

Medical Checks for Children

Medical Report Malawi Mulanje 2010

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Introduction:

In the second week of August 2010 Medical Checks for Children (MCC) visited Mulanje, a region in the South of Malawi (Africa). The medical checks were organized in close cooperation with TNT post and the United Nations World Food Programme (WFP).

The MCC team checked and treated 1010 children, free of cost in an explorative mission because it was the first MCC mission in Malawi.

The MCC team consisted of nine members from The Netherlands: Anne Vlietstra (medical-end-responsible and mission leader, family doctor), Karlien Bongers (organisation-end-responsible, general surgeon), Jolanda van der Velden (tropical doctor), Naomi Ketharanathan (paediatrician trainee), Sandra Buurman (family doctor), Iris van de Gevel (toxicologist/regulatory affairs manager), Roel Raatgever (bioscientist), Jaimy de Graaf (nurse) and Emma Paulides (student bioscience).

The medical camp was organized for seven days, starting the 12th of August, at three different locations at the rural area of the Mulanje region. In this area no regular local transport is available. Healthcare facilities are a small health post and a very basic district hospital.

The first day we saw the orphan and vulnerable children in Majoma village for the so called Community Based Organisation (CBO). The next three days the MCC team checked the children at the Pasani school who are supported by schoolfeeding program of WFP and the last three days the children at Chiwambo school (without support of the WFP) were checked.

Normally, the MCC health checks are focused on children under five years of age because they are the most at risk. Since there is a good health system in Malawi for children under five years of age, the medical checks were focused in Malawi on children of age five to twelve years of age.

Technical equipment and most of the supplies were brought from the Netherlands by MCC team members.

Most of the medication was ordered by Marieke van der Heijden from TNT POST with help of pharmacist of the Mulanje District Hospital. Additional medication was purchased from local pharmacies in Lilongwe and was brought from The Netherlands as a gift of Hil and Margriet Dijkstra, family doctor and pharmacist at Bakhuizen. Soap and toothpaste for every child was purchased from local shops in Moshi and sponsored by Family and friends of Sandra Buurman and Roel Raatgever. Toothbrushes were donated by Ricoh Nederland BV.

An overview of all purchased medicine can be found in Appendix A.

The cooperation of TNT post (in person of Marielle van Spronsen and Marieke van der Heijden) existed out of the following (amongst others):

- Transfer of knowledge about expected diseases.
- Transfer of data on demographics.
- Selection and informing of schools (check locations).
- Arranging lodging of all MCC team members.
- Support in transportation of the MCC team and the supplies to the check locations.
- Support in ordering and delivery of medication.
- Giving all kinds of support to the MCC team during the medical camp.

MCC is very satisfied with the cooperation with TNT post.

Our special thanks go to Marieke van der Heijden. Her support and enthusiasm gave MCC the opportunity to work in the medical camp and examine and treat the 1010 children.

We also want to thank Marielle van Spronsen from TNT post for her support in the Netherlands.

We are impressed about the endurance of Michiel Cohen de Lara for getting the working permit.

Special thanks go to the volunteers of the medical camp from Malawi: Charles Stima (district food coordinator), William Namakhula (head of primary educational adviser), Willard Chimombo (CBO), Esta Selemani, Marta Puliwa, Jesse Mandala, Rejia Katambere, James Mapiku, Fany Nanhoma, Mozes Mwale, Roles Lambera, P.S. Namaona (headteacher of Pasani school), Ofrex Dzimbiri (deputy head teacher of Pasani school and HIV-counselor), Kingsley Mmambo (student), John Julious, Muhammed Wale, Solomon Mphulupulu, Beatrice Msipiwa, Ken Luka, Lidia Bzimbiri, Alex Mphepo, Gracious Zembetsani, A.P.Samson (head teacher of Chiwambo school), Francisco D. Mapondo, George Kelvin Temani, Frank Mawera, Symon N. Nawawa, Judith Kamakwa, Lucia Taulo, Yahayer Adam Samson and Radsoni L. Mulangeni (traditionial healer).

We enjoyed working together with them. We hope they will continue to inspire their communities in the same way they inspired us as they play a vital role in spreading awareness and knowledge about health and its importance for children in reaching their developmental potential.

We are grateful to all the parents, care takers and community people for bringing the children and helping to conduct the program.

We are happy we got the opportunity to work with and to learn from all volunteers, translators and other supporting members who have helped directly or indirectly, despite their own obligations.

And last but not least, we would like to thank the children who came to the checks for their inspiring presence.

Background information of Malawi:

Malawi is located in East Africa and it is bordered by Tanzania (to the north), Zambia (to the west) and Mozambique (to the east and south). Lilongwe is the capital city of Malawi.

Malawi covers a total area of 118,484 km². To put this in perspective, this is nearly 3.5 times the size of the Netherlands. Malawi's population is close to 13 million people (2008). Life expectancy at birth is approximately 52.4 years. The national languages are Chichewa and English. About 80% of the people are Christian, 13% Muslim and 7% follow traditional religious beliefs. Malawi became an independent nation on 6 July 1964 and has been a multi-party democracy since 1994. The National Assembly has 193 seats, all directly elected to serve five-year terms. In 2006, women occupied 14% of the total seats in parliament. Under the 1995 constitution, the president is chosen through universal direct suffrage every five years.

Despite a peaceful history, substantial foreign aid and a democratic system, Malawi continues to be a poor country. As of 2009, it ranks 160th on the Human Development Index, the UNDP's ranking based on scores for three basic human development aspects: health, knowledge and standard of living.

According to the World Bank, the per capita income was about US\$690 in 2008.

Agriculture is by far the single most important industry for Malawi, employing 85% of the population. The main cash crops include tobacco (60%), tea, sugar and coffee. The staple food crop is maize.

Health Issues of Malawi:

Malawi has a network of health facilities belonging to different ministries and agencies. About 85% of the population lives within 10 km of a health facility. The facilities range from small dispensaries on estates to large hospitals in cities. Between these agencies, there were 843 health facilities in the country in 2002, more than 50% of them health centers (dispensary/maternity unit).

