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Information Needs and Self-Management Practices among Students with Asthma at UHAS

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Abstract

Asthma among university students requires effective self-management supported by appropriate health information. However, there is a limited understanding of students' information needs and how they apply such information in daily life exists, particularly in Ghanaian university settings. This study explored the health information needs and self-management practices of students with asthma at the University of Health and Allied Sciences (UHAS). A qualitative descriptive design was employed. In-depth interviews were conducted with 20 students living with asthma across various academic programmes and years of study. Data were analyzed thematically in line with two objectives: 1) information needs regarding symptom management and trigger prevention, and 2) utilization of information in daily asthma self-management. Findings revealed diverse levels of asthma understanding, ranging from basic awareness to clinical knowledge. Participants reported strong needs for practical, simple, and actionable information, particularly for managing acute attacks and identifying hidden triggers such as stress, chemicals, and environmental exposures. Healthcare professionals were the most trusted information source, while digital platforms were widely used but inconsistently interpreted due to varying digital health literacy. Self-management practices ranged from structured and proactive behaviors to reactive symptom-based responses, influenced by emotional factors, academic stress, and environmental conditions. Confidence in managing asthma varied widely. Asthma self-management among students is shaped by gaps in practical knowledge, emotional burden, and contextual university factors. Strengthening tailored health education and digital health literacy is essential.

Keywords

Asthma, University Students, Health Information Needs, Self-Management, Digital Health Literacy

1. Introduction

Asthma is a long-term disease of the airways that causes repeated breathing problems and needs ongoing care rather than a one-time cure [1] [2]. Even when a person feels well, the disease can still be present, so good day-to-day control matters [1] [2]. Asthma can cause serious harm: it has considerable morbidity and mortality, and even people with mild asthma can still have a life-threatening attack [1]. Many people also do not have good control; for example, one report noted that about 55% of adults with asthma had uncontrolled disease, showing that poor control is common and not limited to severe cases [1]. Because asthma symptoms can flare up when the airways react to triggers, asthma control depends on both medicines and avoiding or reducing triggers that make symptoms worse [1] [3]. Triggers can be allergic (such as dust mites and molds) and non-allergic (such as cigarette smoke, perfume, air pollution, stress, strong emotions, or physical activity), and these triggers can interact with how people notice symptoms and decide what actions to take [3]. Respiratory infections are also a major trigger for asthma attacks in children, and guidance written during the COVID-19 period stressed that keeping regular treatment and avoiding known triggers remain important even when daily routines change [2]. Asthma is a global health problem that affects people across age groups and creates health, economic, and emotional burdens, which is why it is widely treated as a public health concern rather than only an individual medical issue [2]. It is also a public health concern because asthma control depends on systems: patients often need repeated follow-up, clear action plans, and skilled education support, yet these resources are not always available at scale [1]. The burden is especially visible in young adults and students because the move toward independent living can disrupt routines that support good control [4]. Guidance aimed at teens leaving home notes that priorities can quickly shift to class schedules, studying, social life, work, and new relationships, so asthma care tasks can be pushed aside even when the long-term risks are high [4]. Nonadherence is a key problem in asthma more generally, and it can remain low even in clinical trials where medicines are free and monitoring is strong, which shows that adherence problems are not simply due to cost or access, but also to beliefs, understanding, and competing demands [1]. When young people move into dormitories or apartments, they can also face new indoor exposures; this same guidance warns that these settings may add asthma triggers, while students may also forget to keep rescue medicines available or may be exposed to smoke from cigarettes, hookah, or marijuana [4]. Campus life can also involve stress and strong emotions, and these are recognized non-allergic triggers that are linked to worse

asthma outcomes and can affect quality of life through anxiety and depression pathways [3]. Problems like rhinitis (often linked with asthma) can further reduce sleep, thinking, and school productivity, so respiratory symptoms can directly interfere with learning and daily performance even when they are not labelled as asthma by the student [5]. In this way, asthma becomes a public health concern in universities because it can raise the risk of severe attacks, reduce attendance and performance, and increase the need for urgent care, especially when students are managing the condition without strong support or clear plans [1] [4] [5].

