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Knowledge, Attitudes and Practices toward Melioidosis among Nursing and Plant Science Students at International Islamic University Malaysia (IIUM): A Cross-Sectional Study

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ABSTRACT

Background: Melioidosis is an endemic but neglected tropical disease in Malaysia, particularly in Pahang. This study hypothesised that nursing students would demonstrate significantly higher knowledge of melioidosis than plant science students due to differences in disciplinary training, while attitudes and preventive practices would be comparable. This cross-sectional study aimed to assess and compare the knowledge, attitudes, and practices toward melioidosis among plant science and nursing students at IIUM.

Methods: A cross-sectional study was conducted among 264 nursing and plant science undergraduate students at the International Islamic University Malaysia (IIUM), Kuantan. Data were collected using a structured self-administered questionnaire and analysed using descriptive statistics and the Mann-Whitney U test ($p < 0.05$).

Results: Nursing students demonstrated significantly higher knowledge scores than plant science students ($U = 1849.0$, $p = 0.020$). No significant differences were observed in attitude ($p = 0.490$) or preventive practice ($p = 0.960$). Overall, nursing students exhibited moderate-to-high knowledge levels, whereas plant science students were more frequently classified as having low knowledge. Both groups demonstrated generally positive attitudes and favourable preventive practices.

Conclusion: Nursing students possessed better knowledge of melioidosis, supporting the hypothesis that discipline-specific education influences disease awareness. Integrating melioidosis education into healthcare- and agriculture-related curricula through a One Health approach may strengthen awareness and preparedness among future professionals in endemic regions.

Keywords: Melioidosis; Knowledge; Attitude; Practice; Nursing; Plant Science; One Health

INTRODUCTION

Melioidosis is an infectious disease caused by the environmental Gram-negative bacterium *Burkholderia pseudomallei*, which is commonly found in contaminated soil and surface water in tropical and subtropical regions (1). The disease is endemic in Southeast Asia and northern Australia and is increasingly recognised as an important yet neglected public health problem because of its high case fatality rate, broad spectrum of clinical manifestations, and frequent underdiagnosis (2). Individuals are primarily infected through direct contact with contaminated soil or water via skin abrasions, inhalation, or ingestion, with individuals with frequent environmental exposure, particularly agricultural workers, and those with underlying medical conditions such as diabetes mellitus being particularly susceptible (3).

Melioidosis remains an important public health concern in Malaysia, where the disease is endemic and continues to cause substantial morbidity and mortality (4). Among the Malaysian states, Pahang has consistently reported a considerable burden of melioidosis, largely due to its tropical climate, extensive agricultural activities, and widespread environmental distribution of *B. pseudomallei* (5). A recent analysis of the Pahang State Melioidosis Registry identified 466 confirmed cases between 2020 and 2024, of which 68 patients (14.6%) died, highlighting the substantial disease burden and persistent mortality associated with melioidosis in Pahang (6). The study further highlighted fluctuations in incidence and mortality over time, reinforcing the importance of sustained public health awareness, timely diagnosis, and effective preventive strategies in endemic communities.

Within this context, nursing and plant science students represent two populations with distinct yet complementary relevance to melioidosis prevention under the One Health framework. Nursing students, as future healthcare professionals, are expected to recognise the clinical manifestations of melioidosis, educate patients regarding preventive measures, and facilitate early diagnosis and appropriate management (7). In contrast, plant science students frequently engage in agricultural and environmental fieldwork that involves direct exposure to soil and surface water, the natural reservoirs of *B. pseudomallei*, potentially placing them at

greater occupational risk of exposure to melioidosis. Comparing these two student populations provides valuable insight into whether differences in educational background influence awareness, attitudes, and preventive practices toward melioidosis.

Although several Malaysian studies have described the epidemiology and clinical characteristics of melioidosis, limited evidence exists regarding the knowledge, attitudes, and preventive practices of university students, particularly among disciplines representing both the healthcare and agricultural sectors (8). Such information is essential for identifying educational gaps and informing targeted health promotion initiatives in endemic regions. Therefore, this study aimed to assess and compare the knowledge, attitudes, and practices toward melioidosis among nursing and plant science undergraduate students at the International Islamic University Malaysia (IIUM), Kuantan.

