



Planetary health education and planetary health literacy in midwifery curricula in Germany—a document analysis of module handbooks

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Abstract

Background: Planetary health is becoming increasingly relevant in midwifery as environmental change impacts maternal-infant-family health. Yet, no studies to date have systematically examined its curricular integration.

Objective: This study aims to systematically assess the integration of planetary health education and planetary health literacy in midwifery curricula in Germany.

Methods: A document analysis of module handbooks of undergraduate and postgraduate courses was conducted between February and March 2025 using an indicator-based lexical content analysis with predefined keywords. Results with high planetary health relevance were examined through qualitative content analysis applying a deductive coding scheme derived from the Planetary Health Education Framework and the conceptual model of Planetary Health Literacy.

Results: A total of 60 German degree programs were included. Of these, six module handbooks contained clear references to planetary health education, while 17 module handbooks represented keywords that did not lead to significant planetary health education content. Within the model of planetary health literacy, the domains *access* and *appraise* were underrepresented. The Planetary Health Education Framework's domains *interconnection within nature* and *systems thinking and complexity* were absent in the units. Longitudinal curriculum integration was not identified.

Conclusion: This study reveals that only six out of 60 module handbooks address planetary health. To harness the potential of midwives in Germany in planetary health promotion, systematic and longitudinal integration into midwifery training is crucial.

Keywords

Midwifery · Planetary health · Education · Document analysis · Climate change

Background

In the midst of a polycrisis, which includes climate change, pollution, and biodiversity loss, health is significantly impacted [1], particularly among vulnerable populations such as pregnant individuals, neonates, and infants [2–4]. Healthcare systems contribute substantially to climate change and in turn are highly affected by it [5, 6]. In

order to mobilize the health sector, take responsibility, and contribute to a healthy lifestyle, a planetary health perspective is required in the healthcare sector. Planetary health is defined as “[...] the achievement of the highest attainable standard of health, wellbeing and equity worldwide through judicious attention to the human systems—political, economic, and social—that shape the future of humanity

and the Earth's natural systems that define the safe environment limits within which humanity can flourish" [7]. Midwives are well-positioned to act as change agents and multipliers for planetary health and to promote just, healthy, and sustainable societies and communities by working with families during sensitive phases of life [8].

To leverage the full potential of midwives and other health professionals in mitigating and adapting to the polycrisis, it is necessary to incorporate planetary health into their education and training programs [9]. There has been an increase in the number of published planetary health education guidelines and frameworks to support effective planetary health education interventions and curriculum design [10, 11]. However, the majority of these appear to be primarily oriented toward medical and nursing education, with a comparatively limited focus on midwifery education [10, 11]. The Planetary Health Education Framework offers a conceptual foundation by outlining five core domains that constitute the essence of planetary health knowledge, values, and practice, encompassing "interconnection within nature"; "the Anthropocene and health"; "systems thinking and complexity"; "equity and social justice"; and "movement building and systems change" [12]. The framework can be understood as a proposal for achieving transformational learning across diverse cultural, disciplinary, and regional contexts and can therefore be adapted to midwifery education.

Planetary health education provides specific skills that facilitate the transformation of knowledge into action [13]. These are synthesized in the planetary health literacy concept [14]. Planetary health literacy describes the competencies of accessing, understanding, appraising, and applying knowledge to take actions addressing the interconnection between human health and the natural systems. Planetary health literacy is conceptualized as a life course and transgenerational approach intended to promote, protect, and improve individual health, population health, and the health of the planet [14].

Most of the studies reporting on planetary health education curricula or planetary health teaching methods were conducted in the context of medical edu-

cation—both in Germany and globally [15–20]. To the best of our knowledge, no studies exist on the implementation of planetary health education in midwifery education in Germany. The revision of the Midwifery Study and Examination Regulations [21] in 2020 that transitioned midwifery education in Germany to a university-level program opened a window of opportunity for substantial and systemic changes to the curriculum for midwifery students. It remains unclear whether the restructuring of midwifery education has been used to effectively integrate planetary health education into the curriculum, thereby addressing the ethical and social responsibilities of midwifery students and enabling them to meet the major global challenges humanity is facing.

Objective

The aim of this work was to describe the current state of the integration of planetary health education and planetary health literacy in midwifery curricula of undergraduate and postgraduate courses in Germany.

The research questions guiding this study were:

- What is the current state of planetary health teaching activities in midwifery degree programs in Germany?
- If planetary health teaching activities are outlined in midwifery degree programs, which planetary health literacy competencies are addressed?
- If planetary health is integrated into midwifery degree programs, what is the extent and the method of this integration?

Method

Study design

This document analysis forms part of the needs analysis for an overarching study called "Development, implementation, and evaluation of a practice-oriented planetary health model curriculum for sustainable healthcare by midwives," (HebPlanet) and its study protocol is preregistered via the OSF [22, 23]. The HebPlanet project [23] aims to integrate planetary health education and literacy

into midwifery curricula. The document analysis will be followed by the project's co-creative phase, involving midwifery students, educators, practitioners, and planetary health education experts to ensure the development of a contextually relevant and evidence-based planetary health education curriculum. While the HebPlanet project initially develops planetary health education within the midwifery study program at the University Medical Centre of the Johannes Gutenberg-University Mainz, its ultimate goal is to create scalable and adaptable best-practice guidelines for co-creative planetary health education curricular development. A module handbook is an official document provided by a university or academic department that gives detailed information about units of a study program. As a first step toward monitoring existing planetary health education activities in midwifery training, a document analysis of German module handbooks was conducted between February and March 2025. The document analysis was methodically based on the indicator-based lexical content analysis of Holst et al. [24] and Bolden and Moscarola [25]. This aligns with our objective of quantifying keyword frequencies to assess thematic proportions, as the heterogeneity of planetary health topics often leads to implicit discussion rather than explicit naming of specific terms, necessitating complementary quantitative and qualitative insights in our content analysis of planetary health in midwifery degree programs in Germany.

