

Significant variations in feeding practices and choice of guidelines for the management of late preterm infants among healthcare professionals in Nigeria

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Abstract

Aim: We aimed to gain insights into current nutritional management practices of late preterm infants (34–36 weeks gestational age) in Nigeria.

Methods: Purposive sampling was employed to recruit 19 healthcare professionals (neonatologists, paediatricians, general practitioners and nurses) involved in the care and nutritional management of late preterm infants in Lagos and Ogun states, Nigeria. Data were collected using interviews, either individually or in small focus groups, between 15 August and 6 September 2022. Thematic analysis of interview transcripts was carried out to interpret the data.

Results: Ten distinct themes emerged across the research questions and objectives. For growth monitoring, 11, 6, 1 and 1 of our participants preferred to use the 2006 WHO growth standards, Fenton preterm growth chart, Ballard score and Intergrowth-21, respectively. Regarding the growth velocity of late preterm infants, most healthcare professionals aimed for 15 g/kg BW/day or more during hospitalisation. Breastmilk was unanimously the primary feeding option for late preterm infants. Most healthcare professionals preferred to use international guidelines over local guidelines.

Conclusion: Our study shows that there is a wide divergence in the nutritional guidelines used in managing late preterm infants in Nigeria. Regarding growth monitoring, healthcare professionals tended to aim for a growth velocity higher than necessary for late preterm infants, which may be disadvantageous for their long-term health.

KEYWORDS

feeding practices, growth charts, health care professionals, practice guidelines, preterm infants

Abbreviations: AAP, American Academy of Paediatrics; ESPGHAN, European Society for Paediatric Gastroenterology, Hepatology, and Nutrition Committee on Nutrition; FGD, Focus group discussion; GA, Gestational age; IDI, In-depth interview; IHDP, Infant Health Development Program; NHS, National Health Services; NISONM, Nigerian Society of Neonatal Medicine; PAN, Paediatric Association of Nigeria; RCPCH, Royal College of Paediatrics and Child Health United Kingdom (UK); WHO, World Health Organization.

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1 | INTRODUCTION

To date, considerable attention has been drawn to support the nutritional management of preterm infants, to improve their survival and quality of life. The World Health Organization (WHO) defines preterm infants as babies delivered at a gestational age of less than 37 completed weeks of pregnancy.¹ Preterm birth is recognised as a major clinical risk and is associated with perinatal mortality, severe neonatal morbidity and moderate to severe childhood disability.² Based on gestational age (GA), preterm birth can be categorised into the following sub-categories: extremely preterm (<28 weeks of GA), very preterm (28–31 weeks of GA), moderately preterm (32–33 weeks of GA) and late preterm (34–36 weeks of GA).³ In Nigeria, close to 85% of preterm babies are born between 32 and 37 weeks of GA (moderate-to-late preterm infants).⁴ In 2010, the European Society for Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) published recommendations on the quantity and quality of enteral feeding for preterm infants weighing 1000–1800 g, to achieve growth that is similar to foetal growth and satisfactory functional development.⁵ Since guidelines have been developed primarily for very preterm and moderate preterm infants,⁵ they are not necessarily fit for late preterm infants.⁵ Contrary to the popular opinion that late preterm infants are relatively “healthy” when compared to babies born <34 weeks of GA however, late preterm infants also have unique and often-unrecognised medical vulnerabilities and nutritional needs, predisposing them at higher risk for clinical complications, morbidity rates, hospital readmissions and long-term health consequences, such as overweight/obesity, cognitive and neurodevelopmental delay.^{6,7} Providing optimal nutritional support for late preterm infants may improve survival and quality of life, as it does for other preterm infants. However, detailed guidelines that specify how to feed late preterm infants, either during hospitalisation or after discharge, are notably absent.^{5,8}

A recent multi-country survey was conducted among healthcare professionals in seven countries namely Malaysia, Bangladesh, Indonesia, Singapore, Taiwan, Mexico and Nigeria to investigate the nutritional practices of late preterm infants. The survey revealed a lack of standardised nutritional practices or expected growth outcomes for these infants in any of the countries, including Nigeria. This highlights the need for country-specific nutritional guidelines, especially in developing nations like Nigeria.⁹ To further understand the current nutritional management in Nigeria, this present study aimed to explore the views of healthcare professionals on the implementation of existing international and local guidelines in their daily practice.

2 | METHODOLOGY

In this study, qualitative research methods were employed, including in-depth interviews (IDI) and focus group discussions (FGD). Both IDI and FGD approaches were utilised to accommodate the participants' demanding and unpredictable schedules as healthcare professionals. When scheduling FGDs became challenging, IDIs were conducted instead. The standards for reporting on qualitative studies were used in the preparation of this manuscript.¹⁰

Key Notes

- The majority of preterm feeding guidelines are mostly designed for very preterm infants and are not suitable to cater to the needs of late preterm infants.
- This study showed a wide divergence in growth monitoring protocols used in the nutritional management of late preterm infants in Nigeria.
- A collaborative effort among different medical practitioners and stakeholders is required to develop a comprehensive nutritional management system for Nigerian late preterm infants.

2.1 | Recruitment and eligibility criteria

The study included healthcare professionals who were actively engaged in the care and nutritional management of late preterm infants. Participants were recruited from both government hospitals (General Hospitals, University Teaching Hospitals, Maternity Hospitals and Primary Healthcare Centers) and private hospitals located in Lagos and Ogun State, Nigeria. To ensure representation from various medical disciplines, we categorised the respondents into four groups based on their specialties: neonatologists, paediatricians, general practitioners and nurses. This classification followed a similar approach as a previous survey conducted.¹¹ A total of 84 healthcare professionals were invited to participate in the study through email invitations, which were followed up with phone calls to encourage their involvement.

