62.0)	168	106	63.1 (55.8–70.4)	16.2	1.4 (0.9-2.2)	0.11
	Assistance offered whenever needed	18	15	83.3 (65.5–100.0)	31	27	87.1 (74.9–99.3)	4.5	1.4 (0.3-6.9)	0.72
	All questions answered adequately	161	136	84.5 (78.8–90.1)	169	149	88.2 (83.3–93.1)	4.4	1.4 (0.7-2.6)	0.33
In-patient department	Enquired about emotional state	140	115	82.1 (75.8–88.5)	143	121	84.6 (78.7–90.6)	3.0	1.2 (0.6-2.2)	0.58
	Comforted whenever anxious	139	105	75.5 (68.4–82.7)	144	113	78.5 (71.7–85.2)	3.9	1.2 (0.7-2.1)	0.56
	Given adequate time at every ward visit	139	130	93.5 (89.4–97.6)	146	142	97.3 (94.6–99.9)	4.0	2.5 (0.7-8.2)	0.14
	Purpose of physical examinations explained	93	49	52.7 (42.5–62.9)	118	67	56.8 (47.8–65.8)	7.8	1.2 (0.7-2.0)	0.55
	Opportunities given to ask questions and clarify doubts	96	82	85.4 (78.3–92.5)	105	94	89.5 (83.6–95.4)	4.8	1.5 (0.6-3.4)	0.38
	Safe atmosphere provided to openly disclose difficulties	148	93	62.8 (55.0–70.7)	161	110	68.3 (61.1–75.5)	8.7	1.3 (0.8-2.0)	0.31
	Attempts made to create a positive or cheerful atmosphere throughout interaction	139	101	72.7 (65.2–80.1)	149	113	75.8 (68.9–82.8)	4.4	1.2 (0.7-2.0)	0.54

*Adjusted for age and sex of the citizen)

‡RII: [(The percentage of positive experiences of citizens during their interaction with healthcare providers who received intervention minus that for providers who didn't receive intervention) / (the percentage of positive experiences of citizens during their interaction with healthcare providers who didn't receive intervention)]*100

LCL: Lower 95% Confidence Limit, UCL: Upper 95% Confidence Limit

Table 7. *Distribution of Citizen's experience during interaction with nurses at out-patient and in-patient departments of district hospitals in Bihar during July-August 2024*

Department	Citizen's experience during interaction with nurses	Non-Intervention participants			Intervention participants			Relative improvement index‡	Intervention participants (Ref: Non-Intervention participants)	
		N	Frequency	Percent (95% CI)	N	Frequency	Percent (95% CI)		aOR* (LCL-UCL)#	p-value
Out-patient department	Treated with respect	102	97	95.1 (90.9–99.3)	108	105	97.2 (94.1–100.0)	2.2	1.8 (0.4-7.8)	0.43
	Enquired about emotional state	100	60	60.0 (50.3–69.7)	99	64	64.6 (55.1–74.1)	7.7	1.2 (0.7-2.2)	0.50
	Health problems and main complaints listened actively	100	80	80.0 (72.1–87.9)	92	85	92.4 (86.9–97.9)	**15.5**	**3.0 (1.2-7.6)**	**0.02**
	Provided appropriate time	100	83	83.0 (75.6–90.4)	92	84	91.3 (85.5–97.1)	10.0	2.2 (0.9-5.3)	0.09
	Opportunities given to ask questions and clarify doubts	57	44	77.2 (66.1–88.3)	44	35	79.5 (67.4–91.7)	3.0	1.1 (0.4-3.0)	0.78
	Safe atmosphere provided to openly disclose difficulties	95	50	52.6 (42.5–62.8)	83	48	57.8 (47.1–68.6)	9.9	1.2 (0.7-2.2)	0.49
	Medical ailment and emotional state managed	102	76	74.5 (66.0–83.0)	91	71	78.0 (69.4–86.6)	4.7	1.2 (0.6-2.4)	0.57
In-patient department	Comforted whenever anxious	170	136	80.0 (74.0–86.0)	179	146	81.6 (75.9–87.3)	2.0	1.1 (0.6-1.9)	0.71
	Safe atmosphere provided to openly disclose difficulties	157	116	73.9 (67.0–80.8)	170	133	78.2 (72.0–84.5)	5.9	1.3 (0.8-2.1)	0.36