In Africa, asthma is described as a significant and growing public health burden, shaped by diverse environmental exposures, limited access to healthcare, and demographic change, such as rapid urbanization, and it is often underdiagnosed and undertreated [6]. This means that the measured prevalence can reflect both true disease patterns and gaps in diagnosis, so trends must be interpreted carefully [6]. Available Africa-focused work emphasizes that asthma burden is influenced by environmental allergens and air pollutants, and that limited healthcare access and socioeconomic barriers can make it harder for people to seek care and follow treatment plans consistently [6]. It also notes that there are difficulties in adapting international treatment guidance to local contexts and that key research gaps remain, including scarce longitudinal studies and limited data on underrepresented populations and on access to care in different settings [6]. These points matter for Ghana because Ghana shares many of the same structural realities described at the continental level (such as fast-changing urban environments and uneven access to services), yet detailed, setting-specific evidence is still limited, so local studies are needed to describe patterns and needs in Ghanaian communities and institutions using designs that can capture real-life management barriers over time [6]. A practical way to narrow from national and continental concerns to the daily experience of young adults is to focus on the university environment, because it combines independent living, shared indoor spaces, and lifestyle change, all of which can affect triggers and self-care [4] [7]. Dormitory conditions are especially important: a case control study of college dorms found that dampness indicators such as a moldy smell were strongly associated with wheezing, and that low ventilation (low air change rate) was also associated with wheezing and other respiratory symptoms; the combination of dampness and low ventilation greatly increased the odds of being a symptomatic case [7]. The same study explained why this may happen: low ventilation can raise indoor pollution and humidity and support dust mites and mold, which are well-known asthma-related exposures [7]. Related work in student dormitories also shows that indoor conditions shape settled dust and airborne exposures; in one dormitory study, higher indoor PM2.5 and CO_2 levels and specific room features were linked with differences in indoor microbial patterns and rhinitis symptoms, and the authors noted that rhinitis often co-occurs with asthma and can complicate management and worsen health outcomes [8]. These findings are not from Africa, but they still show how shared student housing can create predictable respiratory risks through ventilation, damp-

ness, dust, and indoor air quality, which are issues that can also occur in African university housing where maintenance constraints and crowding may make dampness and ventilation harder to manage [6]-[8]. Beyond housing, other triggers relevant to campus life include smoke exposure (including social smoking contexts) and physical activity, both of which are identified as potential triggers in asthma, as well as emotional strain from stress and negative emotions, which are linked to more severe asthma and more night-time symptoms [3] [4]. Families and patients also face cost barriers to asthma regimens, and school policies about medicines can become barriers to good control, showing how institutions can either support or hinder daily asthma management [9]. In lower-resource contexts, these barriers can be intensified by poverty and limited service access, which Africa-focused work identifies as key drivers of poor outcomes and a reason why community-based awareness and access strategies are needed [6]. Evidence from rural Nigeria likewise reports that childhood asthma can remain underdiagnosed and undertreated, and that caregiver income was linked to whether caregivers practiced proper asthma-care behaviors, showing how social conditions shape the ability to follow recommended management [10]. Although this Nigerian work focuses on caregivers of young children rather than university students, it supports the broader point that in African settings, asthma management is often constrained by both knowledge and resources, which is relevant when thinking about young adults who may be managing asthma alone for the first time while studying in Ghana [6] [10].

Self-management in chronic illness means the set of daily actions a person uses to keep the condition under control and to respond quickly when symptoms worsen, and for asthma, this is commonly described as the combination of correct medicine use, monitoring, and trigger avoidance [1]. Asthma self-management training is designed to teach these behaviors, including how to use a personalized asthma action plan to guide daily controller use and short-term relief, how to monitor symptoms or peak flow, and how to reduce exposure to triggers that worsen symptoms [1]. Transition-to-independence guidance for students makes the same point in simple terms: students need to review self-management strategies such as avoidance measures, adherence with controller medicines, and activating their treatment plan at the start of symptoms or when a trigger is likely (for example, during a respiratory infection), because dormitories and new living spaces can bring new triggers [4]. This focus on adherence is critical because asthma care often fails at this point; low adherence to long-term controller therapy is widely reported, and confusion or concerns about treatment effectiveness and safety can reduce adherence even when medicines are available [1]. Education and environmental support can improve outcomes: a large community-linked asthma education and environmental modification program was associated with better asthma symptom outcomes and improved school attendance and participation in activities, alongside improved family knowledge, showing that better information and skills can translate into better daily functioning [11]. In African settings where

