



## Original Article

# Clinician perspectives on nutritional impairment in children undergoing cancer chemotherapy in Thailand: A qualitative descriptive study

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## ABSTRACT

**Objective:** This study aimed to explore the perspectives of pediatric oncology clinicians in Thailand on children's gastrointestinal symptoms, eating habits, and nutrition during cancer chemotherapy. Additionally, it sought to identify factors influencing children's nutritional status, including the characteristics of the children, clinician-related factors, and hospital-level factors.

**Methods:** The study involved pediatric oncology clinicians working at a tertiary hospital in Bangkok. Data were collected through interviews, focusing on three key areas: (1) children's gastrointestinal symptoms, eating behaviors, and nutrition, (2) clinicians' cognitions and behaviors that impact children's nutrition, and (3) environmental factors. Each participating clinician also identified a colleague who could offer additional perspectives. Interviews were conducted in the Thai language and analyzed using directed content analysis.

**Results:** A total of 22 participants were enrolled in the study, comprising sixteen nurses, four physicians, one child life specialist, and one Hospital Nutrition Service staff member. The majority of participants were female (95.4%), with an average age of 37.77 years and an average of 15.55 years of experience in caring for children with cancer. Factors influencing children's nutritional status included the children's cancer diagnosis, treatment exposures, and symptoms. Clinicians attributed changes in children's weight and eating patterns to these symptoms. Influential clinician-related factors included current practices that impacted children's symptoms and food intake. Hospital-level factors included both direct influences on children and those arising from clinical practices.

**Conclusions:** To optimize the nutritional status of Thai children undergoing chemotherapy, multi-level interventions are needed. These interventions should target children's symptoms, clinician knowledge, role norms, and address issues related to the hospital environment, specifically those elements that contribute to unpleasant experiences.

## Introduction

During cancer treatment, most children experience gastrointestinal (GI) symptoms that alter their eating behaviors, consequently impacting their nutritional status and quality of life (QOL). Moreover, children who were underweight at cancer diagnosis and at 3 months later have been found to be at risk for febrile neutropenia during the first year following diagnosis and shorter survival duration.<sup>1</sup> The most common symptoms in the GI symptom cluster include nausea, taste changes, vomiting, lack of appetite, dry mouth, mouth sores, constipation, diarrhea, weight loss, fatigue, changes of self-appearance, and hair loss.<sup>2</sup> Children have reported a preference for bland and light foods (i.e., flavored gelatins) or a lack of desire to eat altogether.<sup>3</sup> Furthermore, children with altered nutritional

status (i.e., both increased and decreased nutritional levels during cancer treatment) had lower QOL than children who had normal nutritional status as measured by body mass index and fat-free mass.<sup>4</sup> Since most previous studies were conducted in Western countries, there is a gap in our understanding of the alteration of nutritional status, changes in eating behaviors, the experience of the GI symptom cluster, and the related QOL for children with cancer in Thailand or other Southeast Asian countries. To develop effective management strategies for these issues, a profound understanding of this experience from the perspectives of different stakeholders is essential. Insights from clinicians who care for children with cancer in Thailand can provide a broader perspective on alterations in nutritional status, what is effective, what is not, and what additional measures can be taken to enhance self-management and clinical

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management of eating behaviors and the GI symptom cluster. This, in turn, can optimize children's nutritional status and QOL during cancer therapy.

Previous studies that delved into clinicians' perspectives on the nutritional status, eating behaviors, and GI symptoms in children undergoing cancer treatment, as well as the approaches to clinical management, have primarily been conducted in Western countries. For instance, Nurses in Sweden attributed changes in the eating behavior of children with cancer to issues like nausea and vomiting.<sup>5</sup> However, no studies have explored the viewpoints of Thai pediatric oncology clinicians regarding the linkages among their patients' impaired nutritional status, QOL, eating behaviors, GI symptoms, and clinical management strategies. The differences between Western contexts in the previous studies and the unique Thai culture and healthcare system make it challenging to directly apply previous research findings on childhood cancer care to the Thai context.

For instance, in accordance with Thai Traditional Medicine, specific foods such as shrimps, poultry, eggs, Chinese kale, and pickled items are avoided due to the belief that they could exacerbate a patient's cancer condition.<sup>6</sup> Furthermore, in Thai culture, healthcare providers are regarded as authoritative figures, contributing to power dynamics within patient, family, and provider relationships. Consequently, studies are necessary to enhance our comprehension of the determinants influencing Thai pediatric oncology clinicians in terms of self and clinical management of alterations in the nutritional status of Thai children during cancer therapy.

The aim of this study is to provide an overview of the viewpoints held by Thai clinicians, in order to attain a multi-level understanding of impaired nutritional status in Thai children with cancer. The research questions (RQs) are as follows.

- (1) How do Thai clinicians perceive the nutritional status and eating behaviors of children during chemotherapy?
- (2) What are the behaviors and practices of Thai clinicians that have an impact on the nutritional status, eating behaviors, and other self-management strategies of children?
- (3) What determinants influence Thai clinicians' practices in improving children's eating behaviors and, consequently, their nutritional status?

*Tentative model*

The tentative model of impaired nutritional status in Thai children with cancer during chemotherapy was developed following step 1

(develop the logic model of problem) of the Intervention Mapping Approach (depicted in Fig. 1).<sup>7</sup> The model components drew upon insights from previous studies of chemotherapy-related GI symptoms, eating, and QOL.<sup>8-11</sup> These components encompass:

- (1) the health-related problem (impaired nutritional status in children undergoing cancer chemotherapy in Thailand)
- (2) the effects of this problem on the child's QOL
- (3) the child's behaviors (eating and self-management approaches) contributing to the problem
- (4) modifiable determinants (GI symptom cluster and others) influencing the child's eating behaviors
- (5) behaviors of influential actors in the clinical setting who influence the child's eating, determinants of the clinicians' behaviors, and hospital environment where children are receiving cancer therapy
- (6) Thai culture which encompass cuisine, beliefs (e.g., cancer treatment), and traditions (e.g., patient-family-health provider relationships), serving as the contextual backdrop influencing all components of this model.

