developing world’s children, suffer from chronic malnutrition. The sheer scale means that this problem is far too great to be left to non-governmental organisations (NGOs) or the public sector alone.

Given the scale of need, VN believe that we need to be considering mass retail distribution mechanisms in a way not conceived of before. Steve and Paul argue that up until now, private companies have had too short-term a vision and have therefore ignored the lower end of the market pyramid, i.e. the poor. They believe that VN could help catalyse development of these markets but cannot do it on their own. They therefore need to engage with the private sector. VN can provide the knowledge and also provide a social brand. It would be a kind of ‘enlightened humanitarianism’ which takes the private sector beyond CSR (corporate social responsibility). Paul argues that CSR funding is significant but, more often than not, a kind of dead-end money with no real strategic underpinning. Too frequently, it is used as a way of buying off the consciences of the private sector and all who work within it. CSR has no vision of long-term sustainability. What VN are proposing is more of a strategic partnership where money can be made, at the same time as having a sustainable humanitarian impact. Paul commented that the INCAP study in Guatemala, involving a 30-year follow-up of the impact of improved early childhood nutrition, has demonstrated major economic and health benefits from the provision of nutritional supplements to children aged 6 to 24 months, including a 42% increase in adult male earning power. This significant ‘return on investment’ and the vast potential markets across the developing world have convinced the VN team that it is imperative and economically viable, for both governments and industry to invest in early child nutrition. Steve added that “although there will be lower profit margins, there will be massive long-term benefits. This will make community therapeutic care (CTC) look tiny. Businesses will be able to use their excess capacity without diluting profit margins on major brands. This should be very attractive to the private sector. If VN can lead by example and show how this might work it could so easily take off. We are convinced that the potential reward, albeit long term, is massive at all levels: humanitarian, socio-economic and commercial. There needs to be an evidence base, i.e. examples of how well it could work. Corporations need to invest in the long-term markets but this needs people with vision and passion”. For their part, the humanitarian community need to proactively come together to develop and agree a framework setting out the terms on which they would support this ethical engagement with industry.

As Steve says, although the idea of making profit out of the poor is repellent to some people in the humanitarian sector, unless we start to consider this as an option then it is just going to be business as usual. Steve and Paul posed the question, “why can’t we have a system where we use the abundant experience and resources of the private sector to fulfil and deliver to a market that is usually left out of the equation and only catered for by the public sector in a way which is ultimately completely disempowering?” As I took the last sip of my slightly over-priced coffee, I had to admit that this was an incredibly powerful and seductive vision.

CMAM in Cambodia – indicators of acute malnutrition for screening

By Jennifer Carter and Joel Conkle

Jennifer Carter is a second year MPH student at the Tulane University School of Public Health and Tropical Medicine in the Department of International Health and Development. She lived and worked for a number of years in the developing world’s children, suffering from chronic malnutrition. The sheer scale means that this problem is far too great to be left to non-governmental organisations (NGOs) or the public sector alone.

Given the scale of need, VN believe that we need to be considering mass retail distribution mechanisms in a way not conceived of before. Steve and Paul argue that up until now, private companies have had too short-term a vision and have therefore ignored the lower end of the market pyramid, i.e. the poor. They believe that VN could help catalyse development of these markets but cannot do it on their own. They therefore need to engage with the private sector. VN can provide the knowledge and also provide a social brand. It would be a kind of ‘enlightened humanitarianism’ which takes the private sector beyond CSR (corporate social responsibility). Paul argues that CSR funding is significant but, more often than not, a kind of dead-end money with no real strategic underpinning. Too frequently, it is used as a way of buying off the consciences of the private sector and all who work within it. CSR has no vision of long-term sustainability. What VN are proposing is more of a strategic partnership where money can be made, at the same time as having a sustainable humanitarian impact. Paul commented that the INCAP study in Guatemala, involving a 30-year follow-up of the impact of improved early childhood nutrition, has demonstrated major economic and health benefits from the provision of nutritional supplements to children aged 6 to 24 months, including a 42% increase in adult male earning power. This significant ‘return on investment’ and the vast potential markets across the developing world have convinced the VN team that it is imperative and economically viable, for both governments and industry to invest in early child nutrition. Steve added that “although there will be lower profit margins, there will be massive long-term benefits. This will make community therapeutic care (CTC) look tiny. Businesses will be able to use their excess capacity without diluting profit margins on major brands. This should be very attractive to the private sector. If VN can lead by example and show how this might work it could so easily take off. We are convinced that the potential reward, albeit long term, is massive at all levels: humanitarian, socio-economic and commercial. There needs to be an evidence base, i.e. examples of how well it could work. Corporations need to invest in the long-term markets but this needs people with vision and passion”. For their part, the humanitarian community need to proactively come together to develop and agree a framework setting out the terms on which they would support this ethical engagement with industry.

