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Knowledge, attitudes, and barriers: Palliative Care services for women with HIV in resource-limited settings

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Abstract

Background Women living with HIV (WLWH) in low- middle-income countries (LMICs) face increased mortality risks from comorbidities despite progress in antiretroviral therapy. Palliative care (PC) is vital for these patients, yet its integration in LMICs, such as Nigeria, is suboptimal due to unique challenges.

Objective This study investigated the knowledge, perceived barriers, and facilitators influencing PC integration into routine HIV care within healthcare (HC) settings.

Methodology A cross-sectional survey was conducted among WLWH in twelve HC facilities throughout Nigeria. Data collection involved surveys focused on PC knowledge, attitudes, facilitators, and barriers. Logistic regression analyses were employed to examine the data.

Results This study revealed significant gaps in knowledge and attitudes towards PC among HIV+ women at NISA-MIRCs. Over 90% were unaware of PC services, but many saw its potential to offer hope (55%) and improve quality of life (56.5%). The key predictors of PC knowledge included education, occupation, religion, having fewer children, urban residence, type of residence, and having a high income ($p < .05$). Despite the willingness to access PC, barriers such as negative HC worker attitudes, perceived high cost, and limited decision autonomy could hinder integration. Facilitators included low-cost services, positive HCW attitudes, physician recommendations, and perceived necessity for personal well-being.

Conclusion Knowledge gaps, diverse attitudes, and significant barriers highlight the need for targeted PC interventions for WLWH. Tailoring educational programs, addressing cost barriers, and improving healthcare infrastructure are crucial to enhancing PC accessibility and quality. These findings can guide policymakers and HC practitioners toward more effective and inclusive care strategies.

Keywords Palliative Care, Women living with HIV, Nigeria, Knowledge, Determinants, PHC, Secondary healthcare

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Introduction

The combination of HIV and comorbidities, such as cancer and organ failure, presents a serious health risk [1, 2], particularly for women living with HIV (WLWH), who experience higher mortality rates from life-threatening conditions [3]. Although combination antiretroviral therapy (cART) has extended the life expectancy of people living with HIV (PLWH), especially in low- and middle-income countries (LMICs), it has also led to increased risks of long-term health issues. For WLWH, these include comorbidities related to HIV and prolonged antiretroviral use, alongside mental health challenges exacerbated by stigma and social inequities [3–8].

Palliative care has become crucial in managing life-threatening illnesses [9–14]. Palliative care is an approach that improves the quality of life for patients and their families facing life-threatening illnesses by addressing not only physical symptoms like pain but also psychosocial and spiritual needs [15, 16]. Early integration of palliative care is crucial for PLWH, who face progressive and incurable comorbidities such as organ failure, cancer and other chronic diseases [17]. Palliative care supports early identification, assessment, and treatment of these conditions, helping to reduce suffering and improve patient outcomes, particularly in regions heavily affected by HIV [18, 19].

Women living with HIV also face poor mental health outcomes, such as depression, due to stigma, discrimination, and social inequities, making palliative care essential [5–8]. However, many WLWH with comorbidities seek healthcare late, leading to more severe symptoms and worsened quality of life [20–24]. Early detection and palliative care can improve patient outcomes and patient satisfaction, yet access remains a public health challenge [25–27]. The World Health Organization (WHO) recommends integrating palliative care into healthcare systems cost-effectively to address this gap, but implementation in LMICs is inadequate [16, 28, 29].

Research shows varying levels of awareness and access to palliative care among women with chronic illnesses, including HIV [30, 31]. Socioeconomic factors influence palliative care knowledge, but gaps remain among patients and healthcare workers [28, 32–39]. Negative attitudes and a lack of trust in healthcare professionals also hinder palliative care delivery [36, 40–43]. Higher education, income, and being married have also been found to positively influence palliative care knowledge and access [35, 37, 44].

Systemic and cultural barriers to palliative care, such as misconceptions, inadequate education for health workers, and limited access, especially in rural areas, have also been highlighted [45–48]. Facilitators of palliative care access include training for healthcare practitioners, patient education, stakeholder engagement, financial support, and community networks [47, 48].

Our study aims to address the limited integration of palliative care into chronic disease treatment in LMICs, with a focus on Nigeria [29, 49–52]. Despite some efforts, challenges such as funding, capacity constraints, and service availability persist [53]. This research investigated knowledge gaps and perceptions of palliative care among WLWH and explored barriers to and facilitators of the integration of palliative care into routine HIV care in Nigeria.

Methods

Study area and population

This study was conducted across Nigeria's six geopolitical zones, using 12 of the 21 Nigeria Implementation Science Alliance-Model Innovation and Research Centers (NISA-MIRCs) [54], also known as implementation laboratories. Supported by PEPFAR through local partners, these facilities are part of the ICON-3 Practice-Based Research Network (ICON-3 PBRN). Linked to six Regional Centers of Excellence and the IVAN Research Institute at the University of Nigeria, the NISA-MIRCs maintain a large cohort of women and children. Our study surveyed WLWH within these 12 facilities.

Study design

We conducted a nested cross-sectional study to explore knowledge gaps, perceived barriers, and facilitators for integrating palliative care into HIV programs in Nigeria. The study followed the Exploration, Preparation, Implementation, and Sustainment (EPIS) Framework [55, 56]. During exploration, 12 NISA-MIRC facilities across six regions were mapped. Preparation involved engagement at NISA-MIRCs and PHCs, participant selection, and stakeholder identification. The implementation included administering pretested survey instruments, whereas the sustainment focused on stakeholder engagement for continued connections.

Sample size calculation

A total of 17,075 WLWH receive care at the study facilities in the 6 geo-political zones; South South (1648), South West (2912), South East (2984), North Central (4545), North West (3934), and North East (1272). We used a priori power analysis with G*power to determine the sample size [57], setting the power at 0.80, the effect size at 0.10, and $\alpha=0.05$. This indicated that a total sample size of 787 participants (approximately 800) was needed. The population proportionate to size (PPS) method was used to assign sample sizes to the NISA-MIRCs sites.

Sampling approach

A multistage sampling method was adopted. Twelve NISA-MIRCs sites involved in an NIH-funded research grant were purposively selected, covering Nigeria's six

regions (2 sites per region). Systematic sampling with a random start was used to select 800 respondents from a list of women who consented to participate. The research staff informed potential respondents and sought their consent to participate.

Data collection and management

A structured, pilot-tested questionnaire was employed to assess knowledge, perceived barriers, and facilitators of integrating palliative care into HIV programs. The researcher-administered survey was conducted with all sampled participants who provided informed consent. For those not proficient in English, local research staff who were natives of the study area and fluent in the local languages explained the concept of palliative care and verbally interpreted the survey questions. Data collection was investigator-assisted, utilizing REDCap for secure data capture and quality assurance [58].

Data analysis

Descriptive statistics summarizing demographic variables, knowledge, perceived barriers, and facilitators. The chi-square test of independence (χ^2) identified predictors of palliative care knowledge, with significance at $p < .05$. Analysis was conducted via IBM SPSS Statistics version 29.

Results

The survey results revealed a predominant concentration of individuals aged 35–44 years (37.3%), with significant proportions of women aged 25–34 years (25.1%) and 45–54 years (24.0%). The youngest [18–24] and oldest (65+) categories are few at 5.3% and 1.1%, respectively. The North Central region has the highest representation (26.5%), and a significant proportion holds a secondary school certificate (29.3%). Traders constitute the largest occupation category (32.8%), Christianity is the dominant religion (66.9%), and urban residences are more common (65.9%). The majority (23.1%) earn $\leq 25,000$ naira (≤ 19.16 USD), and most (87.5%) have 0–5 children. Close to half (46.4%) make health decisions independently, and most are at Stage 1 of their disease (82.9%). Table 1 provides a comprehensive overview of the sociodemographic characteristics of the respondents.

Gaps in Palliative Care among WLWH assessing care at NISA-MIRCS sites

Knowledge of Palliative Care

Overall, the study results revealed that there was a greater proportion of respondents in South West Nigeria (31.2%) indicating knowledge about palliative care than in other zones. In Southern Nigeria, the proportion of respondents with knowledge of palliative care was notably greater (59.9%) than that in Northern Nigeria (9.1%).