Although Malawi has this good network of health facilities, a Ministry of Health and Population inventory in 2002 found that only about 9% of government and mission health facilities were capable of providing the Essential Health Package (= EHP) onsite. This EHP must be able to deliver outpatient care, family planning services, maternity services, and immunization. It must have at least a medical assistant or clinical officer (one per facility) and two nurses/midwives. In each district, only one or two facilities had adequate EHP capacity. These service deficits arise from lack of health workers, supply stock-outs, and lack of basic utilities (water, electricity, phone or radio communication).

Life expectancy at birth	M/F 49/51 years
Median age of total population	16,4 years
Healthy life expectancy at birth	M/F 35/35 years
Maternal mortality ratio (MMR):	807 per 100 000 live births
Neonatal mortality ratio per 1000 live births (2000)	40
Births attended by skilled health personnel	Rural 53% urban 84%
Infant mortality rate	69 per 1 000 live births
Under-5 mortality	120 per 1 000 live births
Probability of dying between 15 and 60 years	M/F 554/514 per 1000 population
Underweight children under 5	19 %
Stunted children under 5	46 %
Level of poverty	65,3% below poverty line 17% below ultra poverty line
HIV/AIDS adult prevalence	12%
Total expenditure on health per capita	\$70
Total expenditure on health	12,3 (as % of GDP)
Measles immunization in 1-year-olds	Rural 78% urban 87%
Physicians	1 per 10000 population

Figures are for 2006 unless indicated (source World Health Statistics 2008)

Millenium goals and Malawi (source: www.mdgmonitor.org)

Goal 1: Eradicate Extreme Poverty and Hunger:	
GDP per capita	731 US\$
Annual GDP growth	8.4 %
Population below PPP \$1 per day (2004)	20.8 %
Level of food poverty: below food poverty line (1998)	41%
Goal 2: Achieve universal primary education	
Net enrolment ratio in primary education (both sexes)	No data
Percentage of pupils starting Grade 1 and reach Grade 5 (both sexes)	35.9 %
Goal 3: Promote gender equality and empower women	
Gender parity Index in primary level enrolment (ratio of girls to boys)	No data
Literacy rates of 15-24 years old (both sexes)	83 %
Seats held by women in national parliament (2007)	13.6 %
Goal 4: Reduce child mortality	
Mortality rate of children under 5 years old (per 1,000 live births)	120
1-year-old children immunized against measles	85 %
Goal 5: Improve maternal health	
Maternal mortality ratio (per 100,000 births) (2005)	1100
Goal 6: Combat HIV/AIDS, malaria and other diseases	
People living with HIV, 15-49 yrs old (2007)	11.9 %
Prevalence of tuberculosis (per 100,000 people)	321.8
Goal 7: Ensure environmental sustainability	
Land area covered by forest (2005)	36.2 %
Access to improved drinking water sources (% of total population)	76 %
Goal 8: Develop a global partnership for development	
Internet users (per 100 people)	0,45

Background information of TNT Post WFP:

Since 2002, TNT post has been an active partner of the United Nations World Food Programme (WFP), the world's largest humanitarian aid agency. Since the start of the partnership, Mail has played an important role in raising awareness for WFP's fight against hunger.

They do this through a range of activities, including Kids Moving the World, Master Chefs for Home Chefs, GSM Retour plan and local initiatives to raise awareness and financial support for WFP.

Knowledge transfer is also an essential part of TNT Post partnership with WFP. Through the programme, TNT Post sends specialist skilled people to Malawi to work on the School Feeding Program. In 2010, three Mail employees worked as Project Manager on the school feeding projects in Malawi. Additionally 2 employees provided logistical and financial knowledge to WFP Malawi.

WFP is the world's largest humanitarian organisation fighting hunger worldwide. Every year, WFP feeds an average of 90 million people in more than 70 countries.

One of WFP's projects is the school meals programme, which provides a free school lunch or snack to poor children in school. The concept is simple: food attracts hungry children to school, and they get an education that can help them break out of the cycle of hunger and poverty. This is especially important for girls, who are the first to be kept at home in poor families. For many parents, these meals are a reason for sending their children to school rather than out to work. It only costs WFP 20 Euro cents to provide a child with a nourishing meal at school.

Hunger is the greatest threat to health worldwide. It claims more lives each year than AIDS, malaria and tuberculosis combined. Over one billion people in the world are undernourished, most of them women and children. A third of all child deaths in the developing world are linked to undernutrition.

For more information about WFP visit www.wfp.org.

Medical Checks for Children on location:

The medical checks of the 1010 children were performed in seven days at three different locations (Majomo village, Pasani school and Chiwambo school). During the checks not only schoolchildren were checked but also children from the villages around the school. In Majoma village mainly orphan and vulnerable children were seen. The schoolchildren from the Pasani school are supported by schoolfeeding program of WFP and the schoolchildren at Chiwambo school are not supported by any feeding program.

During the free of costs medical checks, the children were checked following the medical carousel. This includes:

- Registration of the child and survey of use of meals and latrines
- Measuring height and weight (saturation occasionally)
- Blood test (haemoglobin)
- Physical examination by a medical doctor
- Giving medication (pharmacy)
- Education on tooth brushing (a tooth brush, toothpaste and soap was given to each child)
- HIV/AIDS counselling
- Data analysis (every evening a quick scan of children's health could be made)

At each station, mainly at physical examination and pharmacy, education was given to the children and their care takers on good nutrition and hygiene.

The MCC team paid special attention to the prevalence, treatment and prevention of anaemia, growth abnormalities, worm infections and HIV/Aids.

Diagnosis and categories of ailments:

During the week, MCC checked 1010 children.

Due to the high risk of mortality and morbidity under five years of age, normally the focus of MCC is checking young children. Since there is a good health system in Malawi for children under five years of age, the medical checks were focused in Malawi on children of age five to twelve years of age.

Of all checked children, 93 % had the age of twelve years or younger and 9% of the children had the age of five or younger. At the location of the Chiwambo school relatively more young children (from the village) were seen (see table 1) and at Majomo village relatively more older children. Of course, the children at the different locations cannot be compared completely because of age differences and background. Gender was equally divided at all locations.

