THE THIRD
NATIONAL HEALTH AND MORBIDITY SURVEY
2006
(NHMS III)

INFANT FEEDING

INSTITUTE FOR PUBLIC HEALTH

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LIST OF RESEARCH TOPICS

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MESSAGE FROM THE DIRECTOR GENERAL OF HEALTH MALAYSIA

Since independence, Malaysia has achieved remarkable progress economically and socially, notably in the health sector, through a well planned and comprehensive health care delivery system. However, Malaysia's health care system still has to grapple with many challenges, particularly the rising costs of health care and the increasing demands and expectations for quality care by our consumers. In this respect, the Ministry of Health formed the 'National Institutes of Health' to spearhead health research that will provide the body of evidence to help formulate health policies and create new tools to measure health impacts arising from the series of interventions made in the provision of health care. This will lead to an environment of better governance.

The first National Health & Morbidity Survey (NHMS) was conducted in 1986 by the Institute for Public Health (IPH) which is currently one of the research organizations under the umbrella of the National Institutes of Health (NIH). IPH was also given the task of conducting the second NHMS II in 1996 and the current NHMS III in 2006. Data and information gathered by these surveys are consistently and extensively been used by the Ministry of Health in formulating the Malaysian Health Plans and evaluating the intervention programmes.

The publication of the current NHMS III report would generate much interest amongst of all health care stakeholders in the country as well as international health organizations. It is my sincere wish that the data and information generated by NHMS III be fully distributed, discussed and utilized to enhance further the provision of health care in this country. The date generated on the national health and health - related prevalence would be useful in assessing the national health burden as well as allowing for international comparison of health systems achievements.

I would like to take this opportunity to congratulate all those directly involved in the conduct of the survey, namely members of the National Steering Committee, the Advisory Committee, Research Groups and the Working Committee for their untiring efforts in the planning and conduct of the survey as well as publication of the reports. I would like to specially place on record the Ministry's appreciation of the excellent work done by the Principal Investigator and his team and for their dedication and tenacious efforts in spearheading this project to fruition. The Ministry of Health is committed to conduct these National Health and Morbidity Surveys on a regular basis and hope that IPH will continue to provide the leadership in conducting future National Health and Morbidity Surveys in this country.

Thank you.

Tan Sri Datuk Dr Hj. Mohd Ismail Merican
Director General of Health, Malaysia.

MESSAGE FROM THE DEPUTY DIRECTOR GENERAL OF HEALTH (RESEARCH AND TECHNICAL SUPPORT)

The Research and Technical Support Programme of the Ministry of Health emphasizes the need for research in supporting decision making and planning the activities in the Ministry. Only then can we ensure that every decision made either in planning resources or providing services to the people is supported by evidence based information and ensuring better results and outcome. We would certainly prefer local expertise rather than depend on foreign experts to carry out local research.

Under the umbrella of the National Institutes of Health, the Institute for Public Health has actively been involved in conducting research in public health and the National Health and Morbidity Survey is one of the major research conducted by IKU. This is the third time IKU has been given the responsibility to conduct such a mammoth task. I am very pleased that a lot of improvement have been made in the way this survey was conducted based on the experience learnt during the first and second surveys. However, due to the nature of the community survey, not all diseases and health issues were able to be covered in this survey. The research teams had to conduct an extensive literature reviews for relevant and up to date information on the health status of the Malaysian population.

I believe that the information in these reports are extremely valuable to all decision makers at the National State and district levels as well as those interested in the health of the Malaysian population. It can be a tool in providing guidance in developing and implementing strategies for the disease prevention and control programme in Malaysia.

I would like to take this opportunity to congratulate the research team members who have successfully undertaken and completed this survey. I would also like to thank all individuals and agencies who directly or indirectly made the completion of this survey possible.

The Institute for Public Health again gained a feather in its cap by successfully completing the Third National Health and Morbidity Survey.

Datuk Ir. Dr. M. S. Pillay,
Deputy Director General of Health (Research and Technical Support).

MESSAGE FROM THE DIRECTOR OF INSTITUTE FOR PUBLIC HEALTH

This is the third time the Institute for Public Health (IPH) was given the task to conduct the National Health and Morbidity Survey. The frequency of the study is every 10 years and I am proud that the Institute is able to conduct the surveys successfully since it was first initiated in 1986.

I would like to take this opportunity to thank the Director-General of Health Malaysia, Tan Sri Datuk Dr. Hj. Mohd Ismail Merican, and the Deputy-Director General of Health (Research and Technical Support), Datuk Ir Dr. M.S. Pillay, whose invaluable support and guidance were instrumental in the successful completion of the third National Health and Morbidity Survey (NHMS III). Our appreciations are also extended to all members of the Steering Committee and the Advisory Committee of NHMS III.

I would like also to take this opportunity to congratulate the Principal Investigator and his Project Team Members in completing the NHMS III study and the publication of its report. The NHMS III was made possible through the collaboration of all agencies. The meetings, workshops and conferences that were organised, met their intended objectives and the hard work put up by the field staffs, ensured the three months data collection productive and successful.

My sincere gratitude also goes to Dr. Nirmal Singh, the former Director of the Institute for Public Health, Chairman of the Advisory Committee for his continuous support and guidance which contributed towards the successful completion of the study.

I hope the documentation of this report will be beneficial for future reference.

Finally, I would like to thank all those involved in the survey for a job well done, in making the NHMS III a success and finally producing the national report of this survey.

Dr. Yahya Baba,
Director, Institute for Public Health.

MESSAGE FROM THE PRINCIPAL INVESTIGATOR NHMS III

It is indeed a challenging task when the responsibility was given to me to conduct this survey. I learned the hard way and gained a lot of valuable experience in leading the survey. The survey also taught me lots of new techniques and how it should be addressed which is not available in the textbook. In doing so, I also learned the meaning of friendship and honesty, how to manage people involved and manage properly the given budget.

I would like to take this golden opportunity to thank the Director General of Health Malaysia, Tan Sri Datuk Dr. Hj. Mohd Ismail Merican, Chairman of the Steering Committee for giving me the confidence, valuable support and guidance for the success of this survey.

I would also like to thank the Deputy Director General of Health Malaysia (Research & Technical Support), Datuk Ir. Dr. M.S. Pillay as Co-chairman of the Steering Committee for his patience in seeing through the survey until its completion the production of the national report.

My sincere appreciation to current Director of Institute for Public Health (IPH), Dr. Yahya Baba and former Directors of IPH, Dr. Nirmal Singh, Dr. Sivashamugam and Dr. Sulaiman Che Rus for their trust in me to carried out this survey. Their support for the survey has resulted the smooth conduct and success of the survey.

Special thanks to all State Directors, State Liaison Officers, Field supervisors, Scouts, Data Collection Team members for their full cooperation and efforts to ensure the success of the data collection. My appreciation is also extended to the Assistant Principal Investigator, Dr. Mohd Azahadi Omar, Main Research Group members, members of the Working Committee, Data Management group members, Statistics Consultant, Research group members, Research Officers and Research Assistants for their patience and tolerance of my behaviour to ensure the success of the study. Nevertheless I acknowledge a lot more can be done in strengthening the study.

I believe this report will serve as a useful reference for future surveys and helps in improving the local data sources and also add new valuable information for the Ministry of Health to use in the planning process. I also would like to encourage all research members to participate in further analysis of the data and publish the findings in peer review journals.

Thanks to everyone.