Table 1 Demographic characteristics of the respondents

Age	Frequency (%)
18–24	42(5.3)
25–34	201 (25.1)
35–44	298 (37.3)
45–54	192 (24.0)
55–64	58(7.3)
65 and above	9 (1.1)
Geo-political zone	
South East	139 (17.4)
South West	136 (17.0)
South South	77 (9.6)
North Central	212 (26.5)
North East	52 (6.5)
North West	184 (23.0)
Facility	
Annunciation Specialist Hospital, Emene, Enugu	101 (12.6)
Mother of Christ Specialist Hospital, Ogui, Enugu	38 (4.8)
Ijebu-ode General Hospital	98 (12.3)
General Hospital, Alimosho, Lagos State	38 (4.8)
Oron General Hospital, Oron, Akwa Ibom State	39 (4.9)
Calabar General Hospital, Calabar, Cross River State	38 (4.8)
Dalhatu Araf Specialist Hospital, Lafia, Nasarawa	105 (13.1)
Faith Alive Foundation, Jos, Plateau State	107 (13.4)
Gombe State Specialist Hospital, Gombe	32 (4.0)
General Hospital, Billiri, Gombe State	20 (2.5)
Dr. Gwamna Awan General Hospital, Kaduna	114 (14.3)
General Hospital, Funtua, Katsina State	70 (8.8)
Education	
NFE (No Formal Education)	121 (15.1)
Elementary school certificate	111 (13.9)
Secondary school certificate	234 (29.3)
Technical diploma certificate	163 (20.4)
Undergraduate degree	147 (18.4)
Graduate degree	23 (2.9)
Occupation	
Housewife	130 (16.3)
Farmer	97 (12.1)
Trader	262 (32.8)
Teacher	67 (8.4)
Civil servant	142 (17.8)
Other	98 (12.3)
Religion	
Christian	535 (66.9)
Muslim	262 (32.8)
African traditional religion	2 (0.3)
Other	1 (0.1)
Place of Residence	
Rural	273(34.1)
Urban	527(65.9)
Type of residence	
Duplex	15 (1.9)
Bungalow	97 (12.1)
3- or 2-Bedroom Flat	274 (34.3)

Table 1 (continued)

Age	Frequen- cy (%)
Self-contained Apartment/Residence with outdoor amenities	122 (15.3)
Other kinds of living space with external facilities	291 (36.4)
Monthly Personal Income in Nigerian Naira (USD)	
Less than or equal to 25,000 (\leq 19.16)	185 (23.1)
25,001–50,000 (19.16–38.32)	129 (16.1)
50,001–75,000 (38.32–57.48)	158 (19.8)
75,001–100,000 (57.48–76.64)	168 (21.0)
Above 100,000 ($>$ 76.65)	158 (19.8)
Number of Children	
0–5	700 (87.5)
6 and above	100 (12.5)
Health decision autonomy	
Myself	371 (46.4)
Husband	188 (23.5)
Both of us	165 (20.6)
Friends/Relative	70 (8.8)
Stage of disease	
Stage 1	663 (82.9)
Stage 2	133 (16.6)
Stage 3	2 (0.3)

Specifically, 4.5% and 4.6% of the respondents in North West and North Central Nigeria, respectively, indicated knowledge of palliative care. Furthermore, 31.2%, 15.4%, and 13.3% of respondents in South West Nigeria, South Nigeria, and South East Nigeria, respectively, had knowledge of palliative care. However, there was no record of knowledge of palliative care among those in North East Nigeria. Figure 1 below illustrates the distribution of respondents' knowledge regarding palliative care across different geopolitical zones.

Awareness of Palliative Care services in their facilities.

Figure 2 illustrates respondents' awareness of palliative care services in their healthcare facilities across different geopolitical zones. Most respondents in all zones reported not being aware of such services, with percentages ranging from 90.4% in North East Nigeria to 98.7% in South Nigeria. Conversely, the proportion of respondents who were aware of palliative care services in their facility was low, ranging from 1.3% in North West China to 9.6% in North Central Nigeria. Overall, the majority of respondents across all zones reported a lack of awareness of palliative care services in their facility, with only a few indicating awareness.

Attitude towards Palliative Care

The examination of attitudes toward palliative care across different geopolitical zones revealed diverse attitudes, as shown in Fig. 3. Notably, the respondents expressed fear of referral to palliative care, with proportions varying from 9.6% in South Nigeria to 35.5% in South West

Nigeria. Similarly, respondents indicated feelings of anxiety triggered by the term “palliative care,” varying from 1.9% in South Nigeria to 16.7% in South West Nigeria. With respect to beliefs about palliative care, the majority of respondents across all zones perceived it as offering hope (ranging from 42.0% in South West Nigeria to 84.6% in South Nigeria) and as potentially improving quality of life (ranging from 41.3% in South West Nigeria to 90.0% in North East Nigeria). Additionally, some believed that palliative care could alleviate pain when sick, with proportions varying from 32.6% in South West Nigeria to 71.2% in South Nigeria. Similarly, divergent attitudes were observed regarding the perception that palliative care signifies imminent death (ranging from 18.8% in North West Nigeria to 55.0% in North East Nigeria) or implies that medical professionals can no longer provide needed care (ranging from 26.6% in South East Nigeria to 84.6% in South Nigeria). These perceptions were more nuanced and varied across different regions. More information on attitudes toward palliative care across the six regions in Nigeria is presented in Fig. 3.

Sociodemographic predictors of knowledge of Palliative Care

Table 2 provides a comprehensive overview of the predictors of palliative care knowledge. A chi-square (χ^2) test of independence was used to ascertain the predictors of knowledge of palliative care among women who were sampled across various sociodemographic and other health-associated variables. Specifically, respondents' educational level, occupation, religion, number of children, place of residence, type of residence and income all reached statistical significance in terms of their knowledge of palliative care ($p < .05$). Knowledge of palliative care varied by education, with higher rates among those with HND/Degree (26%) and postgraduate (30%) than among those with OND/Diploma (14%), JSC/SSCE (9%), and FSLC (5%). Those without formal education had the lowest level of knowledge. Chi-square analysis revealed significant variation ($p = .000$). Occupation also showed significant variation ($p = .000$), with civil servants (23%), teachers (19%), and traders (12%) having more knowledge than do housewives (3%) and farmers (4%). Religion was significant ($p = .023$), with Christians (13%) having more knowledge than Muslims (10%). Women with fewer children (0–5) had more knowledge (13%) than those with 6 or more children (4%), with significant variation ($p = .010$). Urban residents (15%) had more knowledge than did rural residents (5%) ($p = .000$). The type of residence was also significant ($p = .000$), with those in duplexes (53%) and bungalows (26%) showing more knowledge than those sharing spaces (4%).

Income levels significantly predicted knowledge ($p = .000$); higher earners had more knowledge, with