LOCATION	Majomo village		Pasani		Chiwambo		Total	
	N	%	N	%	N	%	N	%
Total	84	100%	481	100%	445	100%	1010	100%
Age								
>=0 and <1	2	2%	1	0%	6	1%	9	1%
>=1 and <5	8	10%	7	1%	65	15%	80	8%
>=5 and <12	55	65%	445	93%	346	78%	846	84%
>=12 and <18	19	23%	28	6%	28	6%	75	7%
Boy	42	50%	226	47%	241	54%	509	50%
Girl	42	50%	253	53%	204	46%	499	49%

Table 1: Age and gender distribution of 1010 checked children, total and per area. Figures represent absolute numbers with percentage of children in the area between brackets.

Except of the 434 (43%) cases of anaemia, 338 other major diseases were diagnosed (see table 2). The diagnosis "(suspected) HIV/Aids", "(possible) malaria" were either children who told us this spontaneously or on request, they were on treatment for the disease, or the MCC doctor suspected the mentioned disease. Of course this numbers seems an underestimation.

LOCATION	Majomo village			Pasani			Chiwambo			Total		
	n	N	%	n	N	%	n	N	%	N	N	%
HIV positive				2	481	0%	2	445	0%	4	1010	0%
Malaria (suspected)	1	84	1%	1	481	0%	1	445	0%	3	1010	0%
Bilharzia				20	481	4%	37	445	8%	57	1010	6%
Pneumonia (clinical diagnosis)	8	84	10%	41	481	9%	37	445	8%	86	1010	9%
Dysentaria	1	84	1%	7	481	1%	3	445	1%	11	1010	1%
Diarrhoea without dehydration	1	84	1%	4	481	1%	6	445	1%	11	1010	1%
Obstipation	3	84	4%	64	481	13%	70	445	16%	137	1010	14%
Active worm infection	27	84	32%	58	481	12%	70	445	16%	155	1010	15%
Otitis media acuta / n.o.s.	2	84	2%	10	481	2%	15	445	3%	27	1010	3%
Otitis media with effusion	2	84	2%	8	481	2%	10	445	2%	20	1010	2%
Caries n.o.s.	11	84	13%	91	481	19%	63	445	14%	165	1010	16%
Caries with pain	5	84	6%	68	481	14%	48	445	11%	121	1010	12%
Vitamin deficit (clinical signs)	7	84	8%	38	481	8%	24	445	5%	69	1010	7%
Impetigo / furunculosis	1	84	1%	3	481	1%	6	445	1%	10	1010	1%
Scabies	6	84	7%	16	481	3%	13	445	3%	35	1010	3%
Wounds infected	1	84	1%	12	481	2%	4	445	1%	17	1010	2%
Psychomotoric retardation	1	84	1%	2	481	0%	2	445	0%	5	1010	0%
Epilepsy	3	84	4%	5	481	1%	3	445	1%	11	1010	1%
Pathological murmur (suspected)				2	481	0%	3	445	1%	5	1010	0%
Keratoconjunctivitis	1	84	1%	4	481	1%	1	445	0%	6	1010	1%
Urinary tract infection				3	481	1%	1	445	0%	4	1010	0%
Hernia (umbilical, epigastric, cicatric)	1	84	1%	10	481	2%	7	445	2%	18	1010	2%

Table 2: Disease/ailments prevalence among all 1010 children, total and per area. Figures represent absolute numbers and percentages of children

Most of the ailments and diagnosis could be treated on the spot except the dental problems since a dentist was not included in the MCC team.

Of all 1010 children, 136 children (13%) were referred to medical specialists in the Mulanje Hospital for further diagnoses and/or treatment (see table 3). Of these children, 92 needed a

referral to the dentist because of caries and pain and seven children a blood check after three months because of deep anaemia (Hb below 5 mmol/l).

LOCATION	Majomo village			Pasani			Chiwambo			Total		
	n	/	N %	n	/	N %	n	/	N %	n	/	N %
Dentist	3	/	84 4%	51	/	481 11%	38	/	445 9%	92	/	1010 9%
Specialist in hospital	7	/	84 8%	18	/	481 4%	8	/	445 2%	33	/	1010 3%
Revisit							1	/	445 0%	1	/	1010 0%
X-thorax				3	/	481 1%	1	/	445 0%	4	/	1010 0%
Bloodtest after 3 months	1	/	84 1%	2	/	481 0%	4	/	445 1%	7	/	1010 1%
International foundation				4	/	481 1%				4	/	1010 0%

Table 3: Frequency of follow-up per geographical location

1: Growth abnormality and malnutrition:

(underweight: 24% (206/855), stunting: 30% (301/1006), wasting: 8% (44/533)

Percentages of growth retardation is correlated with poverty, malnutrition, living conditions, hygiene and the prevalence of chronic diseases.

The two major causes of malnutrition are poor feeding practices and inadequate childcare. Adequate food intake and education programs addressing nutritious food need to be provided.

A report of the World Bank shows that one percent decrease in adult height due to childhood stunting correlates with 1.4 percent loss of productivity. The report shows furthermore the fact that stunting in general is associated with as much as eleven points decrease in Intelligence Quotient (IQ).

Malnutrition is thought to account for one third of all deaths of children under five years of age (UN Millennium Developmental Goals). Therefore, MCC assessed growth abnormalities, measuring and weighing all children in a standardized fashion, using the following criteria:

Underweight = weight for age at or under the third percentile of the reference population (WHO growth curves), only children up to 10 years old. This is an indicator of malnutrition or weight loss because of disease.

Stunting = height for age at or under the third percentile of the reference population, (WHO growth curves) only children up to 19 years of age. This is an indicator of chronic malnutrition.

Wasting = weight for height at or under the third percentile of the reference population (WHO growth curves), only children up to 120 cm in height. This is an indicator of acute malnutrition.

It has to be noted that reference data are only available for certain heights, weights and ages (as specified above).