METHODS

A quantitative cross-sectional study was conducted among undergraduate nursing and plant science students at the International Islamic University Malaysia (IIUM), Kuantan. The study aimed to assess and compare the knowledge, attitudes, and practices regarding melioidosis between students from healthcare- and agriculture-related disciplines. A proportionate stratified sampling strategy was initially considered to ensure representation from both academic programmes according to their enrolment. However, recruitment ultimately relied on voluntary participation and participant availability during the data collection period. Consequently, convenience sampling was employed within each programme while maintaining proportional representation of the two student populations. A total of 264 students participated in the study, comprising 242 nursing students and 22 plant science students. The unequal sample sizes reflected the actual enrolment distribution within the university, where the nursing programme has substantially more students than the plant science programme.

Data were collected using a structured self-administered questionnaire adapted from previously published KAP studies on melioidosis by Damrongsukij et al. (9) and Weeratunga et al. (8). The questionnaire was divided into four sections: demographic characteristics, knowledge using 13 items,

attitude using 5-point Likert scale, and practice using 4-point frequency scale. Internal consistency of the questionnaire was assessed using Cronbach's alpha, yielding a value of 0.86, indicating good reliability.

Knowledge items were scored as 1 for each correct response and 0 for incorrect or "I don't know" responses, giving a total possible score ranging from 0 to 13. Higher scores indicated better knowledge regarding melioidosis. Attitude items were measured using a five-point Likert scale ranging from strongly disagree to strongly agree. Negatively worded statements, if any, were reverse-scored so that higher total scores consistently reflected more positive attitudes toward melioidosis prevention. Practice items were assessed using a four-point frequency scale ranging from "Never" to "Always". Responses representing desirable preventive behaviours received higher scores. Reverse coding was applied where necessary so that higher total scores consistently represented better preventive practices.

Data were analysed using IBM SPSS Statistics version 27. Descriptive statistics were used to summarise participant characteristics and KAP scores. Normality was assessed using the Shapiro-Wilk test. As the data were not normally distributed, comparisons between nursing and plant science students were performed using the Mann-Whitney U test. Statistical significance was set at $p < 0.05$.

Ethical approval was obtained from the IIUM Research Ethics Committee (IREC (UG) 2025-027). Participation was voluntary, written informed consent was obtained from all

participants prior to data collection, and confidentiality was maintained throughout the study.

RESULT

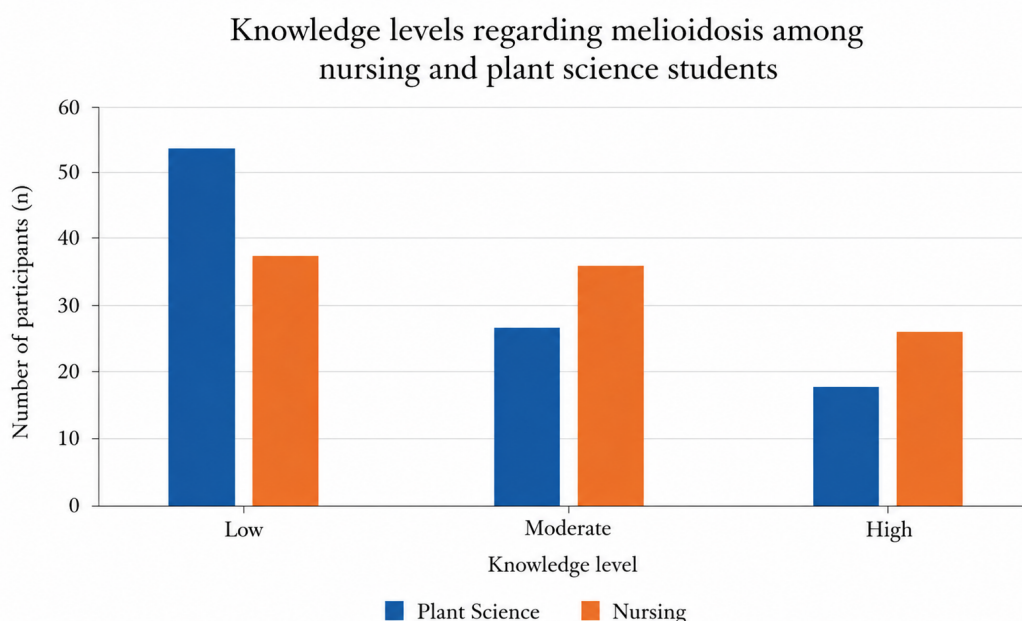
A total of 264 undergraduate students participated in this study, comprising 242 (91.7%) nursing students and 22 (8.3%) plant science students. Female participants accounted for 232 (87.9%) respondents, while 32 (12.1%) were male. The unequal distribution between the two academic programmes reflected the actual student enrolment at IIUM Kuantan, where the nursing programme has a substantially larger student population than the plant science programme. The response rates were comparable between the programmes, with approximately 44% of nursing students and 33% of plant science students participating. Participants were distributed across all four years of study, with Year 3 students representing the largest proportion (31.1%), followed by Year 1 (23.5%), Year 2 (22.7%), and Year 4 (22.7%) (Table 1).