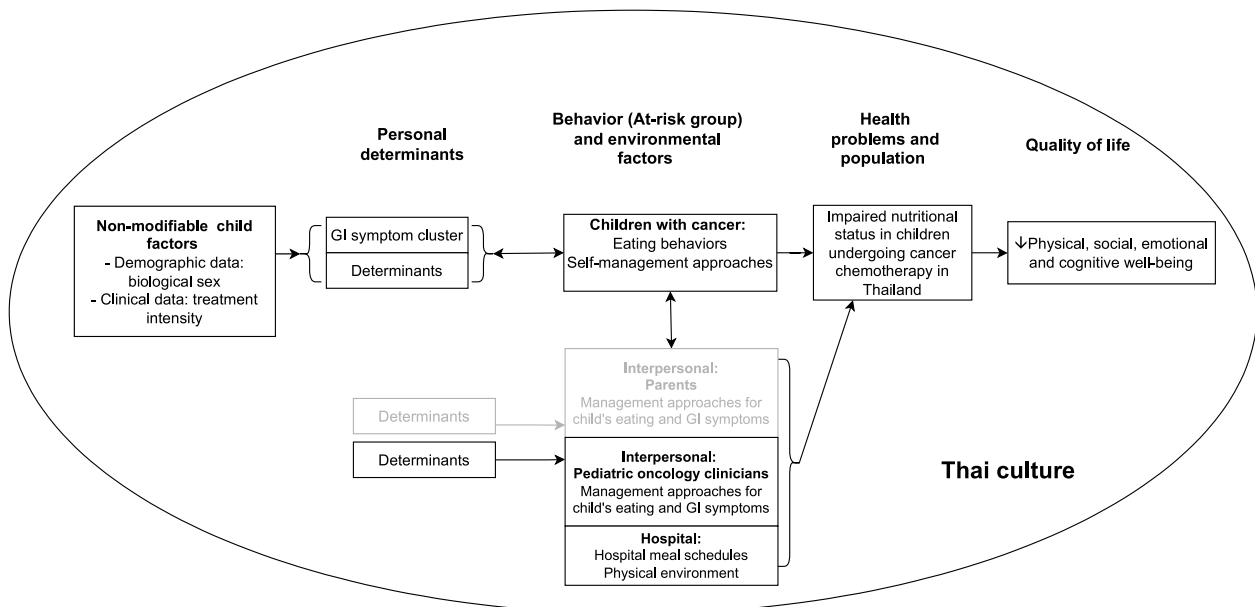
**Methods**

*Study design*

The study used qualitative methods for both data collection and analysis. Data collection involved in-person semi-structured interviews. The interview guide, developed by the investigators after conducting a literature review (as outlined in Table 1), includes three key areas: (1) children's GI symptoms, eating behaviors, and nutritional status, (2) clinicians' cognitions and behaviors influencing children's nutritional status, and (3) influential factors in the physical environment.

*Setting and sample*

The study was conducted at a tertiary hospital in Bangkok that provides care for children diagnosed with cancer in Thailand. This care is the responsibility of the Pediatric Hematology and Oncology Unit, Department of Pediatrics in collaboration with the Division of Pediatric Nursing. Convenience sampling was used to recruit primary clinicians (physicians and registered nurses [RNs]) who have been providing care for children with cancer between the ages of seven and 15 years for at least two years.



**Fig. 1.** Tentative model of impaired nutritional status in children undergoing cancer chemotherapy in Thailand. GI, gastrointestinal.

**Table 1**  
Examples of interview questions for Thai clinicians and other staff members.

Topic	Questions	
Demographic data	This data will be about yourself – your, gender, education level, profession/job, and years of experience in pediatric oncology.	หัวข้อ 1 ข้อมูลส่วนบุคคล - ข้อมูลเหล่านี้จะเป็นเกี่ยวกับคุณ – เพศ อายุ ระดับการศึกษา วิชาชีพ/อาชีพ และจำนวนปีที่ทำงานกับผู้ป่วยเด็กโรคมะเร็ง
Thai child's nutritional status during chemotherapy	Tell me about your experience seeing the changes of nutritional status (i.e., body weight) among Thai children with cancer when they are receiving treatment.	หัวข้อ 2 ภาวะโภชนาการของเด็กไทยโรคมะเร็งขณะได้รับยาเคมีบำบัด - อธิบายประสบการณ์ของคุณที่เห็นการเปลี่ยนแปลงของภาวะโภชนาการ (เช่น น้ำหนักตัว) ของเด็กไทยโรคมะเร็งขณะที่เขาได้รับการรักษา
Thai child's eating behaviors and self-management approaches during chemotherapy	What do you think about children's eating during active treatment with chemotherapy?  How does the hospital environment affect children's eating?  What other factors seem to affect the children's eating? From your experience, what do children usually do to maintain their eating and/or relieve their GI symptoms?	หัวข้อ 3 พฤติกรรมการกินและวิธีการจัดการด้วยตัวเองของเด็กไทยโรคมะเร็งขณะได้รับยาเคมีบำบัด (การกินในที่นี้ครอบคลุมถึง การแสดงออกของความรู้สึกอยากอาหาร ประเภทอาหารที่อยากหรือชอบกินทั้งอาหารมือหลักและอาหารว่าง ความถี่ของการกิน ปริมาณอาหารที่กินแต่ละครั้ง ช่วงเวลากินในระหว่างวัน) - คุณมีความคิดเห็นเกี่ยวกับพฤติกรรมการกินของเด็กตอนที่เขาได้รับยาเคมีบำบัดอย่างไร - สิ่งแวดล้อมของโรงพยาบาลมีผลต่อการกินของเด็กอย่างไร เช่น สภาพแวดล้อมที่มองเห็น กลิ่น กิจกรรมประจำวันภายในหอผู้ป่วย และทรัพยากรช่วยเหลือของโรงพยาบาล - อะไรคือปัจจัยอื่น ๆ ที่อาจจะมีผลต่อการกินของเด็ก - จากประสบการณ์ของคุณ เด็กมักจะทำอะไรที่ช่วยเรื่องการกินและ/หรือลดอาการระบบทางเดินอาหารของเขา
Thai child's GI symptom cluster influencing their eating behaviors	Beside environmental factors, what do you think about GI symptom among children with cancer influencing their eating?  What do you do as a clinician to control children's GI symptoms during chemotherapy?  How do those management approaches influence children's eating and nutritional status?	หัวข้อ 4 กลุ่มอาการระบบทางเดินอาหารของเด็กไทยที่มีผลต่อพฤติกรรมการกินของเขา (กลุ่มอาการระบบทางเดินอาหารประกอบด้วย ปากแห้ง มีแผลในช่องปาก กลืนลำบาก ลื่นรับรสชาติอาหารเปลี่ยนแปลง ไม่อยากกินอาหาร คลื่นไส้ อยากอาเจียน อาเจียน ท้องผูกหรือท้องอืด ท้องเสียหรือถ่ายเหลว น้ำหนักลด อ่อนเพลีย มองดูตัวเองไม่เหมือนเดิมหรือเปลี่ยนแปลงไป ผอมลง) นอกจากปัจจัยเกี่ยวกับสิ่งแวดล้อม คุณมีความคิดเห็นอย่างไรเกี่ยวกับอาการระบบทางเดินอาหารที่มีผลต่อการกินของเด็ก - ในฐานะที่คุณเป็นแพทย์/พยาบาล/ผู้ให้บริการที่ดูแลเด็กโรคมะเร็ง คุณช่วยลดอาการระบบทางเดินอาหารของเด็กขณะได้รับยาเคมีบำบัดอย่างไร - วิธีการจัดการเหล่านั้นมีผลกระทบอย่างไรต่อการกินและภาวะโภชนาการของเด็ก
Thai clinicians and staff approaches to improving children's eating	What do you usually do to maintain children's eating?  Tell me about the current regimes or recommendations you are using to maintain nutritional status among Thai children during cancer treatment. Have you recommended them any non-pharmacologic approaches? What was that? Does health insurance cover this approach? What other recommendations do you usually given to them? Such as environment of their bed or at home. How did that work?	หัวข้อ 5 วิธีการของแพทย์/พยาบาลวิชาชีพ/ผู้ให้บริการอื่น ๆ ที่ใช้ในการส่งเสริมการกินของเด็ก - อะไรคือสิ่งที่คุณมักจะทำเพื่อช่วยการกินของเด็ก - อธิบายเกี่ยวกับแนวทางปฏิบัติหรือคำแนะนำที่คุณกำลังใช้เพื่อควบคุมภาวะโภชนาการของเด็กไทยโรคมะเร็งขณะได้รับยาเคมีบำบัด - คุณเคยแนะนำผู้ป่วยเด็กหรือผู้ดูแลให้ใช้วิธีเสริมนอกจากการให้ยา สิ่งนั้นคืออะไร และประกันสุขภาพถ้วนหน้าครอบคลุมหรือไม่ อย่างไร - อะไรคือคำแนะนำเกี่ยวกับปัจจัยทางสิ่งแวดล้อมอื่น ๆ เช่น สิ่งแวดล้อมรอบเตียงหรือที่บ้าน  - สิ่งนั้นช่วยการกินเด็กหรือไม่ ผลเป็นอย่างไร
What Thai clinicians need to optimize children's nutritional status during chemotherapy	What do you need to help you improve Thai children's eating and nutritional status during chemotherapy?  What advice do you have for other clinicians about optimizing children's nutritional status during chemotherapy?	หัวข้อ 6 สิ่งที่คุณ/พยาบาลวิชาชีพ/ผู้ให้บริการอื่น ๆ ต้องการเพื่อส่งเสริมภาวะโภชนาการของเด็ก - อะไรที่คุณต้องการเพื่อช่วยส่งเสริมการกินและภาวะโภชนาการของเด็กไทยโรคมะเร็งขณะได้รับยาเคมีบำบัด - คำแนะนำใดที่คุณมีให้ แพทย์/พยาบาลวิชาชีพ/ผู้ให้บริการอื่น ๆ ในการส่งเสริมภาวะโภชนาการของเด็กไทยโรคมะเร็งขณะได้รับยาเคมีบำบัด

GI, gastrointestinal.

