Implementation of the WHO Multicentre Growth Reference Study in Ghana

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Abstract

The World Health Organization (WHO) Multicentre Growth Reference Study (MGRS) African site was Accra, Ghana. Its sample was drawn from 10 affluent residential areas where earlier research had demonstrated the presence of a child subpopulation with unconstrained growth. This subpopulation could be identified on the basis of the father’s education and household income. The subjects for the longitudinal study were enrolled from 25 hospitals and delivery facilities that accounted for 80% of the study area’s births. The cross-sectional sample was recruited at 117 day-care centers used by more than 80% of the targeted subpopulation. Public relations efforts were mounted to promote the study in the community. The large number of facilities involved in the longitudinal and cross-sectional components, the relatively large geographic area covered by the study, and the difficulties of working in a densely populated urban area presented special challenges. Conversely, the high rates of breastfeeding and general support for this practice greatly facilitated the implementation of the MGRS protocol.

Key words: Anthropometry, breastfeeding, child health, child nutrition, Ghana, growth, growth monitoring, growth references, infant feeding practices

Introduction

The World Health Organization (WHO) Multicentre Growth Reference Study (MGRS) African site was Accra, Ghana. Ghana is in the West Africa subregion, has a population of 18.3 million [1], and lies 420 km north of the equator. It has two main seasons: the wet season, which peaks from April to June, and the dry season between November and March.

Inclusion of the Ghanaian site was dependent on identifying a subpopulation of children with no socioeconomic constraints on growth. Government property valuations were used to identify 10 communities in the most affluent areas of Accra: the Airport Residential area, Atomic, Adenta, Cantonments, Dansoman, Dzorwulu, East Legon/Legon, Manette/Sakumono/Lashibi, Roman Ridge, and Tema. They were surveyed to assess the feasibility of conducting the MGRS [2]. Households with children aged between 12 and 23 months were identified; information on household demographic and socioeconomic characteristics was collected; and anthropometric measurements of the children, their mothers and grandmothers were obtained. This information was used to identify socioeconomic factors associated with unconstrained growth in early childhood. Information was also collected on hospitals and other delivery facilities used by women in the selected residential areas.

The survey identified the socioeconomic characteristics associated with unconstrained growth of children from affluent families to be high level of education (tertiary) of the father and household income [2]. Having met the criteria required of participating sites [3], Accra was selected as the African MGRS site. Twenty-five hospitals and other delivery facilities were identified that accounted for 80% of births in the targeted subpopulation. The subjects were recruited from those sites. The objective of this paper is to provide an overview of the implementation of the MGRS at the Ghanaian site.
Planning phase

Study timeline and preparatory activities

The MGRS protocol is described in detail elsewhere [3]. The timeline for its implementation in Accra is summarized in figure 1. The preparatory phase lasted from June to October 1999; data collection for the longitudinal component of the study was initiated in December 1999 and completed in December 2002. The cross-sectional component lasted from November 2001 to May 2003.

The principal investigators and/or one of the other members of the research team visited each of the 25 hospitals and other delivery sites to discuss the aims and procedures of the study. Letters were also sent to each hospital formally seeking permission to recruit infants. All gave written consent, except for one facility whose director gave oral consent. Each facility identified one or two maternity ward nurses to serve as contacts between the project and the delivery ward. These senior maternity ward nurses in charge of deliveries enabled the project to identify all deliveries within the required 24 hours after birth.

Institutional approvals were obtained from the University of Ghana Medical School Ethical Review Committee.

Study teams

The site had four study teams: coordination, screening, lactation support, and follow-up. The positions for all field research assistants were advertised in the University of Ghana. Qualified applicants were interviewed and recruited based on their motivation, communication skills, dedication to work, and ability to work in a team.

The coordination team consisted of the two principal investigators, lactation supervisors, a quality control manager, a data manager, a project secretary, and a project adviser. The coordination team was responsible for the overall administration of the study.

