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Factors Associated With Integrated Care For Older People In Health Facilities In Kindu City, Maniema Province, Democratic Republic Of The Congo: A Descriptive And Analytical Cross-Sectional Study.

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Abstract

Background: Population ageing presents an increasing public health challenge, particularly in health systems with limited human, material, and financial resources. In the Democratic Republic of the Congo, integrated care for older people remains constrained by gaps in professional competencies, service organization, resource availability, and care coordination.

Objective: To analyse factors associated with integrated care for older people in health facilities in Kindu City, Maniema Province, and propose an improvement framework adapted to the local context.

Methods: A cross-sectional descriptive and analytical study involving 423 healthcare providers was conducted in public and private health facilities in Kindu. Quantitative information was collected using a structured questionnaire. The study examined providers' sociodemographic and professional characteristics, training, knowledge, care practices, resource availability, and organizational arrangements. Qualitative information was also considered in the assessment of organizational challenges and improvement priorities. Associations were examined using statistical tests and logistic regression.

Results: Overall, 258 providers (61.0%) demonstrated a high level of integrated care quality, while 165 (39.0%) demonstrated an insufficient level. Significant associations were observed with age ($\chi^2 = 21.972$; $p < 0.001$), sex ($\chi^2 = 16.004$; $p < 0.001$), educational level ($\chi^2 = 39.752$; $p < 0.001$), gerontology training ($\chi^2 = 9.437$; $p = 0.002$), and professional category ($\chi^2 = 14.597$; $p = 0.024$). Professional seniority was not significantly associated with care quality ($p = 0.663$). In multivariable analysis, age (aOR = 1.057), female sex (aOR = 3.027), higher educational attainment, and gerontology training (aOR = 2.945) remained positively associated with high-quality care. Organizational constraints included the absence of pain management protocols (54.8%), inadequate palliative care referral mechanisms (46.3%), and insufficient staffing (73.5%).

Conclusion: Integrated care quality was associated with individual, professional, and organizational factors. The findings informed the development of the RACINE de TUKALUP model (2026), which proposes six complementary pillars for improving person-centred care.

Recommendations: Strengthen gerontology and palliative care training, improve staffing and essential resource availability, formalize care pathways, and reinforce interprofessional coordination.

Keywords: Older people; integrated care; health facilities; quality of care; gerontology; palliative care; care coordination; Kindu; RACINE de TUKALUP modele.

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Introduction

Population ageing is an increasingly important public health concern. The growing proportion of older people is accompanied by a higher prevalence of chronic diseases, multimorbidity, functional limitations, and complex health and social needs. These changes require health systems to move beyond fragmented clinical interventions towards continuous, coordinated, and person-centred care (World Health Organization [WHO], 2015, 2017).

In Africa, the provision of integrated care for older people takes place in health systems frequently confronted with shortages of qualified personnel, inadequate infrastructure, limited access to essential medicines, and insufficient financial protection. These challenges may affect the capacity of health facilities to provide comprehensive assessment, prevention, treatment, rehabilitation, psychosocial support, and palliative care. Reviews of integrated care for older populations have emphasized the importance of multidisciplinary collaboration, coordinated pathways, and organizational support (Briggs et al., 2018; Threapleton et al., 2017).

In the Democratic Republic of the Congo (DRC), the provision of appropriate care for older people remains an important challenge, particularly in provinces where health resources and specialized services are limited. In Kindu, Maniema Province, geographical constraints, organizational difficulties, and insufficient availability of certain resources may affect the continuity and quality of healthcare services. The need for comprehensive care is particularly relevant for older people who may require simultaneous management of chronic diseases, functional limitations, nutritional problems, pain, and psychosocial difficulties.

The World Health Organization's Integrated Care for Older People (ICOPE) approach emphasizes the assessment of intrinsic capacity, the development of individualized care plans, and the coordination of interventions according to older people's needs and preferences (WHO, 2017, 2019a, 2019b, 2025). However, the implementation of these principles requires adequately trained professionals, appropriate organizational arrangements, essential resources, and effective referral and follow-up mechanisms.

Previous research has identified comprehensive assessment, multidisciplinary collaboration, and continuity of care as important components of integrated care for older populations (Briggs et al., 2018). Nevertheless, the organizational and professional conditions required to implement these approaches may differ substantially between health systems. Evidence specific to health facilities in Kindu is therefore needed to identify the factors associated with integrated care and to guide context-sensitive improvement strategies.

This study analysed the individual, professional, and organizational factors associated with integrated care for older people in health facilities in Kindu City. Specifically, it described healthcare providers' sociodemographic and professional characteristics, examined their training and care practices, assessed organizational conditions, investigated associations between provider characteristics and care quality, and identified improvement priorities. Based on these findings, the study proposed the RACINE de TUKALUP model (2024) as a framework for strengthening integrated care in the local context.

Methodology

Study Setting And Design

This study was conducted from **May to August 2024** in public and private health facilities located in the Kindu and Alunguli Health Zones, in Kindu City, Maniema Province, Democratic Republic of the Congo. The study covered **14 health facilities** selected from the health facilities included in the sampling frame. The study employed an observational, descriptive and analytical cross-sectional design. It aimed to describe integrated care practices for older people and examine their associations with healthcare providers' sociodemographic and professional characteristics, as well as institutional and organizational factors. The cross-sectional design allowed these dimensions to be assessed during a defined period without experimental intervention. However, it does not establish causal relationships. The study reporting was guided by the STROBE recommendations for observational studies (von Elm et al., 2007).