2.2 | Data collection

Prior to conducting the interviews, the interview guide (suppl. 1) was sent to all potential participants via email. To ensure the quality, clarity, relevance, context and appropriateness of the questions, a pilot test of the interview guide was conducted among two neonatologists and two qualitative research experts who were not involved in the study. Any unclear questions were identified and revised by the first author. The interviews, including both IDI and FGD, were conducted online using Microsoft Teams version 1.5.00.33362 (Microsoft). The first author led the interviews with the assistance of a research assistant affiliated with the Department of Human Nutrition and Dietetics at the University of Ibadan, Nigeria. The research assistant's role primarily involved logistical support in contacting potential participants and taking notes during the interviews. Verbal consent was obtained from each interviewee before proceeding, and they were instructed to find a quiet environment for the interview session. On average, each interview lasted approximately 50 min, resulting in a total interview duration of 900 min.

2.3 | Instrument for data collection

The interview questions were tailored towards three key areas: (i) growth monitoring of late preterm infants during hospitalisation and following discharge; (ii) preferred feeding options and enteral feeding initiation for late preterm infants; and (iii) guidelines used in the feeding management of late preterm infants in Nigeria. The interview guide was used to prompt responses from the respondents. Interviews were recorded in Microsoft Teams, after asking interviewees for permission to record, and then transcribed in full.

2.4 | Data analysis and management

Recordings of each interview session were transcribed verbatim and analysed by the first author and a research assistant. Transcription reliability was reviewed by an independent researcher from the University of Ibadan. Data analysis was conducted using the thematic analytical method with the assistance of NVivo software. The transcribed data were organised in Excel and Word documents before being imported into the software. Themes and sub-themes were derived from participants' responses and linked to research objectives for data interpretation. The flow diagram in Figure 1 illustrates the process.

2.5 | Ethical considerations

Ethical clearance was obtained from the Lagos University Teaching Hospital Health Research Ethics Committee (Reference number: ADM/DCST/HREC/APP/3847). Acceptance to be part of the study through email was regarded as written consent, while verbal consent was also

taken before the start of each interview. Participants were assured of anonymity and confidentiality throughout the interview. They were also informed of their right to withdraw from the study at any time.

3 | RESULTS

From the 15th of August to the 6th of September 2022, 89 healthcare professionals from Lagos and Ogun states were invited to take part in our study. Out of which a total of 19 individuals accepted the invitation, while 50 did not respond, seven declined and 13 did not show up for the study [Correction added on 27 July 2023, after first online publication: The not responded individuals count was corrected in this version.]. This resulted in the completion of 13 interviews, consisting of nine IDIs and four FGDs. The flow chart of the recruitment process is explained in Figure 2. According to Table 1, the study included a significant proportion of healthcare professionals (HCPs) working in hospitals in Lagos state, accounting for 84.2% of the respondents. The interviews were conducted until a point of saturation was reached, where no new or additional information was being gathered, ensuring comprehensive data collection.¹² In terms of gender distribution, the majority of respondents were females, comprising 73.7% of the participants. Furthermore, based on their hospital affiliations, approximately 84.1% of the respondents were employed in government-owned hospitals, as indicated in Table 1.

Ten distinct themes were generated and cross-matched with the research questions and objectives as shown in Table 2. The findings presented below were by the curated responses. They match the categorisation of responses in line with each sub-research question and address pertinent themes and sub-themes. This thematic analysis shows the current nutritional management of late preterm infants in Nigeria, based on the three identified research questions.

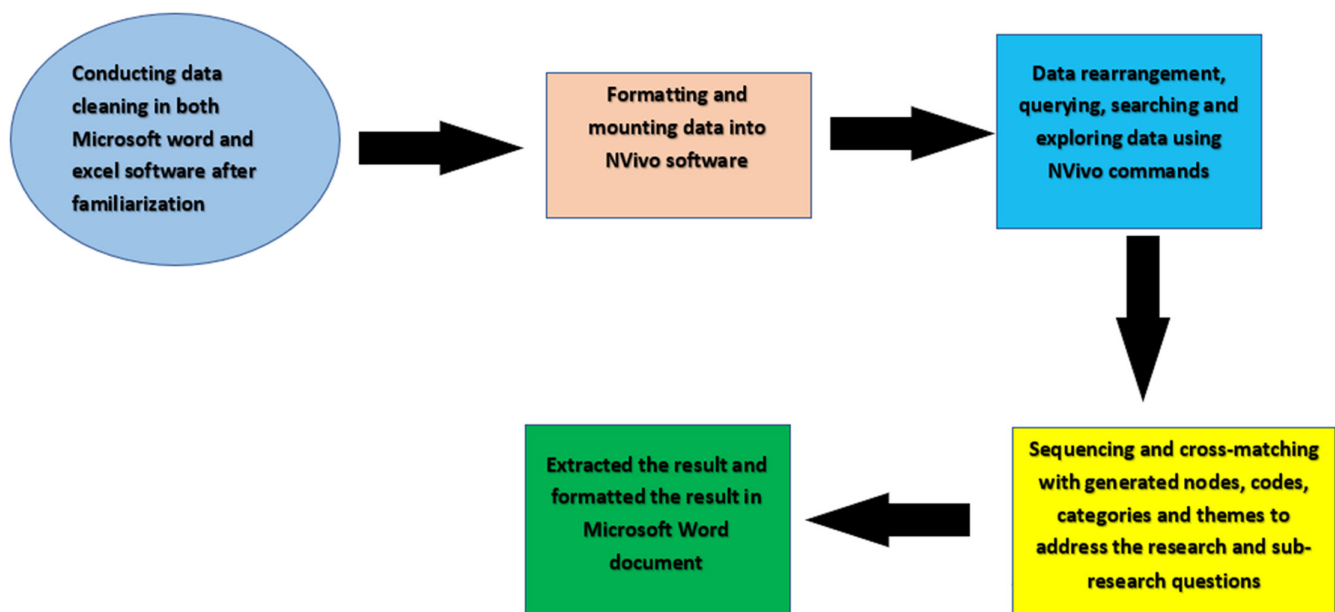


FIGURE 1 Diagram of the data analysis process.

