

# Nurses' monitoring of the Road to Health Chart at primary healthcare level in Makhado, Limpopo province

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Keywords: immunisation, malnutrition, anthropometric indices, child mortality, child health

## Abstract

**Background:** The Road to Health Chart (RTHC) is a record chart carried by the caregiver that combines essential information on the growth monitoring of a child, immunisation, vitamin A supplementation, deworming medicine and other illnesses. It provides useful information to the parent and healthcare professional. This study sought to determine the challenges faced by professional nurses in monitoring the RTHC during consultation, the degree of implementation of the RTHC programme, and the most utilised aspect of the RTHC at Louis Trichardt Memorial Hospital and surrounding primary healthcare (PHC) clinics.

**Method:** A cross-sectional study was conducted among 128 registered professional nurses. A self-administered questionnaire was used.

**Results:** Ninety-six questionnaires were completed. Most of the respondents were female and aged 40-49 years. The majority of the PHC professional nurses stated that the challenges faced in monitoring the RTHC were staff shortages, lack of equipment, a work overload and unequal distribution of professional nurses on duty per shift. There was poor knowledge on how to identify malnutrition. The majority of PHC professional nurses had not completed their basic courses.

**Conclusion:** PHC professional nurses voiced their concern that challenges encountered during consultations were direct reasons for their poor monitoring of the RTHC. The degree of implementation of the RTHC programme fell short of the norms and standards of the Department of Health and Social Development concerning child health care in South Africa. The most utilised aspect of the RTHC was the expanded programme on immunisation, vitamin A supplementation and deworming medicine.

Peer reviewed. (Submitted: 2012-08-07. Accepted: 2012-09-12.) © SAAFP

S Afr Fam Pract 2013;55(3):275-280

## Introduction

The Road to Health Chart (RTHC) is a patient-held record chart that combines essential health information on the growth monitoring of a child, immunisation, vitamin A supplementation, deworming medicine and others illnesses.<sup>1</sup> The anthropometric indices weight for age, weight for height and height for age are components of the RTHC, which allows visual comparison of the growth progress over time.<sup>1</sup> The RTHC is a backbone tool of primary health care (PHC) and a useful summary of a child's health during the first five years of life.<sup>2</sup> The RTHC assists in the screening of children at risk of malnutrition and provides a simple, practical, cost-effective and convenient method of monitoring a child's health. The RTHC also helps to improve health through vaccination compliance and early

identification of growth patterns. It is a mobile data bank and a tool of reference for both caregivers at home and healthcare professionals during consultations.<sup>3,4</sup>

The purpose of introducing the RTHC is early detection of any deviation from the growth curve reference line, in order to be able to identify whether or not the child is growing well. The direction of growth curve line indicates whether it is rising in parallel to the reference curve (a good sign), remaining flat (an early warning sign), or falling or descending (dangerous).<sup>5</sup> Four conditions are important for the growth charts to be useful. Firstly, the data on the weight and the age of the child must be reasonably accurate. Secondly, PHC professional nurses must be able to understand and interpret the growth charts properly. Thirdly, once the growth chart pattern has been detected, PHC professional

nurses must be able to identify the appropriate action that needs to be taken. Fourthly, mothers must also be able to understand the growth chart and the message that it provides and to evaluate the child's response.<sup>6</sup>

The RTHC has been primarily developed for developing countries,<sup>7</sup> where figures account for 70% of early child mortality across the world.<sup>8</sup> The highest rates of child mortality continue to be in sub-Saharan Africa, where one child in eight dies before the age of five, compared to 1 in 167 in developed countries.<sup>9,10</sup>