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**Field Article**

**Cambodia programme data**

Data from screening by the non-governmen- 
tal organisations (NGOs), Samaritan’s Purse7 and 
Magna Children at Risk8 indicates that far more 
children are identified as both moderately and severely acutely malnour-
ished by WH z-scores than by MUAC criteria. Magna screening data (both WH and 
MUAC were used) was collected at a referral 
hospital in Kandal province, where the NGO 
operates a large, comprehensive programme for 
treatment of moderate and severe acute 
malnutrition in Cambodia. While the facility 
is a 24-hour paediatric ward where any sick 
child will be treated, many people in the 
surrounding community are aware of 
Magna’s inpatient and outpatient 
programme for the treatment of malnutrition. 
Thus the children who comprise the self-
selected population, who were screened prior 
to admission to the facility, are far more likely 
to present with acute malnutrition than chil-
dren in a community setting. Recent analysis 
of data from screening at the Magna health 
facility shows that the estimated prevalence 
of moderate and severe wasting among 
patients (6 to 59 months of age) according to 
WH (< -2 SD) is 83.1% compared with 65.8% 
according to MUAC (<125 mm). Differences 
were also found to be greatest among older 
children (> 24 months), whereas prevalence 
estimates derived from WH and MUAC were 
found to be similar among younger children.

Further new anthropometry data from 
both Samaritan’s Purse (collected in slum 
communities in Phnom Penh where the NGO 
is operating) and Magna are being collated 
in Cambodia communities where the NGO 
operating) and Magna are being collated 
Re-analysis of CAS 2008

The CAS 2008 is a nationally representative 
sample of 7,495 households with children ages 
0 to 59 months, making it the largest national 
sample of child measurements ever collected 
in Cambodia. The survey was conducted in 
order to ascertain the effects of the 2008 food 
price crisis on the health and nutrition of 
Cambodians. MUAC was included as an 
anthropometric measure due to the current 
debate over the use of WH versus MUAC as 
measures of acute malnutrition.

A highly significant finding from the 
was that between 2005 and 2008, all 
improvements in the prevalence of acute 
malnutrition had effectively halted. 
According to analysis of the Cambodia 
Demographic and Health Surveys (CDHS), 
using the 2006 WHO growth standards for 
all, between the years 2000 and 2005 Cambodia 
experienced a 1.7% yearly average 
decrease in wasting, with the prevalence 
falling from 16.8% in 2000 to 8.4% in 20059. 
The CAS 2008 determined the prevalence of 
wasting to be 8.9% and not statistically signif-
ically different from the 2005 estimate6.

While prevalences of moderate and severe 
acute malnutrition derived from WH z-scores 
(< -2 SD) and MUAC-for-age (MUAC/A < -2 
SD) were found to be similar in the Cambodia 
Anthropometric Survey (CAS) 2008, at 8.9% 
and 8.7% respectively, MUAC (<125 mm) 
unadjusted for age produced a wasting 
prevalence of only 3.8% (UNICEF analysis, 
see Figure 1). 
This confirms that in 
Cambodia, differences in prevalences derived 
from MUAC and WH occur at the national 
level, as well as in community and facility-
Based nutrition programmes.

With regard to severe wasting, the prevalence 
among children aged 6 to 59 months accord-
ing to MUAC was only one third of the 
prevalence according to WH (see Figure 2). 
The greater correspondence between both 
indicators is for the prevalence of moderate 
wasting, where MUAC prevalence is around 
three quarters that of WH (see Figure 3).

Reasons for WH v MUAC differences in 
prevalence 
Part of the discrepancy between MUAC and 
W/H can be attributed to measurement error. 
The height of the youngest children is more 
likely to be over estimated, which leads to