Dr. Hj. Ahmad Faudzi Hj. Yusoff,
Principal Investigator, The Third National Health and Morbidity Survey,
Institute for Public Health.

✒️UTHOR'S STATEMENT

This survey is part of the national health morbidity survey that is conducted every ten years. This volume is the culmination of several months of collaborative effort by the authors who have strived to ensure the integrity of this work.

We hope that the results of this survey will benefit policy makers in development of future programmes for infants and young children in Malaysia.

The authors welcome any inquiries, comments and suggestions for further improvement of this volume.

$\mathscr{A}$CKNOWLEDGEMENT

ABSTRACT

The general objective of the survey was to determine the infant feeding practices in Malaysia. This survey was part of the larger NHMS III survey where a household interview survey was conducted in 17,200 living quarters. The respondents were mothers or carers of children aged below 24 months. Questions on breastfeeding practices were based on the WHO Sample Questions for Use in Household Surveys using a recall of 24 hours breastfeeding practice while questions regarding complementary foods were based on a seven day recall of type of foods consumed.

Total number of eligible respondents for this module was 2303. The number of respondents who answered the module was 2167 (94.1%) representing 804,480 of the estimated population of children aged below 2 years in Malaysia. The overall prevalence of ever breastfed among children aged less than 2 years was 94.7% (CI: 93.0 - 95.9). The overall prevalence of exclusive breastfeeding below 4 months was 19.3% (CI: 15.5 - 23.9) and below 6 months was 14.5% (CI: 11.7 - 17.9). Predominant breast feeding below 4 months and 6 months were 19.7% (CI: 15.6 - 24.7) and 16.9% (CI: 13.7 - 20.6) respectively. Breast feeding was initiated within one hour of birth in 63.7% (61.4 - 65.9) infants and the national prevalence of continued breastfeeding up to two years was 37.4% (CI: 32.9 - 45.0). 67.9% (CI: 64.9 - 70.7) of children below 12 months received any food or drink from a bottle and the prevalence of pacifier use was 32.9% (CI: 30.9 - 35.1).

In terms of complementary feeding, 41.5% (CI: 36.4 - 46.9) of infants had received timely complementary feeding. However, complementary foods were given as early as two months of age especially in breastfed children. Most children were given a variety of foods but that the percentage of children consuming iron rich foods i.e. meat and fish was low noticeably among children in the younger age groups. Less than 40% of infants below six months consumed these food items at least once a week. Meal frequency of most children aged 6 to 8 months followed the WHO recommendations. However, only 55.9 % of children aged 9-23 months received the appropriate number of meals (at least 3 meals per day).

The results of the current survey suggest that breastfeeding and complementary feeding practices in the country were not optimal. More efforts are needed to improve exclusive breastfeeding especially in educating the public on the practice of giving plain water to breastfeeding infants, improving support for working mothers as well as guidance on appropriate complementary feeding practices.

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ABBREVIATIONS

BFHI   Baby Friendly Hospital Initiative

CCT   Central Coordinating Team

EB   Enumeration Blocks

FI   Face to Face Interview

ID   Individual Identification

IYCF   Infant And Young Child Feeding Practices

LFS   Labour Force Survey

LQ   Living Quarters

MOH   Ministry of Health

NHMS   National and Health Morbidity Survey

PPS   Probability Proportionate to Size

SPSS   Statistical Package for the Social Sciences

STATA   Statistics Data Analysis

SQL   Structured Query Language

UNICEF   United Nation Children Education Fund

WHA   World Health Assembly

WHO   World Health Organisation

1. INTRODUCTION

Adequate nutrition is critical to child health and development. The period from birth to two years of age is particularly important because of the rapid growth and brain development that occurs during this time. The period is often marked by growth faltering, micronutrient deficiencies, and common childhood illnesses such as diarrhoea, as children transition from exclusive breastfeeding to solid foods in addition to breast milk.

Among the most important infant feeding practices as defined by World Health Organisation (WHO) and United Nation Children Education Fund (UNICEF) are initiation of breastfeeding within about 1 hour of birth; frequent, on-demand feeding (including night feeds); exclusive breastfeeding (defined as breast milk only and no other foods or liquids) for the first 6 months of life; breastfeeding complemented with locally available and hygienically prepared, appropriate foods from the age of 6 months; increased breastfeeding during illness and recovery; and continued breastfeeding for up to 2 years of age or beyond, while receiving nutritionally adequate and safe complementary foods (WHO 2001).

Over the past decade, the government of Malaysia has recognized the significance of breastfeeding and infant nutrition. The National Breastfeeding Policy was formulated in 1993 and revised in 2005 in accordance with World Health Assembly Resolution 54.2 (2001) whereby exclusive breastfeeding was recommended for the first 6 months of life and continued up to two years. Complementary foods should be introduced at the age of 6 months.

The government has made commitments to: protect current breastfeeding practices from erosion due to aggressive marketing of breast milk substitutes; support women's desire to breastfeed well by providing appropriate health services, accurate and complete information, and an environment which reinforces breastfeeding such as longer maternity leave and breastfeeding facilities in public areas and work place. One of the major strategies undertaken by the Ministry of Health was the implementation of The Baby Friendly Hospital Initiative beginning in 1992. Since then there are a total of 128 Baby Friendly Hospitals in the country.

To better understand the effect of the programs carried out, information on infant feeding status in the country needs to be monitored to evaluate and improve existing programs.

2. LITERATURE REVIEW

Trend analysis of exclusive breastfeeding patterns in 38 developing countries from the UNICEF global databases was reported by Labbok et al. (2006). Between 1990 and 2000, the data suggest that exclusive breastfeeding levels in the developing world increased 15% overall among infants younger than 4 months (from 46% to 53%) and among infants younger than 6 months (from 34% to 39%). The largest improvements occurred in sub- Saharan Africa, where exclusive breastfeeding rates nearly doubled (18% in 1990 to 38% in 2000). The rates also increased in the Middle East and North Africa region (from 29% to 34%). However, the levels of exclusive breastfeeding in these two regions remain among the lowest of the regions analyzed.

More modest improvements were observed in South Asian and East Asian/Pacific regions, although this part of the world tends to have the highest exclusive breastfeeding rates in the world, averaging between half and two thirds of infants being exclusively breastfed. The increases in exclusive breastfeeding rates tended to be much greater in urban areas than in rural areas, with a 40% increase in urban areas overall. It was also reported that the most notable increases in exclusive breastfeeding occurred in the early months of life. A 22% increase was observed among the 0- to 1-month age group and a 14% increase at 2 to 3 months, while the rates remained approximately the same for the 4 to 5 month olds.

A report of key indicators related to optimal feeding practices breastfeeding data from 43 countries between 1998 and 2004 showed that in the South East Asian region the percentage of children initiated early on breastfeeding was highest in the Philippines (54.0%) and lowest in Cambodia (11.0%) while exclusive breastfeeding below 6 months was highest in Nepal (68.3%) (Mukuria et al. 2006).

In Malaysia, nationally representative data on levels of exclusive breastfeeding was virtually unavailable before the 1990's. The Second National and Health Morbidity Survey (NHMS II) which was conducted in 1996 was the first national survey that used the indicators recommended by WHO for assessing breastfeeding indicators (WHO 1991) and provided baseline data for the country.

Findings of the NHMS II showed that although ever breastfeeding was almost universal, only one third of infants below four month of age were exclusively breastfed and early initiation rate was 41.1% (Fatimah et al.1999). Significant differences were seen between urban and rural localities with higher prevalence in the rural.