The screening team was made up of six members, all with undergraduate university degrees in nutrition or nursing. This team was hospital-based and was responsible for the identification and screening of newborns for eligibility and for obtaining initial anthropometric measurements of enrolled subjects. The screening team worked five days a week (Monday to Friday).

The lactation team was made up of 10 senior or principal nursing officers working with the Ghana Health Service. Each had successfully completed the WHO lactation management and breastfeeding counseling course [4] before the MGRS was implemented in Ghana. Each also used the knowledge and skills gained through that training in their usual employment. The lactation counselors assisted newly delivered mothers to initiate breastfeeding successfully in the hospital, encouraged mothers to comply with the feeding recommendations of the study, and helped them solve any breastfeeding problems that they experienced. They administered the breastfeeding questionnaires and obtained infant weights at the first home visit. The lactation counselors worked part-time; however, the mothers could call their assigned lactation counselors or the lactation team supervisor 24 hours a day, seven days a week.

The follow-up team was made up of six individuals, all with undergraduate degrees in nutrition. The team was responsible for home visits. They administered baseline and follow-up questionnaires and took anthropometric measurements of children and parents. The team normally worked from Monday to Saturday. Some home visits were scheduled on Sundays to ensure the father’s availability. The same follow-up interviewers participated in the longitudinal and cross-sectional components of the study. Figure 2 shows the coordination of study teams.

![FIG. 1. Study timeline](image1.png)

![FIG. 2. Study team coordination chart](image2.png)
Training and initial standardization

A one-day workshop was held for all nurses serving as project contacts to review the project’s goals and procedures and their respective roles in its successful implementation. The field research assistants’ training included a review of the background and objectives of the MGRS, the administration of questionnaires, and the standardized use of study forms and interviewer guides. Particular attention was given to the estimation of gestational age, which was calculated on the basis of ultrasound or estimated from the last menstrual period. The interviewers were trained in the use of “gestograms” [5] using the last menstrual period as the base for the calculation. Follow-up interviewers also conducted role playing sessions at participating maternal and child health clinics to hone interviewing skills. A counseling expert provided training in interviewing techniques and reviewed culturally acceptable behaviors to be observed during home visits.

Anthropometric training and standardization followed the MGRS procedures [6]. Practice sessions on the proper handling of newborns were conducted at one of the participating hospitals, and the screening team received practical training in obtaining measurements on newborns. The follow-up team practiced anthropometric measurement techniques on children attending growth monitoring and immunization clinics. Before the start of data collection, the anthropometry teams participated in a formal standardization session involving one of the two WHO-designated lead anthropometrists, as described elsewhere in this supplement [6]. Team members whose measurements were characterized by low accuracy and/or precision were given corrective training. After this initial standardization with the WHO-designated lead anthropometrist, six screening and six follow-up interviewers were selected for the initial teams. Two adequately trained interviewers were selected as backups. The anthropometry standardization sessions were repeated every two months, separately for the screening and follow-up teams, with the participation once a year of the WHO-designated lead anthropometrist.

Selected interviewers were also trained by staff from the MGRS Coordinating Centre in Geneva to assess the achievement of the six motor developmental milestones, following the MGRS protocol [7]. The training of the lactation support team members for the study focused on providing support to mothers in fulfilling the MGRS feeding requirements [3], administering the breastfeeding questionnaires, and measuring mothers’ and babies’ weights at the week 1 visit.

Three weeks before data collection was initiated, a two-week pilot study was conducted to test the logistics of the site. The 25 hospitals and other delivery facilities from which subjects would be recruited were grouped into three clusters of nine, nine, and seven. One pair of screeners was assigned to each cluster. The pilot study demonstrated that Accra’s heavy traffic would be a major challenge. On the basis of these experiences, the screening teams were required to start their day no later than 7 am, and the clustering of hospitals and other delivery facilities was reorganized to avoid heavy traffic areas.

Adaptation of study materials and procedures

The generic Manual of Operations was adapted to the circumstances of the site with the assistance of the WHO Coordinating Centre, as described elsewhere in this supplement [3]. The eligibility criteria specific to the Ghana site are shown in table 1. This site did not use nonintention to breastfeed as an exclusion criterion, since breastfeeding is nearly universal in Ghana. At our site it was not necessary to translate the study questionnaires into local languages. The mothers enrolled in the study all spoke English fluently, as would be expected in this socioeconomic group. Therefore, all interviews were conducted in English.

