

# **COUNTRY HEALTH PROFILE**

## **STUNTING IN THE UNDER 5's IN NICARAGUA**

**Global Health BSc**

**Module 2 In Course Assessment**

**Total words: 2488**

## **ABSTRACT**

**BACKGROUND:** Political unrest has forced Nicaragua into a state of poverty and a high prevalence of under-nutrition specifically stunting in those under 5. **AIMS:** To establish the burden of stunting in the under 5's in Nicaragua. To ascertain the determinants of stunting and to evaluate interventions put in place to combat the issue. **METHODS:** An OVIDSP search with MeSH terms was carried out to identify relevant articles on stunting in children under 5 in Nicaragua. **RESULTS:** Stunting rate in the Under 5's in Nicaragua is 22%. The main determinants noted are Birth weight, Breastfeeding, Risk of Gastrointestinal and Respiratory infections, Micronutrient intake and Maternal Education. The interventions proposed were valid however more research into counteracting respiratory infections should be looked into. **CONCLUSION:** With new interventions being proposed it is imperative that we continually evaluate them in order to improve child under-nutrition.

## **INTRODUCTION**

The UNICEF 2009 tracking report on maternal and child nutrition noted 195 million children in developing countries such as Nicaragua who are chronically undernourished (stunted) <sup>(1)</sup>. Almost a decade on from when the Millennium Developmental goal 1, was called to eradicate extreme poverty and hunger<sup>(2)</sup>, Nicaragua appears to be making “insufficient progress towards the MDG target”<sup>(3)</sup> which is a “violation of a child’s rights”<sup>(4)(5)</sup>.

Nicaragua is emerging from a volatile political climate. The contra war (1980-1990) resulted in a 29.4% drop in the GNI/capita. Post war, the overpowering of the long-ruling Sandinista government in 1990<sup>(6)</sup> helped in improving the economy steadily and thus the current 2011 GNI/capita as 2430US\$ is roughly the same as it was in 1980, at 2596US\$<sup>(7)</sup>. However this has meant Nicaragua has fallen behind in the global arena, as it’s Human development Index is 0.589. The HDI for Latin America is 0.731 today, placing Nicaragua below the regional average. 45% of the population are as a result living below the international poverty line<sup>(8)</sup> with 4.9% currently unemployed<sup>(9)</sup> and low minimum wages of 750 C\$<sup>(10)</sup>.

This poor economic status has impinged upon the countries food security and child nutritional status has not improved as much as might be expected<sup>(11)</sup>. The low income and poor wealth of the country has led to low food access, particularly for those in rural communities, making up 40.96% of the total population<sup>(12)</sup>. Furthermore during the war

increasing attacks in the countryside has forced people to abandon sustenance farming; a principle source of food, thus causing a reduction in food production leaving 7% of children undernourished<sup>(7)</sup>. Poverty appears to be a greater determinant of poor nutritional status than simple genetics<sup>(13)</sup>.

## **AIMS**

The primary aim was to establish the burden of stunting in the under 5's in Nicaragua. Where possible to identify the determinants of stunting in Nicaragua referred to in the literature and subsequently evaluate effective interventions suggested by 2009 UNICEF tracking report on maternal and child nutrition; improving maternal nutrition pre and during pregnancy, exclusive breastfeeding for 6 months with complementary feeding thereafter, improving micronutrient intake, improving sanitation and water purity<sup>(4)</sup>.

## **METHODS**

I employed OVIDSP, to search the **MEDLINE (1948-present)** database, for English Language journal articles matching the following Medical Subject Headings: "Growth Disorders", "Growth", "Body height", "Infant nutrition disorders", "Nutrition disorders", "Child, Preschool", "Infant", "Under-nutrition", "Malnutrition" and "Stunting". Each of these terms were then combined with an exploded search for "Nicaragua". The articles were selected as relevant through checking that the abstracts looked into stunting and its determinants in the country setting of Nicaragua. Articles that focused on child mortality were excluded. WHO, World Bank and UN child nutrition publications from 1980-2011 were also surveyed for national data reflecting nutrition in Nicaragua.

## **RESULTS AND DISCUSSION**

The OVID search returned 174 articles addressing stunting issues in Nicaragua. These articles ranged in methodological approach and were a compilation of several viewpoints. 8 relevant articles were identified as well as 14 key WHO, World Bank or UN publications.