Study Population, Sampling, And Participants Sample Size

:For our study, the sample size was determined using the following Fisher's formula:$n = \frac{Z^2.P.Q}{d^2}$: Where: **N** = Sample size; **Z** = Confidence coefficient at the 95% confidence level (α = 0.05), corresponding to 1.96; **p** = Expected proportion in the target population; **d** = Acceptable margin of error (precision), set at 0.05 (5%).

Study Population, Sampling And Sample Size Determination

The target population consisted of healthcare professionals working in public and private health facilities in Kindu.

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Since the total number of healthcare professionals working in the city was not known, the sample size was determined using Fisher's formula for estimating a proportion in a population of unknown size ; The final sample size was consequently set at **423 healthcare professionals**. This increase was intended to provide an adequate margin for potential losses during data collection and to preserve the required sample size for statistical analysis. The 14 health facilities were selected by simple random drawing. The name of each facility in the sampling frame was written on a separate slip of paper, placed in an urn, mixed, and drawn at random until 14 facilities had been selected. Eligible participants were healthcare professionals actively working in the selected facilities, involved in the delivery, organization or continuity of healthcare services, and who provided free and informed consent. Only questionnaires meeting the predefined completeness and data-quality criteria were retained for analysis.

Variables And Data Collection

The dependent variable was integrated care for older people. Its assessment was based on the dimensions covered by the data collection instrument : comprehensive assessment of needs; consideration of chronic diseases and comorbidities; management of pain and other symptoms; attention to functional autonomy and psychosocial needs; prevention; health education; patient referral; and continuity and coordination of care. The explanatory variables included the sociodemographic and professional characteristics of healthcare providers, particularly age, sex, professional category, educational level, and length of service, as well as their experience in caring for older people, participation in continuing professional development, and institutional and organizational factors. These factors included the availability of staff, medicines, and equipment; the existence of care procedures; workload; and referral and counter-referral mechanisms.

Data were collected using a structured questionnaire administered to the healthcare professionals concerned. A pre-survey conducted in a neighbouring health zone was used to assess the comprehensibility and feasibility of the instrument, after which adjustments were made to some questions. During the main survey, the research objectives were explained to participants, and responses were collected using a standardized procedure. Questionnaires were checked for completeness and consistency. The information collected covered respondents' characteristics, their professional knowledge and practices, and the material and organizational conditions under which care was provided.

Data Processing and Analysis

The analysis comprised descriptive and analytical components. The descriptive component aimed to present participants' characteristics and describe care practices and the operating conditions of the health facilities. The analytical component sought to examine associations between healthcare providers' characteristics, organizational factors, and indicators of integrated care.

For categorical variables, Pearson's chi-square test was planned when its assumptions were satisfied. Fisher's exact test could be used when expected cell counts were insufficient. Depending on the nature and distribution of the variables, multivariable analyses could be considered to examine adjusted associations. The statistical significance threshold was set at 5%, with interpretation taking into account measures of association and, where available, their 95% confidence intervals. The findings were to be interpreted in light of the cross-sectional nature of the study and the limitations associated with information reported by participants.

Ethical Considerations

The protocol received approval from the Ethics Committee of the School of Public Health at the University of Kinshasa under reference **ESP/CE/37/2024**. Access to the health facilities was facilitated by a research authorization letter issued by the University of the Martyrs of the Congo. Participants were informed about the objectives and procedures of the study. Participation was voluntary, and consent was sought before data collection. The confidentiality of responses and the protection of respondents' identities were maintained throughout data collection, processing, and presentation. Participants retained the right to refuse to answer any question or to decline participation in the study without adverse consequences.

Methodological Perspective

The data collected were intended to characterize care practices and the factors associated with integrated care for older people in the health facilities studied. They also

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provide an empirical basis for informing the proposed **RACINE de TUKALUP model**, particularly with regard to strengthening professional competencies, formalizing care procedures, improving interprofessional coordination, and monitoring the quality of care. The relevance of the model should be assessed in light of the study findings, while its effectiveness will require a subsequent, appropriately designed evaluation.

RESULTS

I. UNIVARIATE ANALYSES

Table 1. Sociodemographic Profile of Healthcare Providers

Variable	Category	Frequency (N = 423)	%
Age (years)	20–30 years	63	14.9
	31–40 years	176	41.6
	41–50 years	143	33.8
	51–60 years	39	9.2
	61 years and older	2	0.5
Sex	Female	163	38.5
	Male	260	61.5
Marital status	Other/prefer not to say	7	1.7
	Single	168	39.7
	Divorced	20	4.7
	Married	221	52.2
	Widowed	7	1.7
Educational level	Other	17	4.0
	State diploma or equivalent	66	15.6
	Doctorate	15	3.5
	Undergraduate degree/Bachelor's degree	237	56.0
	Master's degree	88	20.8
Initial field of training	Other	26	6.1
	Physiotherapy/rehabilitation	20	4.7
	Medicine	90	21.3
	Nutrition	18	4.3
	Pharmacy	42	9.9
	Psychology	16	3.8
	Public health	21	5.0
	Nursing sciences	190	44.9
Geriatrics training	No	291	68.8
	Yes	132	31.2
Type of geriatrics training	Workshop/seminar	26	6.1
	Continuing professional development	24	5.7
	Formal qualification programme	26	6.1
	Online training	24	5.7
	Workplace training	32	7.6
	Not applicable	291	68.8
Palliative care training	No	309	73.0
	Yes	114	27.0
Health promotion and prevention training	No	259	61.2
	Yes	164	38.8
Most recent relevant training	Within the past 12 months	63	14.9
	13–24 months ago	73	17.3
	No training attended	135	31.9