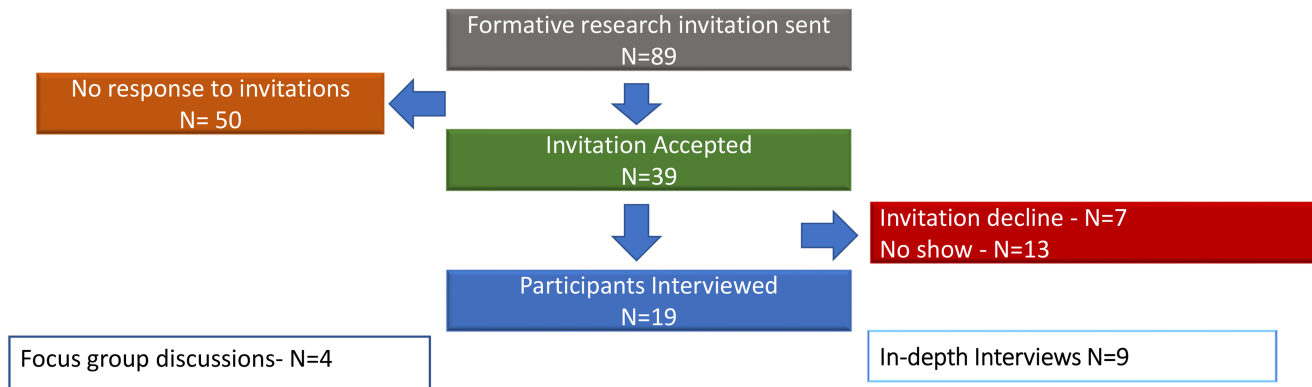


FIGURE 2 Flow chart of the recruitment process. [Correction added on 27 July 2023, after first online publication: Figure 2 was updated in this version.]

TABLE 1 Socio-demographic characteristics of interviewed healthcare professionals^a (N = 19).

Characteristics	IDI ^b	FGD ^c	N ^d (%)
Sex			
Male	2	3	5 (26.3)
Female	7	7	14 (73.7)
Medical profession			
Neonatologist	2	1	3 (15.7)
Paediatrician	3	5	8 (42.1)
General practitioner	2	1	3 (15.7)
Nurses	2	3	5 (26.3)
State of practice			
Lagos state	5	11	16 (84.2)
Ogun state	2	1	3 (15.7)
Type of hospital			
General hospital	4	4	8
University teaching hospital	1	3	4
Maternity centre	1	2	3
Private hospital	1	3	4

^aHealthcare professional.

^bIn-depth interview.

^cFocus group discussion.

^dNumber of respondents.

3.1 | Objective 1: Growth monitoring of late preterm infants

3.1.1 | Theme 1: Specific growth chart used during hospitalisation

Sub-theme 1-i: The gold standard growth chart for monitoring the growth of late preterm infants

Regarding care given to late preterm infants during hospitalisation, all participants highlighted that late preterm infants are kept in the hospital only when urgent medical care such as birth complications, feeding difficulties or are underweight is necessitated. This

is usually done by a team of professionals that manage neonates through routine ward rounds, focusing on clinical principles and continuous monitoring. The care services provided immediately after birth include assessing the baby's health, feeding and growth monitoring. All participants acknowledged conducting ward rounds as part of gold standard clinical practices. During ward rounds, they assess the infants' case files and growth monitoring charts, whether in physical or electronic format shared across facilities. The majority of participants (11 healthcare professionals) stated that they utilise the WHO growth chart. Six participants mentioned using the Fenton chart, while one participant mentioned using the Intergrowth-21 charts and another participant mentioned using the Ballard score.

Some comments illustrate participants' perceptions of the WHO growth chart and why they use it:

We followed the WHO standard in monitoring late preterm, since 2003. Though, at times, using that WHO standard may not work for you or work for all babies. It depends on the situation of the baby or when brought in.

Participant 1, FGD 1

A similar response was provided by *participant 2, FGD 4*, who said: "We use the WHO growth chart, and we use this growth chart for us to know how the preterm is progressing because without this growth chart, there is no way we can know if the preterm is thriving the way they are supposed to thrive."

The WHO growth chart is widely accepted than the other chart that you talked about.

Participant 2, FGD 3

Participant 1 in FGD 4 said: "With regard to the charts used for growth monitoring. WHO is the one that gives us most of the guidelines that we use and people are more aware of it."

Participant IDI 8 also said: "whether while in the hospital or at the well-baby clinic where we discharge our babies and they come

TABLE 2 Thematic summary representation.