Knowledge Regarding Melioidosis among Nursing and Plant Science Students at International Islamic University Malaysia, Kuantan

Overall, nursing students demonstrated higher knowledge scores regarding melioidosis than plant science students. Based on the predefined knowledge categories, the majority of nursing students were classified as having moderate knowledge, whereas most plant science students were classified as having low knowledge (Figure 1).

Table 1: Sociodemographic Data of the Participant (N = 264)

Variable	Frequency (f)	Percentage (%)
Gender		
Males	32	12.1
Females	232	87.9
Course of study		
Nursing	242	91.7
Plant Science	22	8.3
Year of Study		
Year 1 Nursing	57	21.6
Year 1 Plant Science	5	1.6
Year 2 Nursing	55	20.8
Year 2 Plant Science	5	1.9
Year 3 Nursing	76	28.8
Year 3 Plant Science	6	2.3
Year 4 Nursing	54	20.5
Year 4 Plant Science	6	2.3

Figure 1: Knowledge Levels Regarding Melioidosis among Nursing and Plant Science Students (N = 264)

Responses to individual knowledge items showed that nursing students consistently recorded higher proportions of correct responses across most questions (Table 2). Greater awareness was observed among nursing students regarding the bacterial cause of melioidosis, environmental reservoirs, transmission through contaminated soil and water, and preventive measures such as wearing protective footwear and gloves during gardening. Conversely, plant science students showed higher proportions of “I don’t know” responses for several items, particularly those related to disease transmission and prevention.

The mean score for individual knowledge items ranged from 0.35 to 0.71 among nursing students and from 0.18 to 0.50 among plant science students (Table 2).

Attitude Regarding Melioidosis among Nursing and Plant Science Students at International Islamic University Malaysia, Kuantan

Overall, both nursing and plant science students demonstrated generally positive attitudes toward melioidosis. Based on the total attitude scores, the majority of nursing students were categorised as having a high level of attitude, whereas most plant science students demonstrated a moderate level of attitude. No respondents from the plant science programme were classified as having a low attitude level.

Responses to individual attitude statements indicated that participants from both programmes generally agreed that melioidosis is a serious disease and recognised the importance of preventive measures, including the use of protective equipment during outdoor activities and seeking medical attention when necessary (Table 3). Mean scores for individual attitude items ranged from 2.76 to 3.15 among nursing students and from 2.36 to 3.00 among plant science students.

Practice Regarding Melioidosis among Nursing and Plant Science Students at International Islamic University Malaysia, Kuantan

Overall, preventive practice scores were generally favourable in both groups. Based on the predefined practice categories, most nursing students demonstrated a high level of preventive practice, whereas plant science students were almost equally distributed between the moderate and high practice categories. No participants from either programme were categorised as having poor preventive practices.

