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Tracing the roots of One Health principles in nursing practice

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ABSTRACT

This article examines the historical roots of the One Health concept and highlights its deep convergence with Florence Nightingale's Environmental Theory. Although One Health gained prominence in the early 2000s, its intellectual foundations are much older, encompassing Indigenous knowledge systems, nineteenth-century public health, and the work of Virchow, Osler, and Schwabe. Through a historical–conceptual analysis of Nightingale's writings and key One Health milestones, the article shows how her emphasis on environmental determinants, stewardship of natural and built environments, systematic observation, statistical evidence, and coordinated cross-sectoral action anticipated core One Health principles. Five areas of convergence are identified: prevention focused on environmental determinants, environmental stewardship, data-informed decision making, transdisciplinary collaboration, and continuous system improvement. The article argues that Nightingale's legacy positions nursing as a strategic actor in the local implementation of One Health, particularly in designing therapeutic and healthy environments and integrating environmental indicators into care, governance, and health policy.

1. Introduction

The One Health paradigm has emerged as a response to the multifaceted health challenges of an increasingly interconnected world [1]. Its guiding principles reflect an epistemological shift from reductionist biomedical models toward systemic and ecological frameworks for understanding health and disease. This model is grounded in the recognition that health threats cannot be effectively addressed within disciplinary silos. Instead, they demand integrative, cross-sectoral collaboration that considers the complex web of biological, environmental, and socio-economic interrelations that shape health outcomes [2].

One Health gained visibility in the early 2000s following the emergence of severe acute respiratory syndrome [3]. The 2004 "Manhattan Principles" strengthened this awareness by outlining a shared vision for cooperation across human, animal, and environmental health [4].

However, the philosophical roots of One Health extend far deeper. The concept reflects ancient, cross-cultural understandings of balance among living systems. Indigenous and traditional knowledge systems have long held that health arises from harmony among people, animals, and the environment [5]. Illness was viewed as a disruption of ecological equilibrium, and healing as the restoration of relational integrity. The contemporary One Health agenda can therefore be read as a modern scientific reframing of this long-standing ecological wisdom, translating relational ways of knowing into contemporary scientific understanding.

This broader philosophical lineage also finds a distinct trajectory within Western biomedical history, where the genealogy of One Health is commonly traced to the nineteenth century. Rudolf Virchow foregrounded the connections between human and animal diseases, followed by William Osler's recognition of shared biological mechanisms across species. In the mid-twentieth century, Calvin Schwabe expanded these ideas through his One Medicine concept, emphasizing collaboration in addressing zoonoses [6]. These contributions laid the conceptual foundation that was later consolidated under the One Health designation.

Viewed historically and conceptually, One Health can be seen as the institutional articulation of ideas that predate the term. Within nursing, Florence Nightingale expressed principles aligned with this vision. Although she did not explicitly describe the human-animal-environment relationship, her Environmental Theory demonstrated a clear sense of interdependence. Her writing reveals an intuitive grasp of principles resonating with One Health. This article revisits Nightingale's

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contributions within this broader lineage, showing how her thought anticipates foundational elements of One Health and offers guidance for modern global health practice.

2. Florence Nightingale and the foundations of One Health

Through an analysis of the literature produced by Nightingale, it is possible to identify an early approximation to key concepts later central to One Health: prevention through environmental management [7], stewardship of natural and built environments [8], data-driven decision-making [9], and the necessity of coordinated, intersectoral collaboration to sustain health [9].

Nightingale's contribution to modern health thinking lies in her ability to translate environmental awareness into a practical model for care and policy. She regarded the environment not merely as a backdrop to human existence but as an active determinant of health. Her insistence on clean air, pure water, adequate drainage, cleanliness, and light [10], along with varied and well-prepared nourishment, was revolutionary in an era when disease was still widely explained by miasma and poor sanitation rather than by identifiable environmental or microbial causes. By grounding her thinking in tangible determinants [11], Nightingale explicitly linked individual health to environmental conditions, a notion that today forms one of the central pillars of One Health.