Then, purposive and snowball sampling was used to recruit other key personnel (e.g., child life specialist, practical nurse) who could provide additional perspectives.

#### Data collection

Each primary clinician was interviewed by the interviewer (first author), a Thai researcher who was a faculty member at the institution but was not actively practicing due to her graduate studies. The interviews were conducted in Thai language within a private space (e.g., meeting rooms within wards) and audio recorded using a digital device. Within 24 h following the interview, fieldnotes in the Thai language were written to capture the interview process, observations of the participants' non-verbal expressions related to the interviews, and the interviewer's experiences with the interview. At the conclusion of their interview, primary clinicians were asked to identify additional health professionals or support staff for potential recruitment. The interviewer subsequently approached these individuals about the study and went through the same procedures. The average interview duration was 22.01 min (range: 10.10–34.48 min).

#### Data analysis

Consistent with best practice, each interview transcript in the source language (Thai) were read multiple times to get a sense of the whole.<sup>12</sup> The interview data were managed and analyzed through a directed content analysis approach,<sup>13</sup> employing a code book guided by the tentative problem model within Atlas.ti version 22.2.2.13.<sup>14</sup> The transcripts were coded line-by-line using codes and subcodes from the code book (deductive coding). Two Thai coders with experience caring for Thai children with cancer and qualitative research separately generated codes and subcodes that manifest each study model component. Inductively derived codes and subcodes with definitions were added to the code book for use in further coding (inductive coding). The coders met regularly to discuss their work, reached consensus on discordant code assignments, and derived themes and subthemes from the data. Eventually, derived themes, subthemes, and their definitions were translated from Thai language into English language using translation-back translation method. Finally, the study results were reviewed by a participant to enhance the trustworthiness of the qualitative study.

#### Ethical considerations

This study was conducted after obtaining approval from the Research Ethics Review Committee of both the investigator's academic institution and the study setting (respectively, IRB #22-0398, COA and MURA #2022/265). All participants provided written informed consent.

## Results

#### Sample characteristics

Twenty-two participants enrolled in the study, including eight RNs, six licensed practical nurses, four physicians (two sub-specialized in pediatric oncology, one in pediatric nutrition, and one in pediatric infectious diseases), one advanced practiced nurse, one pediatric nutrition RN, one child life specialist, and one Hospital Nutrition Service staff member. Most were female (95.4%) with an average age of 37.77 (SD = 7.69, range: 25 to 55) years and 15.55 (SD = 7.35, range: 3 to 30) years caring for Thai children being treated for cancer. Participants commented on child, clinician, and hospital-level factors that influenced the children's impaired nutritional status.

#### The logic model of impaired nutritional status among Thai children with cancer

The summary of the results was shown in Table 2.

#### Child level

**Determinants: symptoms (RQ1).** Participants described multiple symptoms experienced by the children that affected their eating and nutritional status. These symptoms fit into two broad and sometimes interrelated categories: physical symptoms and psychological symptoms.

Children's physical symptoms included both GI and non-GI symptoms. The most common GI symptoms mentioned were lack of appetite, nausea, vomiting, taste changes, and mouth sores, while the most common non-GI symptom mentioned was fatigue. Participants remarked that children experienced multiple related symptoms. Nausea, for example, led to decreased appetite and, subsequently, fatigue. Participants revealed that the children talked about having taste changes such as a feeling of numbness on their tongue, which differed from pain created by mouth sores.

Additionally, participants perceived psychological symptoms that affected children's eating and nutritional status. These psychological symptoms included worrying, irritability, and sadness. Participants noted that these symptoms were notable around the time of diagnosis and induction therapy. During this life-changing disruption, children were hospitalized and underwent multiple unfamiliar, painful procedures.

As illustrated by the following quote, several participants described the interrelation between the two types of symptoms and an indicator of nutritional status, specifically undernourishment:

“ก็จะมีซูบผอม อ่อนเพลีย ปากแห้ง มันก็จะแบบอิดโรยอะคะ แต่พอได้รับเคมีไป เขาก็ยิ่ง ยิ่งเป็นช่วงที่ร่างกายแย่มากๆ ในด้านของภาวะจิตใจก็ทำให้เบื่ออาหาร หงุดหงิด ไม่อยากทาน มันก็ต่อเนื่องกันมา” “They are skinny, have fatigue, have dry mouth ... weary. When they receive chemotherapy, their physical functioning gets worse. Also, their psychological functioning makes them lack appetite and be irritable. They don't want to eat. These problems are coming along together.” (ID64)

**Non-modifiable child and clinical characteristics (RQ1).** Participants attributed the children's symptoms to the child's cancer, chemotherapy, and other components of the treatment regimen. Noted symptoms such as abdominal distention (due to a space-occupying tumor) put children in a higher risk for weight loss due to the tumor's metabolic demands and their sense of feeling full leading to a lack of appetite. Chemotherapy was reported by participants as the main cause of children's symptoms, particularly during the intensive induction phase of treatment for acute lymphoblastic leukemia (ALL) or with highly emetogenic agents such as cisplatin. For example:

“ถ้าคนไข้ที่ได้คีโมที่มีสูตรที่มีคลื่นไส้อาเจียน ก็เจอแต่ว่าไม่มาก ส่วนใหญ่ที่เจอจะไม่ได้เจอคนไข้ที่มีอาการชัดเจน นอกจากคนไข้ที่ได้ cisplatin carboplatin เนี่ยอันนี้จะชัดเจนที่มาอาการ” “I have seen in some patients who are receiving a chemotherapy formula that causes nausea and vomiting, but not so many. Most patients that I have seen do not have obvious symptoms, except patients receiving cisplatin or carboplatin. This group will present obvious symptoms.” (ID37)

**Eating behaviors changes (RQ1).** Participants spoke about how children's symptoms contributed to three types of changes in their eating behaviors: decreased eating, increased eating, and changes in the foods they ate due to sensory changes.

Decreased eating was mentioned by most participants. They reported that some children reduced the quantity of foods eaten at each meal, while other children did not eat at all during chemotherapy apparently to minimize nausea and prevent vomiting.

Participants described increased eating among children in the maintenance phase of treatment for all when treatment is less intensive and involves steroids. Participants observed that, notably with steroid exposures, children tended to use seasonings and prefer flavorful, spicy, salty and/or fatty foods such as fried chicken or instant noodles.