The document analysis of module handbooks served as a resource-oriented method to investigate the current state of planetary health teaching and provides an opportunity for monitoring potential changes in the long term. To follow a systematic and transparent analysis, units with planetary health education content were selected and analyzed according to the content structuring qualitative content analysis by Kuckartz and Rädiker [26]. To support the development of deductive categories, overall categorization was informed by result categories in Selvam et al. [19]. In order to consider the various elements of a unit outline, additional frameworks for analyzing competencies and teaching content were also required

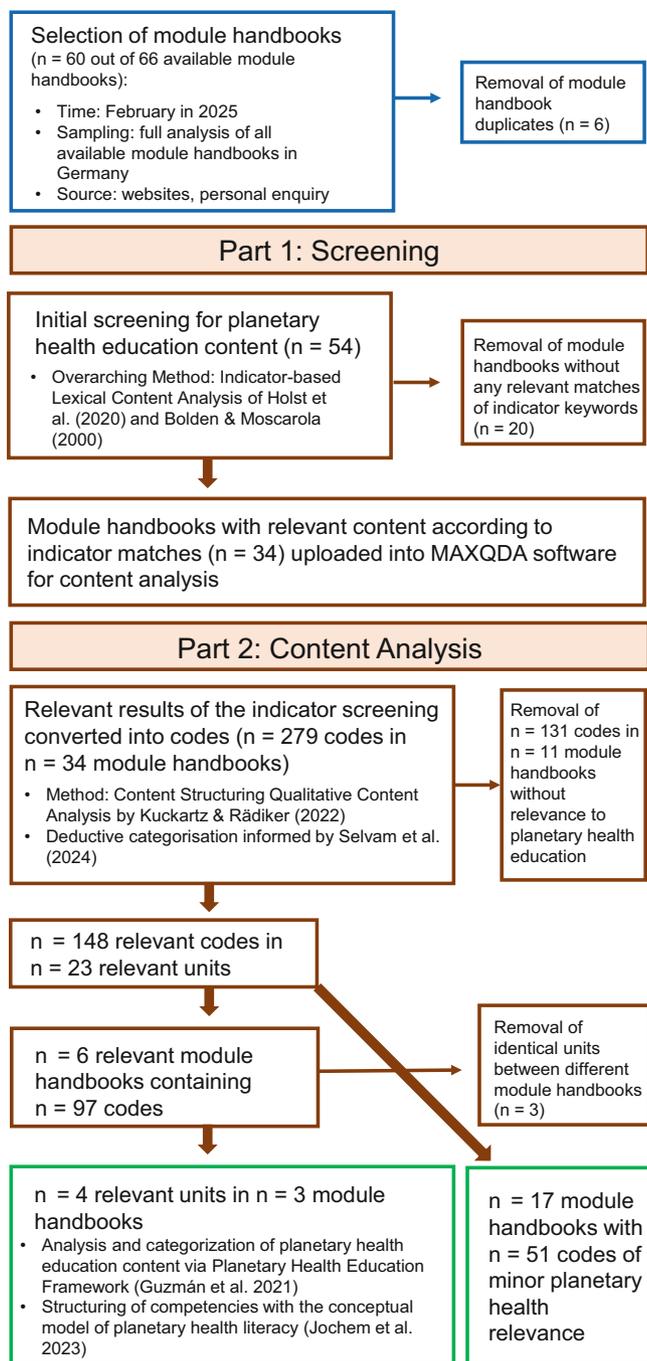


Fig. 1 ◀ Document analysis—data acquisition, screening, and analysis

to ensure alignment with international standards: The Planetary Health Education Framework [12] was used to structure and analyze planetary health education content in the module handbooks, as it is internationally acknowledged for describing comprehensive aspects of planetary health education. The conceptual model of planetary health literacy [14] was applied to structure the competencies addressed in the relevant unit descriptions.

■ **Figure 1** provides an overview of the data acquisition and analysis.

Before conducting the study, the Clinical Ethics Committee of the University Medical Centre of Johannes Gutenberg-University of Mainz was consulted for advice and had no reservations about the project.

Inclusion criteria

The module handbooks were selected based on the following inclusion criteria:

- Primary bachelor’s degree program for midwives in Germany.
- Post-qualifying bachelor’s degree program for midwives in Germany who obtained their initial qualification through vocational training.
- Master’s degree programs with midwifery-specific content in Germany.
- The degree programs had to be offered at the time of data analysis.
- The most recent published version of the module handbook had to be available.

Elective units were only taken into account if they were specifically listed in the module handbook for primary bachelor’s, post-qualifying bachelor’s, or master’s degree programs for midwives, highlighting the possibility for midwifery students to select the unit.

Screening of module handbooks

In cases where module handbooks were not available via websites, personal enquiries were made to obtain the data. Overall, 56 module handbooks were retrieved from websites and four module handbooks were made available via personal contact in February 2025:

- Primary qualifying bachelor’s degree programs: $n = 44$
- Post-qualifying bachelor’s degree programs: $n = 11$
- Master’s degree programs: $n = 5$

Six duplicates were removed: four due to identical module handbooks between primary qualifying and post-qualifying bachelor’s degree programs at different university locations and two due to identical module handbooks among different locations of the same university.