The process of implementation of the RTHC programme at the level of primary health care has lagged behind the objectives of the World Health Organization (WHO) and United Nations Children's Fund (UNICEF) since the 1950s. Despite various strategies, such as growth monitoring, oral rehydration therapy, breastfeeding promotion, an immunisation programme, food, family planning, and female education (UNICEF's GOB-IFFF), as well as the Integrated Management of Childhood Illness (IMCI) programme, and the Millennium Development Goal 4 studies, it has been revealed that implementation of the RTHC programme is still a major public health problem in developing countries. It is also a very serious challenge at different primary healthcare (PHC) settings in South Africa, despite considerable effort and investment by the Department of Health and Social Development.<sup>11-14</sup>

National and international studies have shown that nurses do not have the necessary knowledge on correct interpretation of the growth curve, early identification of malnutrition based on the RTHC, and on the purpose of the RTHC in general.<sup>15,16</sup>

The aim of this study was to determine the challenges faced by professional nurses in monitoring the RTHC during consultation, the degree of implementation of the RTHC programme, and the most utilised aspect of the RTHC at Louis Trichardt Memorial Hospital and the surrounding PHC clinics in the community of Makhado, Tshilwavirusiku, a rural area of South Africa.

## Method

A cross-sectional study was conducted. The study population was 128 PHC professional nurses. The sample size was 96, calculated using the formula,  $SS = Z^2 * (\rho) * (1-\rho) / C^2$ , in which "Z" is the standard normal deviation, usually set at 1.96, which corresponds to a confidence level (CI) of 95%, "C" is the level of challenges (5% for this study), and "ρ" is the percentage of the degree of implementation of the RTHC. This means that with a sample size of 96, a two-sided 95% CI for the percentage of nurses monitoring the RTHC correctly would extend ± 10% from the observed percentage from the sample if the true percentage is 50%.

The all-inclusive method was used to select the PHC professional nurses for the study. All the included PHC professional nurses in this study worked in the public PHC services. Those who were excluded from the study were nurses from other categories, working in administration, emergency services and theatre. All PHC professional nurses signed the informed consent form prior to participating in the study.

To ensure reliability and validity, the questionnaire for this study was adapted, having been based on the Royal College of Paediatrics and Child Health guidelines.<sup>17</sup> It was based on the modified existing questionnaire that had been validated for use in previous studies, and also on the new South African guidelines on the expanded programme of immunisation (EPI).<sup>3,18-20</sup> The basic questionnaire had been previously used and validated by the WHO and Tarwa.<sup>3</sup>

The questionnaire was administered in English by two research assistants. A pilot study was conducted at Waterval Clinic in the neighbouring subdistrict. Eight PHC professional nurses were interviewed. Explanations were given in response to questions in order to clarify unclear parts of the questionnaire. Data were captured on Excel® spreadsheets and submitted to the Statistics Package of Social Science® software version 18. All the information from the questionnaire was captured.

The report is based on the perceptions of the PHC professional nurses and their level of understanding of the RTHC programme. Knowledge was assessed according to whether the PHC nurses could correctly answer questions on the guidelines and protocols of the RTHC, growth chart interpretation, vitamin A supplementation intervals and ability to identify malnutrition. Poor knowledge was indicated when the nurses answered the knowledge questions incorrectly.

The study was approved by the Medunsa Research and Ethic Committee of the University of Limpopo (MREC/M/01/2001:PG) and the Limpopo Provincial Department of Health and Social Development.

## Results

Ninety-six questionnaires were returned by the research assistants, so the response rate was 100%. Most of the PHC professional nurses were women (95%), with a female-to-male ratio of 19:1 (Table I). The majority (41.7%) were aged 40-49 years and 29.2% between 50 and 59 years. Of the PHC professional nurses, 19% had less than five years' experience, 26% 5-10 years' experience, and 55% 11 years or more. Further training of the professional nurses included IMCI training 12 (12.5%) participants; tuberculosis course, 13 participants (13.5%), and a human immunodeficiency virus (HIV) training course, 21 participants (21.9%).

