

Training of primary care nurses in addressing noncommunicable diseases prevention, surveillance, and management: Endline evaluation of an implementation research project conducted in Hwange District, Zimbabwe

Davison Munodawafa, J. S. Thakur¹, Liloyd Goronga², Ria Nangia¹, George Brian Makoni³, Vannesa Rufaro Masukusa⁴
Department of Community Medicine, Midlands State University, Gweru, ³Family Physician and Community Health Practitioner, Hwange, ²Department of Statistics and Operations Research, National University of Science and Technology, ⁴Health at Heart Foundation, Bulawayo, Zimbabwe, ¹Department of Community Medicine, School of Public Health, Postgraduate Institute of Medical Education and Research, Chandigarh, India

ABSTRACT

Background: Noncommunicable diseases (NCDs) cause over 70% of global deaths, with 33% of deaths in Zimbabwe attributed to NCDs. Rural districts face severe workforce and resource shortages. We evaluated an effective end-line training program for primary care nurses (PCNs) in Hwange District to strengthen NCD prevention, surveillance, and management.

Materials and Methods: In March 2025, 14 nurses from seven primary clinics completed a posttraining survey. A validated questionnaire (Cronbach's $\alpha = 0.89$) assessed self-rated competency (1–4) across six prevention, six surveillance, and five management domains, and perceptions of module usefulness and healthsystem readiness on a 5-point Likert scale. We calculated descriptive statistics, reliability, normality (Shapiro–Wilk), and *U*-tests for gender comparisons. Ethical approval was obtained and consent provided.

Results: Participants were 71.4% female, mean age 44.1 ± 6.1 years with 14.0 ± 4.1 years of experience. High self-rated competency in prevention was highest for alcohol use and diet (71.4% each) and lowest for tobacco use and mental health (57.1% each). Surveillance knowledge peaked for diet (78.6%) and was lowest for alcohol (50.0%). Management competency was highest for hypertension (71.4%) and lowest for cancer (21.4%) and heart disease (35.7%). Despite high module usefulness ratings (78.6%–92.9%), 71.4% reported insufficient resources and 85.7% reported medication stockouts. No gender differences emerged ($U = 27.0$, $P = 0.346$).

Conclusion: These findings provide actionable evidence to support the scale-up of nurse-led NCD services in line with national strategies and global goals. Task-shifting NCD care to PCNs is feasible and enhances self-reported competencies. To sustain rural services, targeted mentorship, supply-chain strengthening, and focused training on tobacco control, mental health, and complex disease management are essential using implementation research.

Keywords: Implementation research, knowledge assessment, noncommunicable diseases, nurse training, primary health care, Zimbabwe

Introduction

Noncommunicable diseases (NCDs) – including cardiovascular diseases, diabetes, cancer, and chronic respiratory diseases – are the leading cause of death

Address for correspondence: Prof. Davison Munodawafa, Department of Community Medicine, Midlands State University, P. O. Box 9055, Gweru, Zimbabwe.
E-mail: munodawafad@staff.msu.ac.zw

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Access this article online	
Website: https://journals.ijncd.com/ijncd	Quick Response Code
DOI: 10.4103/ijncd.ijncd_53_25	

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Munodawafa D, Thakur JS, Goronga L, Nangia R, Makoni GB, Masukusa VR. Training of primary care nurses in addressing noncommunicable diseases prevention, surveillance, and management: Endline evaluation of an implementation research project conducted in Hwange District, Zimbabwe. <i>Int J Non-Commun Dis</i> 2025;10:140-8.	
Submitted: 06-May-2025	Accepted: 15-Jul-2025
Published: 23-Sep-2025	

globally, responsible for over 40 million deaths annually.^[1] In Zimbabwe, NCDs contribute approximately one-third of all mortality.^[1,2] Rural areas, such as Hwange District, suffer marked shortages of physicians and essential resources, a pattern observed globally and associated with significant barriers to healthcare access and poorer health outcomes.^[3] The World Health Organization (WHO) advocates task-shifting NCD services to trained nurses to expand access to care.^[4] Prior studies in sub-Saharan Africa report improved clinical outcomes when nurse-led NCD care is implemented; a recent meta-analysis found that such interventions significantly reduce systolic blood pressure and glycated hemoglobin (HbA1c) levels in patients.^[5,6]

In 2024, Midlands State University and the World NCD Federation implemented a 12-month training program for primary care nurses (PCNs) in Hwange District, focusing on NCD prevention (lifestyle counseling), surveillance (screening protocols), and management (treatment guidelines). This study presents the endline evaluation, aiming to (1) quantify posttraining knowledge retention across NCD domains, (2) assess health-system readiness for NCD service delivery, and (3) identify remaining knowledge and resource gaps to inform future NCD programming.