The measuring of the parameters is leading to the following general prevalence's of growth abnormalities in Mulanje:

LOCATION	Majomo village	Pasani	Chiwambo	Total
	n / N %	n / N %	n / N %	n / N %
Total	19 / 58 33%	110 / 401 27%	77 / 396 19%	206 / 855 24%
Per age category				
>=0 and <1	1 / 2 50%	1 / 1 100%	0 / 6 0%	2 / 9 22%
>=1 and <5	4 / 8 50%	3 / 7 43%	8 / 65 12%	15 / 80 19%
>=5 and <12	14 / 48 29%	106 / 393 27%	69 / 325 21%	189 / 766 25%
Boy	7 / 28 25%	49 / 191 26%	38 / 216 18%	94 / 435 22%
Girl	12 / 30 40%	61 / 209 29%	39 / 180 22%	112 / 419 27%

Table 4: Prevalence of Underweight (weight/age $\leq P3$) per geographical location by age and gender

LOCATION	Majomo village	Pasani	Chiwambo	Total
	n / N %	n / N %	n / N %	n / N %
Total	32 / 84 38%	164 / 480 34%	105 / 442 24%	301 / 1006 30%
Per age category				
>=0 and <1	0 / 2 0%	1 / 1 100%	1 / 6 17%	2 / 9 22%
>=1 and <5	5 / 8 63%	2 / 6 33%	14 / 62 23%	21 / 76 28%
>=5 and <12	21 / 55 38%	152 / 445 34%	83 / 346 24%	256 / 846 30%
>=12 and <18	6 / 19 32%	9 / 28 32%	7 / 28 25%	22 / 75 29%
Boy	17 / 42 40%	80 / 226 35%	58 / 238 24%	155 / 506 31%
Girl	15 / 42 36%	84 / 252 33%	47 / 204 23%	146 / 498 29%

Table 5: Prevalence of Stunting (Height/age $\leq P3$) per geographical location by age and gender

LOCATION	Majomo village	Pasani	Chiwambo	Total
	n / N %	n / N %	n / N %	n / N %
Total	2 / 44 5%	27 / 241 11%	15 / 248 6%	44 / 533 8%
Per age category				
>=0 and <1	0 / 2 0%	1 / 1 100%	0 / 6 0%	1 / 9 11%
>=1 and <5	0 / 8 0%	1 / 6 17%	1 / 60 2%	2 / 74 3%
>=5 and <12	2 / 31 6%	25 / 234 11%	14 / 181 8%	41 / 446 9%
>=12 and <18	0 / 3 0%		0 / 1 0%	0 / 4 0%
Boy	0 / 21 0%	9 / 110 8%	6 / 140 4%	15 / 271 6%
Girl	2 / 23 9%	18 / 131 14%	9 / 108 8%	29 / 262 11%

Table 6: Prevalence of Wasting (weight/height $\leq P3$) per geographical location by age and gender

The World Health Statistics has only data of prevalence of growth abnormalities for the age group of five years and below for underweight and stunting (see table 7).

LOCATION	Total Malawi WHO 2006	Total MCC 2010	Majomo village	Pasani	Chiwambo
>=0 and <5	%	n / N %	n / N %	n / N %	n / N %
Underweight	19%	17 / 89 19%	5 / 10 50%	4 / 8 50%	8 / 71 11%
Stunting	46%	23 / 85 27%	5 / 10 50%	3 / 7 43%	15 / 68 22%

Table 7: Prevalence Underweight and Stunting in the under five age group in Malawi (2006) and per geographical location of MCC (2010).

Because the small amount of children seen by MCC in the age group below five years of age no hard conclusions can be made of the differences.

The children attending a school with WFP food program did worse on all parameters for growth abnormality (see table 8) All this numbers are statistical significant. This means, the difference between growth abnormalities at a WFP and a non-WFP school is not based on chance. It is strongly recommended to do more research.

Weight/age \leq P3	Pasani	Chiwambo	Total
No	291	319	610
Yes	110	77	187
Total	401	396	797
	27.4%	19.4%	23.5%
P-value for difference Chiwambo / Pasani: Fishers's Exact test : 0.002; Chi-square test: 0.000			
Height/age \leq P3	Pasani	Chiwambo	Total
No	316	337	653
Yes	164	105	269
Total	480	442	922
	34.2%	23.8%	29.2%
P-value for difference Chiwambo / Pasani: Fishers's Exact test: 0.000; Chi-square test: 0.000			
Weight/height \leq P3	Pasani	Chiwambo	Total
No	214	233	447
Yes	27	15	42
Total	241	248	489
	11.2%	6%	8.6%
P-value for difference Chiwambo / Pasani: Fishers's Exact test: 0.016; Chi-square test: 0.042			

Table 8: Difference in growth abnormalities between children attending school with schoolfeeding program (Pasani) and without (Chiwambo)

During the checks MCC understood from parents, care-takers and teachers that (part of) the children who got a school lunch, didn't get any dinner or a lesser amount at home any more. So, this might be an explanation for the results found.

During the medical check-ups, we gave all children and their guardians hygiene and nutritional advice, with emphasis on hand-washing, vitamin C and vegetable intake, so their children may grow healthy and strong. We noticed the policy of a lot of mothers to feed their babies up to the age of one year or even more, almost only with breast milk. For babies, we advised exclusive breastfeeding up to six months and then start with the introduction of normal food.

2: Anaemia (434, 43 %) (see table 9)

Anaemia is the most prevalent micronutrient disorder.

In Malawi as far as we know, no national policy has been implemented to provide iron supplements to pregnant women or young children. While iron deficiency is frequently the primary factor contributing to anaemia, it is important to recognise that the control of anaemia requires a multi-faceted approach which, through integrative interventions, addresses the various factors that play a significant role in producing anaemia in a given community. In addition to iron deficiency, infectious diseases such as worm infections, other chronic infections, particularly HIV-AIDS and tuberculosis, malaria, as well as other nutritional deficiencies, are especially important.

MCC noted that the typical household's diet is additionally very low in diversity of food products low in fat and low in sources of vitamin C. Maize and some green leafy vegetables dominate the menu on a daily basis; complemented by beans, rice, fish and green bananas on a weekly basis and some meat on a monthly basis.

Because of emotional problems, haemoglobin levels were not determined in 12 children (1.2%); all of them were diagnosed as anaemic based on signs and symptoms.

As in other populations, we found a larger percentage of anaemia in children younger than five years of age, though in this cohort it is only small numbers. So we cannot make any conclusions out of them.