**Table I:** Socio-demographic characteristics and level of in-service training of primary healthcare professional nurses

Variables	Number of PHC professional nurses	Percentage
<b>Gender</b>		
Female	91	95
Male	5	5
<b>Total</b>	<b>96</b>	<b>100</b>
<b>Age group of PHC professional nurses</b>		
20-29	9	9.4
30-39	16	16.7
40-49	40	41.7
50-59	28	29.2
≥ 60	3	3.1
<b>Total</b>	<b>96</b>	<b>100</b>
<b>Years of experience of PHC professional nurses</b>		
< 5	18	19
5-10	25	26
> 10	53	55
<b>Total</b>	<b>96</b>	<b>100</b>
<b>Basic courses completed by PHC professional nurses</b>		
<b>IMCI</b>		
Completed	12	12.5
Not completed	84	87.5
<b>Tuberculosis</b>		
Completed	13	13.5
Not completed	83	86.5
<b>HIV/AIDS/PMTCT</b>		
Completed	21	21.9
Not completed	75	78.1
<b>Total</b>	<b>96</b>	<b>100</b>

AIDS: acquired immune deficiency syndrome, HIV: human immunodeficiency virus, IMCI: Integrated Management of Childhood Illness, PHC: primary health care, PMTCT: prevention of mother-to-child transmission

The majority of the PHC professional nurses (more than 50%) expressed the opinion that the challenges faced in monitoring the RTHC were staff shortages, lack of equipment, a work overload and unequal distribution of professional nurses on duty per shift, with the degree of understaffing ranging from moderate to severe (Table II). In addition, the stock of vaccines was inadequate, the RTHC was often absent at consultations and the poor attendance of caregivers at immunisation sessions resulted in a high rate of missed opportunities.

The majority of the PHC professional nurses (52.1%) knew about the frequency of vitamin A supplementation and deworming medicine (Table III).

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**Table II:** Challenges faced by primary healthcare professional nurses in monitoring the Road to Health Chart at consultations

Challenges	LTMH (Level 1 district hospital)		PHC clinics		p-value
	No	%	No	%	
<b>Challenges faced by PHC professional nurses at consultation</b>					
<b>Shortage of staff</b>					
Agree	25	69	46	77	0.477
Disagree	11	31	14	23	
<b>Lack of equipment</b>					
Agree	23	64	45	75	0.257
Disagree	13	36	15	25	
<b>Workload</b>					
Agreed	22	61	35	58	0.833
Disagree	14	39	25	42	
Aspect of RTHC utilised the most					
<b>EPI programme</b>					
Agree	21	58	36	60	1.000
Disagree	15	42	24	40	
<b>GMP programme</b>					
Agree	6	17	17	28	0.226
Disagree	30	83	43	72	
<b>IMCI programme</b>					
Agree	9	25	7	12	0.100
Disagree	27	75	53	88	
<b>Use of RTHC at consultation</b>					
<b>Inadequate stock of vaccines</b>					
Agree	35	97	59	98	1.000
Disagree	1	3	1	2	
<b>Poor attendance at immunisation</b>					
Agree	33	92	54	90	1.000
Disagree	3	8	6	10	
<b>Absence of RTHC at consultation</b>					
Agree	35	97	49	82	1.000
Disagree	1	3	11	18	
<b>Degree of understaffing</b>					
<b>Degree of understanding</b>					
Mild	10	28	5	8	
Moderate	12	33	27	45	
Severe	14	39	28	47	
<b>Total</b>	<b>36</b>	<b>100</b>	<b>60</b>	<b>100</b>	

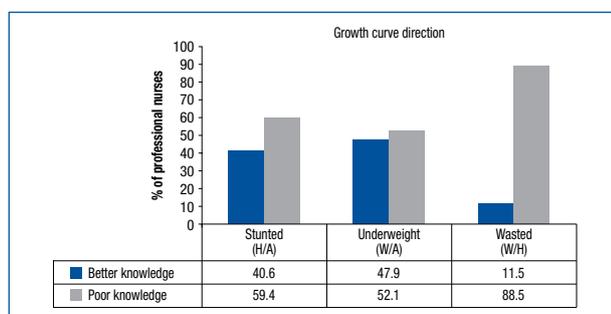
EPI: expanded programme of immunisation, GMP: growth monitoring and promotion, IMCI: Integrated Management of Childhood Illness, LTMH: Louis Trichardt Memorial Hospital, PHC: primary health care, RTHC: Road to Health Chart