*Adjusted for age and sex of the citizen

‡RII: [(The percentage of positive experiences of citizens during their interaction with healthcare providers who received intervention minus that for providers who didn't receive intervention) / (the percentage of positive experiences of citizens during their interaction with healthcare providers who didn't receive intervention)]*100

LCL: Lower 95% Confidence Limit, UCL: Upper 95% Confidence Limit

Compassionate leadership training was associated with better citizen experiences during the interactions with providers in several domains, particularly in OPDs. In OPDs, citizens who interacted with intervention doctors were more likely to report that their health problems were heard actively (93.5% vs 85.2%; RII=9.8; aOR=2.5, p=0.02) and they felt that they received adequate consultation time (90.6% vs 76.5%; RII=18.3; aOR=3.0, p=0.0008). In addition, clients from the intervention group also were more likely to report that they had opportunities to ask questions and clarify doubts (81.2% vs 68.2%; RII=19.1; aOR=2.0, p=0.04) and a safe environment was provided to them to share their difficulties (61.1% vs 50.0%; RII=22.2; aOR=1.6, p=0.05) (Table 6).

In regard to citizen interaction with nurses, intervention nurses in OPD were more likely to listen to their clients' health problems and complaints, with 92.4% of clients reporting positive experiences vs. 80.0% in the non-intervention group (RII=15.5; aOR=3.0, p=0.02). However, no significant differences were observed between trained and untrained nurses in either patients' reported encouragement to ask questions or their comfort in sharing problems when hesitant. Overall, both for doctors and nurses, domains such as respectful behaviour, empathetic responses, and the use of language understandable to the patient did not show statistically significant differences (Table 7 above).

4. Discussion

Leadership development is a dynamic process rooted in overall human development and thrives on mutual trust and respect. The complexity of healthcare systems combined with challenges of low-resource settings and inherent limitations of human behavior makes it challenging to consistently ensure high-quality and respectful care. This is especially because healthcare delivery is highly interdependent, as no one person can assure the highest standard of care alone. Thus, effective leadership demands far more than just technical competencies, but also requires collaboration, compassion and understanding in order to navigate through complex, interpersonal dynamics in organizational settings. Despite this, there is chronic underinvestment in strengthening team management and coordination practices, which are core to sustaining such leadership. Traditional approaches to leadership development have largely focused on "leader-centric" models, which are based on individual competencies and hierarchical authority. However, a growing body of evidence suggests that these models do not produce long-term or sustained movement toward improved and compassionate leadership, particularly in large public healthcare settings (Geerts et al., 2020; MacKechnie et al., 2022).

In our approach, we diverged from these traditional approaches by embedding leadership development within the broader framework of personal transformation, thereby fostering personal growth and organizational development. Our study also represents the first rigorously tested tool and framework to measure the impact of compassionate leadership intervention, implemented comprehensively in a large cohort of 949 healthcare workers at all levels of healthcare system hierarchy from hospital management to support staff including security guards and cleaning staff. This extensive effort was implemented in Bihar, a state with one of the most challenging and underserved healthcare systems in India. In the literature, cultivating compassion in a leadership framework is often viewed through the perspective of promoting a culture of collective leadership, which means that leadership training should not be limited to those in formal or top-level positions but also should include staff members who may not see themselves as leaders in the organization (Silva et al., 2022). The CL-PTT intervention aligned with this by focusing on cultivating collective leadership capabilities and bringing diverse cadres together on a shared platform. By virtue of the evolution of the intervention from a pilot to scaled up model, through a system-driven approach, working closely with government, embedding the

transformational path within the system, the intent is to implement it state-wide, even extending from facility to outreach including Accredited Social Health Activists (ASHAs), Auxiliary Nurse Midwives (ANMs), and Anganwadi Workers (AWWs) as well as other block level health staff, school teachers, and panchayat members). This has yielded a scalable model which can be adapted to similar settings and contexts.