Public relations activities

Several public relations activities were undertaken to enhance community acceptance and help ensure the successful implementation of the study. The project was launched officially by the Deputy Minister of Health, the Vice-Chancellor of the University of Ghana, and representatives of WHO and UNICEF in Ghana. Health-related organizations, physicians, and nurses from all participating hospitals and the media were present. The Deputy Minister of Health awarded a baby diploma to the first mother recruited to the study. The local principal investigators also appeared on popular television and radio programs to present the MGRS project to the public.

Breastfeeding information and other leaflets describing fathers’ roles in supporting their breastfeeding wives were provided to subjects and their families. Each infant was presented with a baby participation diploma and a bib with the project’s logo. At one year of age, all study infants were given personalized birthday cards and an educational toy. At two years, each child

<table>
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<tr>
<th>TABLE 1. Eligibility criteria for enrollment of children at the Ghanaian site</th>
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<tr>
<td><strong>Absence of significant perinatal morbidity (newborns with postnatal stay in intensive care &gt; 24 hours excluded)</strong></td>
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<tr>
<td><strong>Socioeconomic criteria:</strong></td>
</tr>
<tr>
<td>Father has polytechnic education and income &gt; 1 million cedis</td>
</tr>
<tr>
<td>Father has university education and income &gt; 200,000 cedis</td>
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1 US$ = 2,300 cedis (exchange rate July 1998).
received a book.

For the cross-sectional study, day-care center heads or directors were invited to attend a one-day workshop. Its purpose was to explain the goals and objectives of the MGRS cross-sectional component and the roles they and their centers could play. The keynote speaker at the workshop was the Deputy Minister of Education. He encouraged all the centers to support the project.

Implementation of the longitudinal study

Sampling strategy

The average number of monthly deliveries in the 25 participating hospitals and other delivery sites was about 1,276. A successful recruitment rate from that pool of less than 10% was anticipated, based on the expected prevalence of exclusion criteria and refusals among women delivering at the various sites. A recruitment rate of 6 or 7 children per week was necessary to meet the project’s target of recruiting 300 eligible infants in one year. Thus, all infants born in the 25 study hospitals and other delivery facilities whose parents resided in the study areas were screened.

Screening and enrollment of children

Hospital contact nurses assisted in identifying potentially eligible mothers. Using a simple one-page pre-screening form, the contact nurse asked prospective subjects if they lived in any of the study areas and inquired about the husband’s years of formal education. If both criteria were met, the mothers and their infants were considered potentially eligible. In cases where the mothers were uncertain about their husband’s educational level, residence in one of the designated areas was sufficient to establish potential eligibility. Contact nurses were asked to report potentially eligible mothers to the site’s coordination office. Unfortunately, not all contact nurses were equally cooperative. To compensate for this, the screening teams visited all 25 hospitals and other delivery facilities at intervals of less than 24 hours. The hospital with the highest number of daily births was visited twice daily, in the morning and late afternoon.

Subjects for whom no preliminary exclusion criterion was identified were interviewed by the screening team, and newborn anthropometric measurements were obtained. Eligible mothers who were willing to participate in the study gave oral consent at the hospital.

Follow-up logistics

Each enrolled subject was assigned a pair of follow-up interviewers. Each subject was visited consistently by one member of each pair; the other member of the pair was rotated among other follow-up teams every two months, after each bimonthly (every two months) anthropometric standardization session [3].

At the first follow-up home visit, the study was reviewed with mothers and their husbands, if present, and written consent to participate was obtained at this time. This visit also provided a second opportunity to confirm the mother’s and infant’s eligibility. Mothers who were enrolled at the hospital visit but were found not to have complied with study feeding recommendations or not to have conformed with other inclusion requirements were classified as “hidden ineligibles.” Those who remained eligible but rescinded their decision to participate were classified as “hidden refusals.” Hidden ineligibles and hidden refusals were excluded from the study and replaced in the sample following the MGRS protocol [3]. Eligible mothers who dropped out of the study after the first follow-up visit were requested to consent to one measurement when the child reached 12 months.