Besides inadequate breastfeeding, delayed complementary feeding and inadequate quality or quantity of complementary feeding are among the most common causes of growth faltering in developing countries (Allen & Gillispie 2001). While complementary feeding practices alone cannot ensure health and development, good practices can help ensure adequate nutritional intake (Caulfield, Huffman, and Piwoz 1999). Complementary feeding which is defined as the period during which foods or liquids are provided along with continued breastfeeding (WHO 1998) is poorly done in many developing countries, due to lack of information about what foods are appropriate, how much should be given, how they should be given, and their inadequacy in quantity and quality (Tomkins & Watson 1989).

Based on the WHO guiding principles for feeding breastfed and non-breastfed children, complementary foods should be started at the age of six months and appropriate infant and young child feeding practice includes continued breastfeeding or feeding with appropriate calcium rich foods if not breast feeding, feeding a minimum number of times a day according to age and minimum number of food groups a day (PAHO/WHO 2003; WHO 2005).

The standard indicator for assessing timely introduction of complementary foods is expressed by the percentage of infants 6 to 9 months who received breast milk and solid or semi-solid in the last 24 hours (WHO 1991). This indicator also provides information on delayed introduction of complementary foods. In the South Asian region, the rate of timely introduction of complementary feeding countries varies from 22% (Pakistan) to 98% (Sri Lanka) (Gupta & Arora 2007).

Based on the WHO guiding principles for feeding breastfed (WHO 2003) and non-breastfed children (WHO 2005), Infant and Young Child Feeding Practices (IYCF) indicator is defined as comprising of three components, i.e. continued breastfeeding or feeding with appropriate calcium rich foods if not breastfed; feeding (solid/semi-solid food) minimum number of times per day according to age and breastfeeding status; and feeding minimum number of food groups per day according to breastfeeding status (Mukuria et al. 2006). Based on this indicator, it was reported that in most South Asian countries, the percentage of children receiving appropriate IYCF practices was less than 55% (Mukuria et al. 2006).

Locally, a cross sectional study in 2001 in the district of Seremban indicated that majority of Malay infants received complementary foods between the age of 4 to 6 months although only 50% of the infants receive adequate energy intake (Aina Mariana 2000/2001). Currently, there are no nationally representative data that are available to indicate the status of complementary feeding practices in the country. Hence, the current survey provides recent trends in breastfeeding practices as well as baseline information on complementary feeding practices.

3. OBJECTIVES

3.1 General Objective

The general objective of the survey was to determine the infant feeding practices in Malaysia.

3.2 Specific Objectives

3.2.1 To determine the following prevalence among socio-demographic subgroups:

a) Ever breastfed, exclusive, predominant and complementary breastfeeding
b) Bottle feeding
c) Pacifier use
d) Timely Initiation of breastfeeding
e) Continued breastfeeding at 2 years
f) Timely complementary feeding

3.2.2 To determine the complementary feeding patterns of infants in terms of type of food and meal frequency.

3.2.3 To provide information for programme managers to strengthen breastfeeding promotion programmes.

4. METHODOLOGY

4.1 Scope of the Study

Research problems, scopes and main issues to be included in NHMS III were obtained from discussions and feedbacks from Ministry of Health state health managers, as well as experts from the local universities and individuals. The main research team members of the NHMS III reviewed and studied closely the feasibility and practicality of the suggested research topics for this community-based household survey. Extensive literature review was initiated. Technical and research experts in the field related to the identified research areas were consulted for further advise and comments. The main research group used the following criteria in considering the suggested scopes for this survey:

a) The issue/problem is current or has potential of high prevalence
b) The issue/problem is focused on disease/disorders associated with affluence, lifestyle, environment and demographic changes.
c) The issue/problem is causing physical, mental or social disability

d)   The issue/problem has important economic implications
e)   It is feasible to implement interventions to reduce the problem
f)   The information related to the issue/problem is not available through the routine monitoring system or other sources.
g)   The information is more appropriately obtained through a nation-wide community survey
h)   It is feasible to obtain through a nation-wide community-based survey.

The short-listed research topics were then presented to the Advisory Group Members for further deliberation and decisions. These topics were later refined by the research team members based on the decisions made at the Advisory Committee meeting. It was tabled to the Steering Committee and 18 research topics were approved to be included in the NHMS III.

4.2   Sampling Design and Sample Size

4.2.1   Sampling frame

The sampling frame for this survey is an updated 2004 version; an effort undertaken prior to the implementation of Labour Force Survey (LFS) 2004. In general, each selected Enumeration Blocks (EB) comprised of 8 sampled Living Quarters (LQ). The EBs was geographically contiguous areas of land with identifiable boundaries. Each contains about 80-120 LQs with about 600 persons. Generally, all EBs are formed within gazetted boundaries.

The EBs in the sampling frame was also classified into urban and rural areas. The classification into these categories was in terms of population of gazetted and built-up areas as follows:

Stratum	Population of gazetted areas and built-up
Metropolitan	75,000 and above
Urban Large	10,000 to 74,999
Urban Small	1,000 to 9,999
Rural	The rest of the country

For sampling purposes, the above broad classification was found to be adequate for all states in Peninsular Malaysia and the Federal Territories of Kuala Lumpur and Labuan. However, for Sabah and Sarawak, due to problems of accessibility, the rural stratum had to be further sub-stratified based on the time taken to reach the area from the nearest urban centre.

For the purpose of urban and rural analysis, Metropolitan and Urban Large strata are combined together thus referred to as 'urban' stratum, while for Urban Small and the various sub-divisions of the rural areas they are combined together to form to a 'rural' stratum.

4.2.2   Sampling design

A two stage stratified sampling design with proportionate allocation was adopted in this survey. The first stage sampling unit was the EB and within each sampled EB, the LQs were selected as second stage unit.

4.2.3   Sample size

In the course of sample selection, the following factors were taken into consideration:

a)   Expected prevalence rate

The prevalence rate of the health problems for Malaysia obtained from the National Health and Morbidity Survey II (NHMS II) were used to estimate the overall sample size. Using the previous finding of 10% prevalence rate, the initial sample size at the state level was calculated in order to come up with overall sample size. The size was further apportioned for each state using the Probability Proportionate to Size (PPS) method.

b)   Response rate of the NHMS II

The response rates, which ranged from 83 to 97% for the NHMS II of each state, were taken into consideration in the course of the determination of sample size.

c)   Margin of error and design effect

As the factors of precision and efficient of the survey are paramount, the decision reached for the targeted margin of error is 1.2 and the design effect valued at 2. These values were used at the initial stages of the calculation of the sample size of each state.

The survey findings addressing the specific objectives of this survey are expected to be used for state level programmed planning. Thus, the calculation for the sample size has taken into consideration data to be analyzed at the state level.

In addition to the major factors mentioned earlier, the availability of resources, namely, financial and human resources, and the time taken to conduct this survey also becomes part of the process of the determination of sample size.

d)   Sample population for infant feeding module

This survey was part of the larger III survey where a household interview survey was conducted in 17,200 living quarters. The respondents of this part of the survey were mothers or carers of children below the age of 24 months in the household. However, the population of children below 24 months in the household was not taken into account during the sample size calculation and hence the sample was not representative of the state population. Based on the estimated exclusive breastfeeding below four months of 25% and the precision of 20%, the minimum sample size per state should be 300. In

this survey, all states except Selangor and Sabah had a sample size of below 300 (Appendix: Table 1).