Objective 1	Growth monitoring of late preterm infants
Theme 1	Specific growth chart used during hospitalisation Sub-themes: (i) The gold standard: WHO, Fenton, Intergrowth-21, or Ballard (ii) Observed growth velocity
Theme 2	Specific growth chart used following hospital discharge of late preterm infants Sub-themes: (i) The gold standard: WHO, Fenton, Intergrowth-21, or Ballard
Objective 2	Preferred feeding options for late preterm infants
Theme 3	Feeding practices Sub-themes: (i) Preferred feeding options (breastfeeding, preterm formula, wet nursing) (ii) Initiation of enteral feeding
Objective 3	Nutritional guidelines used in the feeding management of late preterm infants
Theme 4	International, national and local guidelines
Theme 5	The Nigerian local context
Theme 6	Maternal and neonatal specificity
Theme 7	Rigid physiological principles and conventional practices
Objective 4	Gaps between current nutritional management practices and international guidelines
Theme 8	Poor circulation and inadequacy of local and national guidelines
Theme 9	Differential credence on guidelines developed by various healthcare professional associations
Theme 10	Challenges encountered in the management of late preterm infants in Nigeria Sub-themes: (i) Maternal socio-economic conditions (ii) Available clinical infrastructure (iii) Lack of awareness and evidence-based convictions among the healthcare professionals (iv) Poor attitude to change among healthcare professionals

Note: Intergrowth chart,¹³ WHO growth chart,¹⁴ Ballard chart,¹⁵ Fenton growth chart.¹⁶

for follow-up and reviews, it is usually the WHO mainly growth chart that is circulated and that we use.”

The quotes show that the participants follow the standard guidelines, but that some improvised with the charts.

Participant 2, FGD 2 said: “...for us in my unit, what we use currently is the Fenton chart. Also, that is what we have recommended in the national guideline for comprehensive newborn care.” The same expression was made by *participant 2, FGD 1*: “So Fenton chart is what we used for even almost all our late preterm because it is first easy to get for a consultant, a personal preference, then easy to follow as we use it.”

Participant IDI 3 asserted that Intergrowth-21 charts are now being adopted by tertiary facilities across the country in addition to the WHO chart due to its detailed parameters that allow for them to assess other anthropometric measurements, like the head or occipital frontal circumference. He said: “There are current adaptations in Nigeria, I'm aware PAN (Pediatric Association of Nigeria) have recently advocated for its use generally in Nigeria now. ...I'm aware some still use WHO centiles but intergrowth in most tertiary centres now... because, for the intergrowth, you can check all parameters; you can measure the head circumference, the occipital frontal circumference, you can measure the lengths, the weights and plot them appropriately. Then you can follow up.”

Participant IDI 4, said: “What we use currently is the Fenton chart. that's what the national guideline recommends for us to use because it adequately covers these growth parameters.”

Additionally, *participant IDI 6* who is a neonatologist reported that she improvised with the use of Ballard score in her affiliated hospital. She said: “When I am in that unit, it is my standard. When I am doing a round, the first thing I ask is what the Ballard score of this child is. So that's why I always talk about the Ballard score.”

Sub-theme 1-ii: Observed growth velocity

With regard to what growth velocity they would like to achieve during hospitalisation, our findings showed that the majority of the participants also followed the WHO standards for this and would like to achieve a growth velocity of 15–20 g/kg/BW/day.

They said:

Participant IDI 4: “At least when they are in the hospital, we still use 15-20 g/kg BW/day. That's what we use in my unit [...]. I think that is what the guideline also says, 15 g/kg BW/day.”

Participant 3, FGD 3, explained that: “...15 g/kg BW/day is usually the target, and of course we want babies to gain weight faster because weight for them is an index of survival.”

Participant IDI 9, explained: “Our target is usually 15 g/kg BW/day, but I put a bracket; 10-20 g/kg BW/day.”

Participant 1, FGD 2, said: "Well, the recommended is a range of 10-15 g/kg BW/day. I would say the maximum attainable."

In his exact words, IDI 3 participant: "If you're going to put a cut-off, let's say 15 g/kg BW/day and it's fair enough and is achievable for late preterm babies that are stable relatively and that's our target actually, in our units."

Responses from five participants showed they desire that late preterm infants gain more weight than recommended during hospitalisation.

They said:

Well, I am used to targeting 20 to 25 to 30 g/kg BW/day, but if I have a client that is doing 15 g/kg BW/day and there seems to be no problem; the parameters, the vital signs are fine, then I would not worry, once it is within the range.

Participant IDI 2

But for me, I can target 20 to 25 to reach 30 g/kg BW/day. I encourage the mothers that this is what I want you to do[...] that's what am used to actually.

Participant 2, FGD 1

3.1.2 | Theme 2: Specific growth chart used following hospital discharge

The majority of the participants mentioned that they have a standard weight requirement before the baby can be discharged from the ward. Following discharge, parents are asked to bring their babies back to the facilities on a weekly basis for routine checks and weight monitoring. With the exception of one healthcare professional, the majority of participants stated that they continue to use the same growth chart used during hospitalisation. The practice of scheduling specific days for follow-up visits is to ensure proper growth maintenance and feeding practices for late preterm infants after discharge, as mentioned by all participants.

Participant 2, FGD 4 supported this assertion by saying: "They come to the hospital. Yes, we follow them up in the out-patient clinic using the WHO growth chart."

For follow-up, what you just want to see is that there is progress. If you are seeing them every week and I will check over this last week, have I been able to get 20-30 g/kg BW/day.

Participant IDI 7

Similarly, Participant IDI 4 explained the procedures that they follow for post-discharge care by saying: "They come in for vaccinations once they are at least 2.5 kilograms, but usually, we would not discharge any child under 2 kilograms, first of all. [...] I continue with the Fenton, the one I have already gotten their charts."