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2. www.magnachildrenatrisk.org
   2008. English supplement to the Cambodia 
   Anthropometric Survey 2008. Phnom Penh, Cambodia: 
   National Institute of Statistics, Ministry of Planning 
   prepared by UNICEF.
4. National Institute of Statistics (NIS), Directorate General 
   for Health [Cambodia], and ORC Macro. 2001. Cambodia 
   Demographic and Health Survey 2000. Phnom Penh, Cambodia, 
   and Calverton, Maryland USA: National 
   Institute of Statistics, Directorate General for Health, 
   and ORC Macro.
5. National Institute of Statistics (NIS), Directorate General 
   for Health [Cambodia], and ORC Macro. 2006. Cambodia 
   Demographic and Health Survey 2005. Phnom Penh, 
   Cambodia, and Calverton, Maryland USA: National 
   Institute of Statistics, Directorate General for Health, 
   and ORC Macro.
An additional issue when considering MUAC and WH is that the two indicators select different children. Of the 9% of children identified as wasted by either measure, only 2% were selected by both MUAC and WH (see Figure 4). For severely wasted children, only 5 out of 145 children were selected by both (see Figure 5). While previous studies have shown a similar mortality rate in children selected with either indicator among hospitalised children, there is still some uncertainty about which indicator is more appropriate for community based screening of children for therapeutic feeding.

Programming implications

Findings from the CAS 2008, along with growing international support for the development of programmes targeting acute malnutrition in non-emergency settings, has led to the development of interim community based management of acute malnutrition (CMAM) guidelines for Cambodia. The guidelines will remain in draft form until sufficient evidence is gathered from the implementation of pilot programmes.

Recommending appropriate indicators of acute malnutrition is integral to ensuring that CMAM guidelines will allow for children at increased risk of mortality due to acute malnutrition to be identified as such in community and health facilities. As the Cambodia CMAM guidelines are being developed, it is important that data is used to inform choices of anthropometric measures. In this respect, it is significant that the difference in MUAC-derived and WH-derived prevalences of wasting increases with age. The indicators produce more similar estimates of acute malnutrition for children under the age of two years than for older children. WH remains consistent across age groups in its identification of children as wasted, while MUAC preferentially selects younger children as wasted.

The fact that discrepancy between MUAC and WH increases with age has significant implications with regard to food security. Wasting among young children is usually indicative of recent disease often coupled with improper feeding practices, while wasting among older children is more indicative of food insecurity. In a 2009 report for the Integrated Food Security Phase Classification (IPC) Global Partners, WH is recommended as a better indicator for monitoring changes in food security because it does not preferentially identify younger children as wasted as MUAC has been shown to do. During periods of food insecurity, as the prevalence of wasting increases, older children are likely to experience a relatively greater increase in acute malnutrition than younger children. Thus it is possible that using MUAC alone will mask problems among older children and thus provide an inaccurate picture of food insecurity in a country or region.

Recommendations

MUAC and WH identifying different children as malnourished means that using only one indicator is likely to leave out a group of children with a similar risk of mortality. For this reason, the interim CMAM guidelines for Cambodia state that either a low MUAC score or a low WH score is grounds for inpatient or outpatient treatment of acute malnutrition, depending on the severity of the deficit and the presence of other clinical signs. This is distinct from the two-stage screening process and thus avoids the problem of ‘rejected referrals,’ where children referred to the health facility due to low MUAC are turned away from treatment because they do not meet the WH criterion. In a non-emergency setting such as Cambodia, the use of both MUAC and WH for community screening seems a fair compromise until additional evidence from CMAM pilot programmes in rural and urban settings can be obtained.

Findings from Samaritan’s Purse, Magna, and the CAS 2008 regarding discrepancies between MUAC and WH warrant further investigation as to which is the better indicator of acute malnutrition. In particular, a facility-based study is needed in order to determine whether MUAC or WH is more associated with clinical signs of malnutrition and mortality in younger children (> 23 months). Having a small arm circumference relative to a set cut-off point at a young age is less likely to be indicative of increased risk of mortality than at an older age. While arm circumference increases slowly between birth and 4 years of age, it does indeed increase among healthy children. Similarly, severe deficits in WH produce an only moderately increased risk of mortality among young children (< 23 months) but a marked increase in risk after 2 years of age.

A separate but related issue in Cambodia is the need to revise the Integrated Management of Childhood Illness (IMCI) to be in line with the WHO/UNICEF Joint Statement on WHO child growth standards and the identification of severe malnutrition in infants and children. At present, IMCI is used at the health centre to diagnose and guide treatment of illness among children. The IMCI algorithm includes weight-for-age (WA) z-scores as the only measure of malnutrition among young children. Research has shown that this may be acceptable for children less than 2 years of age, when low weight is more likely due to wasting than stunting, but not for older children. Low WA in older children is more likely to be caused by stunting rather than wasting (a problem that will not respond to therapeutic feeding). Now that there is evidence that the prevalence given by MUAC and WH is not similar in Cambodia, more research is needed to properly inform the revision of IMCI protocol with respect to anthropometric indicators.

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10 See footnote 8.