4.3   Preparation of Field Areas and Logistic Support

A number of state liaison officers were recruited in preparation for the survey proper. Strong networking with state liaison officers and District Health Officers (MOH and local authorities) from the areas sampled for the survey was established. Field scouts were mobilized from these areas to identify and tag the LQ's selected for the survey, as well as to inform the community and related government agencies of the importance and schedule of the planned survey. State liaison officers were also assisting Field Supervisors in the arrangement of transportation, accommodation and other logistics for the survey teams.

4.4   Method of Data Collections

4.4.1   The questionnaire

A bi-lingual (Bahasa Malaysia and English) pre-coded questionnaire was designed, pre-tested and piloted prior to the survey.

Certain terminology and items in the questionnaire were also had been made available in the dialects or languages of the main ethnic groups in Malaysia, such as Hokkien and Cantonese for the Chinese and Tamil for the Indians. All versions were back translated to English by independent reviewers to ensure the accuracy of the translations.

All research topics for the questionnaire are arranged into modules ranging from A to Z. Topics that are similar area are arranged into sub-modules under a particular module. Questions comprised of both close ended and open ended. The questions in each module were tailored to the target group. Two types of questionnaires were developed i.e. face to face and self administered based on the requirements of the research subgroups and the research topics involved.

The face to face interview questionnaires consisted of 2 subtypes, i.e., the household questionnaire (orange) to be answered by the head of the household of the LQ selected, and the individual questionnaire, to be answered by each member of the household. Four types of individual FI questionnaires were developed, to cater to the different age groups of less than 2 years old (pink), 2 to less than 13 years old (blue), 13 to less than18 years old (yellow) and 18 years old and above (purple).

For those aged below 13 years old, the child's parents or guardians were responsible for answering on his or her behalf. Those aged 13 years and above are required to answer their respective questionnaires directly through the interview.

All the FI questionnaires have a consent form to be read and signed by the respondent or parent / guardian of the respondent. The outside cover of all questionnaires had to be filled with a unique

individual identification (ID) number by the enumerator. The enumerator also had to fill his or her ID as well as the code for the outcome of the interview as part of the quality assurance process.

4.4.2   Questionnaire for breast feeding practice

Questions on breastfeeding practices, pacifier use and complementary feeding were asked using a structured questionnaire. The questions on breastfeeding practices were based on the WHO Sample Questions for Use in Household Surveys which uses a recall of 24 hours breastfeeding practice (WHO 1991).

Mothers or carers of children were asked whether various types of liquids or solid foods were given to the child at any time during the preceding day or night. This information was used to determine the proportion of children who were exclusively breastfeeding, breastfeeding and receiving supplemental foods or not breastfeeding at all. Questions regarding complementary foods were based on a seven day recall of type of foods consumed. The frequency of consumption per week of nine types of food groups was asked. The food groups were:

a)   Commercial baby foods
b)   Cereal-based foods (not including commercial baby foods)
c)   Tubers
d)   Fish (including fresh water fish) and sea food
e)   Meat and poultry including organ meat
f)   Beans and nuts
g)   Eggs
h)   Vegetables
i)   Fruits

4.4.3   The interview

As far as possible, all adult members who qualify from the selected LQ's were interviewed by the data collection team members. Parents or guardians were expected to provide information for their children aged 12 years and below (primary school). Interviews commenced early in the morning and lasted till late in the evening. Where an interview had been unsuccessful due to the absence of the respondent at the selected LQ, repeat visits were conducted after leaving messages with neighbours or by other means for an appointment at a later date. A household member can only be classified as a non-responded after 3 unsuccessful visits.

For the first part of the interview which covers sections on general household, socio-demographic and economic profile, load of illness, health utilization and consumption cost, a trained non-medical or paramedical interviewer conducted the interviews. Sections pertaining to specific health problems and involving blood or other physical or medical examination was conducted by trained nurses.

4.5   Field Preparations

Two main survey implementation groups were formed: the Central Coordinating Team (CCT) and the field team. The CCT's main role was to monitor and coordinate the progress of implementation and provide administrative support in terms of financial and logistic arrangement for the field survey. The Field Teams were responsible to oversee and manage the field data collection process as well as undertake quality control.

The field data collection was conducted throughout Malaysia simultaneously, spanning a continuous period of 4 months starting from the month of April 2006. Teams were organized to move into 5 regions in Peninsular Malaysia, 2 regions in Sabah and 4 regions in Sarawak for data collection.

4.5.1   Pilot study

A pilot study was conducted on a sample of EB's (not included in the NHMS III) about 2 months prior to the nationwide survey. It was conducted in three different areas in and around the Klang Valley, namely Sepang, Klang and Bangsar. The population in these locations comprised of three distinct socio-demographic strata that are rural, semi-urban and urban respectively. The pilot study focused on the following aspects of the survey:

a)   Testing of the questionnaire
b)   Testing of the field logistic preparation
c)   Testing of the scouting activities
d)   Testing of the central monitoring and logistic support

4.5.2   Training of data collection teams

A two weeks training course was held for field supervisors, team leaders, nurses and interviewers was to familiarize them with the questionnaire, develop their interpersonal communication skills and appreciate the need for good teamwork. Briefing on the questionnaire, mock interview in the classroom and individual practice under supervision was conducted during the training.

4.6   Quality Control

Quality control procedures for the data collection were done at two stages, field and central. Please refer to NHMS III protocol for detail description.

4.7   Data Management

4.7.1   Data screening

The following data screening exercises were conducted at the field and central level prior to data entry:

a)   Field data screened by each interviewers at the end of his/her interview
b)   Field data screened for each question by peer interviewers through exchanging questionnaire booklets
c)   Field data screened by team leaders and field supervisors
d)   Central data screening of the questionnaire by the quality control team

4.7.2   Data entry

The data entry system was developed to record the information collected during the data collection phase. It is a web based system that allows multiple simultaneous accesses to the database. The NHMS III used a double manual data entry method and any discrepancy between both entries was verified by the supervisors. The data entry started simultaneously with data collection (first week of April 2006) and was completed at the end of January 2007. The data entered was stored in the database according to the module. The databases were designed using Structured Query Language (SQL) which is a standard language for relational database management system.

4.7.3   Data analysis

Data analysis was done by exporting the data into other analytical tools such as Microsoft Excel, SPSS and STATA. The data in database (text form) was exported to the Microsoft Excel form then to the SPSS and STATA. The raw data was cleaned and analysed according to the terms, working definition and dummy table prepared by the research groups. All the analytical process were monitored and advised by the NHMS III Statistics Consultant.

4.8   Definitions of Terms / Variables

Children were classified into one of the several feeding categories based on current feeding practices reported by their mothers or carers according to the World Health Organization infant feeding indicators (WHO 1991) as stated below.

