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Report on the Expert Meeting on the Use of International Child Growth Standards in High-Andean Populations

Lima, November 21-22, 2011

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Report on the Expert Meeting on the Use of International Child Growth Standards in High-Andean Populations

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The present is a Pan American Health Organization PAHO/WHO document, which has been elaborated by MSc Leticia Martinez, Dr. Miguel Davila, Dr. Adrian Diaz, Dr. Chessa Lutter, Dr. Manuel Peña and Dr. Mercedes de Onis.

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Summary

For the purpose of reviewing the scientific evidence available and making recommendations on the appropriateness and feasibility of carrying out adjustments to the new WHO growth standards for the population living in high-Andean areas, PAHO/WHO called a meeting of experts on November 21-22 in the city of Lima.

Methods and materials.– Bibliographic review, identification and mobilization of experts, presentation of relevant topics and face-to-face and virtual discussion sessions.

Results.– The following topics were presented and discussed: the new WHO standards in comparison with those of NCHS; how Peruvian high-Andean populations are and how they live; current scientific evidence on: high altitude hypoxia and growth; fetal growth at high altitudes; and high altitude growth and development (urban populations in La Paz, Bolivia).

Conclusions.– The presented evidence appears to indicate that altitude has a marginal effect compared to other social determinants that have a synergistic influence on child growth and development retardation at high altitudes. Therefore, establishing national standards or defining correction factors for altitude is not deemed appropriate. Lastly, exploring the possibility of conducting original studies on secondary data in countries in the Andean Region is recommended in order to compare child growth at different altitudes and socioeconomic status, in order to draw conclusions applicable to the Region.

Introduction

In 2007, the Peruvian government established the goal of reducing stunting in children under the age of 5, by 5 percentage points, during the 5-year term of office. The National Strategy CRECER was therefore designed and implemented, in order to articulate the efforts of the different involved sectors, at the different levels of government (national, regional and local).

Within this framework, the analysis of information systems and indicators for monitoring and evaluation of the CRECER Strategy took on particular importance, which included discussion on the incorporation of the 2006 WHO Growth Standards. In this regard, questions arose among some groups that considered necessary to take into account the fact that in Peru, as in other Andean countries, a high proportion of the population lives at high altitudes, a situation that affects children's physical growth. For this reason, the same standards used for a coastal population or one living at an altitude under 2500 meters above sea level (m.a.s.l.) could not be applied.

As a result, the Expert Meeting on Child Nutrition and Growth was organized for the purpose of reviewing available scientific evidence, based on which recommendations could be made on the appropriateness and feasibility of carrying out adjustments to the new WHO growth standards for the population living in high-Andean areas.

Methodology and Development of the Meeting

The Expert Meeting took place at the offices of the Pan American Health Organization in Lima, Peru, on November 21-22, 2011.

The meeting brought together a group of experts on food, nutrition, child growth and development, family and community health, health and development at high altitudes, anthropology, demographics and social indicators from international organizations, public and private institutions, and the academic world. In attendance were representatives of the World Health Organization (Geneva), the Pan American Health Organization (Washington D.C. and Peru), the *Instituto Nacional de Estadística e Informática del Perú* (Peruvian National Institute of Statistics), the *Centro Nacional de Alimentación y Nutrición del Perú* (Peruvian National Food and Nutrition Center), the *Instituto de Investigaciones de Altura* (Institute of Altitude Research) at *Universidad Peruana Cayetano Heredia*, the *Instituto de Investigación Nutricional* (Nutritional Research Institute), the *Instituto de Investigación en Salud y Desarrollo* (Institute of Health and Development Research) at Bolivia's *Universidad Mayor de San Andrés* and the Northwestern University in the United States (see Appendix 1).

The technical discussion meeting was preceded by a preparatory phase, during which a bibliographic review of the available documents was carried out. The group of experts to be invited was determined

and the preparation of some documents for discussion was requested.

During the face-to-face session, the following topics were discussed:

- Description of the 2006 WHO growth standards
- Characteristics of high-Andean populations in Peru
- Compilation of information extracted from publications on high altitude hypoxia and growth available to date
- High altitude growth and development in Bolivia's urban populations
- Fetal growth at high altitudes.

On the second day, Dr. Mercedes de Onís, from the WHO Department of Nutrition in Geneva, participated by means of a teleconference via Elluminate, in order to review the conclusions from the first day and prepare the conclusions for the second day (see Appendix 2).

