Cameroonian Biology Preservice Teachers' Conceptions Of Health Education: Alignment With The Tenets Of Nature Of Science And Sustainable Development Goals

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***Abstract*—This article explores how Cameroonian biology preservice teachers conceptualize health education and whether these conceptions align with the tenets of the Nature of Science (NOS) and Sustainable Development Goals (SDGs). A cross-sectional survey of 275 preservice teachers was employed, using an adapted Biohead-Citizen questionnaire. Data were analysed using descriptive statistics, Exploratory Factor Analysis (EFA), and Structural Equation Modelling (SEM). The EFA revealed five underlying dimensions: health education philosophy and responsibility, personal nutrition attitudes, perceived impact of school health education, environmental health awareness, and core personal health beliefs. SEM results indicated that perceived family responsibility strongly predicted the adoption of biomedical approaches to health education (β = 0.93), while perceived teacher responsibility was negatively associated with biopsychosocial orientations (β = −0.97). Although respondents expressed strong personal commitment to health promotion and environmental awareness, their pedagogical orientations remained partially anchored in biomedical models. These findings indicate partial alignment with NOS tenets, particularly socio-cultural embeddedness and empirical reasoning while revealing weaknesses in the integration of tentativeness and holistic inquiry. The study highlights important implications for SDG 3 (Good Health and Well-being) and SDG 4 (Quality Education) and underscores the need for targeted reforms in preservice teacher education to strengthen competency-based and holistic health education in Cameroon.**

***Keywords*— Health Education Conception; Preservice Teachers; Nature Of Science; Sustainable Development Goals; Biology Education; Cameroon**

I. INTRODUCTION

Health education plays a central role in equipping learners with the knowledge, skills, and dispositions required for lifelong well-being (UNESCO, 2023a). Within secondary school biology curricula, it offers a strategic space for integrating scientific knowledge with personal, social, and environmental contexts, consistent with the tenets of the Nature of Science (NOS), which emphasise empiricism, tentativeness, and the socio-cultural embeddedness of scientific knowledge (Lederman, 2007) as opined in UNESCO IBE (2020). Globally, health education is increasingly framed within competency-based and sustainability-oriented paradigms, particularly under Sustainable Development Goals (SDG) 3 (Good Health and Well-being) and SDG 4 (Quality Education) as echoed by UNESCO & WHO, (2021); Cheong & Kim, (2024); and Hobusch et al., (2024).

In Cameroon, recent educational reforms promoting the Competency-Based Approach (CBA) seek to shift teaching and learning from content-driven instruction towards problem-solving, life skills development, and learner-centred pedagogy. Biology teachers are therefore expected not only to transmit biomedical knowledge but also to foster health-promoting behaviours, critical thinking, and socio-environmental responsibility. However, to Molefac & Aubin (2023), the effectiveness of these reforms depends largely on teachers' underlying conceptions of health education.
As observed by the works of Carvalho et al., (2005); Clement et Carvalho, (2017); and UNESCO, (2025a) research distinguishes two dominant orientations in health education: the biomedical model, which prioritises disease prevention and factual knowledge, and the biopsychosocial or health promotion model, which integrates psychological, social, and environmental determinants of health (Pérez-Martín & Eguizábal, 2024; Nowbuth, 2024; UNESCO, 2015). Teachers' conceptions are shaped by their knowledge, values, and intended practices, as articulated in Clément's Knowledge–Values–Practices (KVP) framework. Understanding preservice biology teachers' conceptions of health education is therefore essential for evaluating the extent to which current teacher preparation aligns with NOS principles and the educational ambitions of SDGs 3 and 4 (Hobusch, 2015).

A. *Problem Statement*

Despite curricular reforms promoting competency-based and holistic education, health education in Cameroon continues to face conceptual and pedagogical challenges. International studies show that teachers' conceptions strongly influence how health education is interpreted and implemented, often oscillating between biomedical and health promotion orientations. When biomedical conceptions dominate, instruction risks becoming content-heavy, teacher-centred, and detached from learners' lived experiences.