specialist educators may be limited, the need for broader delivery of self-management teaching is emphasized by the gap between the number of trained asthma educators and the number of people who need training [1], and by Africa-focused claims that limited healthcare access and barriers to applying guidelines can leave many patients without effective long-term support [6]. In this context, information needs in health can be understood in practical terms as the specific knowledge a person must have to carry out self-management tasks correctly and confidently in daily life, especially when symptoms change or when the person faces new environments and triggers [1] [4]. For students with asthma, these information needs commonly include knowing how to recognize and interpret symptoms early, knowing which medicines to use and how (including what is a controller versus a reliever), knowing how to monitor control and follow an action plan, knowing personal triggers and how to reduce exposure, and knowing what to do in an emergency or severe attack [1] [4]. Accurate trigger knowledge is particularly complex because people vary in how they perceive triggers, and the match between self-reported triggers and allergy testing is only modest; trigger beliefs can also be shaped by suggestion and can change symptom perception and even bronchoconstriction, so students may avoid the wrong things, miss the real cause, or feel unsure about what to change [3]. This is one reason why access to accurate health information matters: wrong or incomplete information can lead to poor decisions, while tailored trigger education and routine inquiry about triggers can support better control [3]. Studies also show that information sources influence behavior. In rural Nigeria, most caregivers reported primary care providers (doctors and community health nurses) as their main asthma information source, while the internet was described as a growing source, and the authors argued that alternative channels such as radio, TV, and internet-based education could be strengthened where asthma educators are lacking [10]. For young adults, technology-based tools are also presented as a way to engage self-management, including mobile health applications and platform-based follow-up approaches (for example, WeChat-based follow-ups suggested during COVID-19) to support compliance when routine clinic contact is disrupted [2] [4]. However, knowledge gaps can still remain even among adults receiving care: a survey among asthma patients found that while many had basic awareness, there were still important gaps in understanding (including uncertainty about exercise links and other key aspects of the disease), and these gaps were not necessarily explained by education level [12]. These patterns show a clear pathway from information to behavior: what students know and believe shapes whether they adhere to medicines, how they respond to symptoms, and whether they avoid or seek out triggers, and structured education programs can improve both knowledge and real outcomes like symptoms and attendance [1] [3] [11]. Previous studies have therefore often focused on asthma epidemiology and broad risk factors in Africa, or on barriers such as healthcare access and guideline fit, or on environmental exposures like dampness and ventilation in dormitories, or on the transition challenges young people face when leaving home [4]

[6] [7]. What remains limited is a direct focus on how university students, especially in underrepresented African settings, define their own asthma-related information needs and how they use available information sources to guide daily choices in dorms, lecture halls, and social life, given that Africa-focused work explicitly notes major data gaps for underrepresented groups and limited setting-specific evidence [6]. This gap is especially important for Ghanaian university settings because existing student housing and indoor environment studies were conducted outside Ghana, while Africa-focused overviews still call for more locally tailored research and sustainable strategies [6] [7]. The practical problem is that students may have asthma but lack adequate information or effective self-management support, leading to poor control, possible severe attacks, disrupted sleep and learning, and interruptions to attendance and participation in university life. This study therefore addresses this gap in Ghanaian higher education by: 1) exploring the specific health information needs of students with asthma regarding symptom management and prevention of triggers and 2) understanding how students with asthma use available information to manage their condition in daily university life, in line with evidence that better self-management knowledge and support can improve health and functioning.

2. Methodology

This study adopted a qualitative descriptive design to explore the information needs and self-management practices of students with asthma at the University of Health and Allied Sciences. The design was considered appropriate because it enabled a detailed exploration of participants' perspectives within their everyday academic and social environments. Reflexive thematic analysis was employed because it provided a flexible and systematic approach for identifying patterns of meaning across participants' accounts while remaining consistent with the interpretive nature of qualitative descriptive research.

The study was conducted at the university, where students manage asthma alongside academic demands and exposure to environmental asthma triggers such as shared accommodation, lecture halls, dust, weather changes, and campus activities. The study population consisted of undergraduate and postgraduate students who had previously received a clinical diagnosis of asthma from a qualified healthcare professional and were actively enrolled at the university during the study period. Asthma diagnosis was based on participants' self-reported prior medical diagnosis. Participants were eligible if they were 18 years or older, had lived with asthma for at least one year, and were willing to share their experiences. Students with other severe chronic respiratory conditions or those unable to participate in an interview were excluded from the study.

A purposive sampling technique was initially used to recruit participants through student networks, health-related departments, and peer referrals from students who met the study inclusion criteria. Snowball sampling was subsequently employed, whereby recruited participants referred to other eligible students with asthma.

Twenty participants were recruited based on the principle of data saturation. Saturation was considered achieved after the eighteenth interview, when no substantially new codes or themes were emerging, although two additional interviews were conducted to confirm thematic consistency.

Data were collected using a semi-structured interview guide developed in line with the study objectives and relevant literature. The interview guide explored participants' asthma-related information needs, self-management practices, trigger prevention strategies, medication use, and experiences seeking health information. Particular attention was given to digital health literacy, defined in this study as the ability to access, understand, evaluate, and use digital health information to support asthma self-management. Interview prompts explored participants' use of online resources, social media platforms, mobile applications, and university or hospital-based digital information sources for asthma-related decision-making.

Interviews were conducted face-to-face or via secure online platforms, depending on participant preference, and each interview lasted approximately 30 to 60 minutes. All interviews were audio-recorded with participants' consent and supplemented with field notes to capture non-verbal cues and contextual observations.