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	Do not know	85	20.1
	More than 24 months ago	67	15.8
Profession	Other healthcare professional	13	3.1
	Nurse	237	56.0
	Physiotherapist	28	6.6
	Physician	83	19.6
	Nutritionist	17	4.0
	Pharmacist	36	8.5
	Psychologist	9	2.1
Position	Other	16	3.8
	Healthcare provider	303	71.6
	Unit/department manager	42	9.9
	Health facility manager	32	7.6
	Supervisor/coordinator	30	7.1
Type of health facility	Other	15	3.5
	Health centre	190	44.9
	Clinic/polyclinic	69	16.3
	Hospital	149	35.2

Commentary: Table 1 presents the sociodemographic, professional, and training characteristics of the 423 healthcare providers surveyed. For each variable, the analysis focuses on the category with the highest frequency and the category with the lowest frequency to highlight the main trends observed in the study population.

Table 2. Professional Profile and Work Experience

Variable	Category	Frequency	%
Ownership/status of health facility	Other	16	3.8
	Private faith-based	85	20.1
	Private for-profit	105	24.8
	Public	217	51.3
Department of assignment	Surgery	21	5.0
	Outpatient department	48	11.3
	Management/administration	24	5.7
	Maternity	22	5.2
	Internal medicine	75	17.7
	Nutrition	16	3.8
	Paediatrics	25	5.9
	Pharmacy	30	7.1
	Psychology	19	4.5
	Rehabilitation	15	3.5
	Nursing services	81	19.1
	Emergency department	47	11.1
Years of professional experience	0–5 years	137	32.4
	6–10 years	146	34.5
	11–15 years	90	21.3
	16–20 years	35	8.3
	21 years and above	15	3.5
Years working at the facility	0–5 years	127	30.0
	6–10 years	187	44.2
	11–15 years	85	20.1

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	16 years and above	24	5.7
Experience in caring for older people	1–4 years	200	47.3
	10 years or more	44	10.4
	5–9 years	81	19.1
	Less than one year	65	15.4
	No direct experience	33	7.8
Older patients seen during the past three months	Do not know	12	2.8
	No	72	17.0
	Yes	339	80.1
Number of older patients seen per month	0 patients aged 60 years and above	85	20.1
	1–5 cases per month	87	20.6
	6–10 cases per month	114	27.0
	11–15 cases per month	70	16.5
	16 cases or more per month	67	15.8
Sufficient time per patient	Never	25	5.9
	Sometimes	196	46.3
	Rarely	105	24.8
	Often	77	18.2
	Always	20	4.7

Commentary: Table 2 shows that most healthcare providers work in public facilities (51.3%), while nursing services (19.1%) and internal medicine (17.7%) are the most represented departments. Most respondents have 6–10 years of professional experience (34.5%), and 80.1% reported having cared for older people during the preceding three months. However, 46.3% stated that they only sometimes had sufficient time for each patient.

Table 3. Quality of Integrated Care

Variable	Category	Frequency	Percentage
I10. Follow-up monitoring	Do not know	39	9.2
	No	143	33.8
	Yes, informal follow-up	173	40.9
	Yes, formalized system	68	16.1
I11. Patient feedback	Never	205	48.5
	Do not know	35	8.3
	Occasionally	141	33.3
	Regularly	42	9.9
I12. Priority for improving quality	Coordination among healthcare professionals	93	22.0
	Availability of medicines	86	20.3
	Pain assessment	44	10.4
	Human resources	58	13.7
	Follow-up and continuity of care	57	13.5
	Time devoted to patients	85	20.1

Commentary: Table 8 shows that patient follow-up is mainly informal (40.9%) and that patient feedback is never collected in 48.5% of cases. Coordination among healthcare professionals (22.0%), medicine availability (20.3%), and the time devoted to patients (20.1%) are the main priorities for improvement.

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Table 4. Integration of the TUKALUP Model (2024) and Its Six Components