In the Cameroonian context, ambiguity surrounding the respective roles of schools, teachers, and families in health education further complicates implementation, particularly in sensitive areas such as nutrition, sexuality education, and lifestyle behaviours. If preservice biology teachers attribute primary responsibility for health education to families, they may restrict their pedagogical role to the transmission of scientific facts, undermining the holistic and inquiry-oriented aims of the CBA. Such misalignment poses a challenge to the effective integration of NOS principles and the realisation of SDGs 3 and 4 through school-based health education.

B. *Research Questions*

- SRQ1: What are the general perceptions and self-assessed preparedness of Cameroonian biology preservice teachers regarding health education topics?
- SRQ2: What underlying factors characterize biology preservice teachers' conception of health education?
- SRQ3: How do perceptions of teachers' responsibility, family responsibility, and personal dietary preferences influence the adoption of biomedical versus biopsychosocial approaches to health education?

II. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

This study is grounded in Clément's Knowledge–Values–Practices (KVP) model, which conceptualises teachers' beliefs as the result of interactions between scientific knowledge, personal and cultural values, and intended professional practices. Applied to health education, the model enables the distinction between biomedical and biopsychosocial conceptions based on differences in values and pedagogical orientations.

The literature consistently highlights the central role of teacher conceptions in shaping health education practices. Cross-national studies have documented considerable variation in health education orientations, influenced by national curricula, cultural norms, and teacher education systems. International policy frameworks further emphasise that effective health education should move beyond information transmission to foster life skills, resilience, and learner agency, aligning with both NOS principles and sustainability goals (UNESCO, 2021; UNESCO IBE, 2024; UNESCO & UNICEF, 2024).

Within the Cameroonian context, empirical research on preservice teachers' conceptions of health education remains limited. This study addresses this gap by examining how future biology teachers conceptualise health education and how these conceptions align with NOS tenets and SDGs 3 and 4.

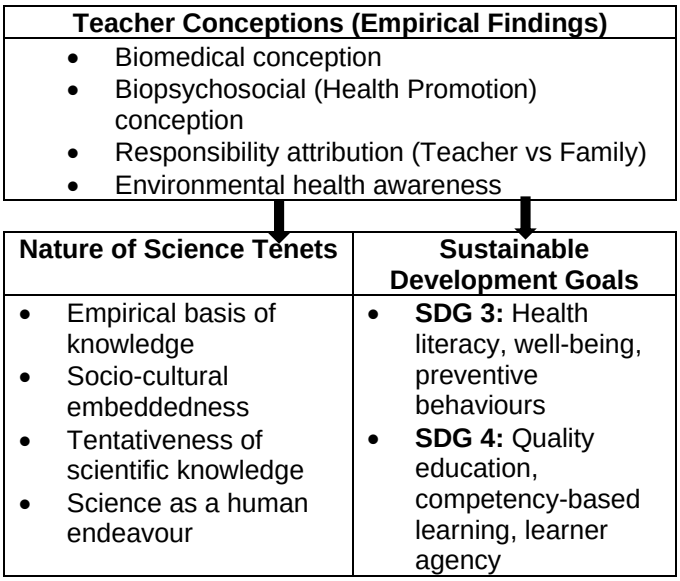

Figure 1: Conceptual Alignment of Health Education Conceptions with NOS and SDGs

Figure 1 illustrates how preservice teachers' conceptions of health education mediate the relationship between Nature of Science tenets and the educational objectives of SDGs 3 and 4. While biopsychosocial orientations facilitate alignment with holistic NOS principles and sustainability goals, biomedical conceptions—reinforced by responsibility attribution to families—constrain the pedagogical realisation of competency-based, health-promoting education.

III. METHODOLOGY

A. *Research Design and Participants*

A cross-sectional descriptive survey design was employed. Participants were 275 biology preservice teachers enrolled in years one to five at a Higher Teachers' Training College in Yaoundé, Cameroon. A convenience sampling technique was used.

B. Instrumentation

Data were collected using a structured questionnaire adapted from Biohead-Citizen project questionnaire. We investigated 16 questions on Health Education: A55, A63, A67, A68, B1, B2, B6, B9, B12, B15, B16, B21, B22, B23, B25, B26, and B27.