Table 4.1: Breastfeeding categories based on current feeding practices

Indicators	Definition
Ever breastfeeding	% children less than 12 months breastfed who were ever breastfed.
Exclusive breastfeeding rate	% infants less than 4 and 6 months exclusively breastfed. An infant is considered to be exclusively breastfed if s/he receives only breast milk and no water, other, or solids. Drops or syrups of vitamins, mineral supplements, or medicines are allowed.
Predominantly breastfeeding rate	% infants aged less than 4 or 6 months predominantly breastfed. An infant is considered to be predominantly breastfed if s/he receives breast milk and water/water based drinks. Drops or syrups of vitamins, mineral supplements, or medicines are allowed.
Complementary breastfeeding rate	% infants aged less than 4 or 6 months complementary breastfed. An infant is considered to be complementary breastfed if s/he receives breast milk and any other fluid or food including non-human milk.
Timely initiation of breastfeeding rate	% children less than 12 months breastfed within the first hour of life.
Continued breastfeeding at 2 year rate	% of children aged 20 to less than 24 months who are breastfed.
Timely complementary feeding rate	% infants between 6 and 10 months being fed complementary foods in addition to breast milk. A 24-hour recall is used to determine whether the infant receives appropriate complementary feeding, "Solids" are defined as foods of mushy (semi-solid) or solid consistency, not fluids.
Bottle feeding rate	% of infants aged less than 12 months of age receiving any food or drink from a bottle with a nipple.
Pacifier use rate	% of children aged less than 24 months of age who were given pacifier.

5. FINDINGS

5.1 General Findings

Total number of eligible respondents for this module was 2303. The number of respondents who answered the module on infant feeding practice was 2167 (94.1%) representing 804,480 of the estimated population of children aged below 24 months in Malaysia.

Appendix : Table 1 shows the distribution of eligible respondents by state in Malaysia and strata. Peninsular Malaysia accounted for 75.3% of the population while Sabah and Sarawak, 16.2 % and 8.5% respectively. Urban locality accounted for 59.6% while rural 40.4%. By ethnicity, 60.7% were Malay followed by Chinese (13.9%), Other Bumiputras (15.3%), Indian (6.3%) and Others (3.8%).

In this report, only national prevalence and strata differentials are reported as the sample size was insufficient to describe other differentials.

5.2 Timely Initiation of Breastfeeding

Early breastfeeding practices determine the successful establishment and duration of breastfeeding. It is recommended that children be put to the breast immediately or within one hour after birth (WHO 1998). When a mother initiates breastfeeding immediately after birth, breast milk production is stimulated. During the first few days after delivery, colostrum, an important source of nutrition and antibody protection for the newborn, is produced and should be fed to the newborn while awaiting the production of regular breast milk. Prelacteal feeding-giving liquids or foods other than breast milk prior to the establishment of regular breast-feeding-deprives the child of the valuable nutrients and protection of colostrum and exposes the newborn to the risk of infection (WHO 1998).

Appendix : Table 2 shows that the overall prevalence of infants initiated breastfeeding within one hour of birth was 63.7% (CI: 61.4 - 65.9). There was a significant different in prevalence when compared by strata. The prevalence in the rural locality was 69.5% (66.1, 72.8) while in the urban area was 60.6% (CI: 57.7 - 63.4). When compared to the findings NHMS II there was a significant increase of 22.3% in the prevalence of early breastfeeding initiation and the increment was higher in the rural localities.

5.3 Ever Breastfeeding

The overall prevalence of children ever breastfed among children aged less than 12 years was 94.7% (CI: 93.0 - 95.9) (Appendix : Table 3). This represent a significant increase of 6.1% compared to the NHMS II in 1996.

Prevalence was higher in the rural [93.6% (CI: 91.3 - 95.4)] than in the urban [96.7% (CI: 94.4 - 98.1)]. However, the difference was not significant. When compared to the findings in the NHMS II, the increase in prevalence of ever breast feeding tends to be higher in the urban localities.

5.4   Exclusive, Predominant and Complementary Breastfeeding Among Infants

UNICEF and WHO recommend that children be exclusively breastfed - fed only breast milk with no other liquids (including water) or food - on demand for the first 6 months of life (WHO 2001). Early introduction of foods and other liquids reduces breast milk intake, decreases the full absorption of nutrients from breast milk, and increases the risk of diarrhoea and acute respiratory infections for infants. It also limits the duration of the mother's postpartum amenorrhea and may result in shortened birth intervals.

In the current survey, breastfeeding rates among infants below four months of age were analyzed to show the trend in comparison to the last NHMS II survey. The findings for the prevalence of exclusive, predominant and complementary breastfeeding among infants below four months of age are shown in Appendix: Table 4.

The overall prevalence of exclusive breastfeeding below four months was 19.3% (CI: 15.5 - 23.9) and predominant breast feeding was 19.7% (CI: 15.6 - 24.7). The prevalence of complementary breastfeeding was 46.7% (CI: 41.2 - 52.2).

Exclusive breastfeeding was significantly more in the rural [30.7% (CI: 23.3 - 39.2)] compared to those in the urban localities [12.9% (CI: 8.9 - 18.5]. However, there were no significant differences in the prevalence of the other types of breastfeeding between strata.

When compared to the findings of the NHMS II, there was a significant decline of 9.7% in the prevalence of exclusive breastfeeding while there was an increased of 9.7% in the prevalence of predominant breastfeeding (Figure 5.1). The prevalence of complementary breastfeeding remained almost the same over the ten year period.

The decline of exclusive breastfeeding was significant in the urban but not in the rural (Appendix : Table 4). Prevalence of exclusive breastfeeding in the urban localities declined by 12.6% (from 25.5% in 1996 to 12.9% in 2006). However, there was only a decline of 2% in the prevalence of exclusive breastfeeding in the rural and this difference was not significant.

For predominant breastfeeding the increment was profound in the urban locality where it rose by 11.3% (from 8.7% to 20.0%).
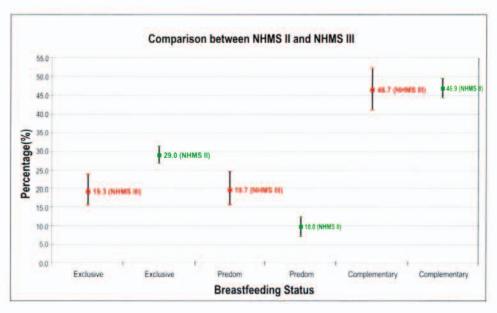
Figure 5.1: Comparison between NHMS II and NHMS III of breastfeeding status among children aged below 4 months

Appendix: Table 5 shows the prevalence of exclusive, predominant and complementary breastfeeding among infants below six months of age.

The overall prevalence of exclusive breastfeeding below six months was 14.5% (CI: 11.7 - 17.9) and predominant breast feeding was 16.9% (CI: 13.7 - 20.6). The prevalence of complementary breastfeeding was 46.9% (CI: 42.4 - 51.4). Significantly, more infants in the rural were exclusively breastfed than those in the urban setting.

The prevalence of exclusive breastfeeding was highest among infants younger than two months (26.7%) and drops rapidly to 11.7% in infants aged between two to three months (Figure 5.2). The prevalence further declined by almost half to 6.1% in infants between the ages of four to five months. It was also noted that percentage of infants who stop breastfeeding increase rapidly in infants 4 months and above.
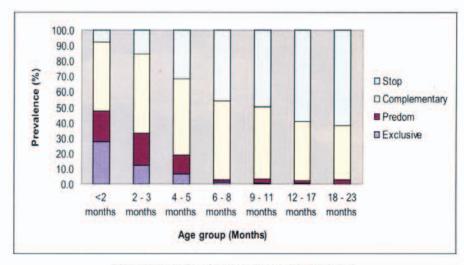

Figure 5.2: Breastfeeding status by age group

5.5 Types of Liquids Consumed by Breastfed Infants

Appendix: Table 6 shows the proportion of children according to breastfeeding status and type of fluids given to breastfeeding children by age. Among breastfeeding infants below two months of age, 18% were given only plain water besides breast milk while 41.4% were given other milk. At the age between two to three months, 19.7% were given only plain water and 40.8% were supplemented with other milk. Non-milk liquids or fruit juice was not commonly given to children below the age of 24 months.