This report was prepared in the last phase, with the contributions of all of the experts who participated in the meeting.

Results and Discussion

At the opening session, Dr. Adrián Díaz, PAHO/WHO consultant on Family and Community Health, took the floor to state the context of the meeting, as well as the reason it was called. He mentioned the commitment of PAHO/WHO to review the evidence on how hypoxia would affect the growth of children living at high altitudes, in order to determine whether it merited the creation of a new standard to correct for altitude levels, taking into account the appropriateness, cost and feasibility of doing so if necessary.

Dr. Manuel Peña, Coordinator of the Pan American Alliance for Nutrition and Development, indicated that the question to be answered at the meeting was whether altitude was an additional determinant of stunting and, if so, to what extent. All of this would lead to a conclusion on the appropriateness of working on a new growth standard under new creation and application criteria.

After their intervention, the participants of the meeting agreed to the adoption of a social determinants approach to the development and discussion of the topics to be analyzed. Therefore, it was deemed necessary to gear the meeting toward these factors, among which are possible agents limiting growth and contributing to the existence of stunting.

Determinants Approach

Traditional approaches to dealing with the problem of malnutrition have been geared toward individual factors, undermining importance from the set of determinants, including socioeconomic context, level of social inclusion, quality of housing, basic education, access to quality healthcare services, physical and social environment, food security, empowerment of women, sexual and reproductive health, construction of gender identity and working conditions, among others.

If it is acknowledged that the nutrition and health status is also socially determined, the purpose of the interventions must not only be about individuals, but also about the physical and social environment in which they live.

At the broadest level, the high-Andean population traditionally lives in poverty, both materially and symbolically. Therefore, in addition to having less oxygen availability, inhabitants of the area do not have access to quality health and education services; basic water and sanitation services are inadequate, as well as suffering from food insecurity; and they lack decent employment, healthy housing and an inclusive social environment.

Therefore, it is difficult to determine the relative weight of these factors with regard to low height, which is frequent at high altitudes. The situation must be analyzed under a perspective that includes these elements in the context of the aforementioned circumstances.

Characteristics of the 2006 WHO Study

For the first presentation of the meeting, Dr. Chessa Lutter, senior advisor on Food and Nutrition at the PAHO/WHO office in Washington D.C., took the floor to speak on the reasons for the establishment of the growth standards, their creation and their scope of application.

In 1993, the anthropometric growth reference standard of the National Center for Health Statistics / World Health Organization (NCHS/WHO), which has been in effect internationally since the nineteen sixties, underwent an exhaustive examination of its interpretation and applications by WHO. The conclusion was that it had significant technical and biological deficiencies and only summarized “how children grew”, highlighting the need to create new growth curves that represent how children “should grow” in early childhood. At the World Health Assembly in 1994, it was agreed to conduct the Multicentre Growth Reference Study (MGRS), which was carried out from 1997 to 2003, guiding the development of new growth and child development curves that were valid worldwide, based on children fed according to WHO recommendations and under optimal environmental and health conditions.

The aforementioned study (which includes length/height-for-age, weight-for-age, weight-for-length, weight-for-heigth and body mass index-for-age) combined longitudinal follow-up from birth to 24 months of age and a cross-sectional study on children from 18 to 71 months of age. Primary growth data and related information were collected on 8440 healthy unweaned babies and breastfed infants, of non-smoking mothers, from widely diverse ethnic and cultural backgrounds (Brazil, United States, Ghana, India, Norway and Oman). The objective was to create a standard based on healthy children living in favorable conditions that help them to fully achieve their genetic growth potential.

The method used to build the standards was generally based on the "Box-Cox-power-exponential" distribution, and the definitive models selected were simplified according to the Least Mean Squares (LMS) method. Consequently, in the calculation of percentiles and z scores for these standards, formulas based on the LMS method are used.

As expected, significant differences with the NCHS/WHO standard are observed, which vary with age, sex, anthropometric measure and the specific percentile or z score curve. Differences are especially important during the first year of life. Using the new WHO standards, linear growth retardation will be greater throughout childhood when evaluated in comparison with the NCHS/WHO standard. The growth standard of breastfed children will give rise to a substantial increase in low weight indices during the first six months of life and a subsequent reduction. Regarding wasting, the main difference occurs during the first year of life, when wasting indices will be notably higher when the new WHO standards are used. With regard to overweight, the use of the new WHO standards will entail increased prevalence, which will vary according to age, sex and the nutritional status of the studied population.

