

Medical Checks for Children

Medical Report Bolivia 2011

Ines von Rosenstiel and David Kopsky
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Introduction

From May 2nd to May 9th, a Medical Checks for Children (MCC) team visited four villages in the Northern Bolivian altiplano (highlands) and El Alto, a poor city just outside La Paz. MCC checked and treated 861 children aged between 0 and 12 free of cost.

The five villages, all remote Andean areas with limited access to modern medical facilities, were Sococoni, Chuma, Titicachi, Mollo and Ayata.

The second free medical campaign ('Campaña de salud') was organised in cooperation with the development organisation Chakana, which supports indigenous people of the Andes.

The team consisted of Ines von Rosenstiel, Iris van de Gevel, David Kopsky, Maaïke van der Heide, Maryse Duran, Yvonne Verdonk, Bernadet Spaan, Menno Oosterhuis, Nicky Jacobs, Luc Nijboer, Femmy Meenhorst and Danielle van der Kaay.

Technical equipment, toothbrushes and some of the supplies were brought from the Netherlands by MCC team members. Most of the medication was ordered by local organizers Paula Lopera and Antoon Huylebroeck via laboratories in La Paz (Bolivia).

Support from Paula Lopera and Antoon Huylebroeck (treasurer of the Lions Club, Oclaf), consisted of the following (amongst others):

- Selection of primary schools and villages.
- Facilitating board and lodging for all MCC team members.
- Transportation of the MCC team to the different check locations in Bolivia.
- Prior announcement of the medical campaign in the locations.
- Making copies of all necessary papers.
- Giving support in ordering and delivering the medication.
- Giving support to the MCC team during the medical campaign.
- Arranging the cooperation with the Arco Iris hospital and SEDES

On the first of May the Lions Club Oclaf arranged a lecture in the Arco Iris hospital about the most common diseases in childhood in the region MCC is serving. The interesting talk was given by Doctor Heinz Welzel with revealing data on child health, which matched the findings in the MCC Bolivia 2010 medical report.

In Bolivia, our group consisted of one driver, one guide and 10 translators who worked in Spanish, Aymara, and English. In total the multidisciplinary group consisted of 25 team members who performed the children's medical health campaign.

The MCC team was very satisfied with the cooperation with the local organizers, and the active, direct support and enthusiasm of the local volunteers who gave MCC the opportunity to work in Bolivia and to facilitate all aspects of the medical campaign. Special thanks go to the translators. We hope the volunteers 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 child health and hygiene. And last but not least, we would like to thank the children and their caregivers who came to the check for their inspiring presence.

Medical Checks for Children on location:

On the first day MCC was invited to the Alma de los Andes (Spirit of The Andes) (ADLA) workshop by Alix Shand, vice president of the non-profit association. The organisation generates sustainable income for women and their children who knit high quality products. We checked 51 of their children in El Alto, a new location for MCC.

Almost every morning, the whole team with all the medical supplies travelled in a special mountain bus to the small towns within a four-hour drive. In the villages, the medical campaign was set up, usually at a local health post, church or school compound. The medical checks were performed over 7 days at 6 different locations.

Table 1: Place of stay and number of checked children per date.

Date	Place	Number of Children
02/5	El Alto	51
03/5	Sococoni	149
04/5	Chuma	65
05/5	Chuma	100
06/5	Titicachi	217
07/5	Mollo	159
08/5	Ayata	121
	Total	861 Children

The children were seen free of cost, at the MCC carousel as follows:

1. Registration
2. Height and weight (saturation occasionally)
3. Blood test (haemoglobin)
4. Physical examination
5. Distribution of medication (pharmacy)
6. Dentistry
7. Education on diet, hygiene, especially tooth brushing (a tooth brush was given to each child) and hand washing.

At registration, efforts were made in order to find the children seen by the medical campaign last year. Of all children seen in this year, 259 children (32%) had been checked in 2010.

Data collection

Anthropometric measurements were recorded, and a finger prick sample was taken to determine the haemoglobin (Hb) concentration. Each child was examined by a clinical officer. History of illnesses in the preceding four weeks was recorded. Specifically, caregivers were asked if the child had fever, respiratory infection, diarrhoea, vomiting, eating soil (pica), decreased appetite, weight loss and pain. They were also asked if their child had received prior treatment, especially deworming within the last half year, iron or multivitamin supplementation and antibiotics.

At the end of the MCC carousel, the data of the checked children were put in the MCC data base which made it possible to make a quick scan of children's health every evening, which was communicated on the spot.

Diagnosis and categories of ailments:

During the week, MCC checked 861 children.

The main alleged causes were bloody diarrhoea (1% of the children), rhinitis (5%), cough without fever (13%) and abdominal pain, nausea and vomiting (12%).

Dermatosis was a common clinical finding (9%), with the more specific clinical diagnoses: dermatomycosis (3%) pyodermatitis (2%), scabies (2%), impetigo and/or lice (4%).

Finally, among the children examined 65% were free of clinically detectable disease, 35% suffered from mild symptoms and only 0.5% from more severe illness, requiring prompt medical treatment.

The overall health and nutritional status of the children was moderately poor, with **30% stunting** and **52% anaemia**. Due to the high risk of mortality and morbidity of children under five, the focus of MCC is on checking vulnerable young children. Of all checked children,

95% of the children was twelve years or younger and 21% of the children was five or younger, and 32% was a revisit.