As indicators for initial screening of planetary health education content, a set of nationally specific keywords, derived from Holst et al. and Bolden and Moscarola [25, 26], were used (see ■ **Table 1**). Since “planetary health education” is not consistently used explicitly in the documents, we operationalized the term using a compre-

Table 1 Keywords derived from Holst et al. (2020) [24] and Bolden and Moscarola (2000) [25], translated from German for this publication			
	Planetary health perspectives	Educational concepts related to planetary health	Concepts related to education for sustainable development (ESD)
Searched terms (translated)	Planet*	Climate*	ESD
	Transformat*	Green	Sustain*
	Polic*	“One Health”	SDG
	Multipl*	Environment*	“Action competency”
	“Change agent”	Eco*	
Global			
Exemplified keywords	<i>Planetary health education</i>	<i>Climate change and health</i>	<i>Education for sustainable development</i>
	<i>Transformative competencies</i>	<i>EcoHealth</i>	<i>Sustainable Development Goals</i>
		<i>Global citizenship</i>	
Originally used keywords	Planet*	Climate*	ESD
	Transformat*	Klima*	Sustain*
	Polic*	Green	Nachhaltig*
	Multiplikator*	Grün*	SDG
	“Change agent”	“One Health”	Gestaltungskompetenz
		Environment*	
		Umwelt*	
		Eco*	
		Ökol*	
		Global	
Natur*			

hensive set of synonyms and thematically related terms.

When reviewing the content of module handbooks, at least one relevant keyword result was found in 34 module handbooks. Matches were considered relevant if a contextual connection to planetary health education could be made. Terms that were obviously irrelevant to the research context were systematically identified and excluded. In total, 20 module handbooks without any relevant keyword results were excluded. The 34 relevant module handbooks were uploaded into the MAXQDA software [27] for data analysis. Of these, 25 described primary qualifying bachelor's degree programs, five post-qualifying bachelor's degree programs, and four master's degree programs.

Data analysis

Content analysis was performed in accordance with the content structuring qualitative content analysis by Kuckartz and Rädiker [26]. The results of the screening with indicator keywords were manually converted into codes. A total of 279 matches in 34 module handbooks were

transformed into codes. After completing the initial coding, the working group (RP, LR) discussed whether the identified content was relevant, e.g., related to planetary health education by discussing possible associations. No disagreements emerged during this process. Content considered irrelevant was excluded from the analysis. Furthermore, matches in the references and tables of content of the module handbooks were excluded due to their irrelevance. This resulted in a final set of 148 relevant codes. Units with content related to planetary health became evident, because the corresponding module handbooks contained a majority of the identified codes (referred to as “major” planetary health reference). To ensure that the units indeed contained planetary health education content, the unit outlines were subsequently examined in detail. A total of six relevant module handbooks containing 97 codes were selected. Four of the units appearing across these handbooks were duplicates and were therefore removed prior to further content analysis. Consequently, four distinct units from three different module handbooks with

major planetary health education content were included in the subsequent analysis.

The remaining 17 module handbooks with 51 codes of minor planetary health relevance (e.g., remarks on sustainability in module handbooks without introducing planetary health education content) were prepared for descriptive analysis (see Fig. 1). Both the content structured according to the Planetary Health Education Framework [12] and the competencies categorized using the conceptual model of planetary health literacy [14] were allocated manually, followed by a discussion in the research team.

Methodological rigor

To maintain the rigor of the document analysis, we considered, in accordance with Lincoln and Guba [28], frequent meetings and discussions in the research team (BF, CJ, RP, LR) as well as a transparent approach and documentation, as essential. The interprofessional research team held weekly meetings during the data analysis process to evaluate it at frequent intervals. The categories were initially defined using established terms that are frequently

Table 2 Keywords results for minor planetary health references						
Keywords	Planet	Climate ^a	Ecological ^a	Environment ^a	Global	Sustainable ^a
Number of codes	2	6	11	18	6	8
Number of different module handbooks	1	1	10	7	4	4
Number of different units	2	4	11	12	4	6

^aTranslated keywords

Table 3 Description of relevant units with major planetary health reference				
	Unit 1	Unit 2	Unit 3	Unit 4
Type of university	University of applied sciences	University of applied sciences	University of applied sciences	University of applied sciences
Type of program	Primary qualifying and post-qualifying bachelor's degree	Master's degree (same as unit 3)	Master's degree (same as unit 2)	Primary qualifying bachelor's degree
Semester	3rd year primary qualifying or 2nd year post-qualifying	1st semester	3rd semester	5th semester
Optional/mandatory	Optional	Mandatory	Mandatory	Mandatory
Interdisciplinarity	No, only primary qualifying and post-qualifying bachelor's students together	No	No	Yes, midwifery and nurse students
Workload (1 h = 60 min)	300 h	150 h, combined with unit 3	150 h, combined with unit 3	240 h, combined with another degree program

employed in the specialist literature and subsequently compared with terms from the module handbooks examined, with no requirement for further adjustments. No automation tools were used in MAXQDA; all coding and analysis were conducted manually (RP and LR).

Results

In total, 60 module handbooks (44 primary qualifying bachelor's degree programs, 11 post-qualifying bachelor's degree programs, and 5 master's degree programs) were included in our analysis. These provided 97 major references with clear content on planetary health education in six different module handbooks, 51 codes of minor relevance to planetary health, and no clear connection to planetary health education content in 17 module handbooks.

Results of the descriptive analysis

Units with only minor planetary health references were primarily those centered on specific midwifery competencies, with additional instances found in units covering ethics, prevention, public health, and global health. While these units did not explicitly address planetary health, climate change and health, or sustainability, they

exhibited thematic linkages to these areas.

■ **Table 2** displays the number and distribution of keywords that were classified as minor planetary health relevance.

In seven of 11 cases the keyword "ecological" was mentioned only in the combination "ecological and economical." Ten out of 20 module handbooks revealed only one code of minor planetary health reference. Further analysis revealed that half of the codes were found in the description of unit competencies, without introducing relevant concepts in the content of these units (unit outlines typically included learning competencies, unit content and their references, pedagogical approach, and administrative details). Specifically, a lack of consistency between competencies and unit content regarding planetary health education was interpreted as less convincing, and such units were therefore excluded from the analysis. For instance, one module handbook used the term "environmental protection" in a sentence describing a competency equally across seven different units, without introducing any related concepts in the units' content as per the module handbooks. It remains unclear whether students using this module handbook were able to apply concepts such as environmental protection in midwifery, given that no explicit unit content on this topic was provided.