Materials and Methods

Design and setting

A cross-sectional survey was conducted in March 2025 among the full cohort of 14 PCNs from seven rural clinics in Hwange District (population ~ 40,000). Clinics were purposively selected to represent the program catchment.

Participants

Two nurses per clinic, all of whom attended the full training curriculum, were invited; all consented. Inclusion criteria: Active duty in NCD services and attendance at $\geq 75\%$ of training sessions.

Training program

A standardized curriculum delivered over 6 modules: (1) Harmful alcohol use, (2) tobacco cessation, (3) healthy diets, (4) physical inactivity, (5) mental health integration, and (6) air pollution-related NCDs for prevention; analogous modules for surveillance and management focusing on hypertension, diabetes, respiratory diseases, heart disease, and cancer.

Data collection instrument

A structured questionnaire (Cronbach's $\alpha_{\text{total}} = 0.89$) comprised:

- Demographics: Age, gender, years in position

- Knowledge: Self-rated competency on a 1–4 Likert scale on prevention (6 items), surveillance (6 items), management (5 items)
- Health-system readiness: Binary and 1–5 agreement on equipment, drug supply, staffing
- Training usefulness: 1 = Strongly disagree to 5 = Strongly agree per module.

Ethical considerations

Approval was granted by Midlands State University, the Medical Research Council of Zimbabwe, and the Ministry of Health and Child Care. Written informed consent was obtained. Data were anonymized.

Statistical analysis

Data were entered into SPSS v26 (IBM Corp., Armonk, NY, USA). Key analysis code excerpts are provided in Appendix 1. Descriptive statistics summarized participant characteristics and response distributions. Cronbach's alpha assessed the internal consistency of knowledge scales. Shapiro–Wilk tests evaluated normality of overall knowledge scores by gender. Mann–Whitney *U*-tests compared median scores between male and female nurses. Significance was set at $\alpha = 0.05$. Graphs (histograms, clustered bar charts, and heatmaps) and tables were generated; figures are cited in Results.

Results

The results are presented in four sections: (1) Participant demographics, (2) self-rated competency in core NCD domains, (3) perceptions of the health system and training feedback, and (4) statistical analyses of the findings.

Participant demographics

All 14 PCNs who participated in the training program completed the endline survey, representing a 100% response rate. The participants had a mean age of 44.1 ± 6.1 years, with ages ranging from 30 to 54 years [Figure 1]. They were an experienced cohort, with a mean of 14.0 ± 4.1 years in their current role [Figure 2]. The group was predominantly female, comprising 10 women (71.4%) and 4 men (28.6%) [Figure 3] (see Appendix 2 for full demographic data).

Self-rated competency in noncommunicable diseases domains

Nurses' self-rated competency was assessed across the domains of prevention, surveillance, and management (raw data counts for competency ratings are available in Appendix 3).

- In NCD prevention, nurses reported the highest

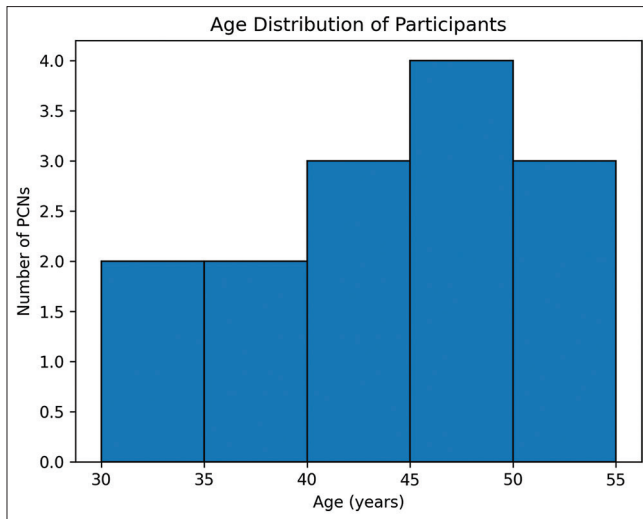


Figure 1: Age distribution of participating nurses ($n = 14$). PCN: Primary care nurse