For individual practice items, high proportions of respondents from both groups reported routinely cleaning their hands or body after visiting agricultural areas or participating in outdoor recreational activities. Conversely, fewer respondents reported engaging in behaviours associated with increased risk,

such as walking barefoot in agricultural areas, swimming in natural water bodies, or applying soil or herbs directly to wounds (Table 4).

Mean scores for individual practice items ranged from 0.47 to 2.74 among nursing students and from 1.55 to 2.77 among plant science students (Table 4).

Table 2: Level of Knowledge Regarding Melioidosis among Plant Science Students and Nursing Students at International Islamic University Malaysia (N = 264)

Questions	Course of study	Yes/True, f (%)	No/False, f (%)	I don't know, f (%)	Mean (SD)
Have you ever heard of melioidosis?	Plant science	5 (22.7)	17 (77.3)	-	0.23 (0.4)
	Nursing	111 (45.9)	131 (54.1)	-	0.46 (0.5)
Cough, ulcer and shortness of breath are the symptoms of melioidosis	Plant science	6 (27.3)	1 (4.5)	15 (68.2)	0.27 (0.5)
	Nursing	102 (42.1)	3 (1.2)	137 (56.6)	0.42 (0.5)
Melioidosis spread by bacteria	Plant science	10 (45.5)	0 (0)	12 (54.5)	0.45 (0.5)
	Nursing	149 (61.6)	1 (0.4)	92 (38.0)	0.62 (0.5)
Melioidosis can be found in soil and natural water.	Plant science	9 (40.9)	1 (4.5)	12 (54.5)	0.41 (0.5)
	Nursing	149 (61.6)	3 (1.2)	90 (37.2)	0.62 (0.5)
Melioidosis can be transmitted through inhalation of contaminated dust particles	Plant science	7 (31.8)	1 (4.5)	14 (63.6)	0.32 (0.5)
	Nursing	116 (47.9)	11 (4.5)	115 (47.5)	0.48 (0.5)
Direct contact with contaminated soil and water through penetrating wounds is a mode of infection transmission.	Plant science	9 (40.9)	0 (0)	13 (59.1)	0.41 (0.5)
	Nursing	167 (69.0)	2 (8.0)	73 (30.2)	0.69 (0.5)
Aspiration of contaminated water cannot lead to infection.	Plant science	2 (9.1)	4 (18.2)	16 (72.7)	0.18 (0.4)
	Nursing	63 (26.0)	84 (34.7)	95 (39.30)	0.35 (0.5)
Gardening in monsoon increase your chance of getting melioidosis	Plant science	8 (36.4)	0 (0)	14 (63.6)	0.36 (0.5)
	Nursing	129 (53.3)	1 (0.4)	112 (46.3)	0.53 (0.5)
Wearing shoes when walking outside protect you from getting melioidosis	Plant science	9 (40.9)	0 (0)	13 (59.1)	0.41 (0.5)
	Nursing	171 (70.7)	7 (2.9)	64 (26.4)	0.71 (0.5)
Being pierced by sharp objects increase your chance of getting melioidosis	Plant science	8 (36.4)	2 (9.1)	12 (5.0)	0.36 (0.5)
	Nursing	133 (55.0)	12 (5.0)	97 (40.1)	0.55 (0.5)
Covering wounds with elastic plaster protect you from getting melioidosis?	Plant science	6 (27.3)	2 (9.1)	12 (54.5)	0.27 (0.5)
	Nursing	116 (47.9)	17 (7.0)	109 (45.00)	0.48 (0.5)
Walking without shoes increase your chance of getting melioidosis?	Plant science	11 (50.0)	0 (0)	11 (50.0)	0.50 (0.5)
	Nursing	170 (70.2)	11 (4.5)	61 (25.2)	0.70 (0.5)
Wearing boots and rubber gloves when gardening protects you from getting melioidosis?	Plant science	11 (50.0)	0 (0)	11 (50.0)	0.50 (0.5)
	Nursing	172 (71.1)	3 (1.2)	67 (27.7)	0.71 (0.5)