## **STUNTING**

The most popular indicator for under-nutrition was stunting which is defined as "the height

for age below minus two standard deviations from the median height for age of the standard reference population”(4). Stunting reflects skeletal length and so is a better predictor of chronic malnutrition than underweight(14) and therefore should be adopted by MDG in 2015 to indicate under-nutrition(15). This idea was supported by several papers that found stunting to be more prevalent in older children than younger children(13)(16). The most recent data agrees that the stunting rate in the Under 5’s in Nicaragua is 22%(17)(18).

Interestingly several researchers reported stunting to have a greater prevalence than underweight(15). A reason for this may be that it is easier for nutritional intervention to have a more potent effect on weight than linear growth(11). Furthermore the UN defines malnutrition to encompass both under and over nutrition and so with developing countries transitioning to higher rates of obesity there will therefore be lower rates of those underweight however malnutrition may still persist and will only be detected by measuring stunting(19). It also gives us a more cumulative measure of nutritional status and is therefore a primary indicator in noting the general nutrition and well being of a population(20).

## **KEY DETERMINANTS**

### *Birthweight*

Several studies have noted a low birth weight below the median of 3000mg to be a significant determinant(11). In 2009, 8% of infants had a low birth weight. One study showed this to be associated with long term, poor nutritional status and inadequate nutritional intake for women during pregnancy(21). The basis of good nutrition in a child’s nutrition must start at the beginning of the child’s existence. It is therefore reasonable to assume that if a child’s birth-weight is low they will begin lagging behind in terms of nutrition and thus without subsequent intervention stunting is inevitable.

### *Breastfeeding*

7.6% are still found to not breastfeed despite UNICEF recommendations for exclusive breastfeeding for the first 6 months(11). Especially in rural Nicaraguan communities, women tend to be in charge of running the household, which often contains family members from several generations. One study found the average family size of participants to be 6.5(22). Caring for a family of this size is often arduous leaving a mother with insufficient time to breastfeed her infant as well. With the availability of animal products e.g. goats and cows

milk, many would believe this to be adequate nutrition and therefore choose not to breastfeed.

### *Risk of Intestinal parasitic infections*

Parasitic infections tend to be chronic. One study noted that when evaluating under-nutrition, intestinal parasites were more prevalent in those that were stunted. This could be due to poor sanitation and repeated exposure to parasitic infections. Treatment of helminthic infections was found to improve nutrition and therefore it can be concluded that parasitosis may be a “crucial step in the evolution of malnutrition”<sup>(16)</sup>.

### *Risk of Respiratory Infections*

It was also suggested that a history of respiratory infection was a determinant for stunting<sup>(11)</sup>. Within the rural setting, extensive hydrocarbon fuels for cooking are increasingly used in households. Burning these fuels emit high levels of smoke and pollutants, which seems to correlate with the rise in respiratory infections.

### *Micronutrient intake*

Micronutrients are found to be essential to the adequate and healthy growth of a child. When examining children on macrobiotic diets, 24% remained stunted. Although this diet is high in protein and energy it is low in calcium and vitamin D leading to inadequate skeletal growth and thus stunting<sup>(14)</sup>.

### *Maternal Education*

Several papers noted maternal education to be strongly and consistently associated with child stunting<sup>(23)</sup>. Evidence shows children can obtain full growth potential when nurtured in healthy environments with their caregivers following recommended health, nutrition and care practises. Sadly mothers in developing countries don't often realise that nutrition is a major risk factor for child disease or have sufficient knowledge of signs that their child's health is in danger, or appropriate methods to intervene<sup>(22)</sup>. Consequently offspring of poorly educated women are more predisposed to have inadequate dietary intake<sup>(24)</sup>. Commonly in

communities where short stature and therefore chronic malnutrition is rife and has occurred for generations, stunting goes unrecognised, as it just appears to be normal<sup>(19)</sup>.

## **INTERVENTIONS**

The 2009 UNICEF tracking report mentions 4 interventions that they deem necessary to focus on to improve stunting.

As most papers suggest; stunting is found to only be preventable in an infants first 2 years of life<sup>(25)</sup>. All interventions should therefore be focussed before then.

### *Improving maternal nutrition*

“Poor nutritional status and inadequate nutritional intake for women during pregnancy can also have a negative impact on the child’s birth weight and early development”<sup>(21)</sup>. As noted by the determinants, access and food production seems an obstacle for nutrition. Food prices are also constantly rising and so alternate sources need to be sought<sup>(26)</sup>. One study mentioned a potential resource of overcoming this obstacle is the use of leaf concentrate. This relatively cheap and rapid solution improves appetite, resolves iron deficiency anaemia and increases amount of milk production of those who breastfeed. John Waterlow describes it as a solution that is “plausible simple and sustainable which like under-nutrition itself is neglected”<sup>(27)</sup>.