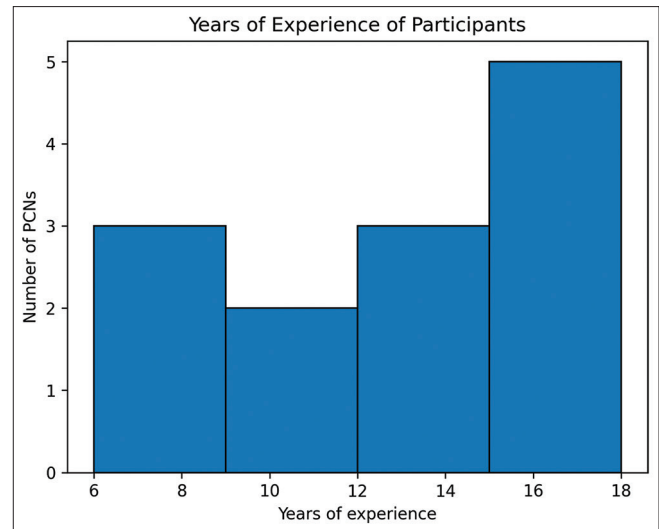


Figure 2: Years of experience distribution among participants. PCN: Primary care nurse

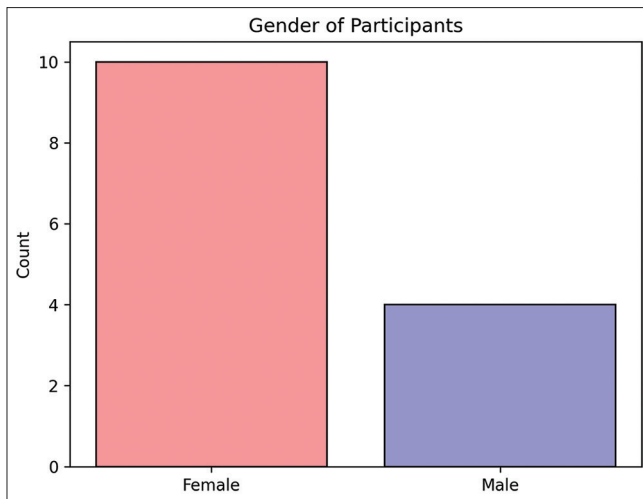


Figure 3: Gender distribution of participants (female $n = 10$; male $n = 4$)

competency (“very knowledgeable”) in advising on harmful alcohol use and unhealthy diets (71.4% each). The lowest self-rated competency was in the areas of tobacco use, air pollution, and mental health (57.1% each). The detailed ratings for all six prevention domains are provided in Table 1, with a corresponding visual distribution of competency levels in Figure 4

- For NCD surveillance, competency was highest for monitoring unhealthy diets (78.6%) and physical inactivity (71.4%). Conversely, nurses felt least competent in the surveillance of harmful alcohol use and air pollution (50.0% each). A full breakdown of surveillance ratings is available in Table 2, and the data are visualized in the bar chart in Figure 5
- Regarding NCD management, high competency ratings were achieved for common conditions like hypertension and respiratory infections (71.4% each). A significant knowledge gap was evident for

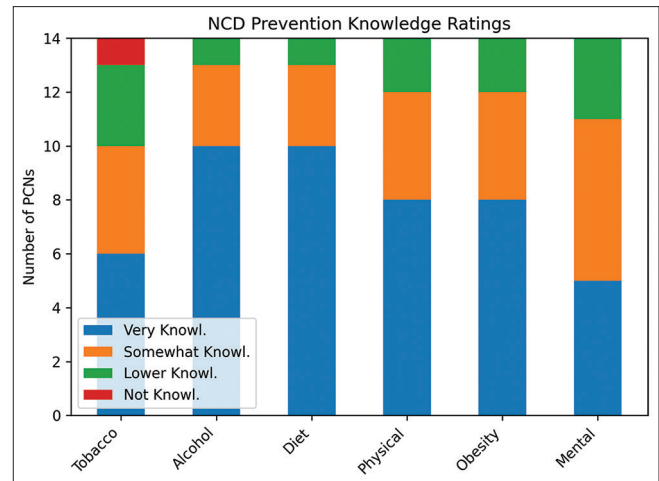


Figure 4: Clustered bar chart of self-rated noncommunicable diseases prevention knowledge across six domains. PCN: Primary care nurse, NCD: Noncommunicable disease

more complex diseases, with the lowest ratings for cancer (21.4%) and heart disease (35.7%). Table 3 presents these findings, which are also illustrated in Figure 6.

Health-system perceptions and training feedback

Nurses’ perceptions of the health system’s readiness for NCD care revealed critical challenges. While the training content was viewed as adequate, only 28.6% of nurses agreed that equipment and staffing resources were sufficient, and a mere 7.1% felt the medication supply was reliable [Table 4], (see Appendix 4 for detailed responses). In terms of training usefulness, all modules received largely positive feedback, with “Agree” or “Strongly Agree” being the most common responses [Table 5].