All questions, except A55, A63, A67 and A68, were coded from 1 to 5, from “I agree” to “I disagree”. The questionnaire included items designed to capture:

- *Perceptions of Health Education Importance* - Items like "*Health Education at school improves student behaviour*" (B1);
- *Conceptions of Health* - Questions asking participants to tick expressions most strongly associated with their personal view of health (A63).
- *Roles and Responsibilities in Health Education* - Items such as "It is chiefly up to the school nurse and doctor to provide health education" (B15), "Health education at school must be restricted to providing scientific information" (B21), "Teachers should not be obliged to teach health education if they do not feel confident" (B22), "Schools have to take into account public health policies" (B23), "Health education at school mainly involves developing the personal skills of pupils" (B26), and "It is exclusively the family’s responsibility to deal with health education" (B27).
- *Personal Health Behaviours and Attitudes* - Questions about dietary preferences (e.g., "I would like to eat fish more often" (B2), "It would be good to put more fat in my food" (B6), "I would like to eat less meat" (B9), "I would like to eat more fruit" (B12), "I should use olive oil more often in my food" (B16), "I should eat more fresh vegetables" (B25).
- *Environmental Health Awareness* - Items concerning air pollution (A67) and walking instead of driving (A68).

C. Analysis

Descriptive statistics were computed to summarise response patterns to individual items. Exploratory Factor Analysis (EFA) using the minimum residual extraction method with oblimin rotation was conducted to identify underlying dimensions. Factor retention criteria included eigenvalues > 1.0 (Kaiser’s criterion), scree plot inspection, interpretability of factor structure, and a minimum of 2–3 items per factor with loadings ≥ 0.40.

Structural Equation Modelling (SEM) was used to examine relationships between responsibility attribution, dietary attitudes, and pedagogical orientations. Reliability analyses indicated acceptable internal consistency across extracted factors. SEM was employed to examine the direct and indirect relationships between perceived responsibilities (Teachers' Responsibility (TchrR), Family Responsibility (FmlyR)), Dietary Preferences (DtryP), and the adoption of Biomedical (Bmdcl) versus Biopsychosocial (Bpsyc) approaches to health education. Latent variables were constructed from observed indicators, and path coefficients were interpreted to determine the strength and direction of relationships.

IV. RESULTS

A. General Perceptions and Attitudes (SRQ1)

Scale Reliability Statistics shown a Cronbach's α of 0.854 and a McDonald's ω value of 0.880 indicating good reliability. Preservice teachers generally perceived health education as important for improving pupil behaviour and promoting healthy lifestyles. Respondents expressed strong environmental awareness and positive attitudes toward healthy dietary practices. However, variability emerged regarding responsibility attribution, with some respondents expressing uncertainty about the respective roles of schools and families.

Table1: Descriptive statistics of variables studied

Items concerning Health education	Mean	Mode	S D	Variance	Shapiro -Wilk W	Shapiro -Wilk p
B1 - Health Education at school improves pupil behaviour.	1.64	1.00	5.91	35.0	0.0641	<.001
B2 - I would like to eat fish more often.	2.25	1.00	5.93	35.1	0.106	<.001
B6 - It would be good to put more fat in my food.	3.96	4.00	7.09	50.3	0.0966	<.001
B9 - I would like to eat less meat.	3.00	1.00	8.30	68.9	0.130	<.001
B12 - I would like to eat more fruit.	2.19	1.00	9.30	86.4	0.0937	<.001
B15 - It is chiefly up to the school nurse and doctor to provide health education.	3.31	4.00	8.28	68.5	0.132	<.001
B16 - I should use olive oil more often in my food.	3.72	1.00	12.3	152	0.159	<.001
B21 - Health education at school must be restricted to providing scientific information (diet, sleeping cycle, drug risk).	4.76	4.00	12.2	149	0.152	<.001
B22 - Teachers should not be obliged to teach health education if they do not feel confident.	4.01	4.00	11.6	135	0.159	<.001
B23 - Schools have to take into account public health policies.	2.57	1.00	10.2	103	0.114	<.001
B25 - I should eat more fresh vegetables.	2.56	1.00	9.29	86.3	0.117	<.001
B26 - Health education at school mainly involves developing the personal skills of pupils such as self-esteem or stress management.	3.40	1.00	10.9	119	0.146	<.001
B27 - It is exclusively the family’s responsibility to deal with health education.	4.16	4.00	9.14	83.5	0.121	<.001