5.6 Continued Breastfeeding up to 2 Years

Continued breastfeeding is important for older infants and young children age 6-23 months, contributing significantly to overall nutrient intake. For older infants (age 6-11 months), breast milk fills most of the energy needs and remains an important source of vitamin A and C, as well as essential fatty acids. Even for young children 12-23 months of age, breast milk can provide as much as 35-40 percent of their total energy needs.

In this survey, the prevalence of continued breastfeeding up to two years was defined as the percentage of children aged 20 to less than 24 months who are breastfed. The national prevalence of continued breastfeeding up to two years was 37.4% (CI: 32.9 - 45.0). Significantly, more children in the rural were breastfed up to two years compared to children in the urban.

When compared to the prevalence ten years ago, there was a significant increase of 25.7% (Appendix: Table 7). The rise in the prevalence of continued breast feeding was greater in the rural compared to the urban localities (from 13.2% to 46.9%).

5.7 Bottle Feeding

Appendix: Table 8 shows the prevalence of bottle feeding. The national prevalence of bottle feeding was 67.9% (CI: 64.9 - 70.0). Significant differences in the prevalence of bottle feeding between rural and urban population was noted. The prevalence in the rural locality was 60.2% (CI: 55.2 - 65.1) while the prevalence in the urban was 71.8% (CI: 68.1 - 75.2).

Significantly less children below 12 months were receiving any food or drink from a bottle compared to the previous survey [86.1% (CI: 84.0 - 88.3)]. The highest decline was in the rural localities where the prevalence fell from 86.5% to 60.2%.

5.8 Pacifier Use

The prevalence of pacifier use was 32.9% (CI: 30.8 - 35.0) in which the urban-rural difference was significant with 35.3% (CI: 32.6 - 38.0) in the urban settings and 28.3% (CI: 25.2 - 31.7) in the urban areas (Appendix: Table 9). Compared to the previous survey, the overall prevalence was not significantly different.

5.9   Timely Complementary Feeding

The current infant and young child feeding recommendation is that solid and or semi-solid complementary foods should be introduced from the age of six months while continuing breastfeeding. The indicator used to determine timely complementary rate was the proportion of infants between the age of six to nine months who are receiving breast milk and complementary foods. Findings on the prevalence of timely complementary feeding are as in Appendix : Table 10.

Of infants aged six to less than nine months, 41.5% (CI: 36.4 - 46.9) had received complementary feeding. Significantly more rural children received timely complementary feeding [53.8% (CI: 45.1 - 62.4)] compared to children in the urban [35.6% (CI: 29.4 - 42.3)].

5.10   Type of Foods Consumed by Children

Appendix: Table 11a and Table 11b show the types of food consumed by breastfed and non-breastfed children in the preceding week of the data collection. A food item was considered consumed if taken at least once in the preceding week. These findings are subject to a number of limitations. Firstly, the respondent may not be able to report fully on the child's intake of foods if the child is fed by another individual during the period. Secondly, the data are subject to recall errors. Despite these limitations, the information collected on the type of foods eaten is useful in assessing the dietary diversity of these children.

The findings of this survey showed that almost half of breastfed children and all non breastfed children were consuming infant formula or other powdered milk (Appendix: Table 11a and 11b). Breastfed infants were already been given a variety of foods besides breast milk before the age of two months while non breastfeeding infants only started consuming other foods at the age of 2-3 months. It was interesting to note that all non breastfed infants were given commercial baby food at the age of 2-3 months compared to 55.4% in breastfed infant. Nonetheless, in all infants below the age of 6 months, besides commercial baby foods other iron rich foods i.e. meat and fish were not commonly consumed whereby less than 30-40% of infants were consuming meat or fish at least once a week (Appendix : Table 11c).

Appendix: Table 11c also showed that at the age of 6-8 months, besides home cooked cereal based foods, the most commonly eaten foods were vegetables (72.7%), fruits (63.1%) and fish (65.1%). About 40-60% was consuming meat, eggs and tubers while only 18.6% were consuming beans. The percentage of children eating these food items increase with age although beans remain the least popular food.

5.11   Meal Frequency

Appendix: Table 12a -12c show the percentage of infants 6-23 months who were fed appropriate number of meals a day by breastfeeding status. As shown in Appendix: Table 12a, 85% of infants aged 6-8 months consumed the appropriate minimum number of meals (two meals per day) compared to only 55.9% of infants aged 9-23 months (three meals per day) (Appendix: Table 12b).

6. DISCUSSION

6.1 Breastfeeding Practices

The results of the current survey suggested that breastfeeding practice in the country was common but not optimal. Even though two thirds of infants were initiated early for breastfeeding and almost all infants were ever breastfed, the prevalence of exclusive breastfeeding among children below six months was less than 15%. Compared to other countries in the South East region, Malaysia was among the countries with the lowest prevalence of exclusive breastfeeding. In the year 2001, Nepal had the highest prevalence of 68.3% while Cambodia was the lowest, with the percentage of 11.4% infants under 6 months exclusively breastfed in 2000 (Mukuria et al.2006).

Findings of the NHMS III showed that the percentage of infants who were exclusively breastfed fell rapidly after the age of two months during which the percentage of infants consuming infant formula began to rise. No information were available to determine factors that may be related to this finding but other studies suggested that mothers working status have a negative effect on breastfeeding (Alison 2004; Butler et al. 2004). In Malaysia, about half of the work force are women and generally the maternity leave is about two months in both the public and private sector. It can be hypothesised that mothers replaced breast milk with formula or other foods by two months of age in preparation to go back to work.

Comparison of the current findings with the NHMS II carried out ten years ago showed a downward trend in the prevalence of exclusive breastfeeding in infants below four months of age while there was an increase in the prevalence of predominant breastfeeding.The rise in predominant breastfeeding (which is defined as the practise of breastfeeding with the addition of water or water based fluids only) may be cause by more infants given plain water. In this survey, it was found that about 20% of breastfed infants were given only plain water in the first three months.

However, the trend in breastfeeding practices should be interpreted with caution due to the differences in the recall periods used in the second National Health and Morbidity Surveys. In a study in the United States, it was found that the age of weaning can be over estimated in interviews 1-3.5 years after birth compared to those within 3 weeks of the event, by approximately one month for 1-3.5 year recall to two weeks for 6-month recall (Gillispie et al. 2006).

The current survey used 24-hour recall to measure breastfeeding practices i.e. the current age of the child and information for the 24 hours preceding the survey whereas in the Second National Health and Morbidity Survey, retrospective data were gathered where carers of children aged below 24 months were asked when they stopped or started particular feeding practices. The recall period could range from one day to 23 months depending on the age of the child at the time of interview. Due to this difference, direct comparisons of the two data sets should be treated with caution.

6.2 Bottle Feeding Practice

Bottle feeding is not recommended because unhygienic conditions and poor formula preparation associated with bottle-feeding can put the child at greater risk of illness and malnutrition. In the current survey, bottle feeding was common especially in the urban. Nevertheless, it was significantly less compared to the last survey.