Results of the content analysis

Of all analyzed module handbooks, four relevant units in three distinct module handbooks had an explicit planetary health focus (see ■ **Table 3**). Unit 1 was an elective course taken jointly by students in both primary qualifying and post-qualifying bachelor's programs. Units 2 and 3 were components of one master's program, both offered as mandatory courses. Unit 4 was an interdisciplinary mandatory course jointly delivered to students in the midwifery and nursing bachelor programs.

Relevant content from the module handbooks was categorized into the following main categories (and their sub-categories): pedagogical approach (teaching and learning formats, assessment of learners), competencies (accessing, understanding, appraising and applying information related to planetary health), unit content (interconnection with nature, the Anthropocene and health, equity and social justice, systems thinking and complexity, movement building and systems change), and key considerations (longitudinal integration, interprofessional collaboration, experiential learning).

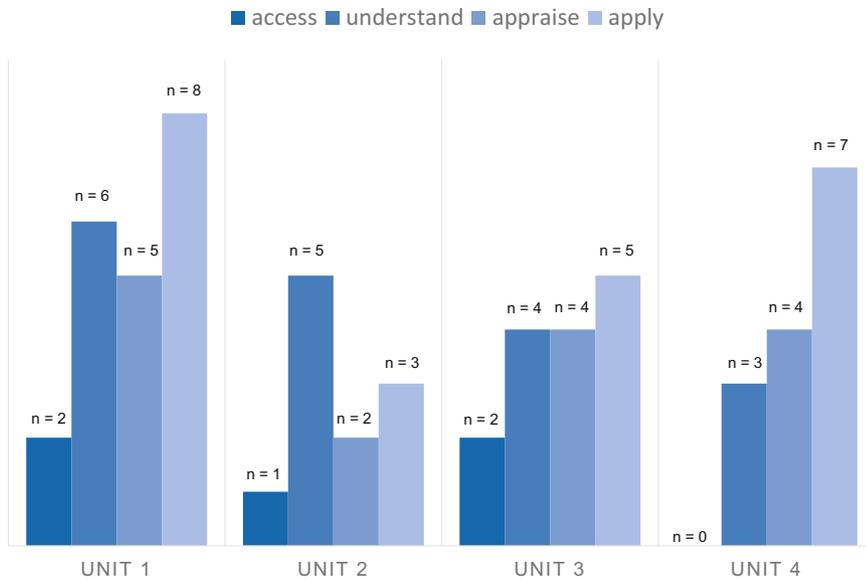


Fig. 2 ▲ Representation of planetary health literacy (Jochem et al. 2023) in the analyzed unit competencies

Pedagogical approach

The pedagogical approaches employed in the four units encompassed a wide range of methods. According to the unit description, unit 1 focused primarily on a blended learning format and a simulation game. Units 2 and 3 included lectures and seminars, as well as cooperative and collaborative learning formats such as role-play and simulation games. In addition to lectures and seminars, unit 4 was organized using cooperative and collaborative learning approaches and contained elements of mobile teaching according to the *Heidelberger Modell* [29]

Learners were assessed through a portfolio or presentation in unit 1; through a portfolio, presentation, written examination, and project presentation in units 2 and 3; and through a digital presentation, such as a podcast or video in unit 4.

Competencies

Relating to the conceptual model of planetary health literacy, a total of five competencies from the module handbooks could be assigned to the domain “access,” 18 competencies to “understand,” 15 competencies to “appraise,” and 23 competencies to “apply.”

The domain “access information regarding planetary health” included three listed methodical competencies and two contributions to professional competencies in

the analyzed units. Methodical competencies assigned to the domain “access” included, e.g., the following:

“In areas where the level of knowledge changes and requires actualisation, they [students] are able to carry out this actualisation themselves.” (Units 1, 2, 3)

The domain “understand information regarding planetary health” was reflected especially in 15 professional competencies and in three personal and social competencies in the analyzed units. Professional competencies mainly comprised knowledge about planetary health:

“Students (...) are aware of the acute threats to maternal and child health posed by the climate crisis and the crossing of planetary boundaries.” (Units 1, 2)

“Appraise information regarding planetary health” could be found in eight listed personal and social competencies as well as in five methodical and in two professional competencies. Personal and social competencies described, in particular, reflexivity and a sense of responsibility:

“Students are able to assess their potential as change agents and contribute to the responsible provision of care for women and families.” (Units 1, 3)

The domain “apply information regarding planetary health” included ten profes-

sional, nine methodical, and four personal and social competencies in the analyzed units. Methodical competencies assigned to the domain “apply” included, e.g., the following:

“The advising of the family regarding the care of the newborn or infant integrates climate-relevant aspects.” (Units 1, 3)

In the context of planetary health literacy, the analysis of the units showed that the literacy domain “access” to relevant information was particularly underrepresented, followed by “appraise” (see ■ Fig. 2). The domain “apply” received the most attention in the learning objectives documented in the module handbooks. It was apparent that the analyzed bachelor’s degree programs (units 1 and 4) had a more practical orientation, whereas the master’s program (units 2 and 3) exhibited a more balanced allocation to planetary health literacy domains.

Unit content

Based on the Planetary Health Education Framework, the content listed in the units was structured with the domains “interconnection within nature,” “the Anthropocene and health,” “systems thinking and complexity,” “equity and social justice,” and “movement building and systems change.”