Data were analyzed using reflexive thematic analysis following Braun and Clarke's six-step approach: familiarization with the data, generation of initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. Inductive coding was used to allow themes to emerge directly from participants' narratives. During the analytic process, comparisons were made across participants' accounts to identify variations associated with factors such as health-related academic training, place of residence, duration of asthma, and previous hospital admissions.

To ensure trustworthiness, the study applied Lincoln and Guba's criteria of credibility, transferability, dependability, and confirmability. Credibility was enhanced through member checking and prolonged engagement with the data. Transferability was supported through thick description of the study context and participants' perspectives. Dependability and confirmability were strengthened through the use of audit trails, reflexive journaling, and consistent documentation of analytic decisions throughout the research process.

Permission to conduct the study was sought from the relevant university authorities before data collection commenced. Participants provided informed consent prior to participation, and confidentiality, anonymity, and voluntary participation were strictly maintained throughout the study.

3. Results and Discussions

This section presents findings from the qualitative analysis of interviews conducted with 20 students living with asthma at the University of Health and Allied Sciences (UHAS). The findings are organized according to the two study objectives: 1) students' health information needs regarding asthma symptom management and trig-

ger prevention, and 2) how students utilize available information in managing asthma within daily university life.

Table 1. Socio-demographic and clinical characteristics of participants (N = 20).

Variable	Category	Frequency (n)	Percentage (%)
Sex	Male	9	45%
	Female	11	55%
Age (Years)	19	1	5%
	20	3	15%
	21	3	15%
	22	4	20%
	23	4	20%
	24	3	15%
	25	1	5%
	26	1	5%
Year of Study	100 Level	4	20%
	200 Level	4	20%
	300 Level	7	35%
	400 Level	5	25%
Programme	Nursing	5	25%
	Public Health	2	10%
	Midwifery	2	10%
	Physiotherapy	2	10%
	Pharmacy	2	10%
	Medicine	2	10%
	Nutrition	2	10%
	Health Information	2	10%
	Laboratory Science	1	5%
Residence	On-campus	13	65%
	Off-campus	7	35%
Asthma Duration	<5 years	2	10%
	5 - 9 years	8	40%
	10 - 14 years	8	40%
	≥15 years	2	10%
Medication Use	Yes	17	85%
	No	3	15%
Hospital Admission	Yes	11	55%
	No	9	45%
Smartphone Use	Yes	20	100%

The demographic profile in Table 1 above shows a slightly higher proportion of female participants (55%) compared to males (45%), with most students aged between 20 and 24 years, reflecting a typical university population. A larger proportion were in advanced years of study, particularly 300 level (35%), suggesting more experienced students. Nursing students formed the largest group (25%), while other programs were evenly represented. Most participants resided on campus (65%), indicating shared environmental exposure. Asthma duration was commonly between 5 and 14 years (80%), highlighting long-term experience with the condition. High medication use (85%) and universal smartphone access (100%) suggest good treatment exposure and strong potential for digital health interventions.

3.1. Objective 1: Health Information Needs for Asthma Management and Trigger Prevention

3.1.1. Diverse and Evolving Understanding of Asthma

Participants demonstrated varying levels of understanding of asthma, ranging from basic awareness to advanced clinical knowledge. For many, asthma was both a physical and emotional experience.

Some participants described asthma in experiential and emotional terms rather than clinical definitions. For example, P1 noted, "it feels like my chest suddenly closes up… sometimes I still panic when it starts because it feels like I cannot breathe at all". Similarly, P11 described asthma as "not just a disease, it is fear", reflecting the psychological burden associated with the condition.

Participants with medical or health-related training showed a more technical understanding. P6 explained asthma as "airway inflammation" while acknowledging its emotional dimension, and P10 framed it as both "a chronic inflammatory condition" and an issue shaped by misinformation.

In contrast, participants with lower awareness expressed uncertainty or misconceptions. P3 stated, "I still feel like I don't fully understand it", while P7 believed "it will just go away". Similarly, P17 highlighted a cultural knowledge gap, explaining that in his community, asthma was simply referred to as "breathing problems".

These findings suggest that understanding of asthma is shaped by personal experience, educational background, and cultural context, with many students still navigating incomplete or evolving knowledge.

3.1.2. Need for Practical, Personalized, and Actionable Information

A dominant theme across participants was the need for clear, practical, and context-specific information rather than abstract or theoretical knowledge.

Several participants emphasized the need for step-by-step guidance during asthma episodes. P2 stated, "I need more practical information… exactly how to manage attacks when I am alone, especially at night". Similarly, P20 expressed the need for "simple emergency instructions that I can remember even when I am scared".