interpretation of the growth curve was poor. They did not know the meaning of the growth chart indices, that weight for age, weight for height and height for age below the third percentile in the RTHC were underweight, wasted and stunted, respectively (see Figure 1). Thirty-nine of the 96 professional nurses (40.6%) were aware that "stunted"

**Table III:** The ability of nurses to ask for the Road to Health chart and their knowledge of Vitamin A supplementation

Ability of nurses to ask for the RTHC at consultations and their knowledge of vitamin A supplementation	No	%
Asking to see the RTHC at consultations		
Poor	64	66.7
Good	32	33.3
Total	96	100
Knowledge of frequency interval of vitamin A supplementation and deworming		
Every month	15	16
Every 3 months	12	12.5
Every 6 months	50	52.1
Every 9 months	19	20
Total	96	100

RTHC: Road to Health Chart

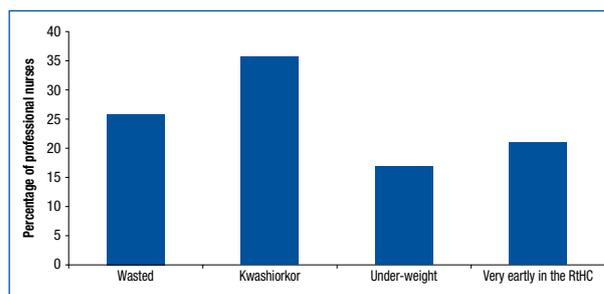


H/A: height for age, W/A: weight for age, W/H: weight for height

**Figure 1:** Professional nurses' knowledge of the growth chart direction

was a growth curve direction below the third percentile for a height-for-age measurement consultation, while 57 of the 96 professional nurses (59.4%) had poor knowledge of this. This means that 40.6% of the nurses could identify stunted growth by answering the question correctly (better knowledge than their colleagues), while 59.4% answered incorrectly (poorer knowledge than their colleagues).

There was also poor knowledge of identification of malnutrition by nurses using the RTHC. Only 21.4% understood the direction of the dotted lines on the growth chart against the growth curve reference (Figure 2). The majority of the PHC professional nurses had not completed important basic courses: 87.5% had not completed a course on IMCI, 86.5% had not finished a course on tuberculosis, and 78.1% had not completed a course on PMTCT or HIV and acquired immune deficiency syndrome. Overall, the degree of implementation of the RTHC programme was poor (Table IV), and professional nurses seldom asked to see the RTHC at consultations. The aspect of the RTHC that was most utilised by professional nurses (59%) was the immunisation programme.



RTHC: Road to Health chart

**Figure 2:** The ability of the primary healthcare nurses to identify malnutrition in a child timeously using the Road to Health chart

**Table IV:** The degree of implementation of the Road to Health programme by primary healthcare professional nurses

Programme implementation	LTMH (Level 1 district hospital)		Primary healthcare clinics		p-value*
	No	%	No	%	
<b>EPI programme</b>					
Good	17	47	41	68	0.053
Poor	19	53	19	32	
<b>Weight-for-age chart</b>					
Good	10	28	21	35	0.502
Poor	26	72	39	65	
<b>Height-for-age chart</b>					
Good	11	31	17	28	0.821
Poor	25	69	43	72	
<b>Weight-for-height chart</b>					
Good	12	33	20	33	1.000
Poor	24	67	40	67	
<b>Growth chart interpretation</b>					
Good	13	36	20	33	0.827
Poor	23	64	40	67	
<b>IMCI programme</b>					
Good	11	31	12	20	0.324
Poor	25	69	48	80	
<b>Guidelines and protocols</b>					
Good	7	19	24	40	0.044**
Poor	29	81	36	60	