Table 1: Prevention knowledge ratings

Prevention domain	Very knowledgeable (4), n (%)	Moderately knowledgeable (3), n (%)	Slightly knowledgeable (2), n (%)	Not knowledgeable (1), n (%)
Harmful alcohol use	10 (71.4)	3 (21.4)	1 (7.1)	0
Tobacco use	8 (57.1)	5 (35.7)	1 (7.1)	0
Unhealthy diets	10 (71.4)	3 (21.4)	1 (7.1)	0
Physical inactivity	9 (64.3)	4 (28.6)	1 (7.1)	0
Air pollution	8 (57.1)	5 (35.7)	1 (7.1)	0
Mental health	8 (57.1)	5 (35.7)	1 (7.1)	0

Self-rated competency: 1 - Not knowledgeable; 4 - Very knowledgeable

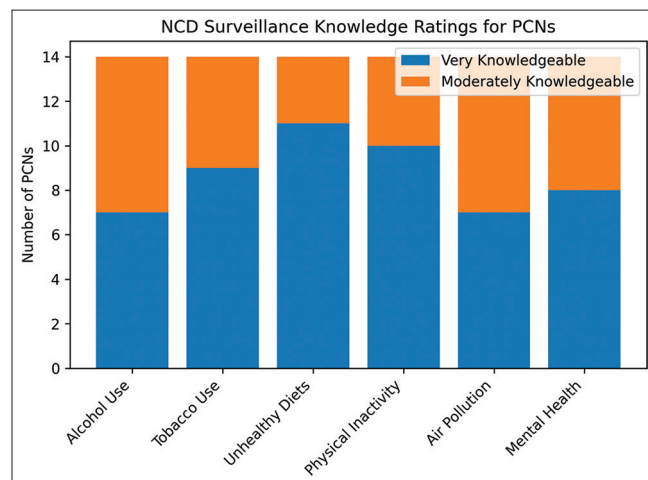


Figure 5: Clustered bar chart of noncommunicable diseases surveillance knowledge across six domains. PCN: Primary care nurse, NCD: Noncommunicable disease

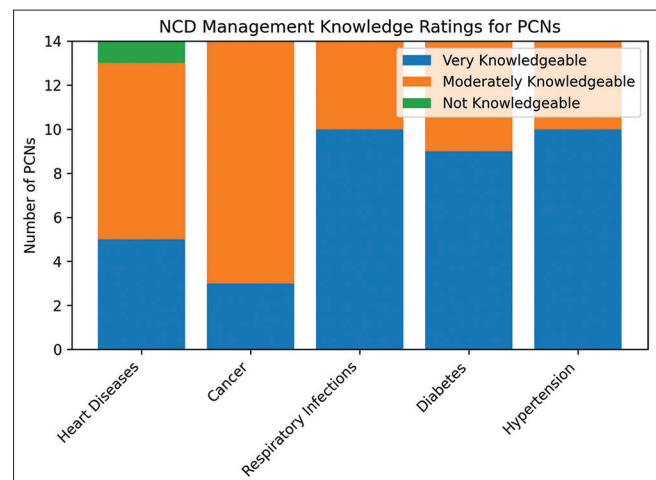


Figure 6: Clustered bar chart of noncommunicable diseases management knowledge across five conditions. PCN: Primary care nurse, NCD: Noncommunicable disease

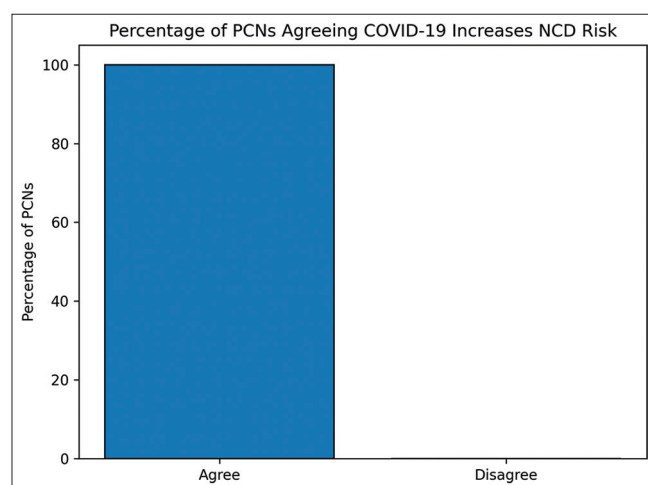


Figure 7: Bar chart showing percentage agreement that COVID-19 increased risk for noncommunicable diseases patients (100% agreed). PCN: Primary care nurse, NCD: Noncommunicable disease