The new growth standards assume a reliable tool that details the normal growth of children under the age of five. In them, normal growth in early childhood under optimum environmental conditions is described, which are useful for studying children from anywhere, regardless of the ethnicity, the socioeconomic status or the food patterns.

For Latin American countries (with similar problems) it is expected that the use of the new growth standards will lead to a reduction in the prevalence of low weight and an increase in the prevalence of length/height retardation and overweight. These changes in prevalence are not because the nutritional status of the population is different, but rather because the standard with which it is compared is different. However, countries will have the assurance that their children population will be properly evaluated and they will obtain a better description of their nutritional status.

How the High-Andean Populations Are and How They Live

The Technical Director of Demographics and Social Indicators at the *Instituto Nacional de Estadística e Informática* (National Institute of Statistics and Informatics), Rofilia Ramírez, presented the profile of Peru based on the information currently available to date in its databases. Currently, the country is divided in 1832 districts of the coast, the highlands and the jungle. The coast is home to 56% of the population and the highlands to 32%. Stratified according to altitude, the largest percentage of the population is found in the ranges from 0 to 2499 m.a.s.l. and from 3000 to 3999 m.a.s.l. From 0 to 2499 m.a.s.l., there are approximately 2,121,279 children from 0 to 5 years of age; from 2500 to 2999 m.a.s.l., approximately 216,695; from 3000 to 3999 m.a.s.l., approximately 562.923; and from 4000 to 4675 m.a.s.l., approximately 34,956, which is in line with the distribution for the general population.

Homes in the highlands mostly use biomass fuels such as firewood, coal or dung. This may cause a reduction in birth weight, due to the increase in carbon monoxide inhaled, which leads to a relative hypoxia in addition to that caused by the altitude. In addition, these areas are affected by poor water and sanitation services. It is also where the fewest average years of studies exist in the country.

The 2007 National Census shows how high-Andean districts, considered to be those located at 1500 m.a.s.l. or higher, have a greater proportion of people under age 14 and age 80 and over. At lower altitudes, there is a larger productive-age population, leaving a more dependent population in high-Andean areas. This reflects the result of migration to the city in the nineteen eighties and nineties.

The 2010 Demographic and Family Health Survey indicated that, of the 23.3% of children under the age of 5 with stunting, 36.5% live at 2500 m.a.s.l. and 17.2% live at lower altitudes. According to the welfare quintile, created based on income data, there is an increase in the proportion from the highest quintile to the least advantaged. In all of them, there is a prevalence of stunting in children living at altitudes over 2500 m.a.s.l. An explanation of differences would include the influence of living conditions at home – including the type of stove used – and the mother's education, among other factors, which interact with hypoxia and poverty. In the highest quintiles, there is no difference between children living at high and low altitudes.

Of the 68.3% of children under 5 years of age who were exclusively breastfed, 84.5% live above 2500 m.a.s.l. and 61.2% under this altitude. Once again, there is an increase in the distribution by quintiles, from the least to the most disadvantaged. In children from 6 to 59 months of age, 37.7% have anemia, of whom 51.4% are found at altitudes over 2500 m.a.s.l. and 31.5% at lower altitudes.

Low birth weight was found in 8% of children under the age of 5, with 9.7% of them living at an altitude of 2500 m.a.s.l. or higher, and 7.4% at lower altitudes. The proportions of acute diarrheal disease (ADD) and acute respiratory infections (ARI) are slightly lower at 2500 m.a.s.l., where there is a greater proportion of children under the age of 36 months with complete growth and development controls ("CRED") for their age.

High Altitude Hypoxia and Growth

For the purpose of clarifying the influence of hypoxia on the growth and development of populations living at high altitude, anthropologist Morgan Hoke carried out an exhaustive review of evidence from research conducted on the subject, covering the development of theories explaining the influence of the lack of oxygen on children's height and weight.

The results of the most recent studies indicate that, although exposure to hypoxia may give rise to slight linear growth retardation (1 to 4 cm in the population living at high altitudes in the Andes Mountains), the majority of which is established at birth or shortly after, the effect is much lower than that indicated in the initial studies on high altitude conducted during the sixties and the early seventies. Subsequent studies identified several factors – such as nutrition, genetics, place of residence (urban or rural) and socioeconomic status, among others – that act synergically and change living conditions and growth patterns in communities living at high altitudes throughout the world.