The data on table 1 for most variables showed non-normal distribution with high standard deviation and variance signifying greater variability, less consistency and uncertainty in practical application of health education. Descriptive statistics revealed that respondents: strongly agree health education in schools believing it improves pupil behaviour (B1: mean = 1.64); prioritize environmental concerns, such as air pollution control (A67); desire to adopt healthier eating habits, such as often eating more fruits (B12: Mean = 2.19), fish (B2: Mean = 2.25), and vegetables (B25: Mean = 2.56).

However, there are differing opinions on the roles and responsibilities of various stakeholders in health education.

They somehow agree schools should provide health education (B26: Mean = 3.40), tend to disagree that it's chiefly up to the school nurse and doctor (B15: Mean = 3.31), and are unsure if it's exclusively the family's responsibility (B27: Mean = 4.16).
These findings suggest that health education is considered important, and respondents are willing to make lifestyle changes to promote health.

Table 2: The main goal of health education in school

A55 - the main goal of health education in school should be:	**Counts**	**% of Total**
Mainly provide knowledge	54	19.6%
Provide knowledge	24	8.7%
Develop respectful behaviour	18	**6.5%**
Mainly develop respectful behaviour	173	**62.9%**
Undecided	6	2.2%

Table 2 shows that 69.4% of respondents (62.9% + 6.5%) believe that developing respectful behaviour is a key goal of health education in schools. This ties with the biopsychosocial approach to health education. A smaller proportion of respondents hold the biomedical view that the goal should be to mainly provide knowledge (19.6%) or provide knowledge (8.7%).

Table 3: Personal view of health

A63- Personal view of health	**Counts**	**% of Total**
No health promotion answer ticked	33	12.0%
One health promotion answer ticked	112	40.7%
Two health promotion answers ticked	112	40.7%
Three health promotion answers ticked	15	5.5%
Undecided	3	1.1%

This dominant biopsychosocial view observed in table 2 is buttressed by the personal health view of almost half of the respondents reported in table 3 whereby 46.2% of respondents strongly associated their personal view of health with health promotion aspects, ticking two or three health promotion answers (e.g., "*Feeling at peace with myself," "Enjoying my life without feeling too much stress," or "Being in good condition to be socially active"*). 12.0% of respondents didn't tick any health promotion answers. They choose biomedical conceptions like "*Not suffering from any serious disease", "Having no need to see a doctor, for treatment"* and *"Having my body components working well".*

Table 4: Environmental Awareness

A68– most important reason we should walk more instead of using cars	**Counts**	**% of Total**
This may save the money that we spend on cars.	33	12.0%
By doing this we get to feel better.	120	43.6%
By this way we keep air cleaner for everybody.	113	41.1%
We are fed up with driving and parking rules.	8	2.9%
undecided	1	0.4%

The top two reasons we should walk more instead of using cars are: feeling better (43.7%), and keeping the air clean (41.2%), which indicate majority of the respondent prioritize the personal and environmental benefits of walking over financial (12%) or frustration-related reasons (2.7%). The results shows the importance of highlighting the health and environmental benefits of walking in promotional campaigns.

B. Factor Structure of Health Education Conceptions (EFA Results)

The EFA using minimum residual extraction with oblimin rotation yielded a five-factor solution explaining 57.2% of the total variance: (1) health education philosophy and responsibility, (2) personal nutrition attitudes, (3) perceived impact of school health education, (4) environmental health awareness, and (5) core personal health beliefs. The model demonstrated good fit (RMSEA = 0.063; TLI = 0.955), supporting the multidimensional structure of participants' health education beliefs and practices.