Beyond her practical reforms, Nightingale advanced a way of thinking that resonates with the systemic logic of One Health. She saw health as the product of multiple interacting factors, physical, social, and moral [12], that could not be isolated or managed in silos. This vision mirrors the integrative systems thinking that underpins One Health, in which human well-being is inseparable from ecological integrity [13]. In her writings, Nightingale emphasized the necessity of working with nature rather than against it, framing care as an act of alignment with natural laws [10]. This perspective foreshadows modern debates on environmental sustainability.

Central to both Nightingale's and One Health's frameworks is the principle of prevention. For Nightingale, prevention was a practical imperative rooted in observation and evidence [14]. She understood that many illnesses were avoidable if environmental conditions were controlled and monitored [15]. In hospitals, she introduced systematic observation and data collection to identify causes of infection and mortality, using visual representations and statistical diagrams to advocate for reform [14]. This preventive logic parallels the epidemiological vigilance central to One Health today.

Another powerful point of convergence lies in Nightingale's use of data as a tool for change. She believed that moral authority in health care must be grounded in empirical evidence. Her pioneering use of statistics to inform policy reform anticipated the data-driven ethos of modern health governance [16]. One Health, with its reliance on surveillance systems, cross-sectoral databases, and predictive modelling, embodies the same conviction that knowledge should serve to improve human and environmental conditions [17]. Nightingale's insistence that what cannot be measured cannot be enhanced captures the essence of contemporary data-informed public health action.

Nightingale's approach was also inherently transdisciplinary, though not in the contemporary sense of multi-professional clinical teams; such teams essentially did not exist given the professional corps of the time. Instead, her reforms mobilized architects, engineers, and administrators to design, build, and govern sanitary infrastructure that would enable nurses and physicians to deliver effective care [7,18]. She recognized that no single profession could safeguard health in isolation. This anticipates the One Health principle that effective solutions require collaboration across relevant sectors and disciplines [19]. Both perspectives acknowledge that complex health problems demand collective action.

The ecological undercurrents of Nightingale's thought become clearer when one considers her belief that health is sustained by harmony with the natural world. She repeatedly emphasized the importance of fresh air, sunlight, and contact with the outdoors, asserting that nature itself was a potent healer [10]. This recognition of the reciprocal relationship between humans and their environment prefigures the ecological sensitivity of One Health, in which human well-being is viewed as contingent on the health of ecosystems [2].

Nightingale's thinking also extended beyond the physical to the moral and social dimensions of health. She regarded social neglect, poverty, and poor living conditions as moral failures that led to disease [20]. One Health builds on this moral dimension by emphasizing stewardship, our collective responsibility to maintain the integrity of the biosphere and to act ethically in our relationships with other species [1].

A particularly striking resonance between Nightingale and One Health is their shared focus on systems improvement. Nightingale's reforms were not isolated interventions but part of a continuous process of learning, feedback, and redesign. She viewed health systems as dynamic and modifiable, subject to the same adaptive logic that governs living systems [7]. This idea of iterative learning is mirrored in One Health's emphasis on adaptive management, where policies and interventions evolve through data feedback and cross-sectoral learning. Both recognize that sustainable improvement demands constant reflection and systemic responsiveness.

Although One Health addresses global challenges, Nightingale's work remains deeply relevant. Her insistence on environmental reform continues to resonate, as contemporary ecological crises echo the unhealthy conditions she sought to correct. Her vision of health as ecological balance bridges individual care and planetary well-being.

From a philosophical perspective, Nightingale's theory can be read as one among several early articulations of interconnectedness, an idea that One Health later institutionalized. She perceived the patient not as an isolated organism but as part of a continuum that included air, water, light, community, and the social and psychological dimensions that shape human well-being. This ontological continuity between the individual and the environment parallels the contemporary understanding that the boundaries between human and non-human systems are porous and mutually influential.