The foregoing led to the author's recommendation to consider altitude as one of many possible causes generating altered or reduced growth patterns during the growth monitoring of a given child. However, it is of secondary importance when there is also poor nutrition or borderline normal nutrition. In order to improve the monitoring of the growth of children living at high altitudes, information related to nutritional status, socioeconomic status, ethnic origin and time living at high altitudes can help to clarify the causes of altered or reduced

growth in a given child. In addition, recording and analysis of longitudinal data will facilitate studying the growth retardation process and make it possible to identify children at risk of growth retardation or stunting.

High altitude growth and development: Urban populations in La Paz, Bolivia

Bolivia, where 60% of the population (10 million inhabitants) is born and live permanently at high altitudes, was also evaluated as one of the countries that can provide more indications regarding adaptation to high altitudes. Dr. José Luis San Miguel, a Research Fellow at the *Instituto de Investigación en Salud y Desarrollo* (Institute of Health and Development Research) in La Paz, presented the results of his research in this Andean country to find similarities in populations living at similar altitudes.

In this country, numerous studies have led to the conclusion that, from 3600 to 4000 m.a.s.l., human growth and development reach higher physiological efficiency in ideal conditions and fulfill their growth potential, based on genetic, physiological and environmental evidence. Scientific research on the urban and rural "Natural Environment", from urban and rural high altitudes, seeks to find the "normal" values of the variables in this environment. It is believed that growth is influenced by the coexistence of many independent variables: urban and rural; mining and non-mining population; socioeconomic and cultural level; gender; different age groups; with varied ancestry and even migration. With all this, research at the aforementioned research institute seeks to obtain interpretations and reach clearer conclusions on growth and development at high altitudes, where hypobaric hypoxia is not the only influential factor, where they have an influence the low temperature, low humidity, and ultraviolet and ionizing radiation, among others.

For decades, studies on growth and development at high altitudes have highlighted increased respiratory function and higher hemoglobin concentration as noteworthy effects. Delving deeper, the generation of new knowledge is proposed based on primary sources of data that not only include descriptive information, in order to show evidence for effective political decisions related to health.

Previous studies in this country have emphasized the importance of interpreting information corresponding to its origin and validity. Therefore, conclusions reached to better understand growth at high altitude must be made according to reality. In Bolivia, anthropometry and measurement of body composition are considered to be complementary. The latter is measured by means of deuterium dilution, which provides a precise calculation of fat-free mass and fat mass, working with different age groups among children living at high altitudes. Using this data, complemented with the use of the 2006 WHO standards, and based on the criterion of a child growth monitoring, or a group of children, the objective is to achieve greater precision regarding the knowledge about growth at high altitudes.

Regarding the values of hemoglobin on pregnant women, living at high altitudes, a study was carried out in the city of La Paz, Bolivia, through iron supplementation in women at the second half of their pregnancy. As a result it has been established, through the design of a "Diagnostic" study (which involves sensibility, specificity and predictive positive and negative values, through the use of ROC curves), a threshold cutoff level of 14.7 g/dl of hemoglobin to define nutritional anemia at high altitude in the second half of pregnancy.

Fetal growth at high altitudes

Dr. Gustavo Gonzales, Senior Professor at the School of Science and Philosophy at *Universidad Peruana Cayetano Heredia* and Director of the *Instituto de Investigaciones de Altura* (Altitude Research Institute), presented research related to the effect of altitude on pregnant women, fetuses and newborns. Peru is a country where 32% of the population, or 9 million inhabitants, live at high altitudes.

He spoke about how, over time, the concept of adaptation to high altitude came about. This concept implies that peoples who have lived at high altitudes for thousands of years can reproduce satisfactorily and their children can live adequately, due to their capacity to adapt to those living conditions, while the infant mortality rate is very high among those exposed to such conditions temporarily.

Several studies have shown that newborns at high altitudes have lower body weight, with a reduction inversely proportional to the number of generations of ancestors who have lived at high altitudes. This low birth weight is not due to premature birth, but rather to intrauterine growth restriction, which becomes evident starting with the 20th week of gestation.