These factors represent distinct underlying dimensions of their attitudes and beliefs:

- *Factor 1: Health Education Philosophy & Responsibility (17.00% variance)* - This factor encompasses beliefs about health education content (scientific information vs. personal skills development), teacher hesitancy (not teaching if not confident), and the perceived role of family versus school. (B21, B22, , B26, B27)
- *Factor 2: Personal Nutrition Attitudes (12.28% variance)* - This factor captures personal dietary preferences and tendencies towards healthy or unhealthy eating, reflecting self-regulation and openness to dietary change (B2, B6, B9, B12, B25).
- *Factor 3: Perceived Impact of School Health Education (9.81% variance)* - This factor reflects the belief that school health education improves pupil behaviour. (B1, B2).

- *Factor 4: Environmental Health Awareness (9.62% variance)* - This factor clearly reflects environmental consciousness and pro-environmental behaviour (e.g., controlling air pollution, walking more) as a component of holistic health. (A67, A68)
- *Factor 5: Core Personal Health Beliefs (8.50% variance)* - This factor represents an individual's fundamental definition or view of health. (A63)

Table 5: Exploratory factor Analysis of In-service teacher's responses to Health Education

Factor Loadings						
Indicators	**Factor**					
	1	**2**	**3**	**4**	**5**	**Uniqueness**
B27 - It is exclusively the family's responsibility to deal with health education.	0.719					0.42883
B22 - Teachers should not be obliged to teach health education if they do not feel confident.	0.611					0.26798
B26- Health education at school mainly involves developing the personal skills of pupils such as self-esteem or stress management.	0.569					0.44808
B21- Health education at school must be restricted to providing scientific information (diet, sleeping cycle, drug risk).	0.547					0.60413
B2 - I would like to eat fish more often.		0.927				0.00333
B6 - It would be good to put more fat in my food.		0.777				0.36034
B25 - I should eat more fresh vegetables.		0.728				0.23376
B9 - I would like to eat less meat.		0.674				0.39844
B12 - I would like to eat more fruit.		0.578				0.51899
B16 - I should use olive oil more often in my food.		0.405				0.58413
B1 - Health Education at school improves pupil behaviour.			0.521			0.61976
A68 - If possible, we should walk more instead of using cars because				0.920		0.06147
A67 - We must keep the air-pollution in cities under control because				0.567		0.66005
A63 - your personal view of health					0.821	0.25992
% of Variance Explained by each Factor	**17.0**	**12.3**	**9.8**	**9.6**	**8.5**	
Cronbach's Alpha (α)value	**0.744**	**0.876**	**0.836**	**0.725**	**0.613**	

EFA revealed that teachers perceive health education as a multifaceted domain involving personal lifestyle behaviours, environmental responsibility, institutional and family roles, pedagogical and policy-oriented issues. The structure supports the integration of personal health, environmental education, and social responsibility in teacher training. Some items need refinement or expansion, especially those with high uniqueness or low loading (B5 and B23) that were dropped after EFA analysis.

C. Influence on Health Education Approaches (SEM Results)

SEM results showed that perceived family responsibility strongly predicted biomedical orientations, while perceived teacher responsibility negatively predicted biopsychosocial approaches. Personal dietary attitudes showed minimal influence on pedagogical orientations.

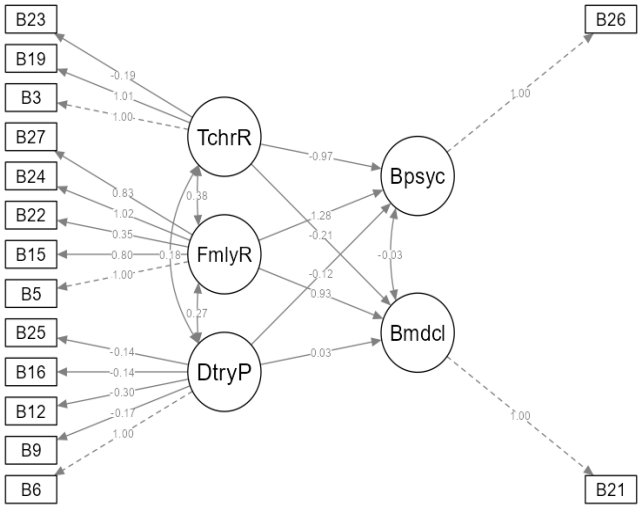

Figure 1: SEM showing extent to which perception influence the adoption of health education approaches

The Structural Equation Model (SEM) on figure 1 below revealed how perceptions of responsibility and dietary preferences influence the adoption of Biomedical (Bmdcl) or Biopsychosocial (Bpsyc) health education approaches. The dashed arrows with numbers indicate factor loadings, showing how strongly each observed variable (e.g., B23, B1, A55) contributes to its respective latent construct (e.g., TchrR, Bpsyc, Bmdcl). Higher absolute values indicate stronger loadings.