There was no content in any of the four module handbooks regarding the central domain “interconnection within nature.” Content that could be assigned to “the Anthropocene and health” consisted of foundational content regarding environmental challenges and their impact on health, healthcare, and planetary health. Besides “interconnection within nature” the domain of “systems thinking and complexity” was also not represented in the module handbooks. The domain “equity and social justice” was evident in the addressing of social and economic inequality and levels of responsibility. The final domain of “movement building and systems change” was the most prevalent in the content of the module handbooks. The content included solution strategies at various levels, such as the Sustainable Development Goals as well as interventions in midwifery, for instance, the sustainable structuring of midwifery practices and climate-sensitive health counselling by midwives.

Key considerations

The prior scholarly framework for assessing planetary health content emphasizes three critical dimensions: (1) longitudinal curriculum integration, (2) interprofessional collaboration, and (3) experiential learning formats. Document analysis of relevant units revealed gaps across these dimensions:

Firstly, the keyword analysis and the content review of four units with substantial planetary health relevance revealed no evidence of systematically structured, phased, or cumulative integration of planetary health content within any study program. Unit 1 was designated as an elective, limiting its potential for consistent curricular impact. While units 2 and 3 were embedded within a master's program in midwifery, only unit 4 was a mandatory course for a primary qualifying bachelor's degree program for midwives. Articulation of progressive planetary health competency development across the programs was not found. Secondly, scrutiny of units and their learning objectives revealed minimal evidence of interprofessional collaboration. Although unit 4 involved learners from two professional groups (midwifery and nursing), the module handbook did not specify intentional interprofessional learning in its learning objectives, or interprofessional collaboration among teaching staff in unit design or delivery. Thirdly, the analysis identified vague indications of experiential learning formats, as explicitly advocated by Selvam et al. for fostering learner development of climate-conscious solutions and advocacy skills. Documented formats included role-play, simulation games, and collaborative exercises.

Discussion

This document analysis examining the current state of the integration of planetary health education and literacy in midwifery curricula in Germany in 2025 revealed that only six out of 60 module handbooks for midwifery education included planetary health education and literacy content. Of these, only one unit was a mandatory course in a primary qualifying bachelor's degree program for midwives. The widely adopted [11, 30, 31] frameworks for evalu-

ating planetary health education [12] and literacy [14] were only partially reflected.

The International Confederation of Midwives (ICM), in collaboration with Human Rights Watch, points out that midwives must be able to meet the challenges of the climate crisis [32]—and cites this as a strategic priority for the period 2024–2026 [33]. Following an international survey of midwives in 2024, the ICM called for urgent action to provide midwives with, among other things, more resources and training to cope with the polycrisis [33]. Whether planetary health education has already found its way into midwifery degree programs internationally remains unclear [34]. Catling et al. and Bonnamy et al. state that planetary health education and literacy are being pursued in undergraduate midwifery programs in Australia and New Zealand, but resources are lacking [34, 35]. Bonnamy et al. [35] reported a deficit in knowledge and confidence in teaching planetary health among nursing and midwifery educators, concluding that educators do not feel prepared to respond to the call from international healthcare organizations.

Several authors emphasize the benefit of longitudinal integration of planetary health within medical education curricula [19, 36, 37]. However, in the module handbooks examined, such an integration could not be identified. Although some keywords appeared in one module handbook repeatedly in several different units, they were not linked to clearly defined competencies, as they consistently appeared in identical wording, and therefore do not constitute longitudinal implementation. Further key considerations for the successful implementation—interdisciplinarity and experiential learning approaches in the form of quality improvement projects [19]—were only marginally apparent. Planetary health education cannot facilitate systemic societal transformation without the incorporation of interdisciplinarity and experiential learning, as planetary health requires the exploration of novel pathways and demands the development of new pedagogical methods [12, 19].

The Planetary Health Education Framework provides a foundation for planetary health-related content and has gained

widespread acceptance [12]. Its domains are focused around the fundamental concept of “interconnection with nature,” thereby omitting anthropocentric worldviews and promoting the perspective of planetary health science and practice, in which humans are viewed as part of, rather than separate, from nature [12, 38]. Given the significance and the centrality of this framework, the absence of any mention of the “interconnection with nature” domain in the unit outlines is noteworthy, as is the case for the “systems thinking and complexity” domain. Likewise, Zandavalli et al. [39] observed that the planetary health domains “interconnection with nature” and “systems thinking and complexity” represent a particular challenge for the integration of planetary health education in Brazilian medical curricula. Their teaching methods for these domains notably enhanced students' understanding of systemic relationships between patients, human health, and the natural environment [39]. In the four analyzed units incorporating planetary health education, the emphasis of planetary health literacy was predominantly on practical application. Although methodological competencies were present, their relative proportion (five out of 28 competencies) indicate that they were underrepresented compared with application-focused competencies. This shows a critical limitation, given that knowledge in the fields of planetary health and sustainability is continuously evolving [40, 41]. Midwifery scientists consistently highlight the centrality of practical and action-oriented competencies in midwifery education [42, 43]. Our findings align with this emphasis, revealing a pronounced dominance of “acting” and “applying” in documented learning objectives and competencies. However, this focus warrants critical examination: If midwives lack the fundamental capacity to autonomously access, understand, critically appraise, and continuously reappraise planetary health-related information, they remain dependent on externally provided and potentially outdated knowledge. Although midwifery students may also learn these skills across other subjects, it remains unclear whether they can then transfer them to planetary health-related con-

texts, and whether they have understood the necessity for planetary health without specific instruction. Considering that most bachelor's and master's degree programs for midwives in Germany have only existed since 2020 following the legislative amendment [21], and are therefore still relatively new, this should be viewed critically. Midwives navigate a complex environment and are thereby required to integrate evidence-informed decision-making into practice, particularly in sensitive contexts like caring for families, while simultaneously contending with the multidimensional determinants of health. This requires a balance between procedural competence and methodological focus, for example, in critical thinking [21].