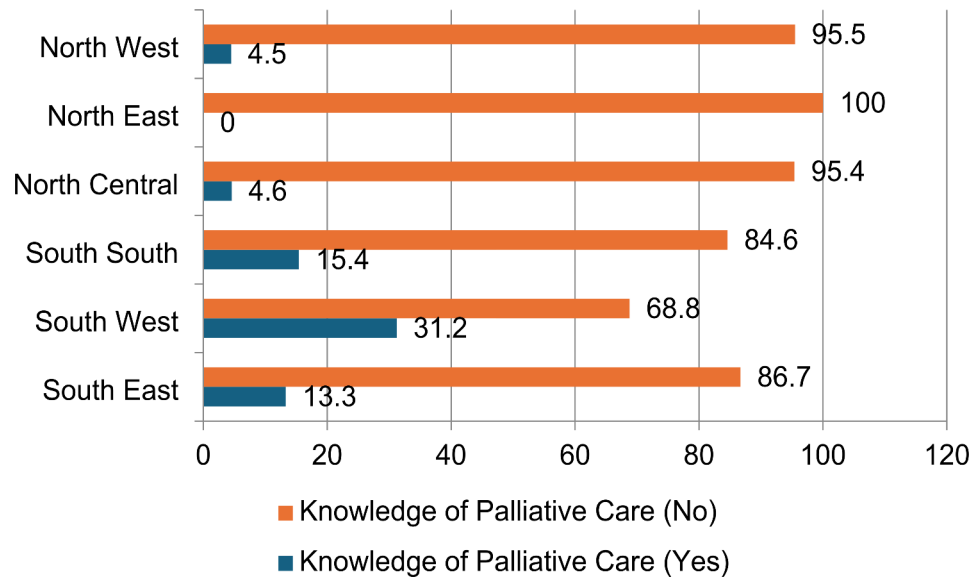


Fig. 1 Knowledge of palliative care across the six regions in Nigeria

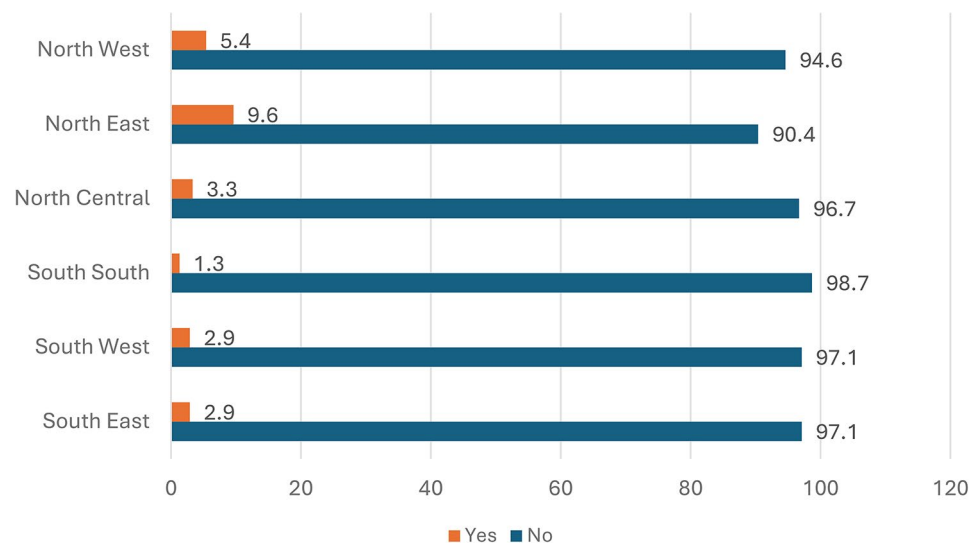


Fig. 2 Awareness of Palliative Care services in NISA-MIRCS facilities across the six regions in Nigeria

22% of those earning above \$76.65 (N100,000) having knowledge compared with 1% of those earning \leq \$19.16 (N25,000). On the other hand, the geopolitical zone, age, and health decision autonomy variables did not show statistically significant associations with knowledge of palliative care, as indicated by the nonsignificant p values ($p > .05$). Specifically, the p -value for geopolitical zones is 0.052, suggesting that there are no significant regional differences in palliative care knowledge. With p values of 0.113 and 0.086, respectively, the respondents' age and autonomy over health decisions do not exhibit any significant relationships. In summary, the findings revealed that socioeconomic variables play a crucial role in the knowledge of palliative care among the women included in the study.

Barriers and facilitators influencing the integration of Palliative Care into routine HIV care in PHC

Willingness of participants to access PCs in PHCs

Figure 4 depicts the 'willingness' of respondents to access or use palliative care services provided by primary healthcare centers (PHCs) near them. The South South region has the highest inclination, with 88.5% of respondents expressing willingness, followed by the North Central region (68.8%). On the other hand, the South West region has a lower proportion (39.9%) reporting willingness. These data indicate considerable regional differences in palliative care acceptance and utilization.

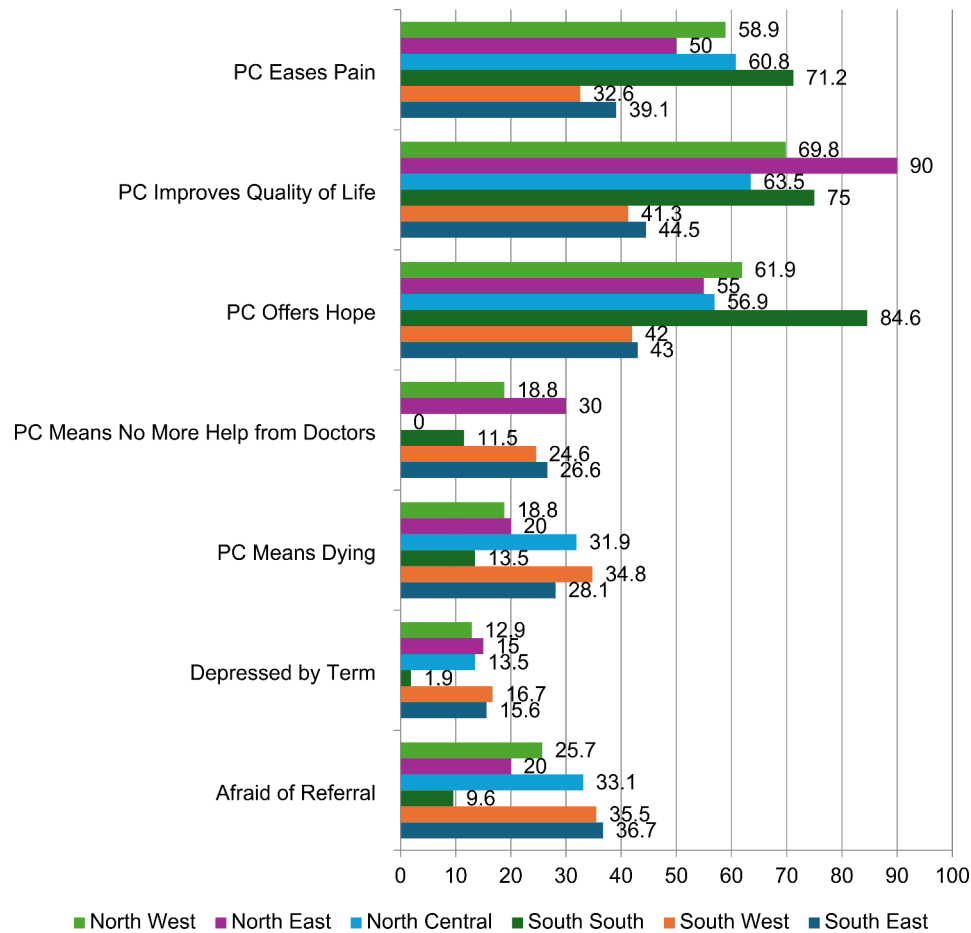


Fig. 3 Attitudes toward Palliative Care across the six regions in Nigeria

Perceived high cost

Across all likely barriers within regions, some crucial distributions were observed. As shown in Fig. 5, a high cost of palliative care topped the list of possible barriers, with respondents in the North Central (82.7%), North West (71.8%) and South South (73.1%) zones indicating it as a concern. The South East and South West zones report similar proportions (approximately 57.8% and 59.4%, respectively), whereas the North East Zone indicates a lower, but still notable, concern at 55.0%.

Stigma

The respondents highlighted that stigma could influence access to palliative care, as those (69.8%) in the North West Zone mentioned it as a barrier. The North Central and North East Zones also reported stigma as a possible concern, at 64.2% and 60.0%, respectively. Moreover, the South West zone has the lowest value of 39.1%.

Negative attitudes of health workers

The issue of negative attitudes from healthcare workers is most pronounced in the South South Zone, with 76.9% of respondents identifying it as a barrier. The North Central

and North West zones also have high proportions, at 64.2% each. The South East zone shows a slightly lower proportion at 51.6%, whereas the South West and North East zones report the lowest levels of negative attitudes, at 30.4% and 50.0%, respectively. This indicates regional variation in healthcare workers' attitudes toward palliative care patients, reflecting potential differences in training, awareness, and cultural attitudes toward palliative care across zones.

Unavailability of trained health workers

Similarly, the majority of respondents in the South South (69.2%), North West (64.4%) and North Central (63.1%) zones highlighted the unavailability of trained healthcare staff as a likely barrier. However, few of those in South East Nigeria (43.8%) and South West Nigeria (29.0%) perceived the unavailability of trained healthcare staff as a problem. The large distance between health facilities and homes emerged as a likely barrier for a moderate proportion of respondents in the North Central (51.9%) and North West (43.6%) zones. However, fewer respondents identified the same barrier in South West Nigeria (23.3%) and South East Nigeria (32.0%).