The motor development study and the 12-month follow-up visit of refusals and dropouts were conducted in accordance with the MGRS protocol [3, 7].

Lactation support and complementary feeding

The enrolled mothers usually received the first lactation support visit in the hospital. In cases where this was not possible, they were visited no more than three days after discharge. After this initial visit, the lactation support team made home visits at one and two weeks and at three and six months, as specified in the MGRS protocol. However, extra visits were scheduled at one and two months for primiparous mothers and for mothers who had breastfeeding problems at weeks one and two. Between three and six months, no extra visits were scheduled except when requested by the mother.

The mothers were advised to introduce complementary foods to the infant by six months of age. The complementary feeding guidelines, shown in table 2, were developed by the Nutrition Unit of the Ghana Health Service [8]. These guidelines were developed to facilitate the activities of field extension workers involved in nutrition education.

Implementation of the cross-sectional study

Sampling strategy

A summary of the protocol of the cross-sectional component is given elsewhere in this supplement [3]. The cross-sectional component sought to recruit and measure children between the ages of 18 and 71
months who were similar to those enrolled in the longitudinal component. Various recruitment strategies to accomplish this aim were considered. In Accra, the most suitable strategy was recruitment from day-care centers, because most mothers enrolled in the study worked outside the home, and it was common practice among the targeted socioeconomic group to send their preschool children to crèches and nurseries.

The parents in the longitudinal study were interviewed in order to determine which day-care centers the target population chose for their children and at what age the children began to attend them. A total of 130 day-care centers were identified. Eighty of these either were used or were intended to be used by 80% of the mothers in the longitudinal study. The 80 day-care centers served about 6,000 children between the ages of 18 and 71 months who resided in the study areas. The following rates were applied to estimate the number to be screened: low socioeconomic status, 30%; twin births, 3%; gestational age < 37 weeks or ≥ 42 weeks, 5%; significant morbidity, 5%; breastfed < 3 months, 1%; enrolled in the longitudinal study, 10%; refusals, 2%; and residence out of study area, 1%. On this basis, it was estimated that 53% of the sample was potentially eligible. Following the MGRS protocol [3], children who participated in the longitudinal study were excluded, as were their siblings. An additional criterion at this site was that eligible children must have resided in one or more of the study areas for at least the previous six months.

Screening, enrollment, and survey logistics

Letters seeking permission to recruit subjects were sent to the 80 day-care centers. An additional 37 centers located within the study areas were added subsequently, because the first 80 provided an insufficient number of children. Consent was received from all but 1 of the 117 centers. Letters also were sent through schools to parents with children within the age group of interest (18–71 months) seeking permission for their children to participate in the study. Parents who consented provided home addresses and contact telephone numbers. Two field assistants were responsible for sending parental consent forms to, and retrieving them from, day-care centers. Follow-up interviewers made appointments with the parents for home visits, during which a screening questionnaire was completed with the parent. If no exclusion criterion was present, the subject was considered eligible; a survey questionnaire was administered, and anthropometric measurements were taken.

Standardization, quality control, and data management activities

Several measures were put in place to ensure data quality. These have been described elsewhere in this supplement [3]. Standardized procedures to ensure accurate and precise anthropometric measurements were followed, as described in the MGRS protocol [6]. Generally, 10 newborns were recruited for the screening team’s bimonthly (every two months) standardization session. The follow-up team conducted their standardization sessions with infants aged 4 to 12 months recruited at growth monitoring clinics. For the height standardization sessions, older children were recruited from nursery school. One of the two WHO-designated lead anthropometrists participated once annually in a standardization session to assess the accuracy and precision of each interviewer’s measurements [6].