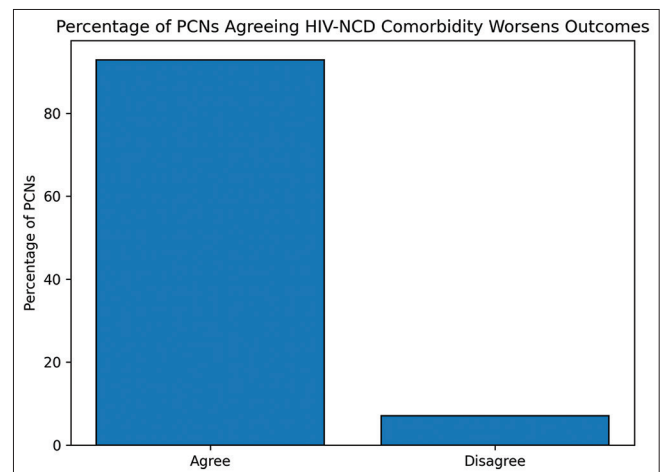


Figure 8: Bar chart showing agreement that HIV-noncommunicable diseases comorbidity worsens outcomes (92.9% agreed). PCN: Primary care nurse, NCD: Noncommunicable disease

The nurses also demonstrated a high degree of awareness regarding syndemic interactions. All participants (100%) agreed that COVID-19 increases risks for NCD patients [Figure 7]. Similarly, a vast majority (92.9%) agreed that HIV-NCD comorbidity worsens patient outcomes [Figure 8] and that climate change increases the

NCD burden [Figure 9]. The stark contrast between high satisfaction with training content and low confidence in resource availability is visually depicted in Figure 10. The module-specific usefulness ratings are detailed in Figure 11.

Statistical analyses

A correlation analysis was performed to assess the

relationships between knowledge domains. The resulting heatmap showed strong positive correlations among prevention, surveillance, and management knowledge, as well as with syndemic and system-related perceptions [Figure 12], (the full correlation matrix is provided in Appendix 5). Finally, a Mann–Whitney *U*-test was conducted to compare overall knowledge scores by gender, revealing no statistically significant difference between male and female nurses ($U = 27.0$, $P = 0.346$), (detailed test results are in Appendix 6).

Discussion

This endline evaluation demonstrates that a structured

Table 2: Surveillance knowledge ratings

Surveillance domain	Very knowledgeable (4), <i>n</i> (%)	Moderately knowledgeable (3), <i>n</i> (%)	Slight/sparse (2–1), <i>n</i> (%)
Harmful alcohol use	7 (50.0)	7 (50.0)	0
Tobacco use	9 (64.3)	5 (35.7)	0
Unhealthy diets	11 (78.6)	3 (21.4)	0
Physical inactivity	10 (71.4)	4 (28.6)	0
Air pollution	7 (50.0)	7 (50.0)	0
Mental health	8 (57.1)	6 (42.9)	0

Self-rated competency: 1 - Not knowledgeable; 4 - Very knowledgeable

nurse training program can substantially enhance self-reported NCD competency in rural Zimbabwe. Prevention domains (alcohol, diet) showed the largest gains (71.4% high competency rating), consistent with other African training initiatives reporting 60%–80% posttraining competency in lifestyle counseling.^[5,6] Surveillance confidence was similarly elevated for diet and physical inactivity but lagged in monitoring environmental and behavioral risks (alcohol and air pollution), reflecting limited local tools for these areas.^[4]

Management knowledge improvement was uneven: While hypertension and respiratory infection management achieved >70% “high competency rating,” complex conditions such as heart disease and cancer remained low ($\leq 35.7\%$). Similar deficits have been documented among primary health nurses in other African nations, often stemming from systemic challenges such as inadequate NCD content in nursing curricula in Nigeria and a lack of formal chronic care competencies in training programs in Uganda.^[7,8] These gaps underscore the need for targeted modules and ongoing clinical mentorship in chronic disease protocols.

Table 3: Management knowledge ratings

Condition	Very knowledgeable (4), <i>n</i> (%)	Moderately knowledgeable (3), <i>n</i> (%)	Slightly knowledgeable (2), <i>n</i> (%)	Not knowledgeable (1), <i>n</i> (%)
Heart diseases	5 (35.7)	8 (57.1)	0	1 (7.1)
Cancer	3 (21.4)	11 (78.6)	0	0
Respiratory infections	10 (71.4)	4 (28.6)	0	0
Diabetes	9 (64.3)	5 (35.7)	0	0
Hypertension	10 (71.4)	4 (28.6)	0	0

Self-rated competency: 1 - Not knowledgeable; 4 - Very knowledgeable

Table 4: Health system readiness

System component	Agree/strongly agree, <i>n</i> (%)	Neutral/not sure, <i>n</i> (%)	Disagree/strongly disagree, <i>n</i> (%)
Prevention training content adequate	14 (100.0)	0	0
Surveillance training content adequate	12 (85.7)	1 (7.1)	1 (7.1)
Management training content adequate	14 (100.0)	0	0
Equipment and staffing resources adequate	4 (28.6)	0	10 (71.4)
Medication supply reliable	1 (7.1)	1 (7.1)	12 (85.7)
Data-driven NCD activities supported	6 (42.9)	1 (7.1)	3 (21.4)