Contrary to other opinions, Participant 2, FGD 2, who would use the Fenton growth chart for late preterm infants during

hospitalisation, said: "Well, following discharge, once the babies are up to 42 weeks, we use Intergrowth. When they reach 42 completed weeks which is when Intergrowth charts end, we go on to use WHO growth standard."

3.2 | Objective 2: Preferred feeding options for late preterm infants

3.2.1 | Theme 3: Preferred feeding options

Sub-theme 3-i and 3-ii: Preferred feeding options and initiation of enteral feeding

Regarding preferred feeding options, the participants unanimously agreed on the importance of early introduction of enteral feeding for late preterm infants to address weight loss after birth and support their growth trajectory. Breastmilk was unanimously preferred as the optimal feeding choice due to its nutritional composition, affordability, accessibility, appropriate temperature and gut stimulation properties. The recommended feeding methods included enteral and parenteral methods using nasogastric or orogastric tubes, IV-fluid feeding, cup feeding and syringe feeding. Additionally, the majority of participants mentioned that feeding should commence within the first 30min after an uncomplicated delivery when both mother and child are stable.

Participant IDI 8 shared her experience: "We have a policy of starting them on breast milk almost immediately. So as soon as they are delivered, they are sorted out in terms of resuscitation, cleaned, examined, provided warmth, the next thing is for us to feed and of course, we try as much as possible to start with breast milk."

Participant 2, FGD 2, shared a similar opinion: "On admission day in the first 24 hours, we go on parenteral. Then after that, we commence once we see that the baby is ready, from 2.5 mls, then you start with tropic feeding, you can start with colostrum rub, from colostrum rub to 2.5 mls. From 2.5 mls, then you graduate next to 5 mls depending on how that baby tolerates the feeds."

Participant IDI 7, asserted that: "The preferred feeding option is breast milk. There is no controversy, you know, yes, we don't use donor milk, it's just the mother's breast milk, yes."

Participant 1, FGD 2, like all other participants, also shared similar insights which buttressed the uniformity of the preferred feeding options uncovered by this study. She said: "So, for all babies including late preterm, the preferred feeding option is the mother's breast milk. That's the best. If the mother cannot breastfeed for any reason, we move to infant formula, while we try to work on different forms of feeding. Maybe you can re-lactate a grandma and make her wet nurse the baby."

3.3 | Objective 3: Nutritional guidelines used in the feeding management of late preterm infants

When Nigerian healthcare professionals follow guidelines, the following international guidelines are prioritised over local guidelines:

WHO recommendations, ESPGHAN⁸ recommendations, AAP guidelines, RCPCH (UK) guidelines and neonatal guidelines from the NHS.

3.3.1 | Theme 4: International, national and local guidelines

Participant 2, FGD 2, mentioned that: "In my hospital, since 2019, we started following the WHO guidelines with regards to feeding...(And) I think the Federal Ministry of Health and some NISONM Members, NISONM being the Nigerian Society of Neonatal Medicine, also developed guidelines in late 2021".

Participant IDI 5 mentioned in her explanation: "Recently, new guidelines for enteral feedings in premature infants were issued by the AAP and ESPGHAN. There is NISPGHAN too, Nigerian Society for Pediatric, Hepatology, Gastroenterology and Nutrition." She further asserted that: "Many facilities and institutions try to have their facility-based guidelines. Then, all of us are covered by an international body like AAP or by the National Health Service (NHS) or by the Royal College of Pediatrics and child Health in England and all of that."

Additionally, *Participant IDI 3* responded: "There's a comprehensive newborn care guideline on feeding, I think from WHO if am right, that we follow. There are local adaptations for peculiarities such as the PAN guideline (Pediatric Association of Nigeria), or a comprehensive guideline for newborn care in Nigeria and there is one developed locally in my centre."

One of these senior professionals included *participant 1, FGD 1*, who expressed this by saying: "I think for us, we just follow our protocol, we have a standard operating protocol (SOP) in the neonatal units as we have in all other wards and that protocol has the guidelines for all conditions we see and there is a section for prematurity. So that's really what we follow. Our SOP are put forth by the head of the department and most times you know looking through the SOPs of other hospitals around and looking at what you know, and putting all together, you know so more or less SOP in one secondary health facility more or less is the same in the other secondary health facilities in Lagos State."

3.3.2 | Theme 5: The Nigerian local context

Throughout the entire interviews, a topic that kept reoccurring was how the Nigerian local context influenced the clinical management practices of late preterm infants. This issue of local context cuts across all the aspects of nutritional management, that is, feeding practices, growth monitoring and follow-up, as well as the overall management guidelines.

Participant 3, FGD 2, for instance, explained how the local environment influences the growth monitoring and velocity post-discharge in her clinic: "As per the kind of environment we have now, as I told you most of the people I deal with, most of them are not educated. They are these people from the rural areas; all these local

mothers selling fish and the rest, so, I just ensure that a minimum of 0.5kg weight addition is okay for me every week...Actually, if it is more than that, I would have preferred it, but you know some of them, we want to really deal with them, putting them on exclusive breastfeeding, not trying to use infant formulas to grow them up."

Another piece of supporting evidence was from the response of *Participant IDI 3*, who said: "What it means is to have local guidelines that you can use. For the hospital, you would understand your peculiarities and constraints, so the hospital guidelines are tailored in a way to fit into the peculiarities of the particular hospital. Take for instance, if the comprehensive guideline says to feed babies late preterm within 30 minutes if the mother delivers spontaneous vertex delivery. You know your peculiarities that might not be feasible before you move the babies and all that."