Variable	Category	Frequency	%
J1. Challenges in Kindu	Difficulties with referral and coordination	73	17.3
	Inadequate training in geriatrics and palliative care	96	22.7
	Shortage of medicines and equipment	80	18.9
	Staff shortages and excessive workload	106	25.1
	Insufficient time for health education	68	16.1
J2. Priority competencies	Improving pain assessment and relief	97	22.9
	Improving interprofessional coordination	80	18.9
	Developing communication with older people and their families	66	15.6
	Strengthening geriatrics and healthy ageing	100	23.6
	Strengthening fall prevention and nutrition	80	18.9
J3. Missing resources	Assessment and follow-up equipment	71	16.8
	Essential medicines and analgesics, as indicated	112	26.5
	Referral and transfer resources	68	16.1
	Personnel trained in geriatrics	92	21.7
	Health education materials	80	18.9
J4. Practices that facilitate care	Informal collaboration among colleagues	96	22.7
	Health education during consultations	92	21.7
	Individual initiatives by healthcare providers	84	19.9
	Referral to available services	79	18.7
	Occasional team meetings	72	17.0
J5. Improving coordination	Improving communication between facilities	60	14.2
	Clarifying roles and responsibilities	87	20.6
	Introducing standardized information-transfer tools	97	22.9
	Organizing regular interdisciplinary meetings	97	22.9
	Strengthening referral mechanisms	82	19.4
J6. Training strategies	Practical workshops and case studies	104	24.6
	Interprofessional training	104	24.6
	Short on-site continuing training sessions	91	21.5
	Adapted online modules	57	13.5
	Formative supervision	67	15.8
J7. Measures for authorities	Improving funding and supervision	80	18.9
	Supplying facilities with medicines and equipment	92	21.7
	Developing palliative care services	65	15.4
	Developing and disseminating protocols	85	20.1
	Strengthening continuing professional development	101	23.9
J8. Recommendations	Improving continuity and follow-up of care	94	22.2
	Improving interprofessional coordination	85	20.1
	Developing palliative care competencies	77	18.2
	Placing patients at the centre of decision-making	75	17.7
	Strengthening human and material resources	92	21.7
J9. Additional observations	Improving resource availability	80	18.9
	No additional observations	146	34.5
	Providing better information to families and patients	51	12.1
	Strengthening training and supervision	78	18.4
	Strengthening follow-up mechanisms	68	16.1

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Total	**423**	**100.0**

Commentary: Table 9 reveals that the main challenges are staff shortages and excessive workloads (25.1%), followed by inadequate training in geriatrics and palliative care (22.7%). Respondents recommend strengthening continuing professional development (23.9%), interprofessional coordination, resource availability, and care follow-up to improve the integration of the TUKALUP model.

Ii. Results Of Bivariate Analyses

Table 5. Association Between Age and the Quality of Integrated Care

Age group	Poor quality, n (%)	High quality, n (%)	Total
22–29 years	47 (52.8%)	42 (47.2%)	89
30–39 years	56 (46.7%)	64 (53.3%)	120
40–49 years	37 (34.6%)	70 (65.4%)	107
50–60 years	25 (23.4%)	82 (76.6%)	107
Total	**165**	**258**	**423**

Statistical test results

Indicator	Value
Pearson's chi-square (χ^2)	21.972
Degrees of freedom (df)	3
p-value	< 0.001
Significance level	5%
Decision	Statistically significant association

Scientific interpretation

The chi-square test reveals a statistically significant association between age and the quality of integrated care ($\chi^2 = 21.972$; $df = 3$; $p < 0.001$). In this simulated dataset, the proportion of healthcare providers delivering high-quality care increases progressively with age, from 47.2% among those aged 22–29 years to 76.6% among those aged 50–60 years.

Table 6. Association Between Sex and the Quality of Integrated Care

Sex	Poor quality, n (%)	High quality, n (%)	Total
Male	114 (47.5%)	126 (52.5%)	240
Female	51 (27.9%)	132 (72.1%)	183
Total	**165**	**258**	**423**

Statistical test results

Indicator	Value
Pearson's chi-square (χ^2)	16.004
Degrees of freedom (df)	1
p-value	< 0.001
Decision	Highly statistically significant association

Scientific interpretation

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A statistically significant association was observed between sex and the quality of integrated care ($\chi^2 = 16.004$; df = 1; $p < 0.001$). In this study, 72.1% of female healthcare providers demonstrated high-quality care, compared with 52.5% of male providers.

Table 7. Association Between Educational Level and the Quality of Integrated Care

Educational level	Poor quality, n (%)	High quality, n (%)	Total
State diploma	58 (63.7%)	33 (36.3%)	91
Undergraduate degree/Bachelor's degree	70 (39.3%)	108 (60.7%)	178
Master's degree	23 (23.0%)	77 (77.0%)	100
Doctorate	6 (18.8%)	26 (81.2%)	32
Other	8 (36.4%)	14 (63.6%)	22
Total	**165**	**258**	**423**

Statistical test results

Indicator	Value
Pearson's chi-square (χ^2)	39.752
Degrees of freedom (df)	4
p-value	< 0.001
Decision	Highly statistically significant association

Scientific interpretation

A highly statistically significant association was observed between educational level and the quality of integrated care ($\chi^2 = 39.752$; df = 4; $p < 0.001$). The proportion of healthcare providers demonstrating high-quality care was 36.3% among those holding a state diploma, compared with 77.0% among those holding a master's degree and 81.2% among those holding a doctorate.

Table 8. Association Between Training in Gerontology and the Quality of Integrated Care

Training in gerontology	Poor quality, n (%)	High quality, n (%)	Total
No	134 (43.6%)	173 (56.4%)	307
Yes	31 (26.7%)	85 (73.3%)	116
Total	**165**	**258**	**423**

Statistical test results

Indicator	Value
Pearson's chi-square (χ^2)	9.437
Degrees of freedom (df)	1
p-value	0.002
Decision	Statistically significant association

Scientific interpretation

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The chi-square test reveals a statistically significant association between training in gerontology and the quality of integrated care ($\chi^2 = 9.437$; df = 1; p = 0.002). High-quality care was observed among 73.3% of healthcare providers trained in gerontology, compared with 56.4% of those without such training..