Table 2 Predictors of knowledge of Palliative Care

Variable	Categories	Knowledge (%)	No Knowledge (%)	Chi-Square p-value
Geo-political zone	South East	11 (9)	117 (91)	0.052 ^{NS}
	South West	22 (16)	116 (84)	
	South South	5 (10)	47 (90)	
	North Central	26 (10)	234 (90)	
	North East	6 (30)	14 (70)	
	North West	24 (12)	178 (88)	
Age of Respondents	18–24	2 (5)	40 (95)	0.113 ^{NS}
	25–34	26 (13)	175 (87)	
	35–44	42 (14)	256 (86)	
	45–54	22 (11)	170 (89)	
	55–64	2 (3)	56 (97)	
	65 and above	0 (0)	9 (100)	
Education	NFE (No Formal Education)	2 (2)	119 (98)	0.000*
	FSLC	5 (5)	106 (95)	
	JSCE/SSCE	20 (9)	214 (91)	
	OND/Diploma	22 (14)	141 (86)	
	HND/DEGREE	38 (26)	109 (74)	
	Post graduate	7 (30)	16 (70)	
Occupation	Housewife	4 (3)	126 (97)	0.000*
	Farmer	4 (4)	93 (96)	
	Trader	31 (12)	231 (88)	
	Teacher	13 (19)	54 (81)	
	Civil servant	32 (23)	110 (77)	
	Other	10 (10)	88 (90)	
Religion	Christian	68 (13)	467 (87)	0.023*
	Muslim	25 (10)	237 (90)	
	African traditional religion	0 (0)	2 (100)	
	Other	1 (100)	0 (0)	
Number of children	0–5 children	90 (13)	610 (87)	0.010*
	6+ children	4 (4)	96 (96)	
Place of Residence	Rural	14 (5)	258 (95)	0.000*
	Urban	80 (15)	446 (85)	
Type of Residence	Duplex	8 (53)	7 (47)	0.000*
	Bungalow	25 (26)	72 (74)	
	3/2 Bedroom Flat	39 (14)	235 (86)	
	Self Con	10 (8)	112 (92)	
	Living space with external facility	12 (4)	279 (96)	
	Less than or equal to 25,000 (\leq 19.16)	2 (1)	183 (99)	
Monthly Personal Income in Nigerian Naira (USD)	25,001–50,000 (19.16–38.32)	9 (7)	120 (93)	0.000*
	50,001–75,000 (38.32–57.48)	25 (16)	133 (84)	
	75,001–100,000 (57.48–76.64)	22 (13)	146 (87)	
	Above 100,000 (> 76.65)	35 (22)	123 (78)	
	Myself	49 (13)	321 (87)	
Health decision autonomy	Husband	18 (10)	170 (90)	0.086 ^{NS}
	Friends/Relative	3 (4)	67 (96)	
	Both of us	24 (15)	141 (85)	
	Stage 1	73 (11)	590 (89)	
Stage of disease	Stage 2	19 (14)	114 (86)	0.134 ^{NS}
	Stage 3	1 (50)	1 (50)	

Note NS: Not significant; *Significant at the 0.05 level

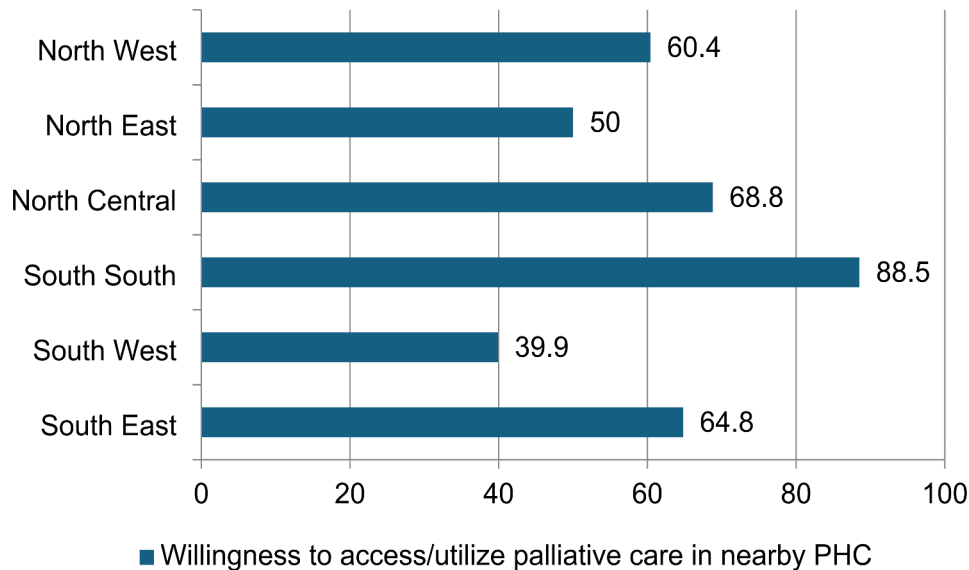


Fig. 4 Willingness to access or utilize palliative care in nearby PHC

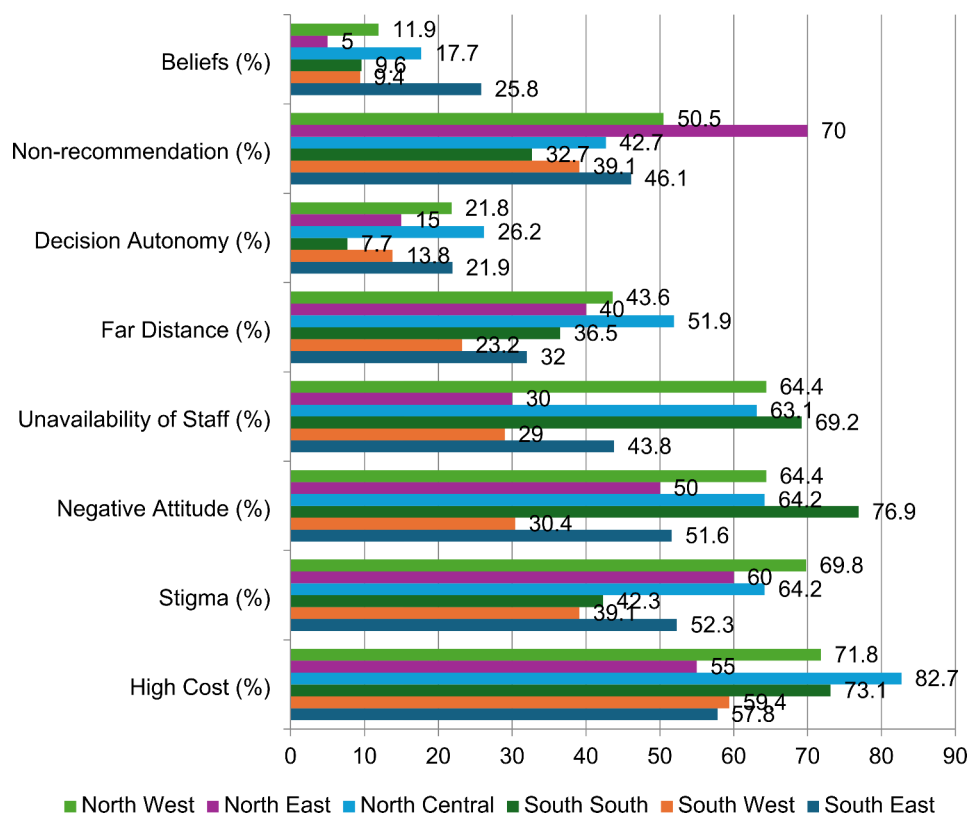


Fig. 5 Distribution of selected barriers to Palliative Care across geopolitical zones

Decision autonomy

Decision autonomy has lower proportions across all zones, indicating that it is less of a barrier than other factors. The South South and South West zones have the lowest percentages, at 7.7% and 13.8%, respectively. In contrast, non-recommendation from doctors is a

substantial barrier in the North East (70.0%) and North West (50.5%) zones, indicating possible gaps in physician advocacy for palliative care. Finally, personal opinions concerning palliative care are a less prevalent obstacle overall, with South East Nigeria reporting the largest share (25.8%), followed by North Central Nigeria (17.7%).