\*: p-value for Fisher's exact test for comparison of percentages

\*\* : statistically significant

EPI: expanded programme of immunisation, IMCI: Integrated Management of Childhood Illness programme, LTMH: Louis Trichardt Memorial Hospital

## Discussion

This study revealed that PHC professional nurses felt that the most encountered challenges at consultation were shortages of staff, an inadequate supply of vaccines, a work overload and lack of equipment. These challenges were directly to blame for their poor monitoring of the RTHC. This point of view has been emphasised elsewhere in South Africa too. It has been stressed that many public PHC clinics lack important equipment, that PHC professional nurses are stressed with a work overload, suffer widespread shortages of staff, and receive little support and supervision.

In their study, Schoeman et al reported that the majority (80%) of PHC professional nurses voiced their frustrations that problems with basic resources negatively influenced the quality of services.<sup>17</sup> Puoane et al reported that a lack of resources, the unavailability of scales or scales that were broken or not in good working condition, contributed to inadequate care.<sup>21</sup>

In this study, it was found that knowledge of the correct interpretation of the growth curve direction was lacking. The PHC professional nurses did not understand the parameters of malnutrition, namely that underweight, stunted and wasted were anthropometric indicators of weight for age, height for age and weight for height below the third percentile. Their knowledge of early identification of malnutrition, based on the RTHC, was below expectations. The participants did not realise that the purpose of the RTHC was to aid the early detection of any abnormality in growth pattern by means of a deviation of the plotted direction lines from the reference growth curve in the RTHC. These findings have also been observed nationally and internationally. In Nigeria, PHC professional nurses did not know that the lower limit of normal for birthweight is 2.5 kg.<sup>15</sup> The study by Harrison et al showed that PHC professional nurses did not understand how to use the weight-for-age chart.<sup>16</sup> Twenty-nine per cent of healthcare workers in developing countries throughout the world have a poor understanding of the growth curve reference.<sup>22</sup> They seldom asked to see the RTHC, did not plot the weight of the child in the RTHC during consultations, and demonstrated poor identification of children with malnutrition whose weight remained below the third percentile over time.<sup>3</sup> This was observed at all levels of health care, namely primary, secondary and even tertiary. Similar studies suggest that a poor understanding of the growth chart and its purpose was a major reason why the monitoring programmes failed and fell into disrepute.<sup>5,15,22</sup> De Onis showed that more than half of the countries evaluated by UNICEF in 1978 and in 1999/2000, experienced difficulties with the use of the RTHC.<sup>18</sup>

Many RTHCs reflected missed immunisation opportunities. This was because the vaccines were out of stock most of the time, parents were unavailable on the day of immunisation because a child was ill, as well as irregular attendance and the absence of the RTHC at consultations. Caregivers' reasons for the latter, as reported by professional nurses, were that either the RTHC had been forgotten at home, the parents were immigrants (and therefore unfamiliar with the required procedure or with a RTHC), the RTHC had been burnt by mistake or left in the taxi (Figure 3).

These results were also observed in other studies elsewhere in South Africa and the world. A study in Canada showed that missed opportunities were due to side-effects. Side-effects were adverse events from the vaccines which resulted in caregivers not bringing their children back for subsequent vaccinations.<sup>23</sup> In Nigeria, the cited reasons

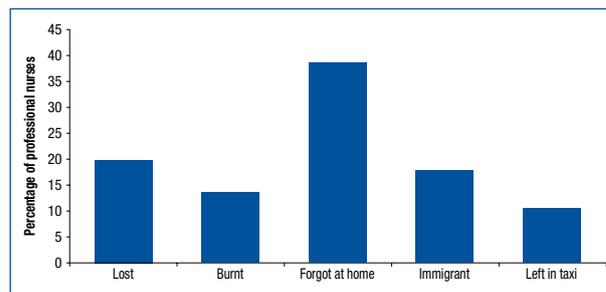


Figure 3: Given reasons for the absence of the Road to Health chart at consultations