Table 3: Level of Attitude Regarding Melioidosis among Plant Science Students and Nursing Students at International Islamic University Malaysia (N = 264)

Questions	Course of study	Strongly agreed, f (%)	Agreed, f (%)	Neutral, f (%)	Disagreed, f (%)	Strongly Disagreed, f (%)	Mean (SD)
Melioidosis are serious and can lead to mortality	Plant science	9 (40.9)	4 (18.2)	9 (40.9)	0 (0)	0 (0)	3.00 (0.93)
	Nursing	47 (19.4)	99 (40.9)	89 (36.8)	6 (2.5)	1 (0.40)	2.76 (0.05)
I believe that using protective measure (glove/shoes) while gardening/ outdoor is important to avoid melioidosis	Plant science	9 (40.9)	10 (45.5)	3 (13.6)	0 (0)	0 (0)	2.36 (1.42)
	Nursing	131 (54.1)	77 (31.8)	33 (13.6)	0 (0)	1 (0.40)	2.76 (0.09)
I believe everyone has risk of this infection	Plant science	5 (22.7)	13 (59.1)	3 (13.6)	1 (4.5)	5 (22.70)	3.00 (0.76)
	Nursing	94 (38.8)	98 (40.5)	43 (17.8)	6 (2.5)	1 (0.40)	3.15 (0.05)
I seek a medical consultation when needed	Plant science	8 (36.4)	7 (31.8)	6 (27.3)	0 (0)	1 (4.50)	2.95 (1.05)
	Nursing	89 (36.8)	94 (38.8)	51 (21.1)	6 (2.5)	2 (0.80)	3.08 (0.06)

Table 4: Level of Practice Regarding Melioidosis among Plant Science Students and Nursing Students at International Islamic University Malaysia (N = 264)

Questions	Course of Study	Always, f (%)	Often, f (%)	Sometimes, f (%)	Never, f (%)	Mean (SD)
Do you clean your hand or body after visiting agriculture area or outdoor recreation	Plant science	18 (81.8)	3 (13.6)	1 (4.5)	0 (0)	2.77 (0.50)
	Nursing	180 (74.4)	52 (21.5)	10 (4.1)	0 (0)	0.47 (0.05)
Do you walking barefoot in agricultural area or while doing outdoor recreation	Plant science	2 (9.1)	1 (4.5)	5 (22.7)	14 (63.6)	2.23 (1.11)
	Nursing	21 (8.7)	11 (4.5)	67 (27.7)	143 (59.1)	2.37 (0.06)
Have you ever been swimming in natural water resources	Plant science	1 (4.5)	3 (13.6)	13 (59.1)	5 (22.7)	2.00 (0.76)
	Nursing	16 (6.6)	38 (15.7)	142 (58.7)	46 (19.0)	1.10 (0.05)
Do you put any soil or herbs on the wound	Plant science	1 (4.5)	0 (0)	7 (31.8)	14 (63.6)	2.55 (0.74)
	Nursing	12 (5.0)	15 (6.2)	52 (21.5)	163 (67.4)	0.49 (0.05)
Do you use band aid to cover your wound before involved in agriculture activities or outdoor recreation	Plant science	6 (27.3)	2 (9.1)	12 (54.5)	2 (9.1)	1.55 (1.01)
	Nursing	76 (31.4)	67 (27.7)	64 (26.4)	35 (14.5)	1.76 (0.07)

Comparison of Knowledge, Attitude and Practice Scores Between Nursing and Plant Science Students

The data for knowledge, attitude, and practice scores were not normally distributed. The Mann-Whitney U test was conducted to compare knowledge, attitude, and practice scores related to melioidosis between nursing and plant science students by using the data from knowledge score, attitude score and practice score (**Table 5**). The Mann-Whitney U test revealed a significant difference in knowledge scores between nursing and plant science students ($U = 1849.0$, $p = 0.02$). Specifically, the mean rank of nursing students (135.86) was higher than that of plant science students (95.55), indicating that nursing

students possessed significantly better knowledge of melioidosis.