**Table 2**  
The logic model of impaired nutritional status among Thai children with cancer and quote exemplars.

Topic	Sub-topic	Quote exemplars	
		English language	Thai language
<b>Child level</b>			
Determinants	Symptoms physical and psychological symptoms	<i>“They are skinny, have fatigue, have dry mouth ... weary. When they receive chemotherapy, their physical functioning gets worse. Also, their psychological functioning makes them lack appetite and be irritable. They don't want to eat. These problems are coming along together.”</i> (ID64)	“จะมีซบผอม อ่อนเพลีย ปากแห้ง มันก็จะแบบอึดโรยอะค่ะ แต่พอได้รับเคมีไป เขาก็ยัง ยิ่งในช่วงที่ร่างกายแย่มากๆ ในด้านของภาวะจิตใจก็ทำให้เมื่ออาหารหงดหด ไม่อยากทาน มันก็ต่อเนื่องกันมา” (ID64)
Non-modifiable child and clinical characteristics	Cancer Cancer treatment	<i>“I have seen in some patients who are receiving a chemotherapy formula that causes nausea and vomiting, but not so many. Most patients that I have seen do not have obvious symptoms, except patients receiving cisplatin or carboplatin. This group will present obvious symptoms.”</i> (ID37)	“ถ้าคนไข้ที่ได้คีโมที่มีสูตรที่มีคลื่นไส้อาเจียน ก็เจอแต่ว่า ไม่มาก ส่วนใหญ่ที่เจอจะไม่ได้อะ คนไข้ที่มีอาการชัดเจน นอกจากคนไข้ที่ได้ cisplatin carboplatin เนี่ยอันนี้จะชัดเจนที่มาจากอาการ” (ID37)
Eating behaviors changes	Decreased eating Increased eating Changes in food preferences	<i>“... first, they receive chemotherapy, which impacts their how food tastes to them leading to lack of appetite. Second, some side effects such as nausea and vomiting also make children not want to eat ... Last group is patients on steroids ... frequently eat.”</i> (ID45)	“... 1 อาจจะด้วยการได้รับยาเคมีบำบัดมา ยาเคมีบำบัดซึ่งมันมีผลต่อการรับรู้รส ประมาณนั้นเองอายุๆ ก็ทำให้เขาอาจจะไม่อยากทาน 2 side effect จากยาที่ทำให้คลื่นไส้อาเจียนอาจจะทำให้เด็กเหมือนไม่อยากจะกิน ... อันที่ 3 เด็กที่ได้รับพวกกลุ่มของ steroid ... จะกินตลอดเวลา” (ID45)
Nutritional status changes	Weight loss Weight gain	<i>“We can see that children are skin and bones, something like that”</i> (ID42) <i>“Some patients lose their body weight ... mostly and are nutrition deficient ... and electrolytes ...”</i> (ID28)	“เราก็ได้เห็นเลยว่าแบบเด็กก็จะผอมติดกระดูกอะไรอย่างเงี้ย” (ID42) “... บางรายก็น้ำหนักลงส่วนใหญ่เนอะ แล้วก็จะมีแบบขาดสารอาหาร ... พวกเกลือแร่ ...” (ID28)
Health and quality of life outcomes	Physical functioning Social functioning	<i>“... some adolescents ... they could not eat and became skinner. They covered their body completely under the blanket. They did not want to see anyone. I went in to talk to them and they said they did not want other people to see this”</i> (ID30) <i>“Children rarely complain ... mostly it would be us (clinicians) that go and ask them if they are skinnier or not ... Their interests are sometimes limited. When they are sick, they can't focus much on their weight.”</i> (ID25)	“... มีเป็นเด็กวัยรุ่น ... ก็คือเขาทานไม่ได้พอมลงอย่างเงี้ยก็จะแบบคลุมโปง ไม่อยากให้อะใครเห็น ไม่อยากเจอใครอย่างเงี้ย พอเขาไปคุย ถามเขาก็จะรู้ว่า เออ เนี่ยเขาก็แบบไม่อยากให้อะใครเห็น” (ID30) “เด็กไม่ค่อยบ่นอะ แต่เราจะไป จะเป็นเราที่ทักว่าพอมลงไปหรือเปล่านั้น ใช่ออย่างเงี้ย ... ความสนใจเขามันบางที พอดอนป่วยเป็นโรครอะ เขาจะไม่ได้อะ ... โฟกัสน้อยมากเลย เรื่องน้ำหนักตัว” (ID25)
<b>Clinician level</b>			
Clinical practice behaviors	GI symptom management	<i>“Recommending that they consume more high-fiber food might be difficult because ... raw vegetables and fruits are not recommended. I usually recommend drinking more water ...”</i> (ID13) <i>“The most challenging problem is diarrhea. It could be caused by the infection either from their consumed food or normal flora in their intestinal tract. Or maybe it is caused by slow GI tract mucosa growth after chemotherapy. There is nothing we can do about this situation except wait.”</i> (ID54)	“ให้ทานกากใยอาจจะพุดยาก เพราะ ... ผักผลไม้สดก็ทานไม่ได้ ก็แนะนำให้ในเรื่องทานน้ำเยอะขึ้น ...” (ID13) “ปัญหาที่จะดูแยกสุดน่าจะเป็นเรื่องท้องเสีย ... ก็คือสาเหตุจากการติดเชื้อเนอะ ไม่ว่าจะเชื่อจากอาหารเขาหรือว่าเชื้อที่มีอยู่แล้วในลำไส้เขา หรือเป็นสาเหตุที่เกิดจากเซลล์เยื่อในทางเดินอาหารมันเจริญตัวไม่ได้หลังได้ยาเคมีบำบัด อันนี้ก็ตรงรอ ท่ออย่างอื่นไม่ได้ ...” (ID54)
	Maintaining nutrition	<i>“Currently, we assess children's nutritional status ... we are monitoring every week, but not applied the results to anything. It ends there.”</i> (ID42)	“แต่คือตอนเนี่ย เรามีกการประเมินเกี่ยวกับภาวะโภชนาการอยู่แล้วอะ ใช่ออย่างเงี้ย ... เรามีประเมินทุกอาทิตย์อะ ใช่ออย่างเงี้ยคะ แต่มันไม่ได้ถูกนำไปปรับใช้ มันก็คือจบอยู่ตรงนั้น” (ID42)
	Minimizing risk for infections	<i>“Recently, ... about bread umm pizza ... Some people said children can eat pizza without cheese, while some said no because it has yeast. So, we asked the pediatric oncologists ... Some said yes, others said no ... It is confusing”</i> (ID16)	“เมื่อกี้ ... ขนมน้อง เออ พี่ซุซ่า บางคนบอกว่าไม่ให้ซีสก็กินได้ บางคนบอกว่าไม่ให้กินนะ มันเหมือนใส่อีสต์อะ อะ ใช่ออย่างเงี้ย เบบ่ๆ เราก็เลยลองถามอาจารย์ดู ... บางคนก็บอกว่าทานได้ บางคนก็บอกว่าทานไม่ได้ ... มันน่าสับสนสำหรับญาติด้วย” (ID16)
Determinants	Lack of knowledge	<i>“I have never recommended using herbs because I do not have knowledge about it”</i> (ID12)	“พี่ก็ไม่เคยแนะนำเรื่องสมุนไพรนะ เพราะพี่ก็ไม่ได้มีความรู้เรื่องสมุนไพรอะ” (ID12)
	Lack of time	<i>Duties of nurses are ... more about documentations, or other things .... I want us to approach patients as much as we can ... spend time and talk with them so that we can get something and give them what they actually need.”</i> (ID45)	“... ภาระงานของพยาบาลอะ ... มันไปเยอะในเรื่องเอกสาร เรื่องอะไรก็ไม่มีอะ ... อยากให้เราอะ เหมือนทำงานโดยการที่เข้าหาคนไข้ให้ได้มากที่สุด ... ไปอยู่กับเขา ไปคุยกับเขา มันได้อะไร มันทำให้เราตอบสนองความต้องการของคนไข้จริงๆ” (ID45)
	Focus on treatment/cure	<i>“In fact, they [Pediatric Nutrition Unit] suggest us to consult with them immediately so that they can help, but we usually cannot see the significance of [children's nutrition] ... we are too busy with other issues ... they should go together - if we improve their nutrition, we also promote their remission.”</i> (ID49)	“คือจริงๆอะ เขามอบอกว่า ให้เราอะ consult เขา[หน่วยโภชนาการ]เลย เขาจะถามมาด้วย แต่ว่าเรามักจะไม่ค่อยเห็นความสำคัญของมันเท่าไร ... เช่นแบบยุ่งอย่างอื่น ... มันควรจะไปด้วยกัน ถ้าแบบมัน improve nutrition อะ มันก็ช่วยให้หายต่อโรคได้อยู่” (ID49)
<b>Hospital level</b>			
Environmental factors directly affecting children	Hospital food	<i>“salted short mackerel soup”</i> (ID70), <i>“stir-fried pickle turnip with egg”</i> (ID59), <i>“stir-fried foods that have garlic smell”</i> (ID62), or <i>“rice porridge for breakfast”</i> (ID30)	“ปลาทุ้มเค็มอะไรซักอย่าง” (ID70), “ผักหัวไชโป๊อย่างเงี้ย ใส่ไข่” (ID59), “พวกผัดมันเหม็นกระเทียม” (ID62), or “อาหารข้าวต้มผัดมัน” (ID30)
Clinician's environmental factors	Lack of guidelines	<i>“... If children have a very high scores (of STRONG<sub>kids</sub>) ... they immediately consult with us. If the scores are in the middle, sometimes it is like 'should I consult with them or not - what should I do?.' This group (of at-risk children) might be unrecognized ... there should be standard guidelines or a system to detect cases with worsening scores ... and start nutritional management early.”</i> (ID99)	“... คือถ้าแบบเด็กมีคะแนน (ของ STRONG <sub>kids</sub> ) สูงมากๆ ... เขาก็จะรีบแบบ consult เราเลย แต่ว่าถ้าเกิด อยู่ในช่วงกลางๆอย่างเงี้ย บางทีอันนี้ เป็นช่วงที่แบบว่า เอ๊ะ แบบ consult หรือว่าไม่ consult ดี แล้วควรทำยังไง ใช่ออย่างเงี้ยคะ ก็กลุ่มนี้ก็อาจจะหลุดไปบ้าง ... ควรจะมีแบบมาตรฐานอะไรซักอย่างหนึ่ง หรือว่าควรจะมีแบบเริ่มมีการเตือนนะ ว่าแบบ case นี้คะแนนเริ่มสูงนะ ... มันเริ่มมีการเข้าไปจัดการเบื้องต้น” (ID99)