Another perspective proposed previously views cultivating compassion from three different angles (Frost et al., 2006). First, it sees compassion as interpersonal work, requiring both cognitive and emotional efforts and focusing on small compassionate actions, which can together lead to big meaningful impacts. Second, it highlights the importance of organizational narratives in developing compassion by restoring connection through a shared collective purpose. By acknowledging and reflecting on the often-unspoken struggles within the organization, leaders can share their values, beliefs and experiences. Third, building compassion within an organizational culture should be based on collective awareness, responsiveness to suffering and feedback mechanisms that can help teams notice and address suffering collaboratively in a system-wide manner (Frost et al., 2006). The CL-PTT intervention addressed all three angles by emphasizing strengthening peer support and shared values across cadres. The multi-pronged OCA of the CL-PTT intervention, encompassing components such as workshops, peer learning communities and live action projects, created a shared platform for healthcare professionals of diverse cadres, aiming to unlock their "*agency to serve*". This approach sought to foster not only a culture of self-reflection, empathy and compassion, but also strengthened managerial capabilities across boundaries and disciplines (West et al., 2015), thus addressing the identified gaps in traditional leadership development.

The findings revealed that CL-PTT had a significant impact on enhancing compassionate leadership competencies among healthcare workers across all the three domains assessed: personal, social, and people. Notably, large associations were observed for the domains of *people leadership* (aOR=6.5) and *social leadership* (aOR=6.00), indicating substantial impact of the intervention on both team competencies as well as relational or inter-personal competencies. These results reflect that the intervention's focus on experiential learning and peer support can positively impact leadership capacities among healthcare providers, aligning with previous literature emphasizing the effect of such structured interventions on compassionate leadership skill development (Geerts et al., 2020).

We further observed an increase in psychological safety among the team members and a team-oriented culture in our results. This is evident from the significant differences in the competencies of *Managing Continuous Learning* and *Facilitating Meetings & Sessions*. This also suggests that CL-PTT encouraged increased team collaboration and feedback. Previous research also shows that environments where team members feel safe to share and discuss their mistakes without any fear of judgement enhance team performance (Edmondson, 1999). Organizational learning mechanisms, including reflective practice, psychological safety, and leadership development, have increasingly been recognized as essential pathways for integration of compassion practices sustainably within healthcare systems (Wapaño, 2026). Similarly, observed betterment of *Developing Teams* highlights the intervention's role in mutual coordination and learning among healthcare workers.

The intervention also helped to heighten emotional intelligence skills, which can be assessed from the improvements in *emotion management*, *self-awareness index* and *adaptability index*. The personal transformation component of the CL-PTT intervention thus helped to strengthen these qualities among healthcare providers. Notably, emotion regulation is an important part of everyday work life of healthcare professionals. These outcomes demonstrate how small but

meaningful actions can bring positive impacts, consistent with previous frameworks that link emotional intelligence to better health outcomes (Frost, 1999).

Furthermore, the intervention enhanced competencies related to management of difficult situations such as team conflicts and disagreements, as demonstrated through improvements in d*ifficult conversation-non-violent communication* and *conflict management* competencies. This is particularly important as communication failure is the most common cause of lack of interpersonal trust among team members and this can be changed through collective awareness and feeling of shared purpose (Foronda et al., 2016; Leonard et al., 2004; Rosen et al., 2018; Sutcliffe et al., 2004).

Thus, while the intervention demonstrated positive effects in several domains, we also observed a lack of association with *developing influence & collaboration* and *interdepartmental collaboration* competencies. This may be due to structural and organizational barriers or limited cross-functional collaboration in healthcare settings. However, the positive changes observed in most of the domains can serve as essential foundational steps to impact system-level changes over time. These developments can enhance trust in the system, empower staff and decrease siloed culture, thus paving a way for sustained positive change and broader organizational transformation with time.