6.3 Complementary Feeding Practices

Findings of the current survey showed that less than half of infants were consuming complementary food at the appropriate age of six to nine months and children were consuming complementary foods as early as younger than two months of age. The practice was more prominent among breastfed infants. This practice was deviant from the Malaysian Breastfeeding Policy and WHO recommendation that during the first six months of life, children should be exclusively breastfed and early complementary feeding is discouraged. This is because early introduction of complementary foods increases the exposure of an infant to pathogens that may cause diarrheal disease, malnutrition and in breastfed infants, may reduce breast milk output. WHO and UNICEF also recommend that all children begin to receive complementary food by the age of six months (PAHO/WHO 2003; WHO 2005) as at this age the mother's breast milk no longer provides adequate nutrition for the child.

In terms of dietary diversity, the survey found that children aged 6-23 months were given a variety of food and the main staple was cereal-based foods. Consumption of vegetables and fruits were also common. Nevertheless, studies have shown that plant-based complementary foods cannot meet the needs of certain micronutrient at this age, particularly iron, zinc, calcium and vitamin B12 (Dewey et al. 2004). This survey also found that the percentage of children consuming iron rich foods i.e. meat and fish was low among children in the younger age groups. Less than 40% of infants below six months consumed these food items at least once a week. This is of major concern as at the age of 4-6 months, neonatal iron stores of full term infants have been depleted and they are at the greatest risk of iron deficiency (AAP 1973).

The minimum meal frequency for children depends on the energy density of the complementary foods given (Dewey 2004). It ranges from 5-6 meals a day if the energy density is 0.6kcal/day to 3 meals a day if the energy density is 1.0kcal a day. Findings of the NHMS III showed that the - percentage of infant ages 6-8 months of age receiving at least two meals a day was high in both breast fed and non breast fed infants. However, more than 45% of children aged 9-23 months did not received the appropriate number of meals (at least 3 meals/day) as recommended by WHO (PAHO/WHO 2003; WHO 2004).

7. CONCLUSION AND RECOMMENDATIONS

Breastfeeding is widely practiced in Malaysia but the challenge from a public health perspective is to improve the exclusive breast feeding and complementary feeding practices. The findings suggest that the program approaches taken since the early 2000, especially the Baby Friendly Hospital Initiative, were effective in improving early initiation of breastfeeding and ever breastfeeding, especially in the rural localities. However, exclusive breastfeeding remain low and of short duration.

Breastfeeding strategies should focus on the common practice of giving plain water to breastfeeding infants and support for working mothers. The timing of interventions to promote the desired breastfeeding and complementary feeding behavior is critical because it is likely to affect a mother's decision-making, her motivation to overcome problems should they arise, and her persistence in maintaining a recommended behavior despite negative influences. Therefore, interventions need to be delivered as close as possible to the time of the desired behavior. Exclusive breastfeeding declines precipitously in the first few months of life. However, once women cease exclusive breastfeeding they usually do not resume. Therefore, reaching women during the prenatal period, soon after delivery, and within the first month postpartum is critical to increasing the duration of exclusive breastfeeding.

It is also necessary to seek for a more comprehensive, multi-sectoral approach and expand breastfeeding-supportive interventions into the community and within the family.

As important as breastfeeding is to infant health and survival, it is also necessary to look beyond breastfeeding and to integrate both breastfeeding and complementary feeding in campaigns to promote optimal nutrition of both the infant and young child. Complementary feeding guidelines need to be developed and education activities have to be intensified especially in term of timing of complementary foods, meal frequency and importance of iron rich foods.

Many feeding behaviours that affect infant and child nutritional status need further study. More qualitative and quantitative research is necessary, to be carried out along with cost-effectiveness analysis to improve existing programmes.

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APPENDIX

APPENDIX

Table 1: Distribution of eligible population by state and socio-demographic characteristics

Characteristics		n	%
State	Johor	220	11.0
	Kedah	151	7.2
	Kelantan	142	6.6
	Melaka	48	2.3
	N.Sembilan	77	3.7
	Pahang	90	4.5
	Pulau Pinang	67	3.4
	Perak	114	5.7
	Perlis	17	0.8
	Selangor	389	18.9
	Terengganu	85	4.0
	Sabah	340	16.2
	Sarawak	173	8.5
	W.P Kuala Lumpur	101	4.8
	W.P Labuan	50	2.3
	Total Malaysia	**2,167**	**100.0**
Strata	Urban	1,292	59.6
	Rural	875	40.4
Ethnic Groups	Malays	1,316	60.7
	Chinese	301	13.9
	Indian	137	6.3
	Other Bumis	331	15.3
	Others	82	3.8

Table 2: Prevalence of timely initiation of breastfeeding among children aged less than 12 months compared to NHMS II

	N	%	95% CI	
			Lower	Upper
NHMS III				
Malaysia	246,995	63.7	60.6	66.6
Urban	152,734	59.4	55.4	63.2
Rural	94,260	72.1	67.4	76.4
NHMS II*				
Malaysia	799,354	41.4	38.7	44.1
Urban	412,666	38.6	34.9	42.3
Rural	386,688	44.4	40.5	48.3

Source: Fatimah et al. 1996

Table 3: Prevalence of ever breastfeeding

	N	%	95% CI	
			Lower	Upper
NHMS III				
Malaysia	367,259	94.7	60.6	95.9
Urban	240,905	93.6	55.4	95.4
Rural	126,355	96.7	67.4	98.1
NHMS II*				
Malaysia	799,354	88.6	87.2	90.1
Urban	412,666	84.5	82.1	86.9
Rural	386,688	93.0	91.3	94.6

Source: Fatimah et al. 1996

Table 4: Prevalence of exclusive, predominant and complementary breastfeeding of infants below the age of four months compared to NHMS II

	N	Exclusive			Predominant			Complementary		
		%	95% CI		%	95% CI		%	95% CI	
			Lower	Upper		Lower	Upper		Lower	Upper
NHMS III										
Malaysia	113,871	19.3	15.5	23.9	19.7	15.6	24.7	46.7	41.2	52.2
Urban	72,939	12.9	8.9	18.5	20.0	14.7	26.6	48.4	41.3	55.5
Rural	40,932	30.7	23.3	39.2	19.3	13.3	27.1	43.6	35.2	52.4
NHMS II*										
Malaysia	799,354	29.0	26.7	31.3	10.0	8.4	11.6	46.9	44.4	49.5
Urban	412,666	25.5	23.5	28.6	8.7	6.9	10.6	47.9	44.3	51.5
Rural	386,688	32.7	29.3	36.1	11.3	8.8	13.9	45.8	42.2	49.4

*Source: Fatimah et al. 1996

Table 5: Prevalence of exclusive, predominant and complementary breastfeeding of infants below the age of six months

	Exclusive				Predominant				Complementary			
			95% CI				95% CI				95% CI	
	N	%	Lower	Upper	N	%	Lower	Upper	N	%	Lower	Upper
NHMS III												
Malaysia	25,930	14.5	11.7	17.9	30,064	16.9	13.7	20.6	83,619	46.9	42.4,	51.4
Urban	12,794	10.8	7.7	14.8	20,388	17.2	13.2	22.1	54,086	45.6	40.0	51.3
Rural	13,137	22.0	16.5	28.5	9,676	16.2	11.6	22.1	29,533	49.4	42.2	56.5

Table 6: Proportion of children <24 months by breastfeeding status according to age