For mothers to have better nutrition they needed to have learnt about the importance of better nutrition in their childhoods. Studies have showed that those engaging in better nutrition practises early on are likely to continue these practises later when they become mother’s themselves<sup>(23)</sup>.

Additionally a child is more likely to learn and adopt good nutrition practises, from seeing their mother carry out good nutrition practises as descriptively speaking ‘taller mothers had taller children’<sup>(23)</sup>.

Improving maternal nutrition seems to be a problem that can be tackled, as though child stunting is rife in Nicaragua, research has shown that mothers, particularly in poorer regions, show considerable interest in health education, “this may reflect the lack of current opportunities” available. Educating mothers on the importance of nutrition is key as well as offering counselling on what an appropriate balanced diet should contain<sup>(28)</sup>. The diets concerned need to be culturally sensitive and therefore include local food that is easily available e.g. plantain, corn, rice.

### *Continual Breastfeeding*

Breastfeeding is the first exposure for an infant to nutrition. Breast milk contains vital nutrients needed that can't be obtained elsewhere. Nicaraguan mothers appeared more inclined to stop breastfeeding early or switch to using bottles<sup>(23)</sup>.

Potential reasons why women might stop breastfeeding include pain at nipple, the thought that bottled feeding is more nutritious or that they may not produce enough milk due to malnutrition.

To change this education is once again important and we need to promote the value of breastfeeding as well as increasing awareness of UN regulations surrounding it. There were no studies noted at present, which examined variances in duration of breastfeeding.

Therefore this might be worthwhile looking into before further suggestions are made. It may also be useful to use alternate methods to encourage milk production e.g. the use of leaf concentrate.

### *Micronutrient intake*

Golden found that milk or soya based supplementation showed significant height gain in the malnourished<sup>(13)</sup>. Supplementation seems to be the way forward. We must raise awareness of the value of milk.

If micronutrients are found to be scarce or inaccessible to the poor, a rationing system could be employed, as used by the government in the contra war to balance the rich and poor and ensure a standard level of nutrition<sup>(29)</sup>. This resulted in a low prevalence of severe acute under-nutrition. However this type of program is not sustainable.

Other micronutrients shown to better linear growth are calcium, vitamin D and food of animal origin. In order to increase consumption of these nutrients especially in rural Nicaragua where access is limited, programs that focus on self-sufficiency are the most valid. The Nicaraguan ministry of agriculture and land reform supports programmes that promote home, school, community gardens as well as animal husbandry<sup>(14)</sup>.

Foreign donation e.g. the distribution of powdered milk and canned meat is another resource worth utilizing. However problems arise when ensuring equal distribution to the population, which when concerning extreme rural communities is logistically unfeasible. Furthermore this method is not sustainable in the long-term.

Importantly we must also ensure our nutrition programs are culturally sensitive e.g. in Nigeria where despite there being ample animal food products, elders were using the meat as a token economy in teaching their children the importance of showing respect to those older. Due to the identification of this practise, an intervention could be formulated and used that targeted and addressed this gap of understanding to ensure change occurred<sup>(14)</sup>.

A social protection network in Nicaragua was set up in late 2000 to simultaneously target and improve under-nutrition and poverty. Households eligible were given US\$19 per month however benefactors could only receive the income after committing to partake in a health education program and attending child growth and development monitoring sessions<sup>(30)</sup>.

### *Sanitation and water purity*

Intestinal parasites, as noted previously, appear to be associated with increase in stunting. One of the main routes of transmission for intestinal parasites is water. Given this, appropriate methods must be enforced to reduce the transmission of these parasites. The main way this could be done is through purification of the water system. There are however considerable difficulties particularly in rural settings where poor sanitation is common. Furthermore studies did not suggest that sanitation or water purity to be a useful intervention in rectifying under-nutrition as perhaps they felt the determinant of gastrointestinal disease to not be as potent in under-nutrition as others.

Positively it was noted that mothers in Nicaragua were good at seeking healthcare readily and on average were willing to spend more on health compared to neighbouring central American countries<sup>(7)</sup>. Therefore to reduce spread of infections it might be worth making gastrointestinal treatment readily available at these accessible health-clinics.