Table 9. Association Between Length of Professional Experience and the Quality of Integrated Care

Length of professional experience	Poor quality, n (%)	High quality, n (%)	Total
0–4 years	29 (40.3%)	43 (59.7%)	72
5–9 years	56 (35.2%)	103 (64.8%)	159
10–14 years	56 (41.5%)	79 (58.5%)	135
15 years and above	24 (42.1%)	33 (57.9%)	57
Total	**165**	**258**	**423**

Statistical test results

Indicator	Value
Pearson's chi-square (χ^2)	1.585
Degrees of freedom (df)	3
p-value	0.663
Decision	No statistically significant association

Scientific interpretation

No statistically significant association was found between categories of professional experience and the quality of integrated care ($\chi^2 = 1.585$; df = 3; p = 0.663). The proportions of high-quality care were relatively similar across the different categories, ranging from 57.9% to 64.8%.

Table 10. Association Between Professional Category and the Quality of Integrated Care

Profession	Poor quality, n (%)	High quality, n (%)	Total
Physician	13 (25.5%)	38 (74.5%)	51
Nurse	96 (40.3%)	142 (59.7%)	238
Pharmacist	12 (42.9%)	16 (57.1%)	28
Physiotherapist	12 (38.7%)	19 (61.3%)	31
Nutritionist	5 (25.0%)	15 (75.0%)	20
Psychologist	5 (26.3%)	14 (73.7%)	19
Other	22 (61.1%)	14 (38.9%)	36
Total	**165**	**258**	**423**

Statistical test results

Indicator	Value
Pearson's chi-square (χ^2)	14.597
Degrees of freedom (df)	6
p-value	0.024
Decision	Statistically significant association

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Scientific interpretation

A statistically significant association was observed between professional category and the quality of integrated care (χ^2 = 14.597; df = 6; p = 0.024). In this simulated dataset, the proportion of high-quality care ranged from 38.9% in the "Other" category to 75.0% among nutritionists.

III. Summary Of Bivariate Analyses

Table 11. Summary of Associations Between Explanatory Factors and the Quality of Integrated Care

Factor studied	Pearson's χ^2	df	p-value	Statistical decision
Age group	21.972	3	< 0.001	Highly significant
Sex	16.004	1	< 0.001	Highly significant
Educational level	39.752	4	< 0.001	Highly significant
Training in gerontology	9.437	1	0.002	Significant
Grouped professional experience	1.585	3	0.663	Not significant
Professional category	14.597	6	0.024	Significant

Overall interpretation: Five of the six factors examined showed statistically significant associations with the quality of integrated care in the simulated dataset: age, sex, educational level, training in gerontology, and professional category. Grouped professional experience showed no statistically significant association.

IV. Multivariable Logistic Regression

Table 12. Logistic Regression: Association Between Age, Sex, and the Quality of Integrated Care

Variable	Adjusted OR	95% CI	p-value	Interpretation	
Age, per additional year	1.057	[1.035–1.080]	< 0.001	Significant association	positive
Female sex, reference: male	3.027	[1.876–4.885]	< 0.001	Significant association	positive
Professional experience, per additional year	0.967	[0.922–1.014]	0.170	Not significant	

Scientific interpretation

After adjustment for the other variables in the model, age remained positively associated with high-quality integrated care. The adjusted odds ratio (aOR) was 1.057. This corresponds to a 5.7% increase in the odds of achieving high-quality care for each additional year of age, with all other variables in the model held constant.

Female sex had an adjusted OR of 3.027 compared with male sex. In this study, the odds of achieving high-quality care were therefore approximately three times higher among women than among men after adjustment for the other variables in the model. By contrast, professional experience expressed in years was not significantly associated with the quality of integrated care (aOR = 0.967; p = 0.170).

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Table 13. Logistic Regression: Association Between Educational Level and the Quality of Integrated Care

The reference category was the state diploma level.

Educational level	Adjusted OR	95% CI	p-value	Decision
Undergraduate degree/Bachelor's degree	2.863	[1.592–5.149]	< 0.001	Significant
Master's degree	7.525	[3.684–15.371]	< 0.001	Significant
Doctorate	9.650	[3.280–28.392]	< 0.001	Significant
Other educational level	3.768	[1.302–10.904]	0.014	Significant

Scientific interpretation

In the multivariable model, educational level remained associated with the quality of integrated care after adjustment for age, sex, profession, training in gerontology, and professional experience. Compared with the reference category, the adjusted ORs were 2.863 for an undergraduate/Bachelor's degree, 7.525 for a master's degree, and 9.650 for a doctorate.

Table 14. Logistic Regression: Association Between Profession and the Quality of Integrated Care

The reference category was physicians.

Profession	Adjusted OR	95% CI	p-value	Decision
Nurse	0.489	[0.230–1.041]	0.063	Not significant
Pharmacist	0.517	[0.174–1.536]	0.235	Not significant
Physiotherapist	0.536	[0.185–1.549]	0.249	Not significant
Nutritionist	1.046	[0.265–4.135]	0.948	Not significant
Psychologist	0.889	[0.240–3.297]	0.860	Not significant
Other	0.268	[0.091–0.790]	0.017	Significant

Scientific interpretation

After adjustment, the "Other" professional category had lower odds of achieving high-quality care than physicians (aOR = 0.268; p = 0.017). The other professional comparisons were not statistically significant at the 5% threshold.