were a failure to simultaneously administer all of the vaccines and unavailability of the vaccines.<sup>24</sup> In Mozambique, lack of information about the day of vaccination had an impact.<sup>25</sup> In Kenya, lack of integration of health services was cited as the reason.<sup>26</sup> In India, immunisation was not offered to clients every time they visited the health facility because of the logistic arrangements of the clinics. (Immunisations were carried out on certain days and different nurses attended to sick children, while others carried out the immunisations).<sup>27</sup> In South Africa, missed immunisation opportunities included lack of information, caregivers being unable to visit the clinic, parents being told by PHC professional nurses to return at another time and being given incorrect immunisation dates, while in some instances, the distance to the clinic was considered to be too far.<sup>27</sup>

The degree of implementation of the RTHC programme in the community of Makhado, Tshilwavhusiku, was so poor that it fell far short of the norms and standards recommended by the Department of Health and Social Development with regard to child health care in South Africa. The results showed that there was poor knowledge of how to interpret the RTHC, inadequate recording of sickness events within it, the RTHC was not always requested at consultations, and there was poor implementation and promotion of the growth monitoring programme, as well as a low level of knowledge of growth chart indicators. More than 50% of the participating PHC nurses could identify malnutrition at a late stage only, when clinical symptoms became apparent. These findings were also observed in similar studies. In Gambia, PHC professional nurses could only correctly identify severe malnutrition. Consequently, children with no clinical signs of malnutrition were wrongly diagnosed or went undetected, and thus received inappropriate management.<sup>28</sup> In Somalia, children who were classified by PHC professional nurses as malnourished were normal, and others who were classified as normal were malnourished. This was owing to poor skills and incorrect plotting of the weight on the growth chart.<sup>6,28</sup> In South Africa, some of the PHC professional nurses were unable to follow the protein-energy malnutrition scheme that is given to malnourished children. There was also inadequate assessment and counselling on nutrition-related diseases, with no standardised monitoring.<sup>29</sup> In Papua New Guinea, PHC professional nurses were unable to decide when the growth chart tapered off, i.e. was flat,

and if this was identified, they were unsure what to do about it. Difficulties were also experienced because of infrequent plotting and previous plotting errors.<sup>30</sup>

This study showed that the most utilised aspect of the RTHC was the EPI, vitamin A supplementation and deworming medicine. PHC professional nurses revealed that they utilised the EPI programme because they believed that it would reduce infantile morbidity and mortality, decrease missed immunisation opportunities and prevent infectious diseases. Despite the good intentions, there are no guarantees that the community of Makhado received good immunisation coverage, while poor implementation of the RTHC programme constitutes a serious public health problem.

## Limitations

The findings of this study may not be generalised because a relatively small sample was used. A cross-section allowed the researcher to describe the perceptions and level of knowledge on monitoring of the RTHC by PHC professional nurses at consultations. Future research should include a larger sample, using the cross-sectional method to apply the results to the general population.

The RTHC has been improved greatly in terms of design, and is now called the Road to Health booklet (RTHB), which was printed in 2010 by the Department of Health and is already in use. The RTHB was not included in the study, but one may assume that the challenges that were encountered by PHC professional nurses using the RTHC will be similar to those faced when using the RTHB.

## Conclusion

The RTHC remains a powerful tool with which to screen protein-energy malnutrition in developing countries. In this study, the PHC professional nurses displayed inadequate knowledge of growth chart indices and the RTHC programme was poorly implemented. However, concerns were voiced which need to be addressed. These included staff shortages and mothers not bringing the RTHC with to every consultation. In-service training, workshops, support and supervision are critical for monitoring of the RTHC. Successful monitoring of the RTHC depends on the commitment, motivation, expertise and abilities of PHC professional nurses with regard to the health of children at primary healthcare level, as per the guidelines and recommendations of the Department of Health and Social Development.

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