This implies that while beliefs influence palliative care uptake, other systemic constraints, such as cost, stigma, and personnel availability, are more important across geographical zones.

Facilitators of integrating Palliative Care

Low cost of Palliative Care services

Figure 6 presents the distribution of facilitators of palliative care across six geopolitical zones in Nigeria. As shown in the figure below, a great majority of respondents in North East Nigeria (90.0%), South South Nigeria (88.5%), North Central Nigeria (85.8%), and North West Nigeria (80.7%) highlighted low-cost or no-cost palliative care as a likely facilitator of integration.

Positive attitudes of healthcare workers

Another facilitator mentioned by most of the respondents in North East Nigeria (80.0%), South South Nigeria (76.9%), North Central Nigeria (74.2%) and North West Nigeria (67.8%) was positive attitudes of health workers. However, fewer than half of the respondents in South West Nigeria identified the positive attitudes of health workers as facilitators.

Recommendation by physicians and the subjective other

Physician recommendations were regarded as critical facilitators, with South South Nigeria (88.5%), North East Nigeria (85.0%), North Central Nigeria (74.6%), South

East Nigeria (73.4%), and other zones having the highest proportions. Palliative care is perceived as necessary for well-being in the North East (80.0%), North Central (80.0%), North West (68.8%), and South South (55.8%) zones, indicating strong recognition of its importance, whereas the South West (38.4%) and South East (46.9%) zones report lower proportions. Recommendations by subjective others are highest in the North East (45.0%) and North Central (34.2%) zones, indicating strong community support, whereas the South West (10.1%) and South East (14.8%) zones indicate lower approval rates.

The perception that palliative care lessens the burden on family caregivers was identified as a facilitator in the North East (65.0%) and North Central (63.1%) zones. Comparatively, South West Nigeria (15.2%) and South East Nigeria (27.3%) presented smaller proportions, suggesting a need for increased awareness of this benefit. Finally, belonging to a support group, which can enhance the support system for palliative care patients, was the most common facilitator in the South East (21.1%) and North Central (16.9%) zones. South West Nigeria (4.3%) and South South Nigeria (1.9%) reported the lowest proportions.

Discussion

This study explored the integration of palliative care into routine HIV care among women living with HIV (WLWH) in Nigeria, highlighting significant regional

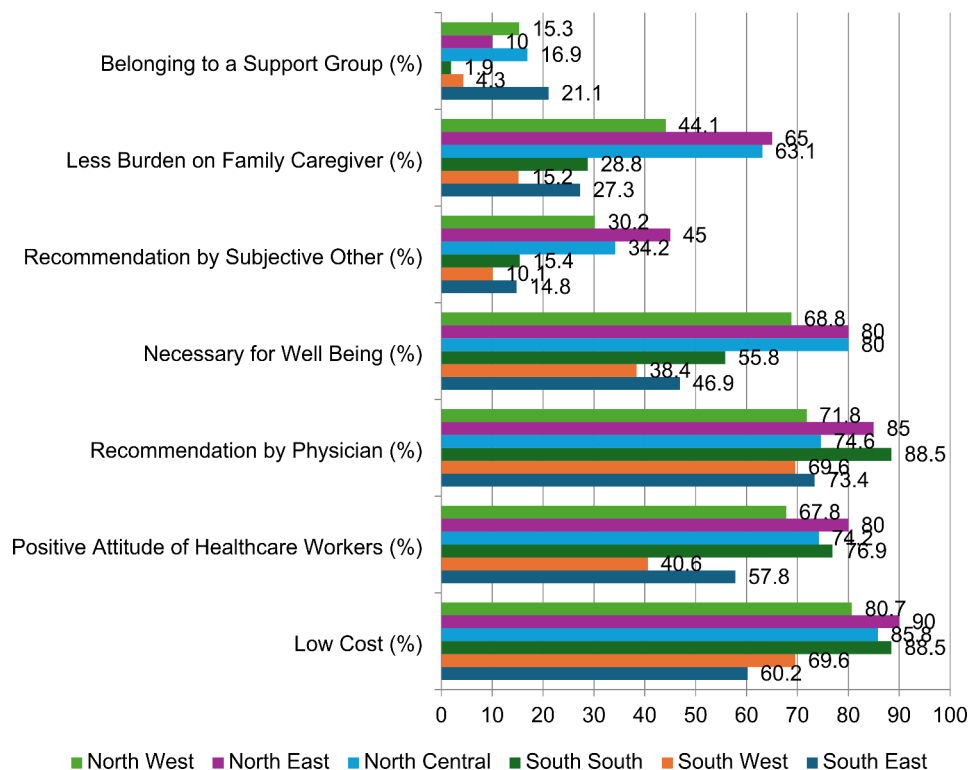


Fig. 6 Facilitators of integration of Palliative Care

disparities in knowledge, barriers, and facilitators. Over 90% of respondents lacked awareness of palliative care, though most recognized its potential to improve quality of life. The predictors of palliative care knowledge included higher education, occupation, urban residence, religion, fewer children, and higher income. Knowledge was highest in the South West (31.2%) and virtually non-existent in the NorthEast (0%). Barriers to integration included high costs, stigma, negative healthcare worker attitudes, and the unavailability of trained staff. Facilitators involved low-cost services, positive healthcare worker attitudes, and physician recommendations.

The findings of this study align with those of previous research [36–39], which also highlighted substantial knowledge gaps regarding palliative care among patients, healthcare workers, and the public. Similar barriers, such as stigma, perceived high costs, and negative attitudes from healthcare workers, have been documented in other studies [45–48]. Additionally, facilitators such as positive attitudes of healthcare workers and physician recommendations are consistent with the literature on palliative care integration [47, 48]. However, the regional disparities identified in this study, particularly the stark differences between the Northeast and Southwest regions, underscore the uneven distribution of healthcare resources and awareness across Nigeria [59].

This study yielded more detailed information than similar studies due to its comprehensive and region-specific focus [59–61]. By examining six geopolitical zones in Nigeria, it provided a nuanced understanding of regional disparities in knowledge, barriers, and facilitators. The use of a large and diverse sample size of HIV-positive women allowed for more robust conclusions and generalizability [62–64]. Additionally, the study's use of the EPIS framework [55, 56] enabled an in-depth exploration of factors influencing palliative care integration at various stages, offering insights that were both detailed and context-specific, particularly in resource-limited settings.

One of the key strengths of this study is its comprehensive approach, involving a large, diverse sample size from Nigeria's six geopolitical regions [60]. The focus on WLWH in a resource-constrained setting like Nigeria provides valuable insights into specific challenges and facilitators for integrating palliative care into HIV care. The use of the EPIS framework allowed for a more detailed exploration of integration phases compared to other studies. Additionally, the patient-centered approach enriched the understanding of factors influencing palliative care uptake in resource-limited settings.

Despite its strengths, the study's reliance on self-reported data introduces the potential for bias [65–68], as participants may not have accurately recalled or reported their experiences. The cross-sectional design limits the establishment of causal relationships between variables

[69]. Furthermore, the focus on WLWH may restrict the generalizability of the findings to other populations or healthcare settings. These limitations suggest the need for more longitudinal studies to track changes in palliative care awareness and integration over time.

The findings have significant implications for policy, clinical practice, and research. To reduce regional disparities in palliative care for WLWH in Nigeria, targeted awareness campaigns should be prioritized, particularly in northern regions where knowledge gaps are most severe. Financial support through subsidies or low-cost services is crucial to overcoming economic barriers in high-cost regions. Nationwide healthcare worker training is essential to improve attitudes and care delivery, particularly in areas with negative perceptions of palliative care. Strengthening rural healthcare infrastructure and utilizing telemedicine can extend services to remote areas. Integrating palliative care into primary healthcare policies will ensure consistent access across all regions, while engaging religious and community leaders can help reduce stigma and encourage service uptake. Finally, a monitoring framework should be established to evaluate and adapt strategies for effective regional implementation, ultimately improving the accessibility and quality of palliative care nationwide.