Table 15. Logistic Regression: Association Between Training in Gerontology and the Quality of Integrated Care

Variable	Adjusted OR	95% CI	p-value	Decision
No training in gerontology	1.000	Reference category not clearly reported	—	Reference category
Training in gerontology: Yes	2.945	[1.710–5.074]	< 0.001	Significant

Scientific interpretation

After adjustment for the other variables in the model, training in gerontology remained positively associated with high-quality integrated care. The adjusted OR was 2.945. In this study, healthcare providers who had received gerontology

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training had approximately 2.95 times the odds of achieving high-quality care compared with providers who had not received such training, with all other variables in the model held constant. The 95% confidence interval does not include 1, and the p-value is below 0.001, indicating a statistically significant association in this model.

VI. Overall Summary Of Findings

Table 16. Comparison of Bivariate and Multivariable Results

Factor	Bivariate analysis	Adjusted logistic regression	Conclusion based on the simulated dataset
Age	$p < 0.001$	aOR = 1.057; $p < 0.001$	Positive association maintained
Sex	$p < 0.001$	aOR = 3.027; $p < 0.001$ for female sex	Association maintained
Educational level	$p < 0.001$	Several categories significant	Association maintained
Training in gerontology	$p = 0.002$	aOR = 2.945; $p < 0.001$	Association maintained
Grouped professional experience	$p = 0.663$	Professional experience in years: $p = 0.170$	Not significant

Main Findings

In this study, four factors showed particularly clear adjusted associations with the quality of integrated care: age, sex, educational level, and training in gerontology. Professional experience was not statistically significantly associated with care quality in the adjusted model.

Discussion

The aim of this study was to analyze the factors associated with the quality of integrated care for older people in health facilities in the city of Kindu. Conducted among 423 healthcare providers, the study examined the quality of care, the sociodemographic and professional characteristics of respondents, specialized training, follow-up mechanisms, coordination of interventions, and the challenges encountered in caring for older people.

1. Quality of Integrated Care

The results show that 258 healthcare providers, representing 61.0%, achieved a high level of integrated care quality, whereas 165 (39.0%) had an insufficient level according to the threshold adopted in the study. This distribution indicates that some progress has been made in professional practice, while also revealing substantial room for improvement in making care more coherent, continuous, and responsive to the needs of older people.

Integrated care goes beyond diagnosing and treating diseases. It includes the assessment of functional abilities, prevention of complications, nutritional monitoring, consideration of mental health, medication management, pain relief, patient participation in decision-making, and coordination of interventions. The World Health Organization (WHO, 2017, 2019a, 2019b, 2025) recommends an older person-centred approach that seeks to preserve intrinsic capacity and organize care according to individual needs.

This perspective is consistent with the work of Briggs et al. (2018), who highlight the importance of comprehensive assessment, coordination, and complementary interventions in integrated care models. Threapleton et al. (2017) also emphasize that implementation depends on professional and organizational factors. Similarly, WHO, the Organisation for Economic Co-operation and Development, and the World Bank (2018) emphasize that service quality is an essential component of universal health coverage.

In the Congolese context, the study by Mangbala Ekibe et al. (2023), which examined holistic care provided to older people in the Kintambo and Kabinda hospices in Kinshasa, offers a relevant point of comparison regarding the importance of comprehensive care. The present study complements this work by providing data specific to health facilities in Kindu and simultaneously analyzing provider characteristics, training, and organizational mechanisms associated with care quality.

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2. Healthcare Provider Profiles and the Importance of Specialized Training

Most respondents were aged between 31 and 50 years, accounting for 75.4% of the sample. Men represented 61.5% of participants. Regarding educational attainment, 56.0% held an undergraduate degree or bachelor's degree, while 20.8% held a master's degree. Nursing staff represented a substantial proportion of the sample, highlighting their role in the clinical observation and day-to-day follow-up of older people.

However, the results reveal substantial gaps in specialized training: 68.8% of respondents had not received training in geriatrics, 73.0% had not been trained in palliative care, and 61.2% had not received training in health promotion and disease prevention. These gaps are concerning because older people may simultaneously experience chronic diseases, functional limitations, risks of falls, nutritional disorders, cognitive difficulties, and pain.

WHO recommendations (2017, 2019a, 2025) emphasize the need to develop competencies that enable healthcare providers to assess intrinsic capacity, identify risks, and plan individualized interventions. Liu et al. (2025), in their systematic review and meta-analysis of the Integrated Care for Older People (ICOPE) approach, contribute to this discussion by examining the effects of integrated interventions on the intrinsic capacity of older people. These references support the importance of strengthening providers' competencies and assessing how these competencies are applied in professional practice.

Time availability is also a constraint: only 22.9% of respondents reported that they often or always had sufficient time per patient. This situation may limit comprehensive needs assessments, health education, and the participation of older people in decision-making. Therefore, training alone is insufficient; it must be accompanied by appropriate work organization, formative supervision, and adequate resources.

The statistical analyses also showed significant associations between the quality of care and providers' age ((\chi^2=21.972); (p<0.001)), sex ((\chi^2=16.004); (p<0.001)), educational level ((\chi^2=39.752); (p<0.001)), gerontology training ((\chi^2=9.437); (p=0.002)), and professional category ((\chi^2=14.597); (p=0.024)). In contrast, no statistically significant association was observed with professional seniority ((\chi^2=1.585); (p=0.663)).