(continued on next page)

Table 2 (continued)

Topic	Sub-topic	Quote exemplars	Thal language
GI, gastrointestinal.	Lack of resources	English language	Thai language
		"If we add a nutritionist or dietitian into the team, it would be great ... there are not many pediatric dieticians right now" (ID78)	"จริงๆ ที่คิดว่า ถ้าเราเพิ่มนักโภชนาการ อีมี นักกำหนดอาหารที่ผู้ปกครองก็ดีนะ ... นักกำหนดอาหารมันกินไม่ได้เยอะเท่าไร" (ID78)

"... 1 อาจจะด้วยการได้รับยาเคมีบำบัดมา ยาเคมีบำบัดซึ่งมันมีผลต่อการรับรสประมาณนี้นะเอาง่ายๆ ก็ทำให้เขาอาจจะไม่อยากจะกิน ... effect จากยาที่ทำให้คลื่นไส้ อาเจียนอาจจะทำให้เด็กเหมือนไม่อยากจะกิน ... อันที่ 3 เด็กที่ได้รับพวกกลุ่มของ steroid ... จะกินตลอดเวลา" "... first, they receive chemotherapy, which impacts their how food tastes to them leading to lack of appetite. Second, some side effects such as nausea and vomiting also make children not want to eat ... Last group is patients on steroids ... frequently eat." (ID45)

*Nutritional status changes (RQ1).* Participants comprehended changes in children's nutritional status by observing changes in their physical appearance including weight and body size/shape and through laboratory results. They observed that the children lost and/or gained weight (mainly lost) during chemotherapy.

"เราก็คือเห็นเลยว่าแบบเด็กก็จะมีผอมติดกระดูกอะไรอย่างเงี้ย" "We can see that children are skin and bones, something like that" (ID42)

"... บางรายก็น้ำหนักลงส่วนใหญ่เนอะ แล้วก็ก็มีแบบขาดสารอาหาร ... พวกเกลือแร่ ..." "Some patients lose their body weight ... mostly and are nutrition deficient ... and electrolytes ..." (ID28)

*Health and quality of life outcomes (RQ1).* Some participants explained that children's impaired nutritional status heightened their risk for infection, delayed their cancer treatment, and lowered their QOL, especially social functioning among adolescents. Conversely, participants noted that younger children tended to be less concerned about body weight.

"... มีเป็นเด็กวัยรุ่น ... ก็คือเขาทานไม่ได้ผอมลงอย่างเงี้ยก็จะแบบคลุมโปง ไม่อยากให้ใครเห็น ไม่อยากเจอใครอย่างเงี้ย พอเขาไปคุย ถามเขาก็จะรู้ว่า เออ เนี่ยเขาก็แบบไม่อยากให้ใครเห็น" "... some adolescents ... they could not eat and became skinner. They covered their body completely under the blanket. They did not want to see anyone. I went in to talk to them and they said they did not want other people to see this" (ID30)

"เด็กไม่ค่อยบ่นอะ แต่เราจะไป จะเป็นเราที่ทักว่าผอมลงไปหรือเปล่า อะไรอย่างเงี้ย... ความสนใจเขามันบางที พอตอนป่วยเป็นโรคอะ เขาจะไม่ได้ .... โฟกัสน้อยมากเลยเรื่องน้ำหนักตัว" "Children rarely complain ... mostly it would be us (clinicians) that go and ask them if they are skinnier or not ... Their interests are sometimes limited. When they are sick, they can't focus much on their weight." (ID25)

Clinician level

*Clinical practice behaviors (RQ2).* Per the participants, behaviors that influenced children's eating habits included (1) clinical management of children's GI symptoms, (2) efforts to maintain nutritional status, and (3) minimizing risk for infections.

To manage GI symptoms, participants primarily described ordering pharmacological agents. For example, they mentioned incorporation of Thai Pediatric Oncology Group (ThaiPOG) antiemetic guidelines (both around the clock and PRN) into treatment protocols throughout the country. For other symptoms such as mouth sores, participants described that they had adapted guidelines from Western countries (including encouraging children to regularly rinse their mouth with normal saline solution). Participants also reported using distractions such as arts and crafts to distract children from distressing symptoms. Bowel changes, including constipation and diarrhea, were reported as the most challenging symptoms to manage. These changes are particularly concerning due to their impact on dietary intake and the increased risk of infection, especially during neutropenia, which is associated with perianal skin disruptions.

"ให้ทานกากใยอาจจะพุดยาก เพราะ ... ผักผลไม้สดก็ทานไม่ได้ ก็จะแนะนำในเรื่องทานน้ำเยอะขึ้น ..." "Recommending that they consume more high-fiber food might be difficult because ... raw vegetables and fruits are not recommended. I usually recommend drinking more water ..." (ID13)



Participants also observed that their lack of time and children's hesitation to report bowel changes contributed to under-recognition and thus undermanagement of these symptoms.