Bimonthly motor development standardization exercises were also held for all the interviewers assigned this function. Staff from the WHO Coordinating Centre visited the site every year to assess the team’s performance and provide training as needed [7]. Team supervisors checked forms routinely for consistency and completeness of recorded responses. The forms approved by the team supervisors were forwarded to the staff in charge of quality control for a final check before data entry, verification, and valida-

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<th>TABLE 2. Complementary feeding guidelines at the Ghanaian site</th>
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<tr>
<td><strong>Before 6 months:</strong> give only breastmilk. Do not give any water, fruits/fruit juice or porridge.</td>
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<tr>
<td><strong>Introduce new foods gradually by 6 months of age:</strong></td>
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<tr>
<td>The first complementary food may be cereal porridge given by spoon one or two times a day as the child grows, increase the amount and frequency of feeding. Continue to breastfeed on demand.</td>
</tr>
<tr>
<td><strong>Feed a variety of foods:</strong></td>
</tr>
<tr>
<td>Cereal porridge</td>
</tr>
<tr>
<td>Enrich cereal porridge, soups, and stews with at least one of the following: milk, mashed beans, fish powder, mashed poultry or meat, groundnut paste, vegetable oil.</td>
</tr>
<tr>
<td>Fruits and vegetables</td>
</tr>
<tr>
<td>Feed iron-rich foods such as fish, fish powder, meat, and poultry. Give fruit or fruit juice with meals or snacks to help absorb iron in other foods.</td>
</tr>
<tr>
<td>Feed vitamin A-rich foods such as palm oil, mangoes, pawpaw, carrots, green leafy vegetables, and eggs. The child’s food must be well cooked, mashed, and softened Do not add pepper or other spices to the child’s food.</td>
</tr>
<tr>
<td><strong>Wash hands with clean water and soap before touching food or feeding the child.</strong></td>
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<td>The child should have his or her own bowl so that there is no competition with older children for food.</td>
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<tr>
<td>Children who refuse food should be persuaded to eat; do not force the child to eat. Do not fuss over a child who refuses to eat. Make mealtimes happy times.</td>
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tion [9]. Errors or inconsistencies detected at any of the manual or computerized quality control checks were referred to the appropriate interviewer for investigation and resolution.

Regular weekly meetings were held with the principal investigators and the team supervisors. Problems encountered by the respective teams were discussed, and decisions were made. Problems that could not be resolved locally were referred to the MGRS Coordinating Centre. The team member responsible for quality control also telephoned or visited 10% of randomly selected participants. This procedure was used to verify that visits were made as scheduled, assess rapport between interviewers and mothers, and verify the accuracy of collected data.

Conclusions

There were numerous challenges to realization of the MGRS in Ghana. A highly committed staff was essential to the establishment of an efficient system that enabled three pairs of screening interviewers to cover all 25 hospitals and other delivery facilities daily. The logistic and training problems presented by these sites and the 117 day-care centers were formidable but solvable because of the human resources available to the project.

The underdeveloped system of physical addresses in Accra made it difficult and time-consuming to locate study participants’ homes. Despite this, the project staff persisted until each home was located. Locating fathers for measurements was also a challenge. With the help of some head teachers at day-care centers, a few fathers were measured at those facilities. Teams also made home visits on Sundays if this was the only time that fathers were available. The first lactation home visit at one week often coincided with the child’s naming ceremony. This often required rescheduling visits. Some study mothers were concerned about exclusive breastfeeding up to six months when they had to resume work at four months. Such mothers were taught to express breastmilk for storage until needed, and others obtained permission to bring the infant to work.

Our site’s success in implementing the MGRS protocol with the level of rigor that was required is attributable to the collaboration and support of many individuals and institutions. Among these were the University of Ghana, the Ministries of Health and Education, and the local offices and headquarters of WHO and UNICEF. Equally important was the collaboration of the participating hospitals and day-care centers, the study team’s enthusiasm and commitment, and the participating mothers’ perseverance. Without these contributions, the study could not have overcome the major challenges it faced. Patience, negotiation, and persuasion were required to secure the collaboration of all responsible personnel at the 25 hospitals and 117 day-care centers.

References