Where One Health speaks of interfaces between domains, Nightingale envisioned an ecosystem of care surrounding each person. Bringing these ideas into dialogue allows for a reinterpretation of Nightingale's legacy alongside today's challenges. Her Environmental Theory was a call to recognize that health depends on the conditions of life; One Health extends and broadens this insight to include multiple species and ecosystems. Both frameworks emerge from a recognition of interdependence, responsibility, and the necessity of coordinated action. Nightingale's contribution, therefore, should not be confined to the history of nursing but acknowledged as part of the wider intellectual genealogy that informs One Health and ecological thinking in the health sciences.

Seen in this light, re-situating Nightingale within a broader lineage also invites a revaluation of nursing's role in global health governance. Nurses, following this legacy, have long worked at the interface between individuals and their environments and witness daily how social, environmental, and behavioural factors intersect in health. In a One Health context, this experiential and integrative perspective is invaluable—her legacy positions nursing not just as caregiving but as an ecological practice.

Ultimately, the link between Florence Nightingale and the One Health paradigm sits within a wider, collective lineage. Across generations, practitioners from multiple disciplines alongside traditional and indigenous knowledge holders and local communities have advanced a relational view of health grounded in interdependence and stewardship. Both Nightingale's environmentalism and these diverse traditions reject reductionism, insisting that well-being depends on the integrity of the whole system. In this sense, the seeds of One Health were sown long before the term existed, rooted in diverse practices that recognized care for individuals as inseparable from care for the environments that sustain life.

3. Conclusion

The historical and conceptual foundations of One Health demonstrate that the interdependence between people, environments, and living systems long predates the contemporary articulation of the term, finding a particularly coherent expression in Florence Nightingale's Environmental Theory. By identifying strong convergences between Nightingale's work and the core principles of One Health this article argues that nursing is not merely aligned with One Health but is integral to its realization. Nursing occupies a distinctive position through its sustained engagement at the interface of everyday environments, social conditions, and health outcomes, enabling the translation of ecological awareness into concrete care practices and system-level change. *Re*-situating Nightingale within this broader intellectual lineage, therefore, is not a historical exercise but a strategic reframing that affirms nursing as a key actor in the local and sustainable implementation of One Health.

CRediT authorship contribution statement

Júlio Belo Fernandes: Writing – review & editing, Writing – original draft, Conceptualization. **Sónia Fernandes:** Writing – review & editing, Writing – original draft. **Cidália Castro:** Writing – review & editing, Writing – original draft. **Diana Vareta:** Writing – review & editing, Writing – original draft.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

References

[1] One Health High-Level Expert Panel (OHHLEP), W.B. Adisasmito, S. Almuhairi, C. B. Behravesh, P. Bilivogui, S.A. Bukachi, N. Casas, N. Cediel Becerra, D.F. Charron, A. Chaudhary, J.R. Ciacci Zanella, A.A. Cunningham, O. Dar, N. Debnath, B. Dungu, E. Farag, G.F. Gao, D.T.S. Hayman, M. Khaitsa, M.P.G. Koopmans, L. Zhou, One Health: a new definition for a sustainable and healthy future, PLoS Pathog. 18 (2022) e1010537, https://doi.org/10.1371/journal.ppat.1010537.

[2] A.S. Winkler, C.M. Brux, H. Carabin, C.G. das Neves, B. Häsler, J. Zinsstag, E. M. Fèvre, A. Okello, G. Laing, W.E. Harrison, A.K. Pöntinen, A. Huber, A. Ruckert, B. Natterson-Horowitz, B. Abela, C. Aenishaenslin, D.L. Heymann, E.K. Rødland, F. C.J. Berthe, I. Capua, J.H. Amuasi, The Lancet One Health Commission: harnessing our interconnectedness for equitable, sustainable, and healthy socioecological systems, Lancet 406 (2025) 501–570, https://doi.org/10.1016/S0140-6736(25)00627-0.

[3] J.S. Mackenzie, M. Jeggo, The one health approach-why is it so important? Trop. Med. Infect. Dis. 4 (2019) 88, https://doi.org/10.3390/tropicalmed4020088.