“ปัญหาที่จะดูแยกยากสุดน่าจะเป็นเรื่องท้องเสีย ... ก็คือสาเหตุจากการติดเชื้อเนอะ ... ไม่ว่าจะเป็นเชื้อจากอาหารเขาหรือว่าเชื้อที่มีอยู่แล้วในลำไส้เขา หรือเป็นสาเหตุที่เกิดจากเซลล์เยื่อในทางเดินอาหารมันเจริญตัวไม่ได้หลังได้ยาเคมีบำบัด อันนี้ก็ต้องรอ ทำอย่างอื่นไม่ได้ ...” “The most challenging problem is diarrhea. It could be caused by the infection either from their consumed food or normal flora in their intestinal tract. Or maybe it is caused by slow GI tract mucosa growth after chemotherapy. There is nothing we can do about this situation except wait.” (ID54)

Participants said that they used the STRONG<sub>kids</sub> assessment tool<sup>15</sup> to assess hospitalized children for malnutrition and changes in nutritional status. However, they remarked that the tool did not account for children's nutritional status prior to diagnosis or between hospitalizations, which disrupted nutritional status improvements. Moreover, acting on assessment results required collaboration among the interprofessional team. This requirement along with the dominance of pediatric oncology and lack of explicit guidelines led to suboptimal management.

“แต่คือตอนนี้ เรายังมีการประเมินเกี่ยวกับภาวะโภชนาการอยู่แล้วอะไรอย่างเงี้ย ... เรามีประเมินทุกอาทิตย์อะไรอย่างเงี้ยคะ แต่มันไม่ได้ถูกนำไปปรับใช้ มันก็คือจบอยู่ตรงนั้น” “Currently, we assess children's nutritional status ... we are monitoring every week, but not applied the results to anything. It ends there.” (ID42)

To reduce risk for infection among children receiving chemotherapy, some participants recommended a low-bacterial diet of “ปรุงสุกทำใหม่สะอาด” “freshly and hygienic-cooked” foods and asked caregivers to avoid serving raw fruits and vegetables. These dietary recommendations decreased children's intake and may contribute to unhealthy eating behaviors in the long-term. Several dietary questions participants received from children and their families included exactly which foods were allowable in the low bacterial diet recommendation. This often led to confusion and contributed to concerns among both families and clinicians. Some participants suggested that an accessible website or mobile application could be a way to educate children and their caregivers about the low bacterial diet recommendation and answer their questions.

“เมื่อที่ ... ขนมนึ่ง เอ่อ พิซซ่า บางคนบอกว่าไม่ใช่ชีสก็กินได้ บางคนบอกว่าไม่ให้กินนะ มันเหมือนไส้ยีสต์อะ อะไรอย่างเงี้ย แบ่งๆ เรายังเลยลองถามอาจารย์ดู ... บางคนก็บอกว่าทานได้ บางคนก็บอกว่าทานไม่ได้ ... มันน่าสับสนสำหรับญาติด้วย” “Recently, ... about bread umm pizza ... Some people said children can eat pizza without cheese, while some said no because it has yeast. So, we asked the pediatric oncologists ... Some said yes, others said no ... It is confusing” (ID16)

**Determinants (RQ3).** Participants recognized that addressing these modifiable factors is necessary to improve current practices and ultimately enhance nutrition among children with cancer.

**Lack of knowledge.** To manage children's symptoms, some participants reported that they did not have adequate knowledge about non-pharmacological agents (e.g., herbal supplements) to recommend these approaches to children and families.

“พี่ก็ไม่เคยแนะนำเรื่องสมุนไพรนะ เพราะพี่ก็ไม่ได้มีความรู้เรื่องสมุนไพรอะ” “I have never recommended using herbs because I do not have knowledge about it” (ID12)

**Lack of time.** Participants noticed that their existing workloads, particularly the required documentation tasks, significantly encroached upon the time available to care for children or interact with families. They expressed beliefs that their lack of time led to miscommunication, loss of

trusting relationships, and suboptimal attention to symptoms and/or nutritional status.

“... ภาระงานของพยาบาลอะ ... มันไปเยอะในเรื่องเอกสาร เรื่องอะไรก็ไม่มีอะ ... อยากให้เราอะ เหมือนทำงานโดยการที่ให้เขาหาคนไข้ให้ได้มากที่สุด ... ไปคุยกับเขา ไปคุยกับเขา มันได้อะไร มันทำให้เราตอบสนองความต้องการของคนไข้จริงๆ” “Duties of nurses are ... more about documentations, or other things .... I want us to approach patients as much as we can ... spend time and talk with them so that we can get something and give them what they actually need.” (ID45)

**Focus on treatment/cure.** Some participants remarked that children's nutritional status was not always a priority, leading to ineffective nutritional management and longer length of stay.

“คือจริงๆอะ เขาบอกว่า ให้เราอะ consult เขา[หน่วยโภชนาการ]เลย เขาจะมาช่วยดู แต่ว่าเรามักจะไม่ค่อยเห็นความสำคัญของมันเท่าไร ... เช่นแบบอย่างอื่น ... มันควรจะไปด้วยกัน ถ้าแบบมัน improve nutrition อะ มันก็ช่วยให้หายต่อโรคได้อยู่” “In fact, they [Pediatric Nutrition Unit] suggest us to consult with them immediately so that they can help, but we usually cannot see the significance of [children's nutrition] ... we are too busy with other issues ... they should go together - if we improve their nutrition, we also promote their remission.” (ID49)

#### Hospital level

Participants perceived factors at the hospital level of the environment that affected the children's eating behaviors both directly and indirectly through clinicians.

#### Environmental factors directly affecting children (RQ3)

**Hospital food.** Participants reported that most children seemed to dislike hospital food for reasons including its lack of flavor and strong odors. Participants perceived that the menus overflowed with vegetables and unfamiliar options that were not usually eaten at certain meals. These meals included “ปลาทุ้มเค็มอะไรซักอย่าง” “salted short mackerel soup” (ID70), “ผักหัวไชโป้วอย่างเงี้ย ใส่ไข่” “stir-fried pickle turnip with egg” (ID59), “พวกผัดมันเหม็นกระเทียม” “stir-fried foods that have garlic smell” (ID62), or “อาหารข้าวต้มมี้อเช้า” “rice porridge for breakfast” (ID30). Participants observed that most children tended to bring food from home or that families purchased food for their child outside the hospital.

**Hospital environment.** Participants spoke about how the hospital's physical environment affected children's eating. They reported that odors in the broader hospital environment (not just hospital food) contributed to children's symptoms, decreased eating, and alterations in nutrition. Participants also observed that sterilization of the stainless-steel trays used to serve hospital food impacted the sense of unpleasant smells. They addressed this aspect of the problem by allowing children and family to use food containers from home or purchased specifically for hospital use. Participants mentioned that seeing bottles of chemotherapy triggered memories of symptoms associated with prior treatments and thus anticipatory vomiting. To address this problem, participants said they covered the chemotherapy bottles with cloth.

#### Clinician's environmental factors (RQ3)

**Lack of guidelines.** In addition to lack of clear guidelines for the low-bacteria diet, participants spoke about lack of guidelines about how to respond to STRONG<sub>kids</sub> assessments.

“... คือถ้าแบบเด็กมีคะแนน (ของ STRONG<sub>kids</sub>) สูงมากๆ ... เขาก็จะรีบแบบ consult เราเลย แต่ว่าถ้าเกิด อยู่ในช่วงกลางๆอย่างเงี้ย บางทีอันนี้ เป็นช่วงที่แบบว่า เอ๊ะ แบบ consult หรือว่าไม่ consult ดี แล้วควรทำยังไงต่ออย่างเงี้ยคะ ก็กลุ่มนี้ก็อาจจะหลุดไปบ้าง ... ควรจะมีแบบมาตรฐานอะไรซักอย่างหนึ่ง หรือว่าควรจะมีแบบเริ่มมีการเตือนนะ ว่าแบบ case นี้คะแนนเริ่มสูงนะ ... มันเริ่มมีการเข้าไปจัดการเบื้องต้น” “... If children have a very high scores (of STRONG<sub>kids</sub>) ... they immediately consult with us. If the scores are in the middle, sometimes it is like 'should I consult with them or not - what should I do?'. This group (of at-risk children) might be

unrecognized ... there should be standard guidelines or a system to detect cases with worsening scores ... and start nutritional management early.” (ID99)

**Lack of resources.** Participants recognized that a lack of pediatric dietitian on the child’s care team limited their ability to monitor and address children’s nutrition status.