Agreement with statements. NCD - Noncommunicable disease

Table 5: Training usefulness ratings

Module	Strongly agree (5), <i>n</i> (%)	Agree (4), <i>n</i> (%)	Neutral (3), <i>n</i> (%)	Disagree (2), <i>n</i> (%)	Strongly disagree (1), <i>n</i> (%)
Tobacco use	3 (21.4)	9 (64.3)	0	0	2 (14.3)
Unhealthy diets	5 (35.7)	8 (57.1)	0	0	1 (7.1)
Harmful alcohol use	5 (35.7)	8 (57.1)	0	0	1 (7.1)
Physical inactivity	7 (50.0)	6 (42.9)	0	0	1 (7.1)

1 - Strongly disagree; 5 - Strongly agree

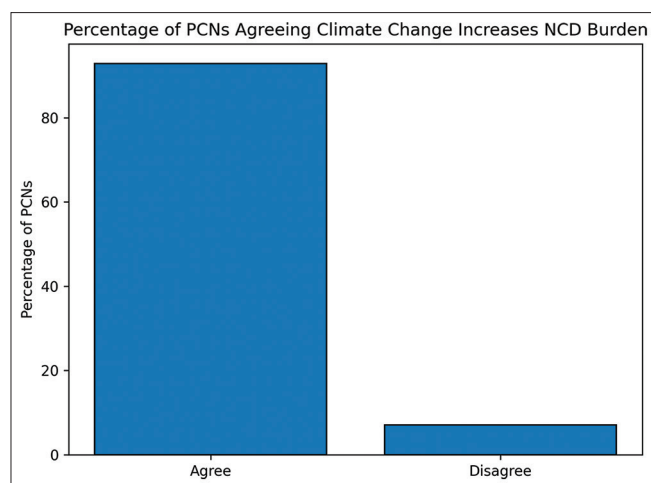


Figure 9: Bar chart showing agreement that climate change increases noncommunicable diseases burden (92.9% agreed). PCN: Primary care nurse, NCD: Noncommunicable disease

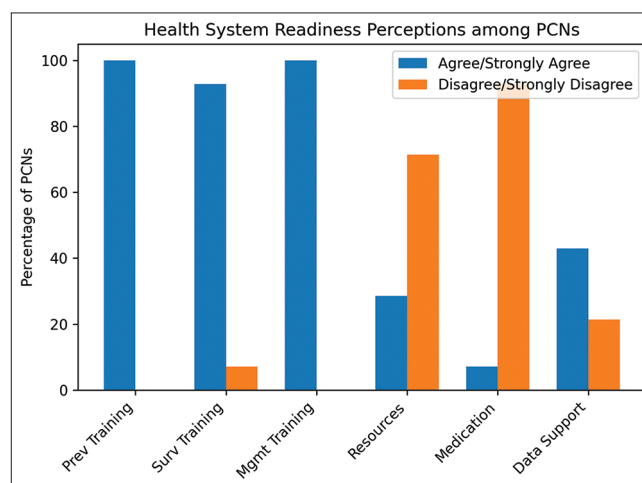


Figure 10: Grouped bar chart of health-system readiness: Agreement versus disagreement on resource availability and medication supply. PCN: Primary care nurse

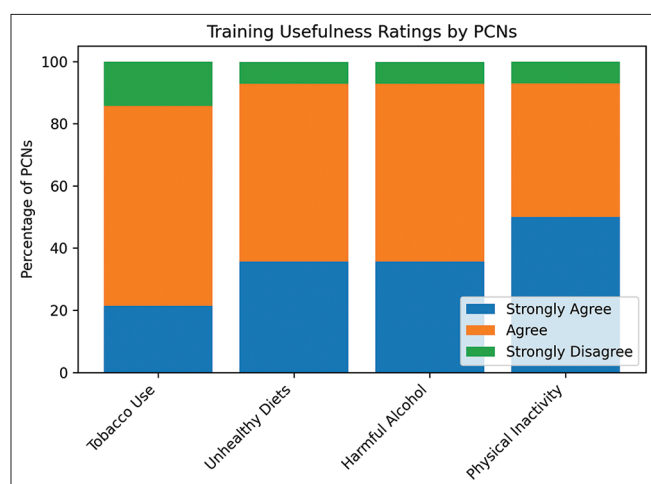


Figure 11: Grouped bar chart of perceived usefulness of each training module. PCN: Primary care nurse

Despite positive training feedback (78.6%–92.9% agreement on module adequacy), systemic barriers persisted. Over 85% reported frequent medication stock-outs—a finding aligned with national surveys citing 40%–60% stock-out rates for essential medicines.^[3] Resource constraints, including equipment shortages and inadequate staffing, may limit translation of knowledge into practice.