[4] One World, One Health, Building interdisciplinary bridges to health in a globalized World. https://www.oneworldonehealth.org/sept2004/owoh_sept04.html, 2004 (accessed 10 October 2025).

[5] R.G. Alders, M.M. Vale, How can indigenous knowledge systems be respectfully shared and employed to improve the implementation of impactful One Health actions at all levels? Res Dir One Health. 2 (2024) e9 https://doi.org/10.1017/one.2024.9.

[6] Centers for Disease Control and Prevention, One Health History. https://www.cdc.gov/one-health/about/one-health-history.html, 2025 (accessed 14 October 2025).

[7] E.C. Kudzma, Florence Nightingale and healthcare reform, Nurs. Sci. Q. 19 (2006) 61–64, https://doi.org/10.1177/0894318405283556.

[8] F. Nightingale, Notes on Hospitals, 3rd ed., Longman, Green, Longman, Roberts, & Green, 1863. https://ia601205.us.archive.org/27/items/cu31924012356485/cu31924012356485.pdf?.

[9] F. Nightingale, Notes on Matters Affecting the Health, Efficiency, and Hospital Administration of the British Army: Founded Chiefly on the Experience of the Late War, Harrison, 1858. https://archive.org/details/b20387118/page/n553/mode/2up.

[10] S.H. Kagan, Florence Nightingale's notes on nursing and the determinants of health, Cancer Nurs. 37 (2014) 478, https://doi.org/10.1097/NCC.0000000000000199.

[11] L. McDonald, Florence Nightingale on Society and Politics, Philosophy, Science, Education and Literature (Collected Works) vol. 5, Wilfrid Laurier University Press, 2004. https://library.uc.edu.kh/userfiles/pdf/41.Florence%20Nightingale%20on%20Society%20and%20Politics%20Philosophy%20Science%20Education%20and%20Literature.pdf.

[12] M.G. Bertram, M.P. Costi, E.S.J. Thoré, T. Sabo-Attwood, B.W. Brooks, One Health, Curr. Bio. 34 (2024) 517–519, https://doi.org/10.1016/j.cub.2024.04.025.

[13] F. Lim, Why Florence Nightingale still matters, Nursing 40 (2010) 46–47, https://doi.org/10.1097/01.NURSE.0000389025.10889.c3.

[14] F. Nightingale, Notes on Nursing: What It Is and What It Is Not, Harrison and Sons, 1860. https://archive.org/details/notesnursingwhat00nigh/page/n7/mode/2up.

[15] N.A. Bradshaw, Florence Nightingale (1820-1910): an unexpected master of data, Patterns 1 (2020) 100036, https://doi.org/10.1016/j.patter.2020.100036.

[16] One Health High-Level Expert Panel (OHHLEP), D.T.S. Hayman, W.B. Adisasmito, S. Almuhairi, C.B. Behravesh, P. Bilivogui, S.A. Bukachi, N. Casas, N.C. Becerra, D. F. Charron, A. Chaudhary, J.R. Ciacci Zanella, A.A. Cunningham, O. Dar, N. Debnath, B. Dungu, E. Farag, G.F. Gao, M. Khaitsa, C. Machalaba, M. Koopmans, Developing One Health surveillance systems, One Health 17 (2023) 100617, https://doi.org/10.1016/j.onehlt.2023.100617.

[17] J. Kisacky, When designs became interventions in hospitals, AMA J. Ethics 26 (2024) 948–962, https://doi.org/10.1001/amajethics.2024.948.

[18] European Centre for Disease Prevention and Control, ECDC One Health Framework, ECDC, Stockholm, 2024, https://doi.org/10.2900/634973.

[19] F. Nightingale, Florence Nightingale on public health care, in: L. McDonald (Ed.), The Collected Works of Florence Nightingale vol. 6, Wilfrid Laurier University Press, 2004.

[20] M. Aravind, K.C. Chung, Evidence-based medicine and hospital reform: tracing origins back to Florence Nightingale, Plast. Reconstr. Surg. 125 (2010) 403–409, https://doi.org/10.1097/PRS.0b013e3181c2bb89.