“จริงๆอะ พี่คิดว่า ถ้าเราเพิ่มนักโภชนาการ อี๋ม นักกำหนดอาหารหม่มากี่ดีนะ ... นักกำหนดอาหารมันก็ไม่ได้มีเยอะเท่าไร” “If we add a nutritionist or dietitian into the team, it would be great ... there are not many pediatric dietitians right now” (ID78)

**Discussion**

*The logic model of impaired nutritional status among Thai children with cancer*

This study explored Thai clinicians’ perspectives on impaired nutritional status and factors that influence Thai children’s nutritional status during active treatment with a regimen that included chemotherapy guided by the logic model of problem (Fig. 2).

*Child level*

**Determinants: symptoms and eating behavior changes (RQ1).** Consistent with the tentative model, participants reported physical and psychological symptoms that, from their perspectives, reduced children’s food intake and thus contributed to impaired nutritional status. Similar to prior studies in Thailand<sup>16,17</sup> and the U.S.,<sup>18</sup> our findings show that nausea, vomiting, mouth sores, taste changes, and lack of appetite were the most common symptoms for Thai children undergoing cancer chemotherapy. Also consistent with a prior study in the U.S.,<sup>19</sup> our participants noted causal relationships among multiple symptoms such as a cluster of nausea, lack of appetite, and fatigue.

In addition to physical symptoms, participants noted that children experienced several psychological symptoms that seemed to affect their eating behaviors. This finding aligns with reports from nurses in Slovenia, indicating that some psychological symptoms such as feelings

of loneliness and depression could decrease children’s food intake.<sup>20</sup>

Participants also noted increased eating by children receiving steroids, which is consistent with the results of several previous studies.<sup>3,21</sup> Observations about Thai children’s preference for salty foods was similarly reported in previous studies with children in the U.S.,<sup>21</sup> Sweden,<sup>5</sup> and Slovenia.<sup>20</sup> Regarding participants’ statements about Thai children’s preference for flavorful foods (such as instant noodles), further exploration is needed. Possible reasons include treatment-related alterations in smell and taste, convenience of instant noodles, or simply that children generally like instant noodles. Understanding the factors that influence changes in eating behavior provides clinicians with valuable information relevant to managing children’s nutritional status.

**Nutritional status changes (RQ1).** Participants noted that Thai children undergoing cancer chemotherapy exhibited both weight loss and, although less frequently, weight gain. Their remarks are supported by previous studies that have illustrated the dynamics of nutritional status among children with cancer throughout their treatment.<sup>22</sup> Most studies from both HICs<sup>23–26</sup> and LMICs<sup>27,28</sup> have showed that children’s body weight decreased mainly during the beginning of treatment and eventually increased toward the end of treatment. However, in HICs,<sup>24–26</sup> more children tended to gain weight and become overweight at later stages of treatment. This could potentially be because undernutrition at diagnosis is more common among children in LMICs.<sup>22</sup>

**Health and QOL outcomes (RQ1).** Participants observed an increased intake of salty and fatty foods among Thai children during treatment, potentially leading to an overweight during and after treatment. This is consistent with a study in South Korea, which found a positive correlation between the “spicy & fried meat and fish” dietary pattern and the risk of being overweight among children with cancer.<sup>29</sup>

In addition to the development of problematic eating behaviors and secondary health conditions later in the illness trajectory, more immediate health and QOL outcomes influenced by weight loss were also perceived by participants. Consistent with a study conducted in several countries,<sup>1,30,31</sup> our participants noted that weight loss places children at risk for cancer treatment delays<sup>26</sup> and infections.<sup>1,30,31</sup> While another prior study reported lower QOL in terms of social functioning among

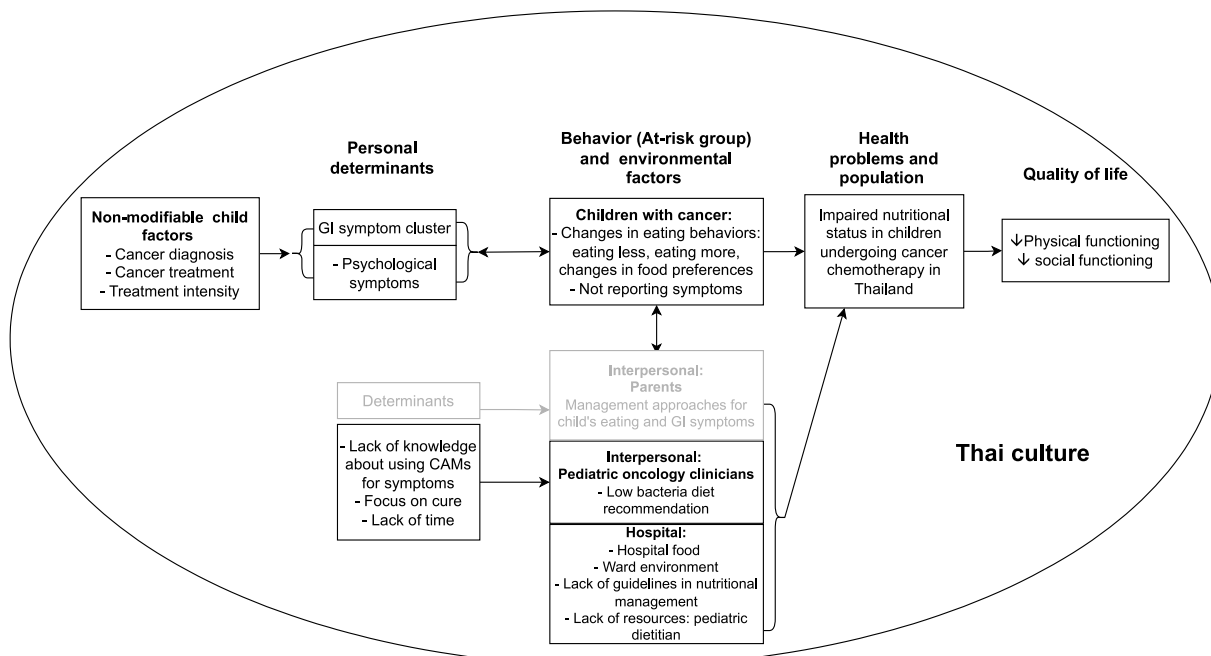


Fig. 2. Logic model of impaired nutritional status among children undergoing cancer chemotherapy in Thailand. GI, gastrointestinal.



undernourished children aged two to 18 years,<sup>4</sup> participants in the current study related this phenomenon to adolescents, with younger children being less likely to complain about changes in their body weight. Rationale for this observation include that aspects of cancer and treatments can overwhelm children and possibly distract them from their body weight change, or that the changes may not be significant enough for younger children to perceive, given their developmental stage. Consistent with observations by our participants, a previous study in Thailand found that children's age influenced their self-image perception. Younger children (aged less than 11 years old) significantly reported weight loss less than older children did.<sup>32</sup> Nutrition not only affects physical health but also has a significant impact on psychological outcomes, particularly in adolescents.

#### Clinician level

*Clinician practice behaviors (RQ2).* In terms of factors at the clinician level, our findings show that current clinical practices impacted children's nutritional status through symptom management, nutrition maintenance, and infection prevention, with a particular focus on low bacteria diet.