Pregnant women of Andean origin have greater arterial flow, lower hematocrit/ hemoglobin levels and their newborns have higher weights than newborns of European ancestry. Intrauterine growth restriction is associated with an increase in hemoglobin levels at both sea level and moderate or high altitude, and hemoglobin values above 13.5 g/dl (which may also occur at sea level) increase blood viscosity, affecting fetal growth among other things. Both high altitude and maternal hemoglobin levels >14.5 g/dl are independently associated with restricted fetal growth, contrasting with that observed at the study in La Paz, Bolivia. It has also been demonstrated that for every 1000 meters increase in altitude, the hemoglobin concentration increases 1.52 g/dl and birth weight decreases by 117 g.

Altitude is also associated with a late fetal mortality rate, with a 4.82 times greater risk at high altitudes than at sea level. This is closely associated with hypoxia and intrauterine growth restriction, factors that coexist in mothers temporarily exposed and with only a few generations of ancestors who lived at high altitudes.

According to different studies, it has been noted that reduction in intrauterine growth is an effect of altitude that is not associated with socioeconomic level, and it has been demonstrated that both elevation of hemoglobin and altitude *per se* are factors that may separately affect fetal health.

Teleconference via Elluminate

The second session of the Expert Meeting included the participation of Dr. Mercedes de Onís from the WHO Department of Nutrition in Geneva, who was responsible for the MGRS study. She highlighted the existence of cases such as that of Bhutan, where the majority of the population lives above 2500 m.a.s.l., where consideration was given to adjusting the growth standard at high altitudes. However, in the end, the proposal was rejected and it was concluded that hypoxia has little effect on growth in comparison with other determinants.

Conclusions

1. Taking into account the evidence presented with regard to the marginal effect of hypoxia on final height, compared to other social determinants[1] that have a synergistic, as well as the complexity entailed by the creation and application of a new growth standard, the establishment of a new growth standard for populations living at high altitudes is deemed unjustified.

2. It has been demonstrated that fetal growth potential can be optimal at high altitudes, provided that populations are adapted to their environment, as it is the case of Andean populations of Aymara and Quechua origin. Thus, there is evidence of certain physiological adaptations that increases the efficiency and survival of individuals living at high altitudes. These populations can better offset the effect of high altitude hypoxia and high levels of maternal hemoglobin at high altitude on intrauterine growth restriction and the risk of late fetal mortality.

3. Regarding the definition of nutritional anemia in pregnant women living at high altitudes, the studies presented vary in terms of the recommended cut-off point.

[1] Included among these are genetic makeup, maternal hemoglobin level, nutritional and energetic status, food security, access to education and health services, water and sanitation, and economic resources, among others.

4. It has been proven that under identical socioeconomic conditions, height and weight are the same in children living at higher and lower altitudes. It has also been demonstrated that stunting levels are lower with higher socioeconomic status. Also, the stunting prevalence is greater at altitudes over 1500 m.a.s.l., although it has been observed that at the same socioeconomic level, stunting values are similar at both high altitudes and at sea level, with the same behavior as growth, as both aspects are directly linked.

5. Numerous studies conducted on children from 0 to 5 years of age have shown that, on average, they have the same growth potential, due to which the new WHO standards are adequate for making international comparisons, as well as for monitoring individual growth and calculating population prevalence.

6. Due to the diversity of criteria among the reviewed studies, the experts in attendance at the meeting agreed on the following definition of altitude, based on hemoglobin dissociation: 2500 m.a.s.l. or less, low altitude; 2500-3999 m.a.s.l, moderate altitude; 4000 m.a.s.l. or more, high altitude.

Recommendations

Based on the knowledge presented at the meeting and the conclusions drawn, the following recommendations were formulated:

1. The WHO growth standard should be adopted by the Peruvian Ministry of Health.

2. The idea of conducting an “ad-hoc” study to define the growth standard of children living above 2500 m.a.s.l. in Peru and/or in the Andean region should be rejected.

3. In the countries of the Andean region, comparative studies should be conducted - based on original and secondary data - on fetal and child growth in groups from different socioeconomic levels, according to altitude, in order to have homogenous information that allows drawing conclusions for decision making on the growth of individual children living in high-altitude areas.

4. Databases from Bolivia and Ecuador should be combined in order to have a larger number of records, especially on the top income quintiles in high Andean areas, which will allow a better analysis of the situation.