Few previous studies have examined the impact of CL interventions on citizen experiences. In our results, clients reported marked improvements in attentive listening (both among nurses and doctors) in intervention facilities, particularly in OPD settings. This suggests that training helps to create an environment that actively encourages meaningful engagement with patients. We also observed a threefold-higher odds of reported receiving adequate consultation time from intervention doctors, indicating that a compassionate framework can help to cultivate a leadership culture that keeps client needs above all, even in a stressful environment. The increase in communication-related indicators such as encouraging questions from clients and fostering a safe atmosphere for sharing suggested that healthcare providers were making efforts to reduce client uncertainty and build trust. Notably, client-provider communication is directly linked to client satisfaction and is particularly relevant in situations of high work pressure, which affects consultation and interaction times

However, no significant improvements were observed in indicators like respectful behaviour and empathetic responses, indicating that further work is needed on specific behavioural attributes. This could be due to factors such as long-standing work cultures or norms, high patient loads, and work pressure, which lead to time constraints and burnout and make it more challenging for providers to consistently demonstrate empathetic and respectful behaviours. Bihar's public healthcare system, as stated before, faces profound challenges in terms of infrastructure shortage, lack of essential facilities and human resource gaps, contributing to overwhelming workloads and compromised quality of care. Thus, to sustain progress, it is equally important to develop provider capacity for self-care, which can help to reduce burnout. Incorporating self-care and emotional resilience modules into future training programs may help mitigate burnout and could strengthen long-term outcomes. Future iterations of this intervention will also include dedicated modules covering these domains.

4.1 Implications of this research

First, our findings confirm that even in a resource-constrained public healthcare setting like Bihar, the CL-PTT approach has significant potential to address barriers to quality care by fostering people-centered leadership capabilities and increased self-awareness among healthcare providers. In other words, these results demonstrate that it is indeed possible to build

compassionate leadership capacity through structured, evidence-based interventions. This transformation among leaders also aligns with 'Lotus of Compassion' model, which conceptualizes leadership as a nurturing force that enables the cultivation of compassionate capacities as well as strengthens resilience, particularly during moments of crisis (Wijesekara et al., 2026). This further reinforces the need for leadership frameworks to extend beyond purely technical competencies and provide holistic capabilities across *personal, people, and social leadership domains*, combining compassion, collaboration, emotional intelligence, and adaptability.

Second, our findings suggest that leadership interventions can not only improve staff performance but also patient/citizen/client-provider experiences. Effective communication, active listening, and respectful behaviour by healthcare providers contribute towards a more trusting and safer environment for both parties. This can positively impact critical areas such as maternity care, a field often reported to be deficient in compassionate leadership and culture (Jemal et al., 2023; Lewis, 2025; Saab et al., 2019). Compassionate leadership, therefore, represents not just a personal trait, but a fundamental way to improve citizen satisfaction, equity, and trust in the healthcare system.

Third, the positive impact of this intervention despite the constraints of the public health system suggests potential replicability of this model in other resource-limited settings where bureaucratic and hierarchical approaches have traditionally dominated. Our findings in Bihar mirror evidence from other LMIC settings, such as Kenya and Uganda, suggesting that healthcare organizations require supportive social architectures, such as defined roles, routines, and leadership systems to sustain collective compassionate responses to suffering (Wodnik et al., 2026). At a policy level, there is a clear requirement to link compassionate leadership development initiatives to broader health system reforms in the government. Future policies should integrate well-being and emotional resilience as critical dimensions of leadership in healthcare, so as to mitigate burnout and sustain a compassionate workforce. However, translation of learned competencies to everyday work life may still be impeded by challenges such as organizational barriers, limited time of hospital staff and resistance to behavioral change.

4.2 Future directions

The assessment tools are envisioned to evolve through testing at different levels, such as block level hospitals, hospital units such as maternity wards and emergency units, and among diverse cadres. A tailored version of these tools will also be developed for frontline health workers – ASHAs and ANMs, to enable assessment of compassionate care practices, to systematically identify gaps and strengths, thereby guiding course corrections during future interventions so that the interventions can be scaled up further and a continuum of compassionate care strengthened at the community level. Moreover, the *Global Alliance for Viksit Bharat (GAVB)(Bose, 2024; Global Alliance for Viksit Bharat Foundation 2025; Piramal, 2025),* a collaborative initiative being led by the Piramal Foundation and supported by the Gates Foundation, represents another opportunity as well as a strategic platform to scale this intervention across other states with high healthcare burdens – such as Assam, Chhattisgarh, Jharkhand, and Odisha. All these states are characterized by pockets of limited healthcare access, high resource constraints and infrastructure deficits, making them priority areas for health system strengthening efforts. Together with Bihar, these states are home to more than 280 million people, of whom 240 million live in rural areas, representing nearly one-fifth of India's rural population. Looking ahead, scaling up this leadership model will require deeper integration into organizational, administrative, and government systems. To ensure sustainability, compassion needs to be understood as a relational process between leaders, staff, and patients, calling for a systems-level