LOCATION	Majomo village	Pasani	Chiwambo	Total
	n / N %	n / N %	n / N %	n / N %
Total anaemia	44 / 82 54%	190 / 475 40%	200 / 441 45%	434 / 998 43%
Hb unknown	2 / 84 2.4%	6 / 481 1.2%	4 / 445 0.9%	12 / 1010 1.2%
Per age category				
>=0 and <1	1 / 2 50%	1 / 1 100%	5 / 6 83%	7 / 9 78%
>=1 and <5	4 / 7 57%	5 / 6 83%	40 / 64 63%	49 / 77 64%
>=5 and <12	29 / 54 54%	177 / 440 40%	145 / 343 42%	351 / 837 42%
>=12 and <18	10 / 19 53%	7 / 28 25%	10 / 28 36%	27 / 75 36%

Table 9 : Anaemia prevalence, total and per age category and area.

In the analysis above, haemoglobin levels at or below the CDC criteria were considered to represent anaemia.

At Chiwambo school location we checked more children under five years of age comparing with the Pasani school location. So, we only compare the category of 5 to 12 years of age because of statistical matters.

The prevalence of anaemia is in the group of children, age five to twelve years, equal at Pasani school (WFP) (40%) and Chiwambo school (non-WFP) (42%).

In other countries in Africa (Kenia and Tanzania) where MCC do medical camps, prevalence of anaemia around 25% in the same age group are found.

We treated the children with anaemia (and their mothers if they were breast fed) with supplements for three months.

In seven children the haemoglobin level was less than 5.0 mmol/l. and these children were referred to the Mulanje Hospital for further diagnostic procedures (HIV test, malaria test and exclusion of sickle cell anaemia (an inborn malformation of the red blood cells)). MCC asked for a re-check of the haemoglobin level after 3 months of treatment.

As pointed out in the paragraph of growth abnormalities, we gave during the medical check-ups all children and their guardians nutritional advice with emphasis on vegetable intake and vitamin C. When it comes to the prevention of anaemia, the vitamin C intake is important because vitamin C facilitates the uptake of iron in the gut (as milk counterparts it). Cheap and available sources for vitamin C in Malawi are lemon and passion fruit.

For babies, we advised exclusive breastfeeding up to six months, then start with the introduction of normal food and we discussed the possibilities of donation of breast milk by another woman when the normal supply is lacking.

3: Worm treatment (990 (98%) prophylactic and 155 (15%) therapeutic)(see table 10)

A strong relationship exists between a Helminth, an *Ascaris Lumbricoides*, a Hookworm or a *Taenia Trichiura* infection and anaemia.

In a high prevalence exists of these infections in (school-aged) children. In the last years, WFP established a de-worming program in Malawi. Due to financial problems, unfortunately the WFP have to stop this de-worming program (costs preventive treatment for a year 50 eurocents).

On the spot 990 (98%) children were given a preventive anti-worm treatment with an Albendazol tablet. An active worm infection was suspected on clinical signs and symptoms in 155 (15%) children. They were treated on the spot with Albendazol as well. We left at the different locations preventive Albendazol treatment for over half a year.

LOCATION	Majomo village	Pasani	Chiwambo	Total
	n / N %	n / N %	n / N %	n / N %
Total Active worm infection	27 / 84 32%	58 / 481 12%	70 / 445 16%	155 / 1010 15%
Per age category				
>=0 and <1				
>=1 and <5	4 / 8 50%	1 / 7 14%	14 / 65 22%	19 / 80 24%
>=5 and <12	19 / 55 35%	55 / 445 12%	55 / 346 16%	129 / 846 15%
>=12 and <18	4 / 19 21%	2 / 28 7%	1 / 28 4%	7 / 75 9%
Boy	16 / 42 38%	33 / 226 15%	33 / 241 14%	82 / 509 16%
Girl	11 / 42 26%	25 / 253 10%	37 / 204 18%	73 / 499 15%

Table 10: Prevalence of active worm infection (clinical diagnosis) per geographical location by age and gender

Health education on the spot was aimed at increasing awareness of worm transmission, the disabilities caused by intestinal worms and the importance of the de-worming program every half year.

Simple ways of improving personal hygiene and sanitation through hand washing, nail trimming and use of a latrine and clear water supplies and soap (at the schools) were encouraged.

Although all members of a population can be infected by worms, those who are at most risk and would benefit most from preventive interventions are the pre-school (2-5 years), school age children, adolescent girls and women of childbearing age.

4: Pneumonia (86; 9%) (see table 11)

The 86 children with a severe acute respiratory infection (ARI) were treated with appropriate antimicrobials and home treatment advice. This percentage is high in comparison with other MCC medical camps. Maybe this was due to the season with a lot of cold and rain and no appropriate clothing for the children available.

"Pneumonia", "coughing", "fast/difficult breathing", "chest indrawing" and "inability to suck milk" are the key words used by care-takers indicating a (severe) ARI.

LOCATION	Majomo village	Pasani school	Chiwambo school	Total
	n / N %	n / N %	n / N %	n / N %
Total Pneumonia	8 / 84 10%	41 / 481 9%	37 / 445 8%	86 / 1010 9%
Per age category				
>=0 and <1	0 / 2	0 / 1	1 / 6 17%	1 / 9 11%
>=1 and <5	1 / 8 13%	0 / 7	11 / 65 17%	12 / 80 15%
>=5 and <12	5 / 55 9%	40 / 445 9%	25 / 346 7%	70 / 846 8%
>=12 and <18	2 / 19 11%	1 / 28 4%	0 / 28 0%	3 / 75 4%

Table 11: Prevalence of pneumonia (clinical diagnosis) per geographical location by age

The principles of the Integrated Management of Childhood Illness (IMCI, see www.who.int/child-adolescent-health/integr.htm) (respiratory rate of 50 breaths per minute or more in a baby of 2 months up to 12 months, and 40 breaths per minute or more in a child of 12 months up to 5 years, lower chest wall indrawing and stridor which is a harsh noise made when the child inhales) for recognition and treatment of a pneumonia were transferred to the local workers and care takers. Since the health post (antibiotics available) is nearby both schools it seems rational to train the teachers of schools in Malawi to recognize a severe acute respiratory infection (ARI).