Others highlighted the need for preventive information. P1 explained, "What I

really need is clear information on how to prevent attacks before they start", while P5 sought clarity on medication adjustments, noting, "I need detailed information about when to increase or reduce inhaler use".

Participants also expressed interest in understanding less obvious factors influencing asthma. For instance, P9 emphasized diet, stating, "I feel like certain foods make me worse, but I'm not sure which ones", while P16 highlighted emotional triggers, noting the need for "reassurance-based information, especially on managing anxiety".

Participants with advanced knowledge (e.g., P6, P13, P18) expressed interest in specialized information such as long-term control strategies and emerging treatments, contrasting with participants like P3 and P12 who requested basic education on the nature and seriousness of asthma.

Overall, information needs ranged from foundational knowledge to advanced clinical insights, but all participants emphasized the importance of clarity and applicability to real-life situations.

3.1.3. Gaps in Knowledge of Triggers and Environmental Factors

Many participants reported incomplete understanding of asthma triggers, particularly less obvious or "hidden" triggers.

Commonly identified triggers included dust, smoke, and cold weather. However, participants also reported discovering triggers through personal experience. P1 stated, "I didn't know that perfume… or chalk dust could affect me. I only learned this after noticing patterns".

Similarly, P14 emphasized environmental exposure, noting, "living off-campus, I notice it more during dusty seasons". P5 raised concerns about chemical exposure in academic settings, stating, "In pharmacy practicals… I don't know if it is dangerous".

Emotional and psychological triggers were also highlighted. P2 explained, "Sometimes even emotional stress triggers me", while P11 expressed the need for clarity on "how stress affects asthma".

Participants with higher knowledge levels sought deeper scientific explanations rather than basic identification. P8 noted, "I know most of my triggers, but I still want more scientific explanation", reflecting a shift from identification to understanding mechanisms.

These findings indicate that while basic trigger awareness exists, there is a strong need for deeper, individualized, and context-specific education on environmental and psychosocial triggers.

3.1.4. Sources of Information and Trust in Health Communication

Participants relied on multiple information sources, with varying levels of trust.

Healthcare professionals were the most trusted source across participants. P1 stated, "I trust doctors more than anything", while P11 emphasized reliance on "hospital nurses and personal experience".

Digital sources were widely used, particularly among more informed partici-

pants. P8 reported using "Google, YouTube, and hospital visits", while P10 relied on "academic databases, WHO, and health journals". However, participants were cautious about online information. P2 noted, "On social media, I am careful because anyone can post anything".

Participants with lower digital engagement relied more on family and peers. P3 stated, "my parents mostly", while P17 relied on "friends and sometimes nurses".

Trust was often established through verification. P5 explained, "I compare information from multiple sources", and P19 noted, "I cross-check information before trusting it".

Despite widespread smartphone use, disparities in digital health literacy influenced how effectively students accessed and evaluated information.

3.1.5. Barriers to Accessing and Understanding Information

Participants reported several challenges in accessing and understanding asthma-related information.

A major barrier was the complexity of medical language. P1 stated, "Medical explanations are too technical", while P17 added, "I need simple explanations, not big medical words".

Some participants experienced information overload. P8 noted, "sometimes online information is overwhelming", while P14 described online content as "confusing".

Others highlighted cognitive barriers during asthma episodes. P20 explained, "I struggle to think clearly during attacks", which limits the ability to apply information in real time.

Participants with lower engagement also reported limited motivation or awareness. P7 stated, "I don't really question information much", while P12 admitted, "I don't search much".

These findings suggest that both structural (complexity, accessibility) and individual (motivation, cognitive capacity) factors shape information use.

3.1.6. Need for Institutional Support and Health Education

Participants consistently emphasized the need for university-level support.

Common suggestions included awareness programs, emergency preparedness, and health education. P1 suggested "awareness programs and emergency support in lecture halls", while P2 recommended "emergency inhalers in departments".

Participants with clinical backgrounds emphasized training. P6 stated, "emergency response training should be compulsory", while P13 advocated for "practical emergency training".

Others highlighted the need for accessible education. P3 suggested orientation programs, and P17 emphasized "simple language" explanations.

Digital solutions were also proposed. P8 suggested "digital health support or apps", while P19 emphasized promoting "digital health literacy".