## **LIMITATIONS**

In the future it would be more comprehensive to have reviewed the references for each paper for potential new studies that could have been included in the research however for this essay this method was a little unfeasible.



There is no national census in play in Nicaragua and given the large rural community, statistics may not be whole-heartedly representative of the entire population.

The interventional areas suggested by the UNICEF tracking report may not be the only ones to address or be considered. My findings suggested respiratory infections to also be a key determinant and so perhaps there needs to also be a focus on intervening here. In subsequent reviews it might be useful to look at or potentially formulate new interventional areas.

## **CONCLUSION**

Nicaragua is currently egressing from a politically uncertain climate, which as a result has led to extreme poverty and poor nutrition in the population. Although data specifically about stunting is not readily available, with the formation of more government organisations, this might change. Through the efforts of MDG1, the UN is finally putting in measures to reduce under-nutrition in the developing world and as a result the literature has highlighted several potent determinants and subsequently interventional strategies. It is vital that we continue evaluating these strategies in order to note their long-term worth in improving child under-nutrition.

## References

- (1) UNICEF. *Maternal and Newborn Health*. [Online] Available from: <http://www.unicef.org/sowc09/docs/SOWC09-FullReport-EN.pdf> [Accessed 08/12/11].
- (2) WHO. *Part 1 Health related Millennium development goals*. [Online] Available from: [http://www.who.int/whosis/whostat/EN\\_WHS2011\\_Part1.pdf](http://www.who.int/whosis/whostat/EN_WHS2011_Part1.pdf) [Accessed 08/12/11].
- (3) UNICEF. *Progress for Children: A report card on Nutrition*. [Online] Available from: [http://www.unicef.org/publications/files/Progress\\_for\\_Children\\_-\\_No.\\_4.pdf](http://www.unicef.org/publications/files/Progress_for_Children_-_No._4.pdf) [Accessed 08/12/11].
- (4) UNICEF. *Tracking Progress On Child and Maternal Nutrition*. [Online] Available from: [http://www.unicef.org/publications/files/Tracking\\_Progress\\_on\\_Child\\_and\\_Maternal\\_Nutrition\\_EN\\_110309.pdf](http://www.unicef.org/publications/files/Tracking_Progress_on_Child_and_Maternal_Nutrition_EN_110309.pdf) [Accessed 08/12/2011].
- (5) [Online] Available from: [http://www.unicef.org/publications/files/Tracking\\_Progress\\_on\\_Child\\_and\\_Maternal\\_Nutrition\\_EN\\_110309.pdf](http://www.unicef.org/publications/files/Tracking_Progress_on_Child_and_Maternal_Nutrition_EN_110309.pdf).
- (6) Lane P. Economic hardship has put Nicaragua's health care system on the sick list. *CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne* 1995 Feb 15;152(4): pp. 580-582.
- (7) UNDP. ***Nicaragua Country Profile: Human Development Indicators***. [Online] Available from: <http://hdrstats.undp.org/en/countries/profiles/NIC.html> [Accessed 08/12/11].
- (8) WHO. *Country Profile of Environmental Burden of Disease: Nicaragua*. [Online] Available from: [http://www.who.int/quantifying\\_ehimpacts/national/countryprofile/nicaragua.pdf](http://www.who.int/quantifying_ehimpacts/national/countryprofile/nicaragua.pdf) [Accessed 08/12/11].
- (9) UN Data. *Country Profile: Nicaragua*. [Online] Available from: <http://data.un.org/CountryProfile.aspx?cname=Nicaragua> [Accessed 08/12/11].
- (10) FAO. *Nutrition Country Profiles: Nicaragua*. [Online] Available from: [http://www.fao.org/ag/agn/nutrition/nic\\_en.stm](http://www.fao.org/ag/agn/nutrition/nic_en.stm) [Accessed 08/12/11].
- (11) Sakisaka K, Wakai S, Kuroiwa C, Cuadra Flores L, Kai I, Mercedes Aragon M, et al. Nutritional status and associated factors in children aged 0-23 months in Granada, Nicaragua. *Public health* 2006 May;120(5): pp. 400-411.