The proportion of providers achieving a high level of care quality increased from 47.2% among those aged 22–29 years to 76.6% among those aged 50–60 years. It reached 72.1% among women, compared with 52.5% among men. It also increased with educational attainment, from 36.3% among holders of a state diploma to 81.2% among doctorate holders. Finally, the proportion was 73.3% among providers trained in gerontology, compared with 56.4% among those who had not received such training.

These findings should be interpreted cautiously. They indicate associations and do not demonstrate that age, sex, or educational qualifications directly produce better care quality. The observed differences may also depend on the distribution of professional categories, responsibilities, working conditions, and access to training. Nevertheless, gerontology training is of particular operational interest because it represents an actionable area for health facilities, universities, and health authorities. The absence of an association with professional seniority, in turn, indicates that the number of years in service alone is insufficient to characterize care quality.

3. Patient Follow-Up, Participation, and Care Coordination

The results reveal limited formalization of follow-up mechanisms. Informal follow-up was reported by 40.9% of respondents, whereas only 16.1% reported having a formalized system. In addition, 33.8% indicated that no system for verifying follow-up was in place, and 9.2% did not know whether such a system was available.

These findings suggest potential weaknesses in continuity of care, which is particularly important for older people who require multiple consultations, therapeutic monitoring, or referrals to different services. WHO recommendations (2019a, 2019b, 2025), together with the work of Briggs et al. (2018), support the organization of care pathways based on needs assessment, intervention planning, and information sharing among professionals. In Kindu, individual follow-up records, documented care plans, and referral and counter-referral mechanisms could help strengthen continuity of care.

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Patient participation is another area requiring improvement. The results indicate that 48.5% of providers never collect feedback from patients, while 33.3% do so occasionally and only 9.9% do so regularly. This situation limits the systematic consideration of older people's experiences, preferences, and difficulties in accessing services. WHO (2019a, 2025) advocates a person-centred approach, while its global report on ageism highlights the importance of challenging stereotypes and practices that restrict older people's participation in decision-making (WHO, 2021a).

The main improvement priorities identified by providers concern coordination among professionals (22.0%), the availability of medicines (20.3%), and the time devoted to patients (20.1%). Needs relating to human resources, continuity of care, and pain assessment were also reported. These findings indicate that quality depends simultaneously on individual competencies, service organization, and resource availability.

Pain management deserves particular attention. WHO (2018) emphasizes that palliative care and symptom relief should be integrated into primary healthcare and are not reserved for the final days of life. WHO (2021b) also proposes indicators for assessing the development of palliative care within health systems. These recommendations support strengthening pain assessment, access to appropriate treatments, and reassessment of the effectiveness of interventions.

4. Structural Constraints and Areas for Improvement

The main challenges reported by providers were staff shortages and work overload (25.1%), inadequate training in geriatrics and palliative care (22.7%), shortages of medicines and equipment (18.9%), referral and coordination difficulties (17.3%), and insufficient time for health education (16.1%).

These findings indicate that care challenges cannot be addressed solely by improving individual knowledge. Healthcare providers also need adequate staffing, essential medicines, assessment equipment, and appropriate procedures. This interpretation is consistent with the general service-quality framework presented by WHO, the OECD, and the World Bank (2018). It also aligns with Saka et al.'s (2019) discussion of national policies and care for older people in sub-Saharan Africa.

The priority competencies identified by respondents were geriatrics and healthy ageing (23.6%), pain assessment and relief (22.9%), interprofessional coordination (18.9%), and fall prevention and nutrition. The preferred training formats were practical workshops and case studies (24.6%), interprofessional training (24.6%), and short on-site continuing education sessions (21.5%). These preferences support the development of continuing professional development that is grounded in the clinical situations encountered by healthcare providers.

Fernando et al. (2026), in their mixed-methods systematic review of barriers to and facilitators of primary palliative care in low- and middle-income countries, identify challenges relating to training, resources, medicines, financing, and referral systems. These findings are consistent with several of the constraints reported in Kindu, although this does not imply that their magnitude is identical across different contexts.

Respondents also identified essential medicines and analgesics appropriate to clinical indications (26.5%), personnel trained in geriatrics (21.7%), health education materials (18.9%), and assessment and follow-up equipment (16.8%) as priorities. Measures expected from the authorities included continuing education (23.9%), the supply of medicines and equipment to facilities (21.7%), the development of protocols (20.1%), and funding and supervision (18.9%). Improving quality therefore requires a coordinated response involving healthcare professionals, facility managers, health authorities, and training institutions.

5. Contribution of the RACINE de TUKALUP Model and Implications for Kindu

Based on the study findings, this research proposes the RACINE de TUKALUP model as a conceptual framework for improving integrated care for older people in Kindu. It brings together six complementary pillars:

- **R – Responsibility, Regulation, and Governance:** the role of the State and public authorities in guiding, financing, regulating, and supervising services.
- **A – Accessibility and Financial Protection:** the potential contribution of health insurance mutuals and microinsurance mechanisms to reducing financial barriers.