5: Suspected pathological Cardiac Murmurs (5; 0.5%)

The MCC carousel includes a cardiac examination. Mitral regurgitation and atrial septal defects being the most common heart problems in the third world. For this condition no treatment is available although a good dental situation is essential for a healthy life.

In five children a pathological heart murmur, mainly due to a septal defect, was suspected.

These children and their care takers were stressed on teeth brushing procedures. Besides this, they were told and got a written explanation to give their child antibiotics when going to a dentist for a teeth extraction.

6: Stomach ache and other gastrointestinal complaints (see table12) (see also the chapter about worm treatment)

During our health checks we encounter a rising percentage of (older) schoolchildren with complaints of stomach pain. In the absence of weight loss, bloating or fever these pains could be stress induced. Pressure on adolescents to succeed academically is well known, alongside with problems at home. Data on milk products sensitivity, gastritis or peptic ulcers are currently lacking as well as the prevalence of Helicobacter pylori bacteria.

LOCATION	Majomo village			Pasani			Chiwambo			Total		
	n	N	%	n	N	%	n	N	%	N	N	%
Dysentaria	1	84	1%	7	481	1%	3	445	1%	11	1010	1%
Diarrhoea without dehydration	1	84	1%	4	481	1%	6	445	1%	11	1010	1%
Obstipation	3	84	4%	64	481	13%	70	445	16%	137	1010	14%
Active worm infection	27	84	32%	58	481	12%	70	445	16%	155	1010	15%

Table 12: Prevalence of gastrointestinal complaints (clinical diagnosis) per geographical location

A striking percentage of all schoolchildren had complains about constipation (see table 13). The adding of more fat (sunflower oil for example) in the diet (school feeding) and stimulation of more fluid intake (water) can, at least partial, solve these complains. Constipation is also seen in 16 children diagnosed with acute worm infection.

LOCATION	Pasani school			Chiwambo school		
	n	N	%	n	N	%
Per age category						
>=5 and <12	58	445	13%	59	346	17%
>=12 and <18	6	28	21%	5	28	18%
Boy	31	226	14%	41	241	17%
Girl	33	253	13%	29	204	14%

Table 13: Prevalence of constipation per geographical location by age and gender

7: Ear-Nose-Throat (ENT) (see table 14)

The prevalence of acute ear infections was comparable with the prevalence in the Netherlands. Chronic or recurrent ear infections are a common condition encountered by the ENT surgeons in the third world. Effective initiatives for better hygiene and nutrition will play a part in diminishing chronic ear infections and their complications. Treatment of middle ear infections with antibiotics have a big impact in preventing deafness as well.

LOCATION	Majomo village			Pasani			Chiwambo			Total		
	n	N	%	n	N	%	n	N	%	N	N	%
Otitis media acuta / n.o.s.	2	84	2%	10	481	2%	15	445	3%	27	1010	3%
Otitis media with effusion	2	84	2%	8	481	2%	10	445	2%	20	1010	2%

Table 14: Indices for ENT infections of 1010 checked children, total

8: Skin diseases (see table 15)

Among the skin diseases, pyoderma, tinea capitis, scabies, viral skin disorders (mainly moluscum contagiosum), pedicosis capitis, dermatitis and reactions due to insect bites are the most common in children in Africa.

A peak of prevalence for pyoderma is observed among 5-9 year olds, with a progressive constant decrease over three years of age.

Pyoderma, scabies and tinea capitis are more common in overcrowded households and orphanages. The role of traumatic sores as a predisposing factor for pyoderma is well known. Especially legs and les commonly ears (because of septic ear piercing) is common of posttraumatic pyoderma.

LOCATION	Majomo village			Pasani			Chiwambo			Total		
	n	N	%	n	N	%	n	N	%	N	N	%
Impetigo / furunculosis	1	84	1%	3	481	1%	6	445	1%	10	1010	1%
Scabies	6	84	7%	16	481	3%	13	445	3%	35	1010	3%
Wounds infected	1	84	1%	12	481	2%	4	445	1%	17	1010	2%

Table 15: Indices for some skin diseases of 1010 checked children, total

The 10 (1%) children with a skin infection were treated with macrolides for pyoderma. Antifungal cream (eventually in combination with hydrocortison) was given for fungal infections (dermatomycosis) and hydrocortison crème was given for different forms of dermatitis. We did not treat the big amount of children with tinea capitis (with Selsun or griseofulvine) as there were limited supplies and the great majority heals spontaneously when in puberty. A possible explanation of the high amount of taenia capitis could be the use of the same razorblade when shaving different children their hair.

All children and their care takers got health education about the genesis and treatment of infectious skin diseases.

9: Eye problems (6, (1%) kerato-conjunctivitis)

Especially in the group of children above five years of age a rather common complaint was dry and/or painful eyes. Xerophthalmia can be attributed to Vitamin A deficiency. Vitamin A deficiency affects growth, the differentiation of epithelial tissues and immune competence. The most dramatic impact, however is on the eye and includes night blindness, xerosis of the conjunctiva and cornea and ultimately corneal ulceration and necrosis of the cornea. Vitamin A deficiency occurs when body stores are exhausted and supply fails to meet the body's requirements, either because there is a dietary insufficiency, requirements are increased, or intestinal absorption, transport and metabolism are impaired as a result of conditions such as diarrhoea. The most important step in preventing Vitamin A deficiency is insuring that children's diets include adequate amounts of carotene containing cereals, tubers, vegetables and fruits.

10: Urinary tract infections, Bilharzia and genital problems (see table 16)

We performed urine screening test in the children with urination related complaints. Some protein will appear in the urine if the level of protein in blood becomes high (infections) even when the kidney is functioning properly. Antibiotics, severe emotional stress and strenuous exercise can interfere with the test. In four children we found a urine infection which was treated with antibiotics.