Conclusion

Our study identified significant gaps in knowledge about palliative care among a diverse population of WLWH and highlighted the value of brief educational exposure. Tailored context-specific interventions focused on improving knowledge and attitudes would be a critical step in efforts to develop coordinated multistakeholder palliative care services, especially in settings without palliative care specialists.

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Author contributions

NIA, TCO, and EEE conceptualized the study. NIA and JOJ contributed to the study design. NIA, IAO, and UJO led data collection. JOJ, JOO, and IAO analyzed the data. NIA, JOJ and IAO wrote the first draft of the manuscript. EEE, JOO, TCO and UJO contributed to the manuscript revision. All authors read and approved the final manuscript.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent participate

Ethical approval for this research was obtained from the Nigerian National Health Research Committee (NHREC/01/01/2007-18/03/2024). Informed consent was obtained from the participants before the commencement of quantitative data collection.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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References

1. Casper C, Crane H, Menon M, Money D. HIV/AIDS Comorbidities: Impact on Cancer, Noncommunicable Diseases, and Reproductive Health. *Disease Control Priorities, Third Edition (Volume 6): Major Infectious Diseases* [Internet]. 2017 Nov 3 [cited 2024 Jan 28];45–66. <https://www.ncbi.nlm.nih.gov/books/NBK525185/>
2. Webel AR, Schexnayder J, Cioe PA, Zuñiga JA. A Review of Chronic Comorbidities in Adults Living With HIV: State of the Science. *J Assoc Nurses AIDS Care* [Internet]. 2021 [cited 2024 Jan 28];32(3):322–46. <https://pubmed.ncbi.nlm.nih.gov/33595986/>
3. Raffae S, Sabin C, Gilleece Y. Women Against Viruses in Europe (WAVE) EACS. Comorbidities in women living with HIV: A systematic review. *HIV Med* [Internet]. 2022 Apr 1 [cited 2024 Jan 28];23(4):331. <http://pmc/articles/PMC9311813/>
4. Hernández-Ramírez RU, Shiels MS, Dubrow R, Engels EA. Cancer risk in HIV-infected people in the USA from 1996 to 2012: a population-based, registry-linkage study. *Lancet HIV* [Internet]. 2017 Nov 1 [cited 2024 Jan 28];4(11):e495–504. <https://pubmed.ncbi.nlm.nih.gov/28803888/>
5. Valverde EE, Beer L, Johnson CH, Baugher A. Changes in Perceived Discrimination in Healthcare Settings Reported by HIV Patients in the United States from 1996 to 2011–2013. *AIDS* [Internet]. 2018 Sep 9 [cited 2024 Jan 28];32(14):2075. <http://pmc/articles/PMC6171101/>
6. Sommer S, Barroso J. A qualitative metasynthesis of stigma in women living with HIV in the United States. *Int J Equity Health* [Internet]. 2023 Dec 1 [cited 2024 Jan 28];22(1):1–14. <https://equityhealth.biomedcentral.com/articles/https://doi.org/10.1186/s12939-023-01969-5>
7. Waldron EM, Burnett-Zeigler I, Wee V, Ng YW, Koenig LJ, Pederson AB et al. Mental Health in Women Living with HIV: the unique and unmet needs. *J Int Assoc Provid AIDS Care* [Internet]. 2021 [cited 2024 Jan 28];20. Available from: <http://pmc/articles/PMC7829520/>
8. Islam JY, Nogueira L, Suneja G, Coghill A, Akinyemiju T. Palliative Care Use Among People Living With HIV and Cancer: An Analysis of the National Cancer Database (2004–2018). *JCO Oncol Pract* [Internet]. 2022 Oct 22 [cited 2024 Feb 1];18(10):e1683–93. <https://doi.org/10.1200/OP.22.00181>
9. Curtis JR, Higginson IJ, White DB. Integrating palliative care into the ICU: a lasting and developing legacy. *Intensive Care Med* [Internet]. 2022 Jul 1 [cited 2024 Jan 28];48(7):939–42. <https://pubmed.ncbi.nlm.nih.gov/35577992/>
10. Dans M, Smith T, Back A, Baker JN, Bauman JR, Beck AC et al. NCCN Guidelines Insights: Palliative Care, Version 2.2017. *J Natl Compr Canc Netw* [Internet]. 2017 Aug 1 [cited 2024 Jan 28];15(8):989–97. <https://pubmed.ncbi.nlm.nih.gov/28784860/>
11. Hodiament F, Jünger S, Leidl R, Maier BO, Schildmann E, Bausewein C. Understanding complexity - The palliative care situation as a complex adaptive system. *BMC Health Serv Res* [Internet]. 2019 Mar 12 [cited 2024 Jan 28];19(1):1–14. <https://bmchealthservres.biomedcentral.com/articles/https://doi.org/10.1186/s12913-019-3961-0>
12. Nevadunsky NS, Gordon S, Spoozak L, Van Arsdale A, Hou Y, Klobocista M et al. The role and timing of palliative medicine consultation for women with gynecologic malignancies: association with end of life interventions and direct hospital costs. *Gynecol Oncol* [Internet]. 2014 Jan [cited 2024 Jan 28];132(1):3–7. <https://pubmed.ncbi.nlm.nih.gov/24183728/>
13. Rugno FC, Paiva BSR, Paiva CE. Early integration of palliative care facilitates the discontinuation of anticancer treatment in women with advanced breast or gynecologic cancers. *Gynecol Oncol* [Internet]. 2014 Nov 1 [cited 2024 Jan 28];135(2):249–54. <https://pubmed.ncbi.nlm.nih.gov/25173586/>
14. Bakitas MA, Tosteson TD, Li Z, Lyons KD, Hull JG, Li Z et al. Early Versus Delayed Initiation of Concurrent Palliative Oncology Care: Patient Outcomes in the ENABLE III Randomized Controlled Trial. *J Clin Oncol* [Internet]. 2015 May 1 [cited 2024 Feb 1];33(13):1438–45. <https://pubmed.ncbi.nlm.nih.gov/25800768/>
15. UNAIDS Technical update AIDS: Palliative Care. 2000 [cited 2024 Sep 4]; <http://www.unaids.org>
16. Palliative care [Internet]. [cited 2024 Sep 4]. <https://www.who.int/news-room/fact-sheets/detail/palliative-care>
17. Harding R. Palliative care: an essential component of the HIV care continuum.
18. Best M, Leget C, Goodhead A, Paal P. An EAPC white paper on multi-disciplinary education for spiritual care in palliative care. *BMC Palliat Care* [Internet]. 2020 Jan 15 [cited 2024 Jan 28];19(1):1–10. <https://bmcpalliatcare.biomedcentral.com/articles/https://doi.org/10.1186/s12904-019-0508-4>
19. Spencer DC, Krause R, Rossouw T, Moosa MYS, Browde S, Maramba E et al. Palliative care guidelines for the management of HIV-infected people in South Africa. *South Afr J HIV Med* [Internet]. 2019 Mar 1 [cited 2024 Jan 28];20(1). <https://pubmed.ncbi.nlm.nih.gov/31956436/>
20. Benemariya E, Chironda G, Nkurunziza A, Katende G, Sego R, Mukeshimana M. Perceived factors for delayed consultation of cervical cancer among women at a selected hospital in Rwanda: an exploratory qualitative study. *Int J Afr Nurs Sci*. 2018;9:129–35.
21. Ceccarelli M, Venanzi Rullo E, Vaccaro M, Facciola A, d'Aleo F, Paolucci IA et al. HIV-associated psoriasis: Epidemiology, pathogenesis, and management. *Dermatol Ther* [Internet]. 2019 Mar 1 [cited 2024 Jan 28];32(2). <https://pubmed.ncbi.nlm.nih.gov/30588732/>
22. Dunyo P, Effah K, Udofia EA. Factors associated with late presentation of cervical cancer cases at a district hospital: A retrospective study. *BMC Public Health* [Internet]. 2018 Oct 3 [cited 2024 Jan 28];18(1):1–10. <https://bmcpubhealth.biomedcentral.com/articles/https://doi.org/10.1186/s12889-018-6065-6>
23. Mlange R, Matovelo D, Rambau P, Kidenya B. Patient and disease characteristics associated with late tumour stage at presentation of cervical cancer in northwestern Tanzania. *BMC Womens Health* [Internet]. 2016 Jan 25 [cited 2024 Jan 28];16(1):1–6. <https://bmcmwomenshealth.biomedcentral.com/articles/https://doi.org/10.1186/s12905-016-0285-7>
24. Mwaka AD, Orach CG, Were EM, Lyrtzopoulos G, Wabinga H, Roland M. Awareness of cervical cancer risk factors and symptoms: cross-sectional community survey in post-conflict northern Uganda. *Health Expect* [Internet]. 2016 Aug 1 [cited 2024 Jan 28];19(4):854–67. <https://pubmed.ncbi.nlm.nih.gov/26205470/>
25. Almainan W, Alfattani A, Alshareef TA. Breaking bad news to children with chronic kidney disease: a questionnaire-based study and literature review. *Int J Pediatr Adolesc Med*. 2021;8(2):87–93.
26. Bercow AS, Nitecki R, Haber H, Gockley AA, Hinchcliff E, James K et al. Palliative care referral patterns and measures of aggressive care at the end of life in patients with cervical cancer. *Int J Gynecol Cancer* [Internet]. 2021 Jan 1 [cited 2024 Jan 28];31(1):66–72. <https://pubmed.ncbi.nlm.nih.gov/33046575/>
27. Brighton LJ, Bristowe K. Communication in palliative care: talking about the end of life, before the end of life. *Postgrad Med J* [Internet]. 2016 Aug 1 [cited 2024 Jan 28];92(1090):466–70. <https://pubmed.ncbi.nlm.nih.gov/27153866/>
28. Integrating palliative care. and symptom relief into primary health care [Internet]. [cited 2024 Jun 3]. <https://www.who.int/publications/item/integrating-palliative-care-and-symptom-relief-into-primary-health-care>
29. Court L, Olivier J. Approaches to integrating palliative care into African health systems: a qualitative systematic review. *Health Policy and Planning*. Volume 35. Oxford University Press; 2020. pp. 1053–69.
30. Kaba M, de Fouw M, Deribe KS, Abathun E, Peters AAW, Beltman JJ. Palliative care needs and preferences of female patients and their caregivers in Ethiopia: A rapid program evaluation in Addis Ababa and Sidama zone. *PLoS One* [Internet]. 2021 Apr 1 [cited 2024 Jan 28];16(4). <https://pubmed.ncbi.nlm.nih.gov/33886561/>
31. Taperia O, Nyakabau AM. Limited knowledge and access to palliative care among women with cervical cancer: An opportunity for integrating oncology and palliative care in Zimbabwe. *BMC Palliat Care* [Internet]. 2020 Feb 13 [cited 2024 Jan 28];19(1):1–9. <https://bmcpalliatcare.biomedcentral.com/articles/https://doi.org/10.1186/s12904-020-0523-5>
32. Ashrafzadeh H, Mojen LK, Barasteh S, Akbari ME, Beiranvand S, Farahani AS et al. Factors Related to Nurses and Physicians' Knowledge and Attitudes Towards Palliative Care. *International Journal of Cancer Management* 2022