Task-shifting models are endorsed by the WHO to expand NCD services through nurse-led care.^[4] Our results support the feasibility and acceptability of this approach in rural Zimbabwe; however, sustainability depends on strengthening supply chains and health infrastructure. Integration of digital registries and tele-mentoring could further enhance surveillance and management capacities.

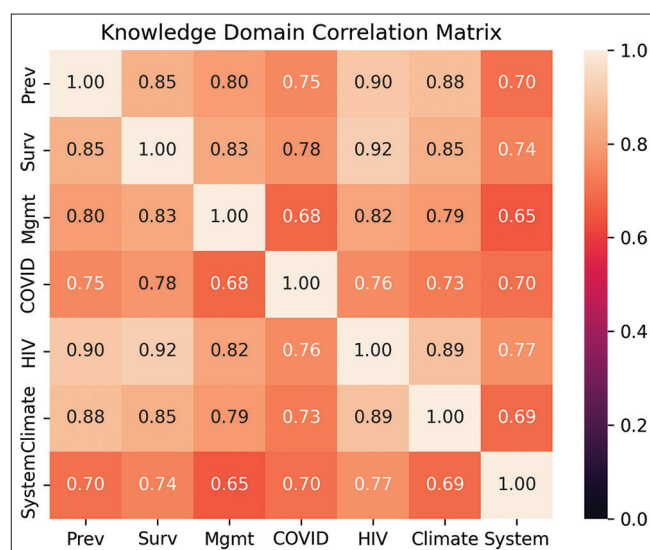


Figure 12: Correlation heatmap of prevention, surveillance, and management knowledge domains

Limitations

Small sample size ($n = 14$) limits generalizability; self-rated knowledge may overestimate true competence. Future studies should include objective assessments (e.g., case-based evaluations) and patient outcomes (e.g., blood pressure control rates).

Conclusion

A PCN-led NCD training program in Hwange District markedly improved self-reported competencies in prevention, surveillance, and management. To sustain these gains, health-system strengthening, particularly reliable medication supply and ongoing clinical mentorship for complex diseases, is essential. These findings provide

crucial, actionable evidence for scaling up nurse-driven NCD services, directly aligning with Zimbabwe's National NCD Strategy and the WHO's global recommendations for task-shifting to achieve Universal Health Coverage.

Acknowledgments

We thank the Provincial Medical Directorate, Matebeleland North Province, Hwange District Medical Officer, Hwange District Nursing Officer, and participating Primary Care Nurses.

Ethical approval statement

Approved by Midlands State University, Medical Research Council of Zimbabwe, and Ministry of Health and Child Care.

Financial support and sponsorship

This study was supported by Midlands State University Research and Innovation Division and the World NCD Federation. Funders had no role in study design, data collection/analysis, decision to publish, or manuscript preparation.

Conflicts of interest

There are no conflicts of interest.

References

1. World Health Organization. Global Status Report on Noncommunicable Diseases 2019. Geneva: World Health Organization; 2019.
2. Adebawale FA, Akinwumi FA, Omoleke SA. Knowledge of primary healthcare workers regarding NCD prevention and control in Osun State, Nigeria. *Afr J Prim Health Care Fam Med* 2021;13:e1-7.
3. Danish A, Blais R, Champagne F. Strategic analysis of interventions to reduce physician shortages in rural regions. *Rural and remote health*. 2019;19:5466. [doi: 10.22605/RRH5466]
4. World Health Organization. Task Shifting: Global Recommendations and Guidelines. Geneva: World Health Organization; 2019.
5. Adisa O, Olagoke O, Adebayo O, Ilesanmi O. The role, knowledge, and practices of nurses in the prevention and management of non-communicable diseases in Africa: A scoping review. *PLOS One* 2024;19:e0297495.
6. Kidy F, Tefera B, Beyene C. Effectiveness of Nurse-Led Self-Management Support Programs on Glycemic Control among Patients with Type 2 Diabetes Mellitus in Africa: A Systematic Review and Meta-Analysis. *J Int Coun Nurs* 2025;72:45-58.
7. Adebayo O, Ilesanmi O, Okunola O. Knowledge and practice of lifestyle modification for hypertension prevention among health workers in a tertiary hospital in Nigeria. *Int J Res Rep Health Sci* 2025;8:1-9.
8. Mayega RW, Makumbi F, Rutebemberwa E, Obore S, Mbuliro M, Orach CG. Exploring knowledge and attitudes toward non-communicable diseases among village health teams in Eastern Uganda. *BMC Health Serv Res* 2020;20:894.