LOCATION	Majomo village			Pasani			Chiwambo			Total		
	n	N	%	n	N	%	n	N	%	N	N	%
Bilharzia				20	481	4%	37	445	8%	57	1010	6%
Urinary tract infection				3	481	1%	1	445	0%	4	1010	0%
Hernia (umbilical, epigastric, cicatric)	1	84	1%	10	481	2%	7	445	2%	18	1010	2%

Table 16: Indices for urinary tract infections, Bilharzia and hernia of 1010 checked children, total

Schistosomiasis (also known as bilharzia, bilharziosis or snail fever) is a parasitic disease caused by several species of trematodes ("clatyhelminth" infection), a parasitic worm of the genus Schistosoma. Although it has a low mortality rate, schistosomiasis often is a chronic illness that can damage internal organs and, in children, impair growth and cognitive development. The urinary form of schistosomiasis is associated with increased risks for bladder cancer in adults. Schistosomiasis is the second most socioeconomically devastating parasitic disease after malaria in the world. The most common way of getting schistosomiasis in developing countries is by wading, playing or swimming in lakes, ponds and other bodies of water that are infested with the snails. Schistosomiasis is readily treated using a single oral dose of the drug praziquantel annually. Praziquantel is not available in the health posts or district hospitals in Malawi.

The World Health Organization has developed guidelines for community treatment of schistosomiasis based on the impact the disease has on children in endemic villages:

- When a village reports more than 50 percent of children have blood in their urine, everyone in the village receives treatment.
- When 20 to 50 percent of children have bloody urine, only school-age children are treated.
- When less than 20 percent of children have symptoms, mass treatment is not implemented.

Since data suggest, the parasitic worm can only be found in ditch water we were not aware of the prevalence in the Mulanje region. When we did the medical camp we discovered a lot of the children had complains of blood while urinating. All these children's urine was tested and when blood positive, they were treated with praziquantel.

LOCATION	Majomo village	Pasani school	Chiwambo school	Total
	n / N %	n / N %	n / N %	n / N %
Total Bilharzia	0 / 84 0%	20 / 481 4%	37 / 445 8%	57 / 1010 6%
Per age category				
>=0 and <1	0 / 2 0%	0 / 1 0%	0 / 6 0%	0 / 9 0%
>=1 and <5	0 / 8 0%	0 / 7 0%	2 / 65 3%	2 / 80 3%
>=5 and <12	0 / 55 0%	19 / 445 4%	25 / 346 7%	44 / 846 5%
>=12 and <18	0 / 19 0%	1 / 28 4%	10 / 28 36%	11 / 75 15%
Boy	0 / 42 0%	8 / 226 4%	20 / 241 8%	28 / 509 6%
Girl	0 / 42 0%	12 / 253 5%	17 / 204 8%	29 / 499 6%

Table 17: Bilharzia infection (clinical diagnosis) per geographical location and age.

Two boy's with a hernia inguinalis were diagnosed and referred to the Mulanje District Hospital. The other hernias is an underestimation of the umbilical hernias. Only the children with complains about their umbilical hernia's were diagnosed as such. The majority of these children were not referred to the hospital because, although they had intermittent pain or signs of bowel obstruction they were not willing to consider surgery for it.

11: Dental (see table 18)

LOCATION	Majomo village	Pasani	Chiwambo	Total
	n / N %	n / N %	n / N %	N / N %
Caries n.o.s.	11 / 84 13%	91 / 481 19%	63 / 445 14%	165 / 1010 16%
Caries with pain	5 / 84 6%	68 / 481 14%	48 / 445 11%	121 / 1010 12%

Table 18: Indices for dental problems per geographical location of 1010 checked children, total

This Medical Check for Children mission to Malawi did not include a dentist.

The number of cases mentioned probably underestimates the prevalence of dental disease in the children we checked with severe toothaches and caries. We stressed the care takers of the children with painful caries to take their child to the dentist in the Mulanje District Hospital.

We had the impression that the wealthier the people were, the more painful caries we saw. Maybe this is due to the more buying of sweets and cookies when there is more money available.

After the check local volunteers handled out toothbrushes, toothpaste and soap and educate the people in teeth brushing.

12: Neuromuscular and Skeletal problems (see table 19)

In the population of 1010 children we found only five children with a psychomotoric retardation. Although the medical camp was focused on children going to school, we expect in this kind of population more children with neurologic problems.

LOCATION	Majomo village	Pasani	Chiwambo	Total
	n / N %	n / N %	n / N %	N / N %
Psychomotoric retardation	1 / 84 1%	2 / 481 0%	2 / 445 0%	5 / 1010 0%
Epilepsy	3 / 84 4%	5 / 481 1%	3 / 445 1%	11 / 1010 1%

Table 19: Indices of psychomotoric retardation and epilepsy of 1010 checked children, total

The 11 children with epilepsy is a higher prevalence than we normally see during our checks (for example in Tanzania or Kenia). The reason for this higher prevalence is speculative. When talking with parents, care takers and teachers there seems a lack in knowledge about the necessity of the life-long treatment for epilepsy.

13: HIV-AIDS, malaria and TB(see table 20)

The diagnosis "suspected HIV/AIDS", "possible malaria" and "TB" were either children who told us spontaneously or on request they were on treatment for the disease or the MCC doctor suspected the mentioned disease.

LOCATION	Majomo village	Pasani	Chiwambo	Total
	n / N %	n / N %	n / N %	N / N %
HIV positive		2 / 481 0%	2 / 445 0%	4 / 1010 0%
Malaria (suspected)	1 / 84 1%	1 / 481 0%	1 / 445 0%	3 / 1010 0%
Clinical TB				-

Table 20: Indices of HIV-AIDS, malaria and TB per geographical location of 1010 checked children, total

Four children told us that they were HIV positive. One child is sent for an X-ray of the chest because of suspected TB. The X-ray was negative. This numbers is for sure an underestimation for these diseases.

Three children are suspected for malaria parasites, they were referred to the Mulanje District Hospital. We were not informed about the definitive test results.

Education health workers, caretakers and other local helpers:

One of the important tasks of MCC is to encourage the continuation of education of the caretakers and older children. During our week we are teaching on the spot on common diagnoses of frequent illnesses and medication. We especially focused on anaemia and malnutrition, on balanced diet, infection, parasites and failure to thrive. Our information mainly consisted of knowledge and practical advice about nutritious food and vitamin supplements, as well as hygienic and health promotion issues.