Our findings indicate that the integration of planetary health education within midwifery studies remains at an incipient stage, both internationally and in the German context. This preliminary status underscores critical avenues for further investigation and potential for development. Significant research gaps persist regarding how planetary health education and literacy can be effectively scaffolded and longitudinally embedded within midwifery curricula. It is of interest which experiential learning formats demonstrably enhance the competency and literacy development. Understanding the educational outcomes and whether explicit longitudinal documentation correlates with measurable improvements in planetary health literacy of midwives is equally important.

Findings from this study will be taken into account for the development, implementation, and evaluation of a longitudinal planetary health education curriculum within the HebPlanet project. It is desirable for other midwifery institutes to show openness to integrating planetary health education into midwifery curricula and work together to equip young midwives with planetary health literacy. To support other faculties, the HebPlanet project aims to create adaptable best-practice guidelines. This first screening of the current state of planetary health teaching activities within midwifery study programs in Germany should be followed by continuous monitoring of planetary health education developments in midwifery programs.

This study acknowledges a fundamental methodological limitation inherent in document analysis: the potential disjunction between formally documented curricula, actual pedagogical practices, and realized learning outcomes [44–46]. Consequently, six critical limitations arise from our reliance on handbook documentation: it cannot be ascertained whether longitudinal integration of planetary health education and literacy occurs implicitly through teaching practices, despite its absence in explicit module handbooks. The documented omission of the planetary health literacy domains “access” and “appraise” raises questions about their presence in the intended curriculum. However, it remains possible that related competencies are addressed through implicit learning objectives not formally documented. The absence of an explicit focus on “interconnection with nature” in the analyzed units suggests a narrower scope of application. Document analysis alone cannot determine whether educators address these perspectives informally. Inherent researcher subjectivity during analysis and interpretation, consistent with qualitative content analysis, is acknowledged. The study aimed to include all German midwifery programs ($n = 66$); however, six module handbooks were unavailable. This study employs a cross-sectional design; therefore, longitudinal monitoring of planetary health education in midwifery in Germany is recommended.

Conclusion

This study presents the first systematic analysis of planetary health integration within midwifery study programs in Germany. It pioneers a novel approach by assessing planetary health literacy domains, as well as evaluating alignment with the core domains of the Planetary Health Education Framework within unit content, thereby integrating these critical conceptual lenses for comprehensive curriculum analysis. This document analysis indicates that planetary health education and planetary health literacy are addressed in only six out of 60 module handbooks—a considerable gap given the relevance of this field. Within the identi-

fied content and competencies, the widely adopted frameworks for planetary health and literacy are only partially reflected. To harness the full potential of midwives in Germany as change agents in planetary health, the systematic integration of planetary health education and literacy into midwifery training is essential. In particular, incorporating the educational domains of “interconnection with nature” and “systems thinking and complexity” into midwifery study programs requires the application of innovative pedagogical strategies. Such strategies can facilitate the exploration of novel pathways, ultimately contributing to systemic societal transformation and a healthy future on our planet.

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Declarations

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For this article no studies with human participants or animals were performed by any of the authors. All studies mentioned were in accordance with the ethical standards indicated in each case.