Participants in this study had shown a wide range of asthma understanding, and their explanations had often blended bodily symptoms with strong emotions, so

asthma had been experienced as both a medical problem and a fear-based event. This emotional framing had fit with evidence that mental health burden had related closely to asthma outcomes: Silverstein *et al.* [13] had reported that higher depressive symptoms had been associated with worse asthma control and worse asthma-related quality of life in adults using a mobile health intervention, which supported the idea that panic, fear, and low mood had been important parts of "living with asthma", not only side issues [13]. Li *et al.* [14] had similarly reported that people with chronic respiratory diseases had shown differences in anxiety and depression by disease group and that eHealth literacy had moderated these disparities, which suggested that information exposure and psychological strain had interacted in complex ways rather than improving well-being in a simple linear manner. At the same time, many participants in our study had admitted confusion, myths, or culturally shaped labels (such as calling asthma only "breathing problems"), and this pattern had matched broader concerns that limited health literacy had been linked to poorer asthma outcomes and poorer self-management behaviors. Udemgba *et al.* [15] had summarized evidence that poor health literacy had been associated with worse asthma outcomes (including worse control and more emergency care use) and had recommended reducing communication complexity through approaches such as pictograms and "teach-back" to improve asthma counseling and inhaler-related skills. Willis [16] had also emphasized that asthma self-management education aimed at symptom control and reduced exacerbations through partnership and repeated education, and that education content had included basic facts, inhaled medications, self-monitoring, environmental control, and written asthma action plans, with "teach-back", teach-to-goal, and motivational interviewing having been effective strategies. These prior studies had helped explain why our participants had asked for practical, personalized, and actionable information (for example, step-by-step instructions during attacks, simple emergency steps they could recall when scared, and clear guidance on medication adjustments): their needs had closely mirrored the structured elements of self-management education described by Willis [16], but our findings had highlighted that learners had wanted these elements delivered in simpler language and in moment-by-moment formats that could work under stress. Salim and colleagues' feasibility study of a self-management app for adults with limited health literacy had offered a close comparison: the intervention had been designed to be accessible (including pictorial asthma action plans and educational components), and adoption had been influenced by ease of use, while continued use had been supported by reminders and family support [17]. In this way, our participants' desire for "simple but specific" instructions had aligned with Salim *et al.*'s emphasis on design choices that had reduced reading burden and had supported real-world adherence, while Udemgba *et al.* [15] and Willis [16] had reinforced that communication methods (teach-back, reinforcement, and supportive interviewing) had mattered as much as content for turning knowledge into usable action during emotionally charged episodes.

Participants had also reported gaps in recognizing and explaining triggers, especially "hidden" environmental triggers (such as perfume, chalk dust, and chemicals in practical settings) and psychosocial triggers (such as stress), and these gaps had suggested that trigger education needed to be individualized and context-based rather than limited to generic lists. This pattern had been consistent with Şanlitürk and Ayaz-Alkaya's [18] randomized trial, where a nurse-led home visit program (with repeated education and counseling) had been linked to improved caregiver outcomes, and where the authors had explained that home visits had offered an ideal setting to identify environmental factors affecting asthma because many home triggers had not been easily identified in clinics. Although our setting had been a university context rather than a home setting, the logic had been similar: students had encountered triggers in dorms, off-campus housing, lecture halls, and laboratories, so the "real exposure setting" had shaped what information had been most useful, and this had supported the participants' calls for institutional preparedness and practical training. Our participants had trusted health professionals most, which had aligned with Willis's account that effective asthma education had relied on clinician communication skills and repeated reinforcement, and it had also aligned with Udemgba *et al.*'s [15] framing that health systems and communities had needed to reduce navigation burdens for people with low literacy by making education easier to understand and use [15] [16]. However, participants had also relied heavily on online sources, while expressing caution about misinformation and overload, and this pattern had strongly matched empirical data on digital literacy limits. Kan and colleagues had found that, among parents of children with asthma, many respondents had reported knowing how to find helpful online resources and using the internet for questions, yet only a minority had felt able to distinguish high-quality from low-quality resources, and only a minority had felt confident using online information to make health decisions; they had also reported differences in connectivity, affordability concerns, privacy concerns, and digital literacy by language and socio-demographic factors. These results closely reflected our participants' reports that online information had been confusing or overwhelming and that trust had often been built through cross-checking across sources, while also explaining why unequal digital health literacy could have produced unequal benefits from the same smartphone access [19]. Cunha *et al.* [20] had added an engagement perspective by reporting, in a national Portuguese asthma study, that higher education and smartphone ownership had been associated with greater interest in public involvement in research, which implied that access to and comfort with digital tools had shaped participation and agency in asthma-related activities [20]. Yet, our findings and the wider evidence had suggested an important nuance: more information and higher eHealth literacy had not always meant better emotional outcomes. Silverstein *et al.* had found that higher eHealth literacy had been associated with more app logins (more engagement) but also with worse asthma-related quality of life, which they had interpreted as possibly reflecting that people with worse quality of life had sought

more information, though directionality had not been established [13]. Li *et al.* [14] had similarly reported that higher eHealth literacy had been associated with improved outcomes such as quality of life and resilience in some comparisons, but it had also widened disparities in anxiety and depression, so digital empowerment had carried potential psychological costs if support had been absent or information had been distressing [14].