Participant IDI 1 also explained how the environment where her affiliated clinic is located influences every practice in the facility. She said "Epe is a rural place, and a lot of the women there are so ignorant and no educated. Most of them do not come to the hospital until things get out of hand, yes, they come out of delivery with asphyxia and if that happens, you know the reflexes may not be there, you may not come up almost immediately. So, the first thing we do is nasogastric." She further commented the same thing on feeding practices too where she said "We don't use donor milk in my facility, even I don't know if donor milk is now acceptable in Nigeria, but you know the mentality how would I allow someone else to be giving my baby milk, no."

3.3.3 | Theme 6: Maternal and neonatal specificity

The findings from this study also showed that the nutritional guidelines used for the management of late preterm infants in Nigeria depend on the mother and child in question.

For instance, *Participant 2, FGD 4*, said: "In my hospital, there are no guidelines. We don't follow any particular guidelines. Each neonate has its peculiarity. So, we treat each neonate based on its peculiarity and how he or she can tolerate the feeds. So, it depends on each neonate. So, each baby is taken based on his peculiarities."

For instance, from the account of *participant IDI 5*, who revealed that: "Some of them have sepsis then what else? Some of them have jaundice. If it's jaundice, by the time it is cleared they are gone. If it's sepsis, that one will take about six, seven to eight days. But the observation was just two-three days. By the time is average, we are looking at five-six days."

Similarly, *participant IDI 2* supported this assertion by saying: "The follow-up has to be a shorter one depending on that child's condition. At times you give three days if their house is so close to the hospital, or at times we give one week. At most it's a week to see how that child is doing. Then another date will be given like one or two weeks just to check that baby, that he's doing fine at home."

Additionally, *participant 2, FGD 4*, explained how follow-up is determined: "They come to the hospital (for follow-up) when the child is initially discharged, every week. Once the child is doing well,

gaining weight, and the mother knows how to feed well, we increase up to two weeks, a lot of times from 2 weeks, we really don't go to 3 weeks. From 2 weeks we go to one month, we move to every two months."

Furthermore, the health condition of the baby is used to determine the number of days late preterm infants stay at the hospital.

3.3.4 | Theme 7: Rigid physiological principles and conventional practices

Some of the participants also explained that their background knowledge in physiology and their long years of practice determined how they manage their cases. This assertion was more common among medical consultants that specialise in late preterm infants who have tried and tested established guidelines over the years.

Participant IDI 7 also shared his experience by stating how he and people in his affiliated facilities follow physiologic principles in their practices of late preterm infants: "Soe, I don't think they've come out with any guideline about the feeding of late preterm. You know everybody just goes by the physiologic principles that, for example, a baby from 34 weeks will have good suck, swallow, no respiratory distress, then you introduce the feed. The type of feed you use depends on what is available to you. If you have breast milk, you do. If you don't have breast milk and the baby is in distress or something, you give intravenous fluids and the baby is fine, then if the baby has any congenital anomaly or what they may decide not to feed and give intravenous fluids instead. If the baby is fine, active, for example, a 34-weeker will be like 2.8 to 2.9 kg and that baby is able to suck soon."

Participant IDI 6, who is an experienced professional, explained how she managed by leverages the experience of healthcare professionals that she works with. She said: "I have a guideline, but I also follow the nurses, there are guidelines, I facilitate for Lagos State Ministry of Health on neonatal resuscitation, Essential newborn care, putting the baby to the skin, skin to skin, feed immediately, those things are not always possible. So, I listen to the nurses. I consider the nurse working with me. Only by working with her can I have the best outcome. If I insist on my rights as a doctor, if I insist on my right for my protocols, I insist on WHO this, Fenton that, Ballard this, am just going to have a dead baby at the end of the day. So, I listen to the nurses."

3.4 | Objective 4: Gaps between current nutritional management practices and international guidelines

3.4.1 | Theme 8: Poor circulation and adequacy of available local and national guidelines

One of the major challenges faced by Nigerian healthcare professionals is the limited distribution of local nutritional national guidelines for managing preterm infants. Many participants expressed unawareness of any updates in nutritional management practices

or mentioned that copies of the guidelines have not been widely distributed or are too cumbersome. The assertion of poor circulation and accessibility of existing and updated guidelines was further strengthened by the response from *participant 1, FGD 4*, who stated: "Then the other thing is us ourselves, the doctors, particularly the consultant if you are aware of the guidelines like I said the WHO guidelines have been here since 2011. I qualified in 2008 and honestly, I didn't know anything about it until I went for my master's in 2018. I mean in practice I found out that I can feed these babies faster, I can move faster but how fast and all of that."

Participant 2, FGD 3, also said: "(For the localized version that was created by a professor), it was during the residency training program that we had that, but it's not widely circulated. Am not even sure they have that same chart in other universities. So, it might have been done for a project and then left in the neonatal ward and we used it then. But out of the university circles, no it's not widely used. But I know it's available because I used it then and that's why I mentioned it just so you know there are other local ones too."

On the contrary, some of the professionals mentioned they often feel that there is nothing new that the new guideline can add as they feel that guidelines are being recycled. *Participant 2, FGD 2*, justified this assertion when she reacted to a new national and local professional association guideline that was newly introduced: "In fact, I think, the WHO guidelines are maybe more compact for feeding preterm and low birth weight babies."

Additionally, *participant 2, FGD 4*, also expressed that "The Nigerian guideline is over a 200-page document. And it's difficult to go through that thing, but I try to read through it when I got it. Like my colleague said, I have it on three different platforms for Paediatricians. And going through some parts of it I realize that we really do not have differences. Nothing different except maybe they were able to put up tables and they are saying that some preterm should be fed every two hours, some preterm should be fed every three hours."