- 15:2 [Internet]. 2022 Feb 1 [cited 2024 Jul 10];15(2):122653. <https://brieflands.com/articles/ijcm-122653>
33. Kimani CW, Kioko UM, Ndinda C, Adebayo PW. Factors Influencing Progressive Utilization of Palliative Care Services among Cancer Patients in Kenya: The Case of Nairobi Hospice. *International Journal of Environmental Research and Public Health* 2023, Vol 20, Page 6871 [Internet]. 2023 Oct 2 [cited 2024 Jul 10];20(19):6871. <https://www.mdpi.com/1660-4601/20/19/6871/htm>
 34. Bérubé A, Tapp D, Dupéré S, Plaisance A, Bravo G, Downar J et al. Do Socio-economic Factors Influence Knowledge, Attitudes, and Representations of End-of-Life Practices? A Cross-Sectional Study. *J Palliat Care* [Internet]. 2022 [cited 2024 Jan 28]; <https://pubmed.ncbi.nlm.nih.gov/36237145/>
 35. Ogunsanya ME, Goetzinger EA, Owopetu OF, Chandler PD, O'Connor LE. Predictors of Palliative Care Knowledge: Findings from the Health Information National Trends Survey. *Cancer Epidemiol Biomarkers Prev* [Internet]. 2021 Jul 1 [cited 2024 Jan 28];30(7):1433–9. <https://pubmed.ncbi.nlm.nih.gov/34088752/>
 36. Atena D, Imane B, Maryam R, Naiire S, Fatemeh T. The level of knowledge about palliative care in Iranian patients with cancer. *BMC Palliat Care* [Internet]. 2022 Dec 1 [cited 2024 Jan 28];21(1):1–8. <https://bmcpalliatcare.biomedcentral.com/articles/https://doi.org/10.1186/s12904-022-00920-9>
 37. Kim S, Lee K, Kim S. Knowledge, attitude, confidence, and educational needs of palliative care in nurses caring for non-cancer patients: a cross-sectional, descriptive study. *BMC Palliat Care* [Internet]. 2020 Jul 11 [cited 2024 Jan 28];19(1). <https://pubmed.ncbi.nlm.nih.gov/32652984/>
 38. Taber JM, Ellis EM, Reblin M, Ellington L, Ferrer RA. Knowledge of and beliefs about palliative care in a nationally-representative U.S. sample. *PLoS One* [Internet]. 2019 Aug 1 [cited 2024 Jan 28];14(8). <http://pmc/articles/PMC6695129/>
 39. Wijesinghe T, Gunathilaka N, Mendis S, Udayanga L. Assessment of Knowledge and Attitude Towards the Palliative Care Among Nurses in Sri Lanka: A Hospital-Based Study. *J Palliat Care* [Internet]. 2023 Jul 1 [cited 2024 Feb 2];38(3):345–54. <https://pubmed.ncbi.nlm.nih.gov/36740944/>
 40. Getie A, Wondmieni A, Mengesha A, Fitwi A, Gedefaw G, Demis A. Assessment of Knowledge and Attitude towards Palliative Care and Associated Factors among Nurses Working in North Wollo Hospitals. *Ethiop J Health Sci* [Internet]. 2021 Mar 1 [cited 2024 Jan 28];31(2):393–400. <https://pubmed.ncbi.nlm.nih.gov/34158791/>
 41. Laporte P, Juvet T, Desbiens JF, Tapp D, Pasquier J, Bornet MA. Factors affecting attitudes towards caring for terminally ill patients among nursing students in Switzerland: a cross-sectional study. *BMJ Open* [Internet]. 2020 Sep 17 [cited 2024 Jan 28];10(9). <https://pubmed.ncbi.nlm.nih.gov/32948561/>
 42. Testoni I, Wieser MA, Kapelis D, Pompele S, Bonaventura M, Crupi R. Lack of Truth-Telling in Palliative Care and Its Effects among Nurses and Nursing Students. *Behavioral Sciences* [Internet]. 2020 May 1 [cited 2024 Jan 28];10(5). <http://pmc/articles/PMC7287675/>
 43. Yoo SH, Kim M, Yun YH, Keam B, Kim YA, Kim YJ et al. Attitudes toward early palliative care in cancer patients and caregivers: a Korean nationwide survey. *Cancer Med* [Internet]. 2018 May 1 [cited 2024 Jan 28];7(5):1784–93. <https://pubmed.ncbi.nlm.nih.gov/29577624/>
 44. Nowels M, Kozlov E, Nowels D, Duberstein P. LOWER SOCIOECONOMIC STATUS PREDICTS NEGATIVE PREFERENCES FOR PALLIATIVE CARE. *Innov Aging* [Internet]. 2023 Dec 21 [cited 2024 Jan 28];7(Suppl 1):502. <http://pmc/articles/PMC10737609/?report=abstract>
 45. Amroud M, Raeissi P, Hashemi SM, Reisi N, Ahmadi SA. Investigating the challenges and barriers of palliative care delivery in Iran and the World: A systematic review study. *J Educ Health Promot* [Internet]. 2021 Jan 1 [cited 2024 Jan 28];10(1). <http://pmc/articles/PMC8395877/>
 46. Mendieta CV, de Vries E, Gomez-Neva ME, Muñoz-Escudero AM, Calvache JA, McConnell T. Barriers and facilitators to palliative care for patients with non-curable cancer in Colombia: perspectives of allied health and social care professionals. *BMC Palliat Care* [Internet]. 2023 Dec 1 [cited 2024 Jan 28];22(1):1–10. <https://bmcpalliatcare.biomedcentral.com/articles/https://doi.org/10.1186/s12904-023-01267-5>
 47. Abu-Odah H, Molassiotis A, Liu J. Challenges on the provision of palliative care for patients with cancer in low- and middle-income countries: a systematic review of reviews. *BMC Palliat Care* [Internet]. 2020 Apr 22 [cited 2024 Jun 3];19(1). <https://pubmed.ncbi.nlm.nih.gov/32321487/>
 48. Donkor A, Luckett T, Aranda S, Phillips J. Barriers and facilitators to implementation of cancer treatment and palliative care strategies in low- and middle-income countries: systematic review. *Int J Public Health* [Internet]. 2018 Dec 1 [cited 2024 Jan 28];63(9):1047–57. <https://pubmed.ncbi.nlm.nih.gov/29974131/>
 49. Freeman R, Luyirika EBK, Namisango E, Kiyange F. Interventions geared towards strengthening the health system of Namibia through the integration of palliative care. *Ecanermedicalsience* [Internet]. 2016 Jul 7 [cited 2024 Jan 28];10. <https://pubmed.ncbi.nlm.nih.gov/27563348/>
 50. Grant L, Downing J, Luyirika E, Murphy M, Namukwaya L, Kiyange F et al. Integrating palliative care into national health systems in Africa: a multi-country intervention study. *J Glob Health* [Internet]. 2017 Jun 18 [cited 2024 Feb 2];7(1):10419. <http://pmc/articles/PMC5475315/>