3.2. Objective 2: Utilization of Information in Asthma Self-Management

3.2.1. Variations in Daily Self-Management Practices

Participants demonstrated varying levels of engagement in daily asthma management.

Highly engaged participants described structured routines. P6 stated, "I maintain strict control habits daily", while P13 noted, "I am very disciplined with inhaler use".

Moderately engaged participants reported partial adherence. P1 explained, "I try to carry my inhaler everywhere", while P14 stated, "I try to avoid dust and smoke".

In contrast, low-engagement participants reported reactive rather than proactive management. P3 stated, "I don't think about it daily", and P17 added, "I don't manage it daily".

These variations reflect differences in knowledge, perceived severity, and personal experience.

3.2.2. Response to Symptoms and Decision-Making

Participants' responses to asthma symptoms followed a general pattern but varied in consistency and confidence.

Most participants reported using inhalers as the primary response. P2 stated, "I sit down and use my inhaler", while P4 emphasized immediate action: "I don't delay".

However, emotional responses influenced behavior. P11 noted, "I panic first", while P20 stated, "panic affects me".

Participants with limited knowledge often relied on passive strategies. P3 reported, "I rest and wait", highlighting delayed intervention.

Digital reassurance was also common. P1 explained, "I check my phone to see if it is serious", reflecting reliance on external validation.

3.2.3. Application of Information in Real-Life Contexts

Participants varied in how they applied information to self-management.

Some demonstrated effective integration of knowledge. P5 noted, "I apply both academic and clinical advice", while P10 reported structured application of guidelines.

Others struggled with consistency. P15 admitted, "I try, but I forget sometimes", while P1 noted reliance on reminders.

Participants with limited knowledge reported minimal application. P7 stated,

"I don't apply much because I don't know much".

These findings suggest that access to information does not always translate into effective practice.

3.2.4. Behavioural Change and Adaptation

Many participants reported behavioral changes influenced by information and experience.

Common changes included improved medication adherence and trigger avoidance. P2 stated, "I stopped staying in smoky environments", while P9 reduced "cold drinks".

Severe experiences often prompted change. P1 noted, "after one serious attack… I now always carry [my inhaler]", and P15 reported similar behavior change.

Participants with clinical knowledge demonstrated more proactive adaptation, such as P4 discontinuing "football competitively".

3.2.5. Barriers to Adherence and Information Use

Despite awareness, participants reported challenges in following recommendations.

Academic workload and stress were major barriers. P2 noted "deadlines", while P15 reported "stress makes me forget medication".

Personal preferences also influenced behavior. P1 admitted, "I don't avoid cold drinks", despite advice.

Emotional factors were significant barriers. P16 explained that "fear sometimes overwhelms me", affecting execution of knowledge.

3.2.6. Influence of University Environment

University life significantly influenced asthma management.

Stress emerged as a key trigger. P1 noted "during exams my asthma becomes worse", while P16 described exam stress as "my biggest trigger".

Environmental exposures also played a role. P1 mentioned "dusty lecture rooms", while P14 highlighted "transport and dust off-campus".

Physical demands, such as walking long distances, were also noted (P17).

3.2.7. Confidence in Self-Management

Participants' confidence levels varied widely.

Highly informed participants expressed strong confidence. P6 stated, "I am very confident", while P13 attributed confidence to training.

Moderately confident participants expressed caution. P1 stated, "I feel moderately confident", while P14 reported similar levels.

Low-confidence participants cited lack of knowledge. P7 stated, "I am not confident", while P17 added, "not confident at all".

Emotional factors also influenced confidence. P20 noted, "I am not fully confident because of fear".

Participants in this study showed clear differences in how they used information

for daily asthma self-management, reflecting patterns reported in earlier research that frames self-management as a combination of individual habits and environmental influences. Highly engaged participants, who described strict routines and disciplined inhaler use, aligned with structured self-management practices involving symptom monitoring, medication adherence, and trigger avoidance. Moderately engaged participants demonstrated partial adherence, acting on some advice but inconsistently, which supports evidence that self-management depends not only on knowledge but also on attitudes, skills, and contextual support [21] [22]. Low-engagement participants described reactive behaviors, consistent with findings that emerging adults often struggle with routine self-care due to competing life demands despite having general awareness [23]. Across all groups, inhaler use was the primary immediate response, reinforcing its central role in pharmacological self-management (Sapouna *et al.*, 2023). However, emotional factors such as fear and panic influenced decision-making, aligning with research highlighting psychosocial challenges in asthma management among young adults [23]. Delayed responses and reliance on rest further reflected gaps in confidence and practical skills, consistent with broader evidence linking adherence to health literacy and contextual influences [21]. The use of mobile phones for reassurance mirrored the role of digital tools in supporting symptom tracking and self-management, although studies show that app availability does not guarantee sustained engagement due to usability and preference barriers [24] [25].