- (12) WHO. *Country Cooperation Strategy at a Glance: Nicaragua*. [Online] Available from:  
[http://www.who.int/countryfocus/cooperation\\_strategy/ccsbrief\\_nic\\_en.pdf](http://www.who.int/countryfocus/cooperation_strategy/ccsbrief_nic_en.pdf)  
[Accessed 08/12/11].
- (13) Seireg M, Zeitlin MF, LaMontagne J, Morales CM. Field validation of the Tallstick in marginal communities in Nicaragua. *Journal of tropical pediatrics* 1992 Oct;38(5): pp. 214-223.
- (14) Zeitlin MF, Sockalingam S, Seireg M, Bonilla J. The tallstick: a tool for community-based assessment of nutritional stunting. *Food and Nutrition Bulletin (UNU)* 1990;12(2): pp. 128-137.
- (15) Lutter CK, Chaparro CM, Munoz S. Progress towards Millennium Development Goal 1 in Latin America and the Caribbean: the importance of the choice of indicator for undernutrition. *Bulletin of the World Health Organization* 2011 Jan 1;89(1): pp. 22-30.
- (16) Oberhelman RA, Guerrero ES, Fernandez ML, Silio M, Mercado D, Comiskey N, et al. Correlations between intestinal parasitosis, physical growth, and psychomotor development among infants and children from rural Nicaragua. *The American Journal of Tropical Medicine and Hygiene* 1998 Apr;58(4): pp. 470-475.
- (17) UNICEF. *Maternal Newborn and child survival Country Profile UNICEF*. [Online] Available from:  
<http://www.childinfo.org/files/maternal/DI%20Profile%20-%20Nicaragua.pdf>  
[Accessed 08/12/11].
- (18) UNICEF. *At a glance statistics*. [Online] Available from:  
[http://www.unicef.org/infobycountry/nicaragua\\_statistics.html](http://www.unicef.org/infobycountry/nicaragua_statistics.html) [Accessed 08/12/11].
- (19) de Onis M, Blossner M, Borghi E. Prevalence and trends of stunting among pre-school children, 1990-2020. *Public health nutrition* 2011 Jul 14: pp. 1-7.
- (20) de Onis M, Frongillo EA, Blossner M. Is malnutrition declining? An analysis of changes in levels of child malnutrition since 1980. *Bulletin of the World Health Organization* 2000;78(10): pp. 1222-1233.
- (21) WHO. *Child Growth Standards*. [Online] Available from:  
[http://www.who.int/childgrowth/4\\_double\\_burden.pdf](http://www.who.int/childgrowth/4_double_burden.pdf) [Accessed 08/12/11].
- (22) Sakisaka K, Jimba M, Hanada K. Changing poor mothers' care-seeking behaviors in response to childhood illness: findings from a cross-sectional study in Granada, Nicaragua. *BMC international health and human rights* 2010 Jun 1;10: pp. 10.

- (23) Ruel MT, Menon P. Child feeding practices are associated with child nutritional status in Latin America: innovative uses of the demographic and health surveys. *The Journal of nutrition* 2002 Jun;132(6): pp. 1180-1187.
- (24) Walker SP, Wachs TD, Gardner JM, Lozoff B, Wasserman GA, Pollitt E, et al. Child development: risk factors for adverse outcomes in developing countries. *Lancet* 2007 Jan 13;369(9556): pp. 145-157.
- (25) Victora CG, de Onis M, Hallal PC, Blossner M, Shrimpton R. Worldwide timing of growth faltering: revisiting implications for interventions. *Pediatrics* 2010 Mar;125(3): pp. e473-80.
- (26) The World Bank. *Near Record High Food Prices Keep Poorest People on the Edge*. [Online] Available from: <http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:22982095~pagePK:64257043~piPK:437376~theSitePK:4607,00.html> [Accessed 08/12/11].
- (27) Davys G. The greatest untapped food resource on earth? *Public health nutrition* 2009 Jan;12(1): pp. 142.
- (28) Shrimpton R, Victora CG, de Onis M, Lima RC, Blossner M, Clugston G. Worldwide timing of growth faltering: implications for nutritional interventions. *Pediatrics* 2001 May;107(5): pp. E75.
- (29) Health effects of the war in two rural communities in Nicaragua. Nicaragua Health Study Collaborative at Harvard, CIES, and UNAN. *American Journal of Public Health* 1989 Apr;79(4): pp. 424-429.
- (30) Mesoamerica Nutrition Program Targeting Study Group. Targeting performance of three large-scale, nutrition-oriented social programs in Central America and Mexico. *Food and nutrition bulletin* 2002 Jun;23(2): pp. 162-174.