public health approach to intervention (Kirby et al., 2026). This, in turn, requires moving beyond individual training toward "structural compassion", where care is institutionalized through policies and economic systems that remove barriers to flourishing (Ozawa-de Silva & Mascaro, 2026). Such institutional embedding can be supported through organizational learning mechanisms like reflective practice and leadership development (Wapaño, 2026), that help compassion become an enduring feature of workplace culture rather than a one-off training outcome. This will be crucial to enhance program effectiveness, while addressing barriers such as interdepartmental collaboration highlighted in this study.

4.3 Limitations

Despite the positive findings, this study has some limitations. First, during the intervention, not all cadres received full set of all training sessions uniformly, which means that duration and depth of different training modules varied across cadres or facilities. This may have resulted in potential underestimation of the impact of the intervention, owing to reduction of intervention exposure contrast between participants from intervention and non-intervention facilities. Second, although we compared intervention versus non-intervention groups in our cross-sectional design, the study did not measure improvements from baseline or capture the longitudinal improvements in leadership competencies of trained participants in this assessment, which could help us to understand the long-term sustainability of these effects. Our future studies will incorporate longitudinal assessments. Third, leadership assessments were not triangulated with records such as performance reviews or supervisory assessments of healthcare participants, which could have strengthened validity. Fourth, as the tool has to date only been used for assessing healthcare workers in district hospitals, findings may not be representative of other facility levels such as block hospitals or primary health centers. This will also be included in our future assessments.

5. Conclusion

This study established a robust leadership assessment tool to systematically assess and quantify compassionate leadership competencies among healthcare workers across personal, social, and people domains. The tool enabled measurement of self-reported leadership behaviours as well as patient/citizen/client-reported experiences, thus offering a reliable dual framework for leadership evaluation within the public health system. The study also demonstrates the validation of this tool by assessing the ability of the CL-PTT intervention in meaningfully transforming the internal qualities and capabilities of healthcare workers, even in a high pressure and resource-constrained settings. The success of CL-PTT transformation shows the potential of compassionate leadership interventions in increasing hospital performance as well as citizen experiences by enhancing a culture of respectful communication and engagement. This means that even in the challenges of a highly constrained under resourced public health system, such interventions can help to build a more compassionate and resilient healthcare system.

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Author contribution statement

RM, HP drafted the manuscript with contributions from SSA, SB and TR. AJ, TM-1, SF, MKS-2 and KV contributed to Programmatic narrative development. SD, TR, AS, DG, KC, TM-1, SF, AD and NSR were involved in tool development and implementation. MKS-1, AK, SSA, AD and TM-2, designed the conceptual model, and analytical plan. MKS-1 and AK conducted data analysis. KV and TM-2 contributed to review and finalization of manuscript. All authors critically reviewed the manuscript and approved the final version.

Note on supplementary material

Supplement 2b is available on the IJW website: https://doi.org/10.5502/ijw.v16i2.5605s. The other supplements are available upon reasonable request to the corresponding author.

Funding

The intervention and related monitoring were funded by Gates Foundation (INV-042003). The current analysis and development of the manuscript were supported by the internal funding of Piramal Foundation.

Conflict of interest statement

The authors declare no competing interests.

AI statement

AI was not used in the drafting of this manuscript.

Data availability statement

The data used for the manuscript is freely available upon emailed request with justification to the corresponding author.

Acknowledgements

Authors acknowledge the support from Gates Foundation, senior management of Piramal Foundation and Piramal Swasthya Management and Research Institute and government of Bihar. Authors also express their deep gratitude towards to field team of the Piramal School of Leadership – School of Health and the participating providers and clients – for their contribution of time and energy for successful completion of the assessment.

Publishing Timeline

Received 1 September 2025
Revised version received 24 November 2025
Revised version received 1 December 2025
Accepted 3 December 2025
Published 4 March 2026

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