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References

- WHO (2023) Climate change. <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>
- Braun CB, Rasmussen SA, Jamieson DJ (2025) Climate change and pregnancy outcomes: a systematic approach to reviewing the data. *Birth Defects Res* 117(6):e2493. <https://doi.org/10.1002/bdr2.2493>
- Chersich MF, Pham MD, Areal A, Haghghi MM, Manyuchi A, Swift CP et al (2020) Associations between high temperatures in pregnancy and risk of preterm birth, low birth weight, and stillbirths: systematic review and meta-analysis. *BMJ* 371:m3811. <https://doi.org/10.1136/bmj.m3811>
- Roos N, Kovats S, Hajat S, Filippi V, Chersich M, Luchters S et al (2021) Maternal and newborn health risks of climate change: a call for awareness and global action. *Acta Obstet Gynecol Scand* 100(4):566–570. <https://doi.org/10.1111/aogs.14124>
- Health Care Without Harm (2019) Health care's climate footprint: how the health sector contributes. <https://noharm-uscanada.org/ClimateFootprintReport>
- McGain F, Naylor C (2014) Environmental sustainability in hospitals - a systematic review and research agenda. *J Health Serv Res Policy* 19(4):245–252. <https://doi.org/10.1177/1355819614534836>
- Whitmee S, Haines A, Beyrer C, Boltz F, Capon AG, de Souza Dias BF et al (2015) Safeguarding human health in the anthropocene epoch: report of the Rockefeller foundation-lancet commission on planetary health. *Lancet* 386(10007):1973–2028. [https://doi.org/10.1016/S0140-6736\(15\)60901-1](https://doi.org/10.1016/S0140-6736(15)60901-1)
- Sattar SMRU, Akeredolu O, Bogren M, Erlandsson K, Borneskog C (2023) Facilitators influencing midwives to leadership positions in policy, education and practice: a systematic integrative literature review. *Sex Reprod Healthc* 38:100917. <https://doi.org/10.1016/j.srhc.2023.100917>
- German Advisory Council on Global Change (2023) Healthy living on a healthy planet. https://issuu.com/wbgu/docs/wbgu_hg2023
- MacKenzie-Shalders K, Zadow G, Hensley-Hackett K, Marko S, McLean M (2024) Rapid review: guides and frameworks to inform planetary health education for health professions. *Health Promot J Austr* 35(4):864–874. <https://doi.org/10.1002/hpja.819>
- Carrion C, Alay Llamas C, Saffitri ED, Domènech-Panicello C, Downward GS, Findyartini A et al (2025) Conceptual frameworks, competencies, contents and teaching methods in planetary health education for health students and professionals: a global systematic scoping review. *BMC Med Educ* 25(1):956. <https://doi.org/10.1186/s12909-025-07450-x>
- Guzmán CAF, Aguirre AA, Astle B, Barros E, Bayles B, Chimbari M et al (2021) A framework to guide planetary health education. *Lancet Planet Health* 5(5):e253–5. [https://doi.org/10.1016/S2542-5196\(21\)00110-8](https://doi.org/10.1016/S2542-5196(21)00110-8)
- Ehlers J, Nitsche J (2024) Planetary health literacy. In: Fichtner-Rosada S, Heupel T, Hohoff C, Heuwing-Eckerland J (eds) *Kompetenzen für die Arbeitswelten der Zukunft*. Springer, Wiesbaden, pp297–307
- Jochem C, von Sommoggy J, Hornidge AK, Schwienhorst-Stich EM, Apfelbacher C (2023) Planetary health literacy: a conceptual model. *Front Public Health* 10:980779. <https://doi.org/10.3389/fpubh.2022.980779>
- Chase H, Hampshire K, Tun SYM (2022) Improving the medical curriculum on planetary health and sustainable healthcare. *BMJ* 376:o209. <https://doi.org/10.1136/bmj.o209>
- Grieco F, Parisi S, Simmenroth A, Eichinger M, Zirkel J, König S et al (2024) Planetary health education in undergraduate medical education in Germany: results from structured interviews and an online survey within the national PlanetMedEd Project. *Front Med* 11:1507515. <https://doi.org/10.3389/fmed.2024.1507515>
- Oudbier J, Sperna Weiland NH, Boerboom T, Ravesloot JH, Peerdeman S, Suurmond J (2022) An evidence-based roadmap to integrate planetary health education into the medical curriculum. *Med Teach*. <https://doi.org/10.1080/0142159X.2022.2137015>
- Schwienhorst-Stich EM, Wabnitz K, Geck E, Gepp S, Jung L, Mumm A et al (2023) Initiatives promoting planetary health education in Germany: an overview. *GMS J Med Educ* 40(3):Doc38. <https://doi.org/10.3205/zma001620>
- Selvam R, Séguin N, Zhang L, Lacaille-Ranger A, Sikora L, Raiche I et al (2024) International planetary health education in undergraduate and graduate medical curricula: a scoping review. *J Grad Med Educ* 16(6):58–68. <https://doi.org/10.4300/JGME-D-24-00027.1>
- Walpole SC, Pearson D, Coad J, Barna S (2016) What do tomorrow's doctors need to learn about ecosystems? - A BEME systematic review: BEME guide no. 36. *Med Teach* 38(4):338–352. <https://doi.org/10.3109/0142159X.2015.1112897>
- Federal Ministry of Justice and Consumer Protection (2020) Midwifery study and examination regulations. <https://www.gesetze-im-internet.de/hebstprv/BJNR003900020.html>
- Reismann L, Fillenberg B, Pröhmer R, Jochem C (2025) Co-creative curriculum development via real-world laboratory: a mixed-methods assessment to inform planetary health education in midwifery. A study protocol. *Center for Open Science*
- HebPlanet DBU (2024) Entwicklung, Implementierung und Evaluation eines praxisorientierten Planetary Health-Modell-Curriculums für eine nachhaltige Gesundheitsversorgung durch Hebammen. *Deutsche Bundesstiftung Umwelt*
- Holst J, Brock A, Singer-Brodowski M, de Haan G (2020) Monitoring progress of change: implementation of education for sustainable development (ESD) within documents of the German education system. *Sustainability* 12(10):4306. <https://doi.org/10.3390/su12104306>
- Bolden M, Moscarola J (2000) Bridging the quantitative-qualitative divide. The lexical approach to textual data analysis. *Soc Sci Comput Rev* 18:450–460. <https://doi.org/10.1177/089443930001800408>
- Kuckartz U, Rädiker S (2022) *Qualitative Inhaltsanalyse: Methoden, Praxis, Computerunterstützung: Grundlagentexte Methoden*, 5th edn. Beltz Juventa
- VERBI Software MAXQDA, Software für qualitative Datenanalyse. Consult. Sozialforschung GmbH, Berlin
- Lincoln YS, Guba EG (1985) *Naturalistic inquiry*. SAGE
- Healthy Campus Freie Universität Berlin Bewegte Hochschullehre. Von der Bestandsaufnahme zur Intervention. Themenbereich Physische Gesundheit. https://www.fu-berlin.de/sites/healthy-campus/interventionsmanual/interventionsbeschreibungen/Website_Bewegte-Hochschullehre.pdf
- Streater M, Walton A (2025) The role of midwives in advancing planetary health: a contemporary issue in education and practice. *Nurse Educ Today* 155:106880. <https://doi.org/10.1016/j.nedt.2025.106880>
- Roden J, Pitt V, Anäker A, Lewis T, Reis J, Johnson A (2025) Introducing new nurse leadership roles through an educational framework to protect the planet and human health. *Contemp Nurse* 61(2):180–194. <https://doi.org/10.1080/10376178.2024.2432630>
- International Confederation of Midwives (2024a) Interlocked: midwives and the climate crisis. <https://internationalmidwives.org/wp-content/uploads/Midwives-climate-survey-report-V2.pdf>
- International Confederation of Midwives (2024b) Strategic plan 2024-2026. <https://internationalmidwives.org/resources/strategic-plan-2024-2026/>
- Catling C, McIntyre E, Hastie C, Levett-Jones T (2025) Enhancing midwifery course curricula: validating knowledge and skills in climate change and planetary health. *Midwifery* 149:104573. <https://doi.org/10.1016/j.midw.2025.104573>
- Bonnamy J, Levett-Jones T, Carr B, Lokmic-Tomkins Z, Maguire J, Catling C et al (2024) Australian and New Zealand nursing and midwifery educators' planetary health knowledge, views, confidence and teaching practices: a descriptive survey study. *J Adv Nurs*. <https://doi.org/10.1111/jan.16317>
- Blom IM, Rupp I, de Graaf IM, Kapitein B, Timmermans A, Sperna Weiland NH (2023) Putting planetary health at the core of the medical curriculum in Amsterdam. *Lancet Planet Health* 7(1):e15–e17. [https://doi.org/10.1016/S2542-5196\(22\)00316-3](https://doi.org/10.1016/S2542-5196(22)00316-3)
- Jowell A, Lachenauer A, Lu J, Maines B, Patel L, Nadeau K, Erny BC (2023) A model for comprehensive climate and medical education. *Lancet Planet Health* 7(1):e2–3. [https://doi.org/10.1016/S2542-5196\(22\)00215-7](https://doi.org/10.1016/S2542-5196(22)00215-7)
- Zelenski J, Warber S, Robinson J, Logan A, Prescott S (2023) Nature connection: providing a pathway from personal to planetary health. *Challenges* 14(1):16. <https://doi.org/10.3390/challe14010016>
- Zandavalli RB, Stein AT, Camargo TS (2025) Developing competencies in planetary health: integrating systems thinking and interconnection within nature into medical education. *Rev bras educ med* 49(3):e83. <https://doi.org/10.1590/1981-5271v49.3-2025.0001.ING>
- Jochem C, von Sommoggy J, Hornidge AK, Schwienhorst-Stich EM, Apfelbacher C (2024) Planetary health literacy as an educational goal contributing to healthy living on a healthy planet. *Front Med* 11:1464878. <https://doi.org/10.3389/fmed.2024.1464878>
- Vaghela G, Khan ZA, Elsheikh R, Makram AM, Fatima A, Makram OM et al (2024) Planetary health booms: unpacking the surge in research across the globe through joint-point analysis. *GeoHealth* 8(11):e2024GH001028. <https://doi.org/10.1029/2024GH001028>
- Bovermann I (2020) *Akademisierung des Hebammenberufs (Teil 1): Chancen – und wie sie in den Studiengängen bestmöglich genutzt werden können*. *Z Geburtshilfe Neonatol* 224(03):124–129. <https://doi.org/10.1055/a-1124-9760>
- International Confederation of Midwives (2025) ICM global standards for midwifery education.