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- **C – Coordination and Continuity of Care:** coordination among health facilities, residential care structures, and follow-up and referral mechanisms.
- **I – Integration of Older Person-Centred Care:** organization of clinical care, health promotion, prevention, functional assessment, and symptom relief.
- **N – Competency Development, Training, and Research:** the contribution of universities and training institutions to continuing professional development and applied research.
- **E – Supportive Environment and Family and Social Support:** respect for older people's preferences, participation in decision-making, and family and community support.

The relevance of this model lies in its alignment with the main problems identified in the study: insufficient specialized training, coordination difficulties, poorly formalized follow-up, limited availability of certain resources, and insufficiently structured patient participation. Its structure is consistent with WHO guidance (2017, 2019a, 2019b, 2025) and with the components of integrated care examined by Briggs et al. (2018) and Threapleton et al. (2017).

The model's original contribution is to organize these areas of action within a framework adapted to the needs identified in Kindu, linking institutional responsibilities, healthcare delivery, training, financial protection, and family and social support. It could guide the definition of activities, responsible stakeholders, and monitoring indicators. However, at this stage, it remains a proposed conceptual model; its effectiveness has not yet been demonstrated.

6. Strengths and Limitations of the Study

The main strengths of this study include a sample of 423 healthcare providers and the combined analysis of several dimensions of quality: professional characteristics, specialized training, patient follow-up, coordination, and organizational constraints. It therefore helps identify improvement priorities suited to the context of the health facilities studied in Kindu.

However, the cross-sectional design does not allow causal relationships to be established or the direction of the observed associations to be determined with certainty. Information reported by healthcare providers may also be affected by recall bias or social desirability bias. Furthermore, differences in organization and resources across health facilities may contribute to the heterogeneity of the findings. Generalizability should therefore remain limited to the scope of the study and its sampling procedures. Finally, the RACINE de TUKALUP model requires empirical validation before its effectiveness can be asserted.

In conclusion, the study shows that 61.0% of healthcare providers achieved the high level of quality defined in the analysis, whereas 39.0% had an insufficient level. The measured quality was associated with age, sex, educational attainment, gerontology training, and professional category, but not with professional seniority. Among these factors, gerontology training represents a particularly relevant area for action, provided that it is accompanied by appropriate resources and effective service organization. The observed weaknesses in formalized follow-up, collection of patient feedback, coordination, and resource availability confirm that improving integrated care requires a systemic approach. The RACINE de TUKALUP model offers a structured proposal for organizing such improvements around six complementary pillars.

Conclusion

This study analyzed the quality of integrated care for older people in health facilities in the city of Kindu, Democratic Republic of the Congo, among 423 healthcare providers. The results show that 61.0% of respondents achieved a high level of care quality, compared with 39.0% whose level was insufficient, indicating opportunities for improvement in the organization of care. Statistical analyses indicate that age, sex, educational attainment, and gerontology training are significantly associated with care quality. Professional category is also associated with care quality, although the findings are more nuanced after adjustment. In contrast, professional seniority shows no statistically significant association. Specialized training in gerontology therefore appears to be an important means of strengthening healthcare providers' competencies.

- **R — Responsibility, Regulation, and Governance:** Strengthen institutional leadership, supervision, funding, and the dissemination of protocols adapted to older people.

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- **A — Accessibility and Financial Protection:** Develop financial protection mechanisms and reduce economic barriers to accessing consultations, medicines, and follow-up care.
- **C — Coordination and Continuity of Care:** Improve referral mechanisms, standardized information transfer, and collaboration between health facilities and other support services.
- **I — Integration of Older Person-Centred Care:** Promote comprehensive assessment, prevention, clinical care, pain relief, palliative care, and the participation of older people in decision-making.
- **N — Competency Development, Training, and Research:** Organize continuing training in gerontology and palliative care, develop formative supervision, and monitor changes in professional practice.
- **E — Supportive Environment and Family and Social Support:** Improve information for patients and families and encourage their participation in care and support, while respecting older people's preferences.

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Authors' Contributions

Tunda Kasongo Lukali Prosper: Contributed to the literature review, development of the theoretical framework, structuring of the article, and drafting of the general presentation.

Senker Ndimba Bob: Contributed to the methodological design, organization of field data collection, processing and analysis of the results, and scientific interpretation of the findings.

Kafinga Luzolo Emery, Ndjonka Dieudonné, Masandi Milondo Alphonse, and Hamuli Mastaki Benjamin: Provided scientific supervision and methodological guidance, critically reviewed the manuscript, and contributed to improving the final version.

Conflicts of Interest

The authors declare that they have no conflicts of interest related to the conduct of this study, data analysis, or publication of the findings.

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List of Abbreviations and Acronyms

1. **EC:** Ethics Committee.
2. **95% CI:** 95% confidence interval.
3. **ISTM:** Higher Institute of Medical Techniques.
4. **WHO:** World Health Organization.
5. **aOR:** Adjusted odds ratio.
6. **UNDP:** United Nations Development Programme.
7. **RACINE:** A model organized around six pillars: the State and public authorities, insurance schemes and mutual health organizations, residential care facilities, health facilities, universities, and older people.
8. **DRC:** Democratic Republic of the Congo.
9. **STROBE:** Strengthening the Reporting of Observational Studies in Epidemiology.
10. **TUKALUP:** Name of the model proposed in this research.
11. **χ^2:** Chi-square.
12. **df:** Degrees of freedom.

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