Participant 1, FGD 2, acknowledged that she was aware of new national guidelines since 2021 but she did not take a look at them. "Federal Minister of Health and some NISONM Members, NISONM being Nigerian Society of Neonatal Medicine, developed guidelines in late 2021, which they've tried to disseminate. In all honesty, I know I have received it on two different platforms. Have I sat down to read it? No."

3.4.2 | Theme 9: Differential credence on guidelines developed by various healthcare professional associations

According to some study participants, gaps in current preterm management practices stem from differences between guidelines developed by different professionals and those introduced by international healthcare agencies such as WHO and NHS. Discrepancies were found in growth chart measurement calibration, growth velocity and feeding practices.

3.4.3 | Theme 10: Challenges encountered in the management of late preterm infants in Nigeria

All participants acknowledged various challenges in the adequate management of late preterm infants in Nigeria. They mentioned multiple challenges, including maternal socio-economic conditions, inadequate clinical infrastructure, lack of awareness and evidence-based convictions among healthcare professionals and resistance to change. The following quotes provide examples of participants' responses.

Participant 1, FGD 2, mentioned: "Hmm, we have one thousand and one reasons. The facilities we have in Nigeria is nothing to write about. Like one of us just said now, we improvise a lot, the only thing we are yet to improvise is a human being."

On inadequate clinical infrastructure, *participant IDI 5* expressed: "So by international standards, your if a preterm baby need parenteral nutrition, we do not have facilities for parenteral nutrition here in Nigeria. The best we can do is some form of partial parenteral nutrition, we give amino acids, we give glucose."

4 | DISCUSSION

Our study reveals a lack of consistency in growth monitoring protocols for nutritional management of late preterm infants in Nigeria. Healthcare professionals generally aim for a growth velocity of 15 g/kg BW/day or higher during hospitalisation. Initiation of enteral feeding within the first hour of birth is a common practice for stable late preterm infants, with a unanimous preference for breastmilk as the feeding mode. While some healthcare professionals deviate from guidelines based on clinical assessment and expertise, local context also plays a role. In terms of guidelines, international ones, particularly those issued by WHO, are favoured over local or national guidelines by most healthcare professionals.

In the monitoring of infants, growth charts play a major role by providing the basis for growth assessment in comparison to a reference. The WHO growth standards,¹⁴ the Fenton growth monitoring chart¹⁶ and the Intergrowth-21¹⁵ are the most commonly used growth charts among healthcare professionals in Nigeria. The majority of our participants (approximately 58%) expressed a preference for using the 2006 WHO growth standards. They (wrongly) emphasised that these growth charts are specifically designed for monitoring preterm infants up to 40 weeks of gestational age.¹⁷ Participants highlighted that these standards are easy to interpret, provide comprehensive monitoring from 0 to 5 years of age and offer a good representation of growth patterns. However, it is important to note that the WHO growth chart, although providing a wider range of charts for different age groups (birth to 6 months, birth to 2 years, birth to 5 years, 6 months to 2 years, 2–5 years), cannot be used to assess the growth of preterm infants <37 weeks and should only be used for preterm infants who have reached term age after correction.¹⁷

There is a difference of opinion among scientists regarding the suitability of the 2006 WHO growth standards for late preterm

infants, contrary to current clinical practice in Nigeria.^{18,19} A comparison between the 2006 WHO growth standards and the Infant Health Development Program (IHDP) growth reference, designed for preterm infants under 37 weeks (GA), revealed moderate agreement in two clinically relevant classifications of growth (less than 5th and equal to or greater than 95th percentiles).²⁰ The primary risk factor for discrepancies in weight and length classification was early gestational age, particularly under 30 weeks.²¹ The Fenton growth charts, on the other hand, are specifically designed for growth monitoring of preterm infants with a GA at the birth of fewer than 37 weeks.¹⁶ Also, the Intergrowth-21 chart is based on growth patterns of preterm infants between GA 33 and 34 weeks with "an uncomplicated intra-uterine life and low neonatal and infant morbidity."¹³ Fenton growth charts have reportedly been used in 45 developed countries, with South Africa being the only African country.²² In our study, 36% of healthcare professionals (six participants) reported using the Fenton growth charts for monitoring the growth of late preterm infants. They cited the completeness of these charts, which encompass all anthropometric indicators, as well as their specificity for preterm age. Additionally, the Fenton growth charts were recommended as the gold standard in Nigerian national guidelines. Notably, all neonatologists in our sample preferred using the Fenton infant growth chart, while the WHO growth standards were more commonly used by paediatricians, general practitioners and nurses. This divergence in growth chart preference among practitioners may be attributed to their initial exposure during medical school or the growth chart endorsed by their respective medical associations. Using different types of growth charts not specifically designed for monitoring the growth of late preterm infants, in particular, might negatively influence how healthcare professionals interpret growth and might not provide adequate or expected improved outcomes for the infants.²³ The preference of one healthcare professional for the Ballard score appears inconsistent with the basic growth assessment of weight, length and occipital frontal circumference. The Ballard score is commonly used to evaluate gestational age (GA) in newborns, focusing on physical, nerve and muscle development as indicators of maturity, rather than physical growth.¹⁵ However, this participant likely uses development insight from Ballard score to interpret growth parameters, that is, when development is adequate, growth might be too. Therefore, conducting a validation study of existing infant growth charts in low- and middle-income African countries becomes crucial. It is necessary to determine which population and specific medical and nutritional conditions are appropriate for the use of a particular growth chart. One example of a validation study is the comparison conducted between the Preterm Infant Multicentre Growth Study (PreMGS) in Canada and the US,²⁴ the Foetal-Infant Growth Reference (FIGR) conducted in six developed countries (Germany, Italy, USA, Canada, Australia and Scotland)¹⁸ and the WHO Growth Standard among preterm infants²⁵ all with a gestational age ranging from 19 to 40 weeks.