- tion. <https://internationalmidwives.org/wp-content/uploads/ICM-GLOBAL-STANDARDS-FOR-MIDWIFERY-EDUCATION-1.pdf>
44. Fraser SP, Bosanquet AM (2006) The curriculum? That's just a unit outline, isn't it? *Stud High Educ* 31(3):269–284. <https://doi.org/10.1080/03075070600680521>
45. Sterz J, Hoefler SH, Janko M, Bender B, Adili F, Schreckenbach T et al (2019) Do they teach what they need to? An analysis of the impact of curriculum mapping on the learning objectives taught in a lecture series in surgery. *Med Teach* 41(4):417–421. <https://doi.org/10.1080/0142159X.2018.1481282>
46. Wijngaards-de Meij L, Merx S (2018) Improving curriculum alignment and achieving learning goals by making the curriculum visible. *Int J Acad Dev* 23(3):219–231. <https://doi.org/10.1080/1360144X.2018.1462187>

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Bildung für planetare Gesundheit und planetare Gesundheitskompetenz in Hebammencurricula in Deutschland – eine Dokumentenanalyse von Modulhandbüchern

Hintergrund: Planetare Gesundheit wird für Hebammen zunehmend relevant, da Umweltveränderungen Auswirkungen auf die Gesundheit von Müttern, Kindern und Familien haben. Jedoch wurde die Aufnahme solcher Inhalte in die Curricula bisher noch nicht in Studien systematisch untersucht.

Ziel: Ziel der vorliegenden Studie war es, die Einbindung von Bildung für planetare Gesundheit und planetarer Gesundheitskompetenz in die Curricula für Hebammen in Deutschland systematisch zu untersuchen.

Methoden: Zwischen Februar und März 2025 wurde eine Dokumentenanalyse von Modulhandbüchern der Studiengänge für Bachelor- und Masterstudierende unter Verwendung einer indikatorbasierten lexikalischen Inhaltsanalyse mit vordefinierten Schlüsselwörtern durchgeführt. Ergebnisse mit hoher Relevanz für planetare Gesundheit wurden durch eine qualitative Inhaltsanalyse mit Anwendung eines deduktiven Kodierungsschemas untersucht, das aus dem Rahmenkonzept für Bildung für planetare Gesundheit (Planetary Health Education Framework) und dem Konzeptmodell für planetare Gesundheitskompetenz abgeleitet wurde.

Ergebnisse: In die Auswertung wurden insgesamt 60 Studiengänge in Deutschland eingeschlossen. Davon enthielten 6 Modulhandbücher klare Hinweise auf Bildung für planetare Gesundheit, während 17 Modulhandbücher Schlüsselwörter aufwiesen, die zu keinen wesentlichen Inhalten führten. Innerhalb des Modells der planetaren Gesundheitskompetenz waren die Domänen *Zugang* und *Bewertung* unterrepräsentiert. Die Domänen des Rahmenkonzepts für Bildung für planetare Gesundheit *Verbundenheit mit der Natur* und *Systemdenken und Komplexität* waren in diesen Einheiten nicht vorhanden. Eine longitudinale Aufnahme in die Curricula wurde nicht festgestellt.

Schlussfolgerung: Die vorliegende Studie zeigt, dass sich nur 6 von 60 Modulhandbüchern mit planetarer Gesundheit befassen. Um das Potenzial von Hebammen in Deutschland zur Förderung von planetarer Gesundheit zu erschließen, ist eine systematische und longitudinale Aufnahme solcher Inhalte in die Hebammenausbildung entscheidend.

Schlüsselwörter

Hebammenwesen · Planetare Gesundheit · Bildung · Dokumentenanalyse · Klimawandel