Participants also differed in how effectively they applied information, adapted behaviors after severe experiences, and navigated environmental barriers. Those who translated knowledge into structured routines reflected effective self-management supported by self-education and deliberate trigger control [22]. Others relied on reminders or forgot key practices, reinforcing the importance of systems that reduce cognitive burden and support adherence [21]. Behavioral changes following severe asthma attacks, such as consistently carrying inhalers or avoiding triggers, aligned with evidence that lived experiences and perceived severity shape health behaviors [22]. Despite awareness, many participants faced barriers, particularly academic workload and stress, which have been identified as major challenges for asthma management among university students [23]. Stress also acted as a trigger, illustrating how the university environment can disrupt routines and worsen symptoms, consistent with social-ecological perspectives on health behavior [22]. Environmental exposures such as dust and transport conditions further reinforced the role of context in daily management [25]. Variations in confidence reflected differences in knowledge, fear, and self-efficacy, supporting the view that effective self-management requires more than information alone [21] [22]. While developmental factors have been discussed in prior studies, this study suggests that confidence is more strongly shaped by situational pressures and lived experience in university settings [23].

Finally, the findings underscore the importance of structured education and system-level support. Evidence shows that improved delivery systems, such as respir-

atory therapist-led protocols, can enhance access to asthma education and clinical support [26]. Similarly, targeted interventions and better-designed digital tools have been recommended to address the specific needs of university students, although current tools remain underdeveloped in supporting sustained engagement [23]. From an equity perspective, adherence is influenced by broader social determinants, including socioeconomic status and contextual inequalities, which shape access, behavior, and outcomes [27]. This aligns with findings that socioeconomic background affects both self-management practices and engagement with digital tools [22] [24].

4. Conclusions

This study demonstrates that asthma self-management among students at the University of Health and Allied Sciences is influenced by a complex interaction of information needs, health knowledge, emotional experiences, digital health literacy, and environmental conditions within the university setting. Although many participants had lived with asthma for several years, their understanding and application of asthma-related information differed considerably. Students enrolled in health-related programmes generally demonstrated more structured and evidence-based knowledge, while others relied more heavily on personal experience, incomplete information, or cultural interpretations of asthma symptoms and triggers.

The findings further reveal that asthma was experienced not only as a physical health condition but also as an emotional challenge characterized by fear, anxiety, uncertainty, and panic during acute attacks. These emotional responses affected participants' ability to recall and apply health information effectively, particularly during emergencies. Participants consistently expressed the need for simple, practical, and context-specific information, including step-by-step guidance on managing asthma attacks, proper medication use, and strategies for identifying and avoiding triggers within the university environment. While commonly recognized triggers such as dust, smoke, and cold weather were widely identified, many students only became aware of other triggers, including stress, perfumes, chemicals, and academic pressure, through personal experience. This suggests gaps in preventive asthma education and highlights the need for asthma information that reflects the realities of university life.

The study also found that healthcare professionals remained the most trusted source of asthma information, although digital platforms increasingly shaped students' self-management practices. Despite universal smartphone access among participants, the ability to critically evaluate online asthma information varied significantly. Some students effectively used digital resources to support clinical advice, whereas others reported confusion, misinformation, and information overload, indicating differences in digital health literacy. Self-management practices similarly varied, ranging from proactive and structured routines to reactive symptom-based management. Students with prior clinical exposure or health-related

training were generally more confident in inhaler use, trigger avoidance, and emergency planning, while others sought treatment only when symptoms became severe.

The findings suggest that improving asthma outcomes among university students requires interventions that go beyond medication access alone. Universities should integrate asthma education into student orientation and health promotion activities, develop clear emergency response pathways for asthma attacks on campus, and provide curated digital asthma resources that are accurate, practical, and easy to understand. In addition, student health services should incorporate emotional support and stress management strategies into asthma care, given the strong relationship between psychological stress and asthma experiences identified in this study.

This study was limited to one university and included a high proportion of students from health-related programmes, which may limit the transferability of the findings to other student populations. In addition, asthma diagnosis and management experiences were based largely on self-reported accounts. Nevertheless, the study provides important insights into the lived experiences, information challenges, and self-management practices of students with asthma within a Ghanaian university context and contributes to the growing body of research on student health and chronic disease management in higher education settings.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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