Future medical needs:

- The people in Mulanje need more clean water for drinking and hygiene purposes. We strongly advise TNT post/WFP to provide safe drinking water options in the village. Providing a source of clean drinking water (and soap!) at the schools is especially important for lessons in hygiene and for giving the children a source of save drinking water when they are at school.
 - It is important to stress, over and over again, the importance of regular (half yearly) deworming off all children up to fourteen year of age. Maybe TNT post/WFP can help to organize an anti-worm program for the schools and maybe for the whole villages.
 - Like all the locations we visited, in the Mulanje region, there is a strong need for comprehensive and systematic health promotion and preventive measures. Special emphasis needs to be put on personal hygiene (starting with the importance of hand washing with soap), dental care, good eating habits and nutritious food. If teachers know "the alarming symptoms" of common diseases (even some are potential life threatening) they can function as a safety net for promoting early and adequate medical help.
- Maybe TNT post/WFP can help to start a health education program for pregnant woman and young mothers with special attention for breastfeeding and good motherhood.

- Since Schistosomiasis (Bilharzia) can have a major impact in children on growth and cognitive development, it is important to educate the people to find medical help when a child complains of blood while urinating.
- There is a need to find a method for keeping relevant information with the child (like the need of antibiotics before dental extraction in children with a cardiac septal defect).
- We recommend WFP the addition of more fat and fibers (e.g. fruit and vegetables)
- We also recommend to evaluate the content of the feeding program, and to give more education to the care-takers of the children about feeding.
- Because of a lot of cases of constipation it is important to give more water to the children and more fat (in the food).
- It is advisable to teach about gardening and use school gardens for this purpose. We recommend to involve more women of the villages in this project.

Although there is a need for medical support and comprehensive health education in the Mulanje region, it will be difficult for MCC to continue the medical camps in the coming year since TNT post is leaving the Mulanje region and by this MCC is lacking local support. We hope MCC and TNT post/WFP are willing to investigate opportunities to work together to perform medical camps at the Mulanje region or at different regions in Malawi.

Last words:

Our first trip as volunteers for Medical Check for Children to Malawi was again one of the wonderful experiences in our lives and in the lives of the team members.

Over the last five years we have participated in medical missions at different places in Asia, Africa and South America. Witnessing the evolution of the programs and the development of local expertise is exciting. It is stimulating to work with team members from different background, exchanging ideas and to learn from each other. We enjoy learning from the local cultures and experiencing the beauty of people at the different destinations. Both medical and non-medical volunteer work is fantastic and we are proud to work with such kind and generous individuals.

Our special personal thanks go to Iris van de Gevel, who helped organise the MCC mission in a perfect way working together in a very tight time schedule and to feel to have such good friends! We hope MCC will find a way to return to Malawi next year to see the smiling faces of the children and work together again with all the people who put their time and energy in creating a better world for all of us.

Karlien Bongers and Anne Vlietstra, MCC mission MaMu10,
Amsterdam, 5 januari 2011

Appendix A: Ordered and used medication in Malawi-Mulanje mission 2010

Medication	Ordered before mission	from NL	Bought during mission	Total mission	Total end mission	Used during mission	Given to CBO/school	Given to Hospital	Composition
Ferro B complex syrup	144	0	0	144	108	36		108	5 ml: iron and ammonium sulphate 200 mg, vit B1 2 mg, riboflavine 0.5 mg, vit B12, 2.5 ug, nicotinamide 5 mg
Ferrosulfaat tablets	24000	0	0	24000	0	2400			200 mg ferrosulfaat + 0.25 mg foliumzuur, 65 mg elementair
Rinavit, multivitamin syrup	704	0	100	804	140	564		140	Vitamine A 100 U, vit B1 1.5 mg, Riboflavine 1.5 mg, Nicotinamide 10 mg, vit B12 2,5 ug, vit C 40 mg, vit D 200 U, per 5ml
Multivitamin tablets	20000	0	0	20000	0	20000			vitamin A 2500 IU, vit B1 1 mg, vit B2 0.5 mg, nicotinamide 7.5 mg, vit C 15 mg, vit D3, 250 IU per tablet
Albendazole	9000	0	0	9000	6600	5000	1600		albendazole 200 mg
Amoxiciline syrup	105	0	0	105	88	17		88	125 mg per 5 ml
Amoxiciline capsule	1000	0	0	1000	120	880		120	250 mg
Erythromycine tablets	1000	0	0	1000	0	1000			250 mg erythromycine
Erythro	20	0	0	20	10	0	10		erythromycine 125 mg per 5 ml
Cledomox, co-amoxiclav tablets	1920	0	0	1920	0	1920			amoxiciline 250 mg, clavulanic acid 125 mg
Cotrimoxazole syrup 100 ml	5	0	0	5	4	1		4	5 ml: sulfamethoxazole 200 mg, trimethoprim 40 mg
Cotrimoxazole tablets	1000	0	0	1000	600	400		600	sulfamethoxazole 400 mg, trimethoprim 80 mg
Metronidazole tablets	1000		0	1000	1000	-		1000	200 mg metronidazole
Miconazole tube 15 g	40	0	30	70	0	70			2% miconazole
Lucin, tube 15 g	50	0	0	50	6	44		6	hydrocortisone 1%
Cuticare tube 15 g	40	0	0	40	1	39		1	Gentamicine base 0.1%, Beclomethasone dipropionate BP 0.025%, Clotrimazole BP 1%
Nistatine	20	0	0	20	16	4		16	1000 IU per ml
Ivermectine 3 mg	0	20	0	20	0	20			
Ivermectine 6 mg	0	6	0	6	0	6			
Flamazine tube 50 g	0	10	0	10	0	-			
eye/ear drops	50	0	0	50	31	19	31		0.4 % gentamicin per ml
Praziquantel	-	0	100	100	0	57			600 mg

Appendix B: Content School feeding program WFP:

100 g hot porridge provides 60% of protein and 18% of daily energy requirements

Micronutrient	% daily requirement met by hot porridge
Vitamin A	100
Iron	38
Vitamin C	100
Vitamin B12	100
Calcium	100
Folate	55
Niacin	43
Riboflavin	33
Thiamine	16