 51. Mwangi-Powell FN, Powell RA, Harding R. Models of delivering palliative and end-of-life care in sub-Saharan Africa: a narrative review of the evidence. *Curr Opin Support Palliat Care* [Internet]. 2013 Jun [cited 2024 Jan 28];7(2):223–8. <https://pubmed.ncbi.nlm.nih.gov/23572158/>
 52. Onyeka TC. Palliative Care in Enugu, Nigeria: Challenges to a New Practice. *Indian J Palliat Care* [Internet]. 2011 May [cited 2024 Jan 28];17(2):131. <http://pmc/articles/PMC3183602/>
 53. Afolabi OA, Nkhoma K, Soyannwo O, Aje A, Ogunniyi A, Harding R et al. Integrated Primary Palliative Care in Nigeria- Perspectives of Patients, Families and Providers. *J Pain Symptom Manage* [Internet]. 2022 Oct 1 [cited 2024 Jan 28];64(4):319–29. <https://pubmed.ncbi.nlm.nih.gov/35835429/>
 54. Olawepo JO, Ezeanolue EE, Ekenna A, Ogunsola OO, Itanyi IU, Jedy-Agba E et al. Building a national framework for multicentre research and clinical trials: experience from the Nigeria Implementation Science Alliance. *BMJ Glob Health* [Internet]. 2022 Apr 1 [cited 2024 Feb 16];7(4):e008241. <https://gh.bmj.com/content/7/4/e008241>
 55. Aarons GA, Hurlburt M, Horwitz SMC. Advancing a conceptual model of evidence-based practice implementation in public service sectors. *Adm Policy Ment Health* [Internet]. 2011 Jan [cited 2024 Jan 28];38(1):4–23. <https://pubmed.ncbi.nlm.nih.gov/21197565/>
 56. Moullin JC, Dickson KS, Stadnick NA, Rabin B, Aarons GA. Systematic review of the Exploration, Preparation, Implementation, Sustainment (EPIS) framework. *Implementation Science* [Internet]. 2019 Jan 5 [cited 2024 Jan 28];14(1):1–16. <https://implementationscience.biomedcentral.com/articles/https://doi.org/10.1186/s13012-018-0842-6>
 57. Faul F, Erdfelder E, Lang AG, Buchner A. G*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behav Res Methods* [Internet]. 2007 [cited 2024 Jan 28];39(2):175–91. <https://pubmed.ncbi.nlm.nih.gov/17695343/>
 58. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform* [Internet]. 2009 Apr [cited 2024 Feb 16];42(2):377–81. <https://pubmed.ncbi.nlm.nih.gov/18929686/>
 59. Adedini SA, Odimegwu C, Bamiwuyeye O, Fadeyi O, De Wet N. Barriers to accessing health care in Nigeria: implications for child survival. *Glob Health Action* [Internet]. 2014 [cited 2024 Sep 9];7(1):1–10. <https://www.tandfonline.com/doi/abs/https://doi.org/10.3402/gha.v7.23499>
 60. Akeredolu JO. Health disparities in Nigeria: core evidence and practical implications. *International Journal of Community Research* [Internet]. 2018 [cited 2024 Sep 9];7(3):52–68. <https://www.ajol.info/index.php/ijcr/article/view/255016>
 61. Abubakar I, Dalglish SL, Angell B, Sanuade O, Abimbola S, Adamu AL et al. The Lancet Nigeria Commission: investing in health and the future of the nation. *The Lancet* [Internet]. 2022 Mar 19 [cited 2024 Sep 9];399(10330):1155–200. <http://www.thelancet.com/article/S0140673621024880/fulltext>
 62. Currow DC, Wheeler JL, Glare PA, Kaasa S, Abernethy AP. A Framework for Generalizability in Palliative Care. *J Pain Symptom Manage* [Internet]. 2009 Mar 1 [cited 2024 Sep 9];37(3):373–86. <http://www.jpmsjournal.com/article/S0885392408004387/fulltext>
 63. Hansen MB, Petersen MA, Ross L, Groenvold M. Should analyses of large, national palliative care data sets with patient reported outcomes (PROs) be restricted to services with high patient participation? A register-based study. *BMC Palliat Care* [Internet]. 2020 Jun 23 [cited 2024 Sep 9];19(1):1–11. <https://bmcpalliatcare.biomedcentral.com/articles/https://doi.org/10.1186/s12904-020-00596-z>
 64. Lavergne MR, Johnston GM, Gao J, Dumont S, Burge FI. Exploring generalizability in a study of costs for community-based palliative care. *J Pain Symptom Manage* [Internet]. 2011 Apr 1 [cited 2024 Sep 9];41(4):779–87. <http://www.jpmsjournal.com/article/S0885392410010286/fulltext>
 65. Bauhoff S. Self-Report Bias in Estimating Cross-Sectional and Treatment Effects. *Encyclopedia of Quality of Life and Well-Being Research* [Internet]. 2014 [cited 2024 Jul 9];5798–800. https://link.springer.com/referenceworkentry/https://doi.org/10.1007/978-94-007-0753-5_4046

66. Janssens ACJW, Kraft P. Research Conducted Using Data Obtained through Online Communities: Ethical Implications of Methodological Limitations. *PLoS Med* [Internet]. 2012 Oct [cited 2024 Jul 9];9(10):e1001328. <https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1001328>
67. Tempelaar D, Rienties B, Nguyen Q. Subjective data, objective data and the role of bias in predictive modelling: Lessons from a dispositional learning analytics application. *PLoS One* [Internet]. 2020 Jun 1 [cited 2024 Jul 9];15(6):e0233977. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0233977>
68. Coombes L, Bristowe K, Ellis-Smith C, Aworinde J, Fraser LK, Downing J et al. Enhancing validity, reliability and participation in self-reported health outcome measurement for children and young people: a systematic review of recall period, response scale format, and administration modality. *Quality of Life Research* [Internet]. 2021 Jul 1 [cited 2024 Jul 9];30(7):1803–32. <https://link.springer.com/article/https://doi.org/10.1007/s11136-021-02814-4>
69. Sedgwick P. Cross sectional studies: advantages and disadvantages. *BMJ* [Internet]. 2014 Mar 26 [cited 2024 Jul 9];348. <https://www.bmj.com/content/348/bmj.g2276>

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