In contrast, no significant differences were found in attitude ($p = 0.49$) and practice ($p = 0.96$) scores between the two groups, thus, the null hypothesis was not rejected. Although the attitude scores of nursing students (Mean Rank = 133.48) were slightly higher than those of plant science students (Mean Rank = 121.77), the difference was not statistically significant. Similarly, for practice scores, the mean ranks between nursing students (132.57) and plant science students (131.73) were nearly identical, indicating no substantial difference in practice between the two cohorts.

Table 5: Comparison of Mean Ranks for KAP Scores Using Mann-Whitney U Test

	Knowledge	Attitude	Practice
Mann-Whitney U	1849.00	2426.00	2645.00
<i>p</i> -value	0.02	0.49	0.96

DISCUSSION

To our knowledge, this is among the few studies in Malaysia to compare the knowledge, attitudes, and preventive practices regarding melioidosis between undergraduate students from healthcare- and agriculture-related disciplines within a One Health framework. The findings provide valuable insights into discipline-specific educational gaps and highlight opportunities for strengthening melioidosis awareness among future professionals working in endemic settings.

This study evaluated and compared the knowledge, attitudes, and preventive practices regarding melioidosis among nursing and plant science undergraduate students at IIUM Kuantan. Overall, nursing students demonstrated better knowledge of melioidosis than plant science students, whereas attitudes and preventive practices were generally comparable between the two groups. These findings suggest that differences in educational background primarily influence disease awareness, while attitudes and preventive behaviours may be shaped by broader environmental, social, and institutional factors.

Knowledge Regarding Melioidosis

Nursing students demonstrated a higher level of knowledge regarding melioidosis than plant

science students. This finding is consistent with the educational backgrounds of the two disciplines. Nursing curricula typically include microbiology, infectious diseases, infection prevention, and patient education, providing students with greater exposure to clinically important pathogens such as *B. pseudomallei*. In contrast, although plant science students frequently work in agricultural and environmental settings where exposure to *B. pseudomallei* may occur, formal teaching on human infectious diseases and occupational health risks may be less emphasised within their curriculum.

These findings are consistent with previous studies reporting that students from healthcare-related disciplines generally possess better knowledge of infectious and zoonotic diseases than students from non-health programmes. Damrongsukij et al. (9) and Weeratunga et al. (8) similarly observed that awareness of melioidosis remains limited outside health-related professions, highlighting persistent educational gaps among populations with potential occupational exposure. The large proportion of “I don’t know” responses among plant science students observed in this study further suggests unfamiliarity with melioidosis rather than the presence of misconceptions, indicating that the disease receives limited attention within their academic training.

Given that plant science graduates may subsequently work in agriculture, environmental management, or plantation industries where contact with contaminated soil and surface water is common, improving awareness among this group is equally important. Incorporating melioidosis and other environmentally acquired infectious diseases into agricultural curricula would strengthen occupational health preparedness while supporting the broader One Health agenda.

Attitudes Toward Melioidosis

Although nursing students generally demonstrated more positive attitudes toward melioidosis than plant science students, both groups showed favourable perceptions regarding the seriousness of the disease and the importance of preventive measures. This suggests that even students with limited factual knowledge may recognise the importance of protecting themselves against infectious diseases.

Previous studies have shown that attitudes toward disease prevention are often influenced not only by knowledge but also by perceived susceptibility, previous health education, and cultural beliefs (8). The findings of the present study support this concept, as the differences in knowledge between the two disciplines were not accompanied by similarly large differences in attitudes. This observation suggests that improving knowledge alone may not necessarily result in substantial changes in attitudes unless educational interventions also address personal risk perception and professional responsibility.

These findings reinforce the importance of integrating behavioural and risk communication components into university health education programmes to encourage students to translate awareness into positive health beliefs and preventive intentions.

Preventive Practices Toward Melioidosis

Preventive practices were generally favourable among both nursing and plant science students, with no meaningful difference observed between the two groups. Most respondents reported practising appropriate personal hygiene behaviours following outdoor activities and recognised the importance of wound care and personal protection during environmental exposure. Nevertheless, some

participants continued to report behaviours associated with increased exposure risk, including walking barefoot in agricultural areas and swimming in natural water bodies.