To manage symptoms such as nausea and vomiting, participants reported adopting guidelines from Western countries that apply both pharmacological and non-pharmacological strategies.<sup>33,34</sup> Distraction was also used by participants to minimize distress from symptoms during hospitalization.<sup>35,36</sup> In our study, constipation and diarrhea were frequently perceived as common and most difficult to manage symptoms. Similarly, recent studies discovered that constipation was commonly experienced by children with ALL<sup>37</sup> or solid tumors.<sup>38</sup> Moreover, they highlighted the potential underestimation of constipation occurrence for various reasons, acknowledged the presence of institution-based guidelines, and called for the development of evidence-based and consensus-driven guidelines for assessing and managing constipation.<sup>38</sup>

Participants reported that some children hesitated to report their symptoms, including bowel changes. Children in other countries reported that barriers to symptom reporting including beliefs that symptoms cannot be relieved and difficulty quantifying their symptoms.<sup>39</sup>

Participants perceived that the low-bacteria diet, viewed as an infection control strategy, complicated food preparation and consumption, resulting in poorer food intake. Previous studies have shown that a restrictive diet is not superior to a regular diet in terms of reducing infection in patients at risk for neutropenia.<sup>40-42</sup> A randomized trial conducted in the U.S. also reported no significant difference in infections between the groups following the Food and Drug Administration approved food safety guidelines versus the neutropenic diet and food safety guidelines.<sup>43</sup> On the other hand, a study in India found a higher risk of neutropenic enterocolitis among children on a standard Indian diet compared to children on a neutropenic diet.<sup>44</sup> The references provide examples of inconsistent results in studies conducted in diverse contexts. This highlights the importance of considering the context of care, including accessibility to hygienic foods, high ambient temperatures that can cause food to spoil easily, access to food preservation methods and clean water, as well as overall infection incident rates.

*Determinants (RQ3).* The identified clinicians' determinants included lack of knowledge, focus on treatment/cure, and lack of time. Lack of knowledge about using herbs in managing symptoms was reported by participants. Similarly, previous studies found that limited knowledge was a reason of not using complementary medicine.<sup>45,46</sup> Time constraints have been reported by healthcare providers as a barrier to obtain children's reported outcomes, which can hinder symptom or nutritional management.<sup>47</sup> The nurses' workload was perceived as a barrier to investigating unmet needs of children and families and addressing the problems effectively. As reported by a prior study, nurse workload can also impair relationships between nurses and children and families as nurse presence was related to positive hospital experiences for parents of children with cancer.<sup>48</sup>

#### Hospital level

*Environmental factors directly affecting children (RQ3).* Participants identified the hospital environment as affecting children's eating behaviors. This finding is similar to previous studies from Sweden<sup>5</sup> and Slovenia<sup>20</sup> where nurses described that children's attitudes towards the ward environment affected their food intake. Our findings showed that the strong smell of hospital food that children complained about resulted from the sterilized stainless steel divided tray used to serve hospital food. No study that we are aware of has explored relationships between the odors of food trays sterilized by steaming, alterations in children's sensory due to chemotherapy, or personal preferences. Participants reported allowing children to use their personal food containers. A previous study also mentioned higher satisfaction among hospitalized children after a meal improvement intervention that included use of a child-friendly food container.<sup>49</sup> Participants in our study also reported that alterations to the ward environment, for example, covering intravenous (IV) bottles, have potential to relieve children's nausea and vomiting. Similarly, a study in Turkey described concealing IV bottles of hydration fluid to reduce children's anticipatory nausea.<sup>50</sup>

Similar to prior studies,<sup>5,20</sup> our participants' observations indicate that hospital foods are unpleasant for Thai children with cancer. When preparing foods for all of its patients, hospitals are challenged to satisfy individual preferences. Yet, the importance of good nutrition for children being treated for cancer calls including their voices when exploring how to improve hospital foods.

*Clinician's environmental factors (RQ3).* Factors in the hospital environment also affect clinician practice behaviors, and thus the children for whom they provide care. Although participants reported recommending the low-bacteria diet and conducting regular nutritional assessments, they also commented on related challenges including need for greater attention to nutrition, consideration of children's nutritional status at diagnosis, and continuous assessment throughout as methods to develop in-depth understanding. Participants noted that needed environmental resources included pediatric nutritionist or dietitian, who plays a significant role in managing children's nutrition by offering tailored dietary and nutrition guidance for each child's unique needs. Their recommendation is supported by a study conducted in Singapore that presented the significance of collaborative partnership among physicians, nurses, and dietitians in nutritional management for children with cancer.<sup>51</sup>

#### Implications for future research and clinical practice

In order to learn valuable information and develop more effective plans for improving nutritional statuses among Thai children with cancer, further studies are needed to explore the relationships between psychological distress and appetite changes, specifically decreased food intake. Research that examines the nutritional trajectory of children throughout cancer treatment, monitoring their eating habits, and assessing the risk for metabolic syndromes during survivorship as well as studies that investigate bowel changes among children are essential. Studies that develop effective management strategies as a way to control risk for life-threatening gram-negative sepsis from leaky stretched bowel and peri-anal abscess would be beneficial as well.<sup>52</sup> Finally, studies, especially in Thailand, should investigate tradeoffs between the benefits of low-bacteria diet in different contexts and its impact on children's food intake during cancer chemotherapy, particularly for children who are undernourished at diagnosis.

Actions to both maintain proper nutrition and monitor symptoms during cancer treatment are critical. These actions include innovative approaches to symptom reporting and child-friendly rating scales (such as a game-based digital applications that children can use to report their symptoms), especially for embarrassing symptoms such as constipation<sup>53</sup> or an application that supports children's symptom self-management

strategies,<sup>54</sup> providing education (such as low bacteria diet recommendation) via a user-friendly website, improving the hospital environment, and including spaces for families to prepare foods familiar to children.<sup>5</sup> Hospitals that provide care for children with cancer should explore barriers and potential solutions, particularly with regard to the clinicians' workload, ultimate implementation of health outcome measures in clinic, and expertise needed to optimize comprehensive care for children diagnosed with cancer.

### Limitations

This study has several limitations. First, it was conducted exclusively in a single tertiary hospital in Bangkok, and therefore, the findings may not be fully generalizable to clinicians in other parts of Thailand. Second, since the study focused on informants with expertise in the care of children with cancer, hospital policy makers who could offer insights into the hospital nutrition service system were not included in the study.

### Conclusions

The findings highlight both similarities and differences in nutrition among children undergoing cancer chemotherapy, comparing Thai clinicians' perspectives and existing literature. While many findings align with previous research across different contexts, the low-bacteria diet recommendation was found to significantly influence changes in eating habits and nutritional status among Thai children. The findings also demonstrate the application of the Intervention Mapping socio-ecological perspective, which identifies intervention targets at multiple levels to inform the development of multi-level interventions to ultimate children's nutrition. This approach represents a step toward addressing a problem that researchers worldwide have described, yet few have developed and tested multi-level interventions for.

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### CRedit author statement

**Donuedee Kamkhood:** Conceptualization, Methodology, Formal analysis, Investigation, Writing – Original Draft, Visualization, Project administration, Funding acquisition. **Sheila Judge Santacroce:** Conceptualization, Methodology, Writing – Review & Editing, Supervision. **Autchareeya Patoomwan:** Formal analysis, Writing – Review & Editing, Supervision. All authors were granted complete access to all the data in the study, with the corresponding author bearing the final responsibility for the decision to submit for publication. The corresponding author affirms that all listed authors fulfill the authorship criteria and that no others meeting the criteria have been omitted.

### Declaration of competing interest

The authors declare no conflict of interest.

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### Ethics statement

The study was approved by the Research Ethics Review Committee of both the investigator's academic institution and the study setting (respectively, IRB #22-0398, COA and MURA #2022/265). All participants provided written informed consent.

### Data availability statement

Data available on request due to privacy/ethical restrictions.

### Declaration of Generative AI and AI-assisted technologies in the writing process

No AI tools/services were used during the preparation of this work.

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