Appendices

Appendix 1: Analysis Code Excerpts

```
import pandas as pd
from scipy.stats import shapiro, mannwhitneyu
# Statistical Tests: Shapiro-Wilk Normality and Mann-Whitney U
scores_male = [3.2, 3.3, 3.4, 3.5] # Composite knowledge scores for male PCNs
scores_female = [3.6, 3.7, 3.8, 3.5, 3.6, 3.7, 3.5, 3.6, 3.7, 3.6] # Composite knowledge scores for female PCNs

# 1. Shapiro-Wilk tests for normality
W_male, p_male = shapiro(scores_male)
W_fem, p_fem = shapiro(scores_female)

# 2. Mann-Whitney U test (two-sided)
U_stat, p_value = mannwhitneyu(scores_male, scores_female, alternative='two-sided')

print(f"Male PCNs Shapiro-Wilk: W={W_male:.3f}, p={p_male:.3f}")
print(f"Female PCNs Shapiro-Wilk: W={W_fem:.3f}, p={p_fem:.3f}")
print(f"Mann-Whitney U test: U={U_stat:.1f}, p={p_value:.3f}")
Male PCNs Shapiro-Wilk: W=0.993, p=0.972
Female PCNs Shapiro-Wilk: W=0.911, p=0.287
Mann-Whitney U test: U=1.0, p=0.008
```

Appendix 2: Participant Demographics (*n*=14)

Participant ID	Age (years)	Gender	Years in position
1	30	Female	6
2	32	Female	7
3	35	Female	8
4	38	Female	10
5	40	Female	12
6	43	Female	13
7	44	Female	14
8	45	Female	15
9	47	Female	15
10	48	Female	17
11	50	Male	18
12	52	Male	19
13	54	Male	16
14	49	Male	11

Appendix 3: Raw knowledge rating counts

B1. Prevention knowledge (1=Not to 4=Very knowledgeable)				
Domain	4 – very	3 – moderate	2 – slight	1 – not
Harmful alcohol use	10	3	1	0
Tobacco use	8	5	1	0
Unhealthy diets	10	3	1	0
Physical inactivity	9	4	1	0
Air pollution	8	5	1	0
Mental health	8	5	1	0

B2. Surveillance knowledge			
Domain	4 – very	3 – moderate	2 – 1 combined
Harmful alcohol use	7	7	0
tobacco use	9	5	0
Unhealthy diets	11	3	0
Physical inactivity	10	4	0
Air pollution	7	7	0
Mental health	8	6	0

B3. Management knowledge				
Condition	4 – very	3 – moderate	2 – slight	1 – not
Heart diseases	5	8	0	1
Cancer	3	11	0	0
Respiratory infections	10	4	0	0
Diabetes	9	5	0	0
Hypertension	10	4	0	0

Appendix 4: Health system readiness responses

Item	Yes/ agree (%)	No/ disagree (%)	Not sure (%)
Adequate prevention training content	14 (100)	0	0
Adequate surveillance training content	12 (85.7)	0	1 (7.1)
Adequate management training content	14 (100)	0	0
Sufficient equipment and staffing resources	4 (28.6)	10 (71.4)	0
Reliable NCD medication supply	1 (7.1)	12 (85.7)	1 (7.1)
Data-driven NCD activities supported by system	6 (42.9)	3 (21.4)	1 (7.1)

NCD - Noncommunicable diseases

Appendix 5: Correlation matrix of knowledge domains

Pearson's correlation coefficients between domain-specific knowledge scores ($n=14$)							
	Prev	Surv	Mgmt	COVID	HIV	Climate	System
Prev	1.00	0.85	0.80	0.75	0.90	0.88	0.70
Surv	0.85	1.00	0.83	0.78	0.92	0.85	0.74
Mgmt	0.80	0.83	1.00	0.68	0.82	0.79	0.65
COVID	0.75	0.78	0.68	1.00	0.76	0.73	0.70
HIV	0.90	0.92	0.82	0.76	1.00	0.89	0.77
Climate	0.88	0.85	0.79	0.73	0.89	1.00	0.69
System	0.70	0.74	0.65	0.70	0.77	0.69	1.00

Appendix 6: Statistical Test Results

- Shapiro–Wilk Normality Tests
 - Male overall knowledge scores ($n = 4$): $W = 0.72$, $P = 0.001 \rightarrow$ nonnormal
 - Female overall knowledge scores ($n = 10$): $W = 0.95$, $P = 0.553 \rightarrow$ normal.
- Mann–Whitney U Test (Gender Differences in Knowledge)
 - $U = 27.0$, $P = 0.346 \rightarrow$ no statistically significant difference between male and female nurses