1. Influence on Biopsychosocial (Bpsyc) Approach

A strong negative effect (-0.97) was observed on influence of Teachers' Responsibility (TchrR) on the Biopsychosocial approach to health. This indicates that teachers who perceive a higher degree of their own responsibility are less likely to adopt a Biopsychosocial approach. This is contrary to the prescription in the official biology curriculum.

A weak negative effect (-0.21) or influence is observed between family responsibility (FmlyR) on the Biopsychosocial approach to health. While no significant effect (-0.00) is established between Dietary Preferences (DtryP) and Biopsychosocial approach to health

2. Influence on Biomedical (Bmdcl) Approach

Teachers' Responsibility (TchrR) has a weak negative effect (-0.21) on the use of Biomedical approach. Family Responsibility (FmlyR) has a very strong positive effect (0.93) on the use of biomedical approach. This indicates that teachers who perceive families as primarily responsible for health issues are much more likely to adopt a biomedical approach.

Dietary Preferences (DtryP) has a very weak positive effect

3. **Inter-correlations between Predictors**

Moderate positive correlation (0.38) is established between Teachers' Responsibility and Family Responsibility (TchrR ↔ FmlyR). A Weak positive correlation (0.27) links Family Responsibility and Dietary Preferences (FmlyR ↔ DtryP) while a Weak negative correlation (-0.20) is established between Teachers' Responsibility and Dietary Preferences (TchrR ↔ DtryP)

V. DISCUSSION

A. Discussion of Results

The results of this study offer a multifaceted understanding of Cameroonian biology preservice teachers' conceptions of health education. The strong consensus that health education improves student's behaviour and the preference for developing "respectful behaviour" over mere knowledge provision signal a foundational alignment with the aims of a competency-based approach. This suggests that preservice teachers appreciate the transformative potential of health education beyond factual recall. Similarly, their strong association with health promotion perspectives in their personal view of health is encouraging, indicating a predisposition towards holistic health concepts. The significant awareness of environmental health impacts further reinforces this holistic tendency, aligning with UNESCO's emphasis on health education in the context of global environmental vulnerability (UNESCO, 2025b).

However, the SEM results reveal a complex and somewhat counter-intuitive dynamic regarding responsibility and pedagogical approaches. The most striking finding is the very strong positive influence of Family Responsibility (FmlyR) on the adoption of the Biomedical (Bmdcl) approach (0.93). This suggests that when preservice teachers perceive families as the primary custodians of health, they tend to default to a more traditional, fact-based medical model in their teaching. This could be due to a belief that providing "medical facts" is a clear way to contribute, while complex psychosocial aspects are left to the family domain. This finding is critical as it highlights a potential barrier to implementing a comprehensive, competency-based health education that requires integration of social and psychological dimensions.

Conversely, the strong negative relationship between Teachers' Responsibility (TchrR) and the Biopsychosocial (Bpsyc) approach (-0.97) is unexpected. While a biopsychosocial approach typically implies greater teacher involvement and a more holistic view, this result might suggest that for these preservice teachers, a higher sense of sole teacher responsibility may lead them away from a more integrated approach. Perhaps they perceive a comprehensive biopsychosocial model as too broad or demanding if the onus is entirely on them, leading them to prefer more defined, perhaps less collaborative, teaching strategies. This warrants deeper qualitative investigation to unpack the nuances of "teacher responsibility" in this context.

The negligible influence of Dietary Preferences (DtryP) on either health education approach (0.00 coefficients) is another notable finding. Despite expressed desires for healthier eating habits, these personal inclinations do not appear to translate into a specific pedagogical orientation. This might indicate a disconnection between personal health behaviours and professional teaching approaches, or simply that dietary knowledge is seen as a universal component regardless of the overall pedagogical model.