Age (months)	Not Breast-Feeding	Breastfeeding and consuming					Number of children
		Exclusive	Plain water only	Nonmilk liquids/juice	Other milk	Complementary foods	
<2	9.6	27.1	18.0	1.4	41.4	2.5	155
2 - 3	18.0	11.7	19.7	0.6	40.8	9.2	154
4 - 5	34.8	6.2	10.1	0.8	14.8	33.3	167
6 - 8	49.6	0.0	0.4	0.0	1.3	48.7	261
9 - 11	53.2	0.6	0.7	0.0	0.4	45.1	294
12 - 17	61.0	0.5	0.1	0.2	0.1	38.1	520
18 - 23	63.4	0.2	0.4	0.1	0.3	35.6	604
Total	50.4	3.5	3.8	0.3	7.3	34.7	2155

Table 7: Prevalence of continued breastfeeding up to two years (among children 20 to 24 months) compared to NHMS II

	N	%	95% CI	
			Lower	Upper
NHMS III				
Malaysia	58,428	37.4	32.8	42.2
Urban	32,213	32.9	27.1	39.2
Rural	26,215	45.0	37.9	52.3
NHMS II*				
Malaysia	382,553	11.7	9.8	13.6
Urban	199,584	10.2	7.8	12.6
Rural	192,969	13.2	10.3	16.1

*Source: Fatimah et al. 1996

Table 8: Prevalence of bottle feeding among children aged less than 12 months compared to NHMS II

	N	%	95% CI	
			Lower	Upper
NHMS III				
Malaysia	263,346	67.9	64.9	70.7
Urban	184,618	71.8	68.1	75.2
Rural	78,728	60.2	55.2	65.1
NHMS II*				
Malaysia	634,516	86.1	84.0	88.3
Urban	342,750	85.9	82.5	89.1
Rural	291,766	86.5	83.7	89.2

*Source: Fatimah et al. 1996

Table 9: Prevalence of pacifier use among children aged less than 24 months compared to NHMS II

| | N | % | 95% CI | |
			Lower	Upper
NHMS III				
Malaysia	264,964	32.9	30.9	35.1
Urban	185,479	35.4	32.7	38.1
Rural	79,484	28.4	25.3	31.7
NHMS II*				
Malaysia	698,786	32.6	30.4	34.7
Urban	345,559	36.4	33.0	39.9
Rural	353,227	28.8	26.0	31.5

Source: Fatimah et al. 1996

Table 10: Prevalence of timely complementary feeding among children aged between 6 to 10 months

| | N | % | 95% CI | |
			Lower	Upper
NHMS III*				
Malaysia	55,492	41.50	36.4	46.9
Urban	32,040	35.6	29.4	42.3
Rural	23,452	53.8	45.1	62.4

Source: Fatimah et al. 1996

Table 11a: Type of foods consumed by breastfeeding children according to age

Age (months)	Infant formula /other powdered milk	Commercial baby food	Percentage of breastfeeding children fed								
			Cereal-based foods	Tubers	Fish	Meat	Beans	Eggs	Vegetables	Fruits
<2	47.0	39.6	40.2	0	23.8	16.4	0	29.5	40.2	13.0
2 - 3	58.7	55.4	54.6	5.4	13.4	13.4	5.4	5.4	5.4	5.4
4 - 5	48.2	69.7	70.9	28.5	34.4	22.7	4.3	26.0	39.9	34.4
6 - 8	53.0	59.5	86.0	49.5	61.9	57.8	15.1	49.3	70.5	66.2
9 - 11	54.2	37.4	92.3	57.0	75.9	74.2	32.9	68.9	82.3	83.0
12 - 17	52.9	29.5	91.4	66.5	91.1	81.7	45.6	80.6	91.3	91.2
18 - 23	57.8	24.8	86.8	66.6	95.6	86.9	54.7	89.2	87.2	88.9
Total	**53.5**	**38.7**	**86.5**	**57.1**	**78.3**	**71.4**	**36.4**	**69.7**	**79.0**	**78.1**

Table 11b: Type of foods consumed by non breastfeeding children according to age

Age (months)	Infant formula /other powdered milk	Commercial baby food	Cereal-based foods	Tubers	Fish	Meat	Beans	Eggs	Vegetables	Fruits
			Percentage of breastfeeding children fed							
<2	100.0	0	0	0	0	0	0	29.5	0	0
2 - 3	96.0	100.0	39.8	23.0	46.0	23.0	23.0	5.4	46.0	23.0
4 - 5	100.0	68.1	72.6	24.9	40.9	29.0	00.0	26.0	40.2	41.7
6 - 8	99.1	54.7	82.9	56.2	68.4	50.9	22.9	49.3	74.4	59.7
9 - 11	98.1	55.8	91.6	61.3	83.5	73.2	28.3	68.9	79.9	83.6
12 - 17	98.9	35.5	92.1	64.5	90.0	81.8	41.4	80.6	88.7	88.4
18 - 23	94.1	29.7	88.0	68.3	92.6	85.2	55.5	89.2	92.7	92.8
Total	**97.1**	**40.3**	**88.3**	**62.7**	**85.3**	**75.9**	**41.0**	**69.7**	**85.1**	**83.9**

Table 11c: Type of foods consumed by all children according to age

Age (months)	Infant formula /other powdered milk	Commercial baby food	Cereal-based foods	Percentage of breastfeeding children fed						
				Tubers	Fish	Meat	Beans	Eggs	Vegetables	Fruits
<2	51.8	39.6	40.2	00.0	23.8	16.4	00.0	29.5	40.2	13.0
2 - 3	65.4	65.1	51.1	09.3	20.6	15.5	09.3	04.2	14.3	09.3
4 - 5	66.6	69.0	71.6	26.9	37.2	25.5	02.4	17.0	40.0	37.6
6 - 8	75.6	56.9	84.7	52.1	65.1	54.3	18.6	43.8	72.7	63.1
9 - 11	77.6	47.5	91.9	59.3	80.0	73.8	30.5	64.8	81.1	83.4
12 - 17	81.1	33.2	91.9	65.2	90.2	81.7	42.9	76.0	89.6	89.4
18 - 23	81.0	28.0	87.7	67.8	93.6	85.6	55.2	86.2	90.8	91.5
Total	**75.6**	**39.6**	**87.6**	**60.3**	**82.3**	**73.9**	**39.0**	**69.1**	**82.5**	**81.5**

Table 12a: Proportion of children aged 6-8 months who consumed at least two meals a day

Strata	All children		Breast fed		Non breastfed	
	n	%	n	%	n	%
Urban	122	84.4	53	82.3	69	87.1
Rural	75	86.1	47	85.2	25	86.7
Malaysia	**197**	**85.0**	**100**	**83.5**	**94**	**87.0**

Table 12b: Proportion of children aged 9-23 months who consumed at least three meals a day

Strata	All children		Breast fed		Non breastfed	
	n	%	n	%	n	%
Urban	427	54.8	139	52.4	285	56.0
Rural	314	57.9	155	58.8	157	56.9
Malaysia	**741**	**55.9**	**294**	**55.3**	**442**	**56.2**

Table 12c: Proportion of children aged 6-23 months who consumed the appropriate number of meals a day

Strata	All children		Breast fed		Non breastfed	
	n	%	n	%	n	%
Urban	549	59.4	192	58.2	354	60.2
Rural	389	61.8	202	63.4	182	59.7
Malaysia	**938**	**60.3**	**394**	**60.5**	**536**	**60.1**