This apparent inconsistency between knowledge and preventive behaviour has also been described in previous studies, which suggest that health behaviours are influenced by multiple factors beyond knowledge alone, including habitual practices, environmental conditions, convenience, peer influence, and institutional safety culture (10). Consequently, educational programmes should not only provide factual information regarding melioidosis but also promote practical behavioural interventions that encourage consistent adoption of protective measures in both occupational and recreational settings.

Implications Within the One Health Framework

Melioidosis represents a classic One Health disease because transmission is closely linked to interactions between humans and environmental reservoirs of *B. pseudomallei*. Consequently, effective prevention requires collaboration across healthcare, agriculture, environmental science, and public health sectors. The findings of this study demonstrate that awareness differs between disciplines despite their complementary roles in disease prevention. Strengthening interdisciplinary education through One Health approaches may therefore improve recognition of melioidosis, encourage safer occupational practices, and enhance preparedness among future professionals working in endemic regions.

Universities have an important role in preparing graduates who understand the interconnected nature of human, environmental, and occupational health. Incorporating melioidosis awareness into curricula beyond healthcare programmes would contribute to a more comprehensive approach to disease prevention, particularly in endemic states such as Pahang.

CONCLUSION

This study demonstrated that nursing students possessed better knowledge of melioidosis than plant science students, while attitudes and preventive practices were generally comparable between the two groups. These findings suggest that academic discipline

influences disease awareness; however, positive attitudes and preventive behaviours are likely shaped by additional factors beyond formal education. The lower level of knowledge observed among plant science students is particularly noteworthy given their potential occupational exposure to *B. pseudomallei* through agricultural and environmental activities.

The findings highlight the need to strengthen melioidosis education across both healthcare- and agriculture-related programmes. Integrating melioidosis awareness into undergraduate curricula through an interdisciplinary One Health approach may improve disease recognition, promote appropriate preventive behaviours, and enhance occupational health preparedness among future professionals working in endemic regions such as Pahang.

Future studies involving multiple universities and larger, more balanced study populations are recommended to validate these findings and evaluate the effectiveness of educational interventions aimed at improving melioidosis awareness and prevention. Strengthening melioidosis awareness among future healthcare and agricultural professionals represents an important step towards reducing the burden of this neglected tropical disease in endemic communities and advancing Malaysia's One Health approach.

RECOMMENDATIONS AND LIMITATIONS

This study adds to the limited evidence to compare knowledge, attitudes, and preventive practices regarding melioidosis between healthcare- and agriculture-related undergraduate students in an endemic Malaysian setting. By adopting a One Health perspective, the study provides insights into educational gaps that may influence future occupational health preparedness.

Several limitations should be acknowledged. First, the unequal sample sizes reflected the actual enrolment distribution between the nursing and plant science programmes; however, the relatively small number of plant science participants may have reduced the statistical power of between-group comparisons. Second, participants were recruited using convenience sampling, which may introduce selection bias and limit the representativeness of the findings. Third, the cross-sectional design precludes causal

inference, and the results may not be generalisable to students from other universities or academic disciplines. Future studies involving multiple institutions and larger, more balanced sample sizes are recommended to validate these findings and evaluate the effectiveness of targeted educational interventions.

The findings of this study support the incorporation of melioidosis awareness into undergraduate curricula for both healthcare- and agriculture-related programmes. Interdisciplinary educational initiatives, particularly those grounded in the One Health approach, may improve disease recognition, encourage safer occupational practices, and strengthen preparedness among future professionals working in melioidosis-endemic regions. Universities located in endemic states such as Pahang are well positioned to lead these efforts through collaborative teaching, community engagement, and occupational health education.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest among the authors.

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AUTHOR CONTRIBUTIONS

NAZ@AZ: Conducted the study and prepared the initial draft of the manuscript.

MASS: Contributed to writing the draft manuscript.

RA: Reviewed the draft manuscript.

AA: Contributed to writing the final draft of the manuscript.

MHJ: Contributed to writing the final draft of the manuscript

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