The EFA's identification of five distinct factors further supports the multifaceted nature of health education conceptions. The factors "Health Education Philosophy & Responsibility" and "Personal Nutrition Attitudes" directly reflect the interplay between teachers' beliefs and their personal health-related behaviours. "Environmental Health Awareness" highlights a modern, ecological dimension of health that should be integrated into training.

B. Implications for Nature of Science and Sustainable Development Goals

The findings demonstrate partial alignment with key NOS tenets. Preservice teachers' strong environmental health awareness and recognition of behavioural outcomes reflect an understanding of science as socially embedded and empirically grounded. However, the persistence of biomedical orientations—particularly when health responsibility is attributed to families—suggests limited engagement with the tentativeness and integrative nature of scientific knowledge. This indicates that health education is still perceived by many as the transmission of stable facts rather than a dynamic, inquiry-based process.

From an SDG perspective, the results reveal both opportunities and constraints. Alignment with SDG 3 is evident in respondents' positive attitudes toward health promotion and lifestyle change. Nevertheless, the weak translation of these attitudes into pedagogical orientations raises concerns regarding SDG 4, particularly in relation to quality, learner-centred education. Strengthening preservice teachers' capacity to integrate psychosocial and environmental dimensions of health through inquiry-based pedagogy is therefore essential for advancing both goals simultaneously.

The findings reveal a complex pattern of alignment and misalignment between preservice teachers' conceptions, NOS principles, and sustainability goals. While strong environmental awareness and health promotion attitudes reflect socio-cultural embeddedness and empirical reasoning, the persistence of biomedical orientations suggests

limited engagement with the tentativeness and integrative nature of scientific knowledge.
From an SDG perspective, alignment with SDG 3 is evident in respondents' health-promoting attitudes. However, the weak translation of these attitudes into pedagogical orientations raises concerns regarding SDG 4, particularly in relation to quality, learner-centred education.

C. Implications for Teacher Education

Teacher education programmes should explicitly address the pedagogical implications of NOS and sustainability-oriented health education. Clarifying teacher responsibility, integrating inquiry-based approaches, and strengthening links between theory and practice are essential for fostering holistic health education.

VI. IMPLICATIONS

These results have significant implications for teacher training programs in Cameroon and for health education policy, particularly in light of global efforts to strengthen competency-based education (UNESCO, 2023a; UNESCO IIEP, 2015) and promote health-promoting schools (UNESCO & WHO, 2021):

A. Reinforce Teacher Responsibility for Holistic Health

Training programs should actively reinforce and clarify the teacher's role in promoting holistic (biopsychosocial) health education, moving beyond the biomedical model. This involves empowering teachers with confidence and strategies to address the psychosocial and environmental dimensions of health, in line with UNESCO's strategic focus on education for health and well-being (UNESCO, 2025a).

B. Address the Role of Family Responsibility

Professional development strategies need to explicitly address the cultural perspectives on family responsibility. While family involvement is crucial, an exclusive attribution of health responsibility to families by teachers may inadvertently limit the scope of school-based health education to a narrow biomedical focus.

C. Integrate Theory and Practice

The findings suggest a need for more practical and applied training in health education pedagogy, rather than solely focusing on scientific information. This will help preservice teachers translate their positive attitudes and environmental awareness into effective classroom practices.

D. Curriculum Review

Curricula for preservice biology teachers should be reviewed to ensure a strong emphasis on the competency-based approach in health education, explicitly addressing how to integrate environmental consciousness and personal skill development alongside biomedical knowledge. UNESCO-IBE's work on curriculum for health and well-being provides valuable guidance in this area (UNESCO IBE, 2024).

VII. CONCLUSION

This study provides empirical evidence on Cameroonian biology preservice teachers' conceptions of health education and their alignment with NOS and SDGs. While positive orientations toward health promotion are evident, responsibility attribution patterns constrain pedagogical practice. Addressing these challenges through targeted teacher education reforms is critical for advancing holistic, competency-based health education.

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