5. According to the new definition of high altitude agreed at the meeting, cut-offs at 2500 m.a.s.l. and 4000 m.a.s.l. should be included in the national data used by the *Instituto Nacional de Estadística e Informática* (National Institute of Statistics and Informatics), in order to clarify the direct effect of altitude in comparison with other social factors.

6. Workshops should be conducted on the application of the new WHO standards and their differentiated use, both for monitoring individual growth and for calculating population prevalence of stunting, wasting, overweight and obesity.

7. A variables protocol should be created regarding their effect on child growth and development, among all the mentioned determinants and others that may arise throughout the study regarding the situation at high altitudes.

Appendices

APPENDIX 1

Expert Meeting on the Use of International Child Growth Standards in High-Andean Populations

Pan American Health Organization/World Health Organization (PAHO/WHO)
Lima, Peru – November 21-22, 2011

FIRST DAY

9:00-10:00 General framework of the meeting

- Round of presentations
- How this inquiry came about
  Dr. Adrián Díaz, *Advisor on Family and Community Health, PAHO/WHO Lima*
- Description of the 2006 WHO growth standards
  Dr. Chessa Lutter, *Regional Advisor on Food and Nutrition, PAHO/WHO WDC*

10:00-11:00

- How the High-Andean Populations of Peru Are and How They Live
  Mag. Rofilia Ramírez, *Technical Director of Demographic and Social Indicators, Instituto Nacional de Estadística e Informática (National Institute of Statistics and Informatics), INEI, Peru*

Discussion and conclusions

11:00-11:30 Coffee break

11:30-13:00

- State of the Art on High Altitude Hypoxia and Growth. "High Altitude Hypoxia and Growth" report, October 7, 2011
  Morgan Hoke, *Medical Anthropologist, Northwestern University, Illinois, USA*

Discussion and conclusions

13:00-14:30 Lunch

14:30-15:30

- High altitude growth and development: Urban Populations of La Paz, Bolivia
  Dr. José Luis San Miguel, *Research Fellow Emeritus, Instituto de Investigación en Salud y Desarrollo (Institute of Health and Development Research), Universidad Mayor de San Andrés, La Paz, Bolivia*

Discussion and conclusions

15:30-16:30

- Fetal growth at high altitudes
  Dr. Gustavo Gonzales, *Senior Professor, School of Sciences, Universidad Peruana Cayetano Heredia, UPCH, Peru*

Discussion and conclusions

SECOND DAY

09:00-11:00

- Teleconference
  Dr. Mercedes de Onís, *Department of Nutrition, WHO, Geneva*
- Presentation of the discussion outcome from the first day

11:00-11:30 Coffee break

11:30-12:30

- Preparation of final conclusions

12:30-13:00

- Closing of the event

13:00-14:30 Lunch

APPENDIX 2

List of Participants

Organizers

- Adrián Díaz,
  International Consultant on Family and Community Health, PAHO/WHO (Peru)
- Chessa Lutter,
  Senior Advisor on Food and Nutrition PAHO/WHO (WDC, USA)

Speakers

- Gustavo Gonzales,
  Institute of Research on Altitude at Universidad Peruana Cayetano Heredia (Peru)
- Morgan Hoke,
  Anthropologist, Northwestern University (USA)
- Chessa Lutter,
  Senior Advisor on Food and Nutrition PAHO/WHO (WDC, USA)
- Rofilia Ramírez,
  National Institute of Statistics and Informatics (Peru)
- José Luis San Miguel,
  Universidad Mayor de San Andrés (Bolivia)

Special Guests

- Miguel Dávila,
  National Consultant on Child Health and IMCI, PAHO/WHO (Peru)
- Mercedes de Onís,
  Coordinator of the Growth Assessment and Surveillance Unit. Department of Nutrition, WHO (Geneva, Switzerland)
- Laura Grajeda,
  Johns Hopkins Bloomberg School of Public Health (USA)
- Rubén Grajeda,
  Regional Advisor on Micronutrients PAHO/WHO (WDC, USA)
- Leticia Martínez,
  Intern, PAHO/WHO (Peru)
- Irela Mazar,
  Nutrition and Consumer Protection Division, FAO (Rome, Italy)
- Mary Penny,
  Nutritional Research Institute (Peru)
- Manuel Peña,
  Pan-American Alliance for Nutrition and Development (Panama)
- Américo Quispe,
  Consultant, PAHO/WHO (Peru)
- Wilfredo Salinas,
  National Center for Food and Nutrition (Peru)

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