Growth velocity illustrates the difference in anthropometric measurement of infants between two time periods. The recommended intrauterine growth rate for preterm infants (GA of 32–34 weeks) during hospitalisation is 15 g/kg BW/day.^{24,26}

The majority of healthcare professionals in our study (74%) aimed for a growth velocity of 15–20 g/kg BW/day, aligning with the global recommendation. However, 26% of respondents preferred a higher growth velocity of 20–30 g/kg BW/day. Studies have shown that a growth velocity of 20–30 g/kg BW/day can lead to late preterm infants maintaining or surpassing their birth weight z-score, comparable to infants with lower gestational age at birth.²⁷ It is important to note that exceeding the recommended growth rate may result in increased fat mass due to overfeeding.²⁸ Recent research conducted in Nigeria demonstrated that formula-fed late preterm infants achieved an average growth velocity of 14.7 ± 1.53 g/kg BW/day, leading to surpassing their birth weight z-score, while breastfed late preterm infants had a growth velocity of 12.8 ± 1.77 g/kg BW/day in the same study.²⁹ Higher plasma insulin concentration induced by fat deposition and early adipocyte development has been found to contribute more to growth velocity in formula-fed infants compared to breastfed infants.³⁰ Therefore, infant formulas for late preterm infants should be carefully formulated to deliver balanced and appropriate nutrients in the precise amounts necessary to support normal growth.

All 19 participants in our study unanimously agreed that breastfeeding is the preferred feeding practice for late preterm infants. The rationale behind this preference is to promote growth patterns similar to foetal growth and ensure satisfactory functional development.⁸ Breastfeeding is strongly recommended for late preterm infants during their hospital stay. However, due to their developmental maturity and various physiological and psychological factors in mothers, late preterm infants face greater challenges such as breastfeeding initiation and duration compared to full-term infants.³¹ Healthcare professionals have been identified to play a crucial role in facilitating successful breastfeeding practices among the preterm infant population.³²

Baby-Friendly Hospital Initiative support from healthcare professionals such as postnatal breastfeeding support, maternal education, kangaroo mother care and skin-to-skin care has been shown to improve breastfeeding initiation and duration in late preterm infants.⁸ All study participants recommended preterm baby formula only when the mother is not available, in case of birth complications or HIV, or if the baby is unable to suckle directly from the mother. Unlike some developed countries, the acceptability of donor milk is still very low in Nigeria. About 61% of women in Jos, Nigeria, were found willing to donate their breastmilk, but would not feed their infants with donor milk from another woman owing to the fear of transfer of diseases such as human immunodeficiency virus (HIV), genetic traits transfer, and religious and cultural taboos.³³ The same perception is reported in Kenya,³⁴ Zimbabwe³⁵ and Uganda.³⁶ South Africa, on the other hand, has recently reported a substantial improvement in the operation of their milk banks with almost 24 milk banks in seven out of nine provinces.³⁷ According to data from the European Milk Bank Association, there are 281 active human milk banks (HMBs) in Europe, including 38 in Central and Eastern Europe where donated breastmilk is stored and dispensed when needed for feeding infants including preterm infants.³⁸ In the absence of donor

milk through milk banks, Nigerian healthcare professionals do explore possibilities for wet nursing, where a known family member capable of lactating is encouraged to feed the baby.

With regard to guidelines and recommendations used for the management of late preterm infants, our findings show that guidelines and recommendations for the management of late preterm infants are not consistently followed by healthcare professionals, regardless of the presence of scientific evidence. Multiple international guidelines were being used across different healthcare facilities in this study for the same group of late preterm infants. Although Nigerian healthcare professionals are aware of local guidelines, they tended to prioritise international guidelines. Furthermore, the healthcare professionals' current practices were influenced by the unique health conditions of late preterm infants, which affected various aspects of care, including growth monitoring and feeding practices. However, the guidelines mentioned by healthcare professionals primarily focused on support for preterm infants in general and did not specifically address the needs of late preterm infants. The local national guideline for comprehensive newborn care, released in 2021, was perceived as cumbersome and not well-circulated among healthcare professionals. Additionally, the information in this guideline was considered outdated. It was unanimously agreed that there are currently no specific local or international guidelines specifically tailored for late preterm infants.

A strength of this study was the participation of different layers of medical practitioners (neonatologists, paediatricians, general practitioners and nurses), which gave rich insights into the different perspectives on the management of late preterm infants in the Nigerian clinical setting. The outcome of this study is not representative of the whole nation, since only participants from two states in the southwest of Nigeria were included in the study. Also, another limitation is the high number of no-response and no show of over 58 healthcare professionals.

In conclusion, our study has further shown that there is a wide divergence in the nutritional management of late preterm infants in Nigeria. A collaborative effort between different medical practitioners is required to come to a proper nutritional management system for Nigerian late preterm infants. Lastly, there is an urgent need for a harmonised international guideline on late preterm infant growth to prevent overfeeding.

AUTHOR CONTRIBUTIONS

A.J.O., A.M.-B., F.O.S and A.S. designed the study, A.J.O. conducted the study, A.J.O analysed the data, all authors contributed to writing and editing, A.M.-B. and E.J.M.F. supervised the study. All authors have read and agreed to the final version of the manuscript.

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CONFLICT OF INTEREST STATEMENT

At the time of submission, Anne Schaafsma just retired as an employee of FrieslandCampina. He was involved in the design of the study but not in the recruitment and execution of the study.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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