Table 2: Age and gender distribution of checked children, total and per area. Figures represent absolute numbers with percentage of children in the area in brackets.

LOCATION	ADLA		Sococoni		Chuma		Titicachi		Mollo		Ayata		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Total	50	100%	149	100%	165	100%	217	100%	159	100%	121	100%	861	100%
Age														
>=0 and <1	3	6%	11	7%	6	4%	5	2%	2	1%	6	5%	33	4%
>=1 and <5	13	26%	24	16%	22	13%	36	17%	26	16%	22	18%	143	17%
>=5 and <12	34	68%	114	77%	132	80%	154	71%	119	75%	87	72%	640	74%
>=12 and <18	0	0%	0	0%	5	3%	22	10%	12	8%	6	5%	45	5%
Boy	23	46%	74	50%	86	52%	115	53%	68	43%	57	47%	423	49%
Girl	27	54%	75	50%	79	48%	102	47%	91	57%	64	53%	438	51%

Table 3:

Prevalence of selected diagnosis in 2010 and 2011, including children visiting the medical campaign for the second time (revisit) and selection of school children

Diagnosis	Total 2010		Total 2011		Revisit 2011		School children 2011	
	n	%	n	%	n	%	n	%
Total number	935		871		259		703	
Vitamin deficit	2	0%	77	9%	14	5%	63	9%
Anaemia	428	46%	443	52%	122	47%	341	49%
Underweight (W/a)	105	11%	45 / 743	6%	17 / 227	7%	31 / 596	5%
Wasting (w/h)	31	3%	7 / 560	1%	2 / 147	1%	4 / 423	1%
Stunting (h/a)	356	38%	253 / 856	30%	79 / 259	31%	202 / 702	29%
Caries	217	23%	200	23%	59	23%	185	26%
Caries with pain	210	22%	206	24%	76	29%	190	27%
Active worm infection	150	16%	112	13%	38	15%	81	12%
Pneumonia	6	1%	9	1%	0	0%	3	0%
Dysentery	7	1%	12	1%	2	1%	7	1%
Dermatomycosis	-		23	3%	6	2%	18	3%
Lice	69	7%	34	4%	5	2%	29	4%
Scabies	52	6%	15	2%	2	1%	7	1%
Infected wounds	30	3%	18	2%	6	2%	16	2%

Most of the ailments could be treated on the spot. Even the most severe dental problems could be addressed due to the fact that this year 2 dentists were part of the team.

MCC referred 11 chronically ill children to medical specialists in the Arco Iris Hospital for further diagnoses and/or treatment.

Arco Iris Hospital

As our referral hospital is situated at a distance of 4-6 hours there are many barriers including physical distance from the households to facilities, cultural distance between patients and providers and the unavailability of transportation.

1: Growth abnormality and malnutrition:

(underweight: **6%**, wasting: **1%**, stunting: **30%.**)

Malnutrition has been related to poor cognitive and school performance. There is strong evidence to suggest that malnutrition places children under the age of 5 at increased risk of death. Literature from Bolivia (2004) reports that 27% of all children is chronically malnourished. The main factors contributing to malnutrition in Bolivia are poverty, lack of sanitation, poor living conditions (overcrowding), child labour and child abuse, lack of protein intake concomitant with an abundance of carbohydrate intake.

The prevalence of stunting, wasting and underweight was 30%, 1% and 6% respectively. These data correspond well to a cohort described in the literature, Public Health Nutrition 9(3) 327 – 335 in 2005, where stunting prevalence was 35.6%, wasting in 2.4% and underweight in 14.1% in rural areas in Bolivia.

Apart from the abovementioned factors leading to malnutrition, the prevalence of growth retardation is also correlated to chronic diseases. One major cause of malnutrition we encountered is poor feeding practices. Adequate food intake and education programs addressing nutritious food need to be promoted.

Malnutrition is thought to account for one third of all deaths of children under five (UN Millennium Developmental Goals). Therefore, we 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.
- 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.
- 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.

It should be noted that reference data were only available for certain heights, weights and ages (as specified above), leading to the following general prevalence of growth abnormalities in the communities we visited:

Table 4: Growth indices of checked children per location.

2011	Total (%)	ADLA	Sococoni	Chuma	Titicachi	Mollo	Ayata
Weight/age < P3	45/743 (6)	2/46 (4)	6/139 (4)	10/149 (7)	5/162 (3)	11/137 (8)	11/110 (10)
Height/age < P3	253/856 (30)	3/50 (6)	48/146 (33)	65/164 (40)	46/217 (21)	57/159 (36)	34/120 (28)
Weight/height < P3	7/560 (1)	0/28 (0)	0/101 (0)	1/103 (1)	1/133 (1)	1/103 (1)	4/92 (4)

On the locations checked, the typical diet is abundant in carbohydrates, but deficient in proteins and other food categories. In 2000, the World Food Program released figures that 94% of rural households in the Bolivian Andes were unable to fulfil basic nutritional requirements (Bostick).

Altiplano dwellers showed the highest levels of malnutrition, 50.4% suffering from anaemia. Harsh climate and water scarcity were the main reasons. Greenhouses for the supply of vitamin rich vegetables (dark green leafed), as formally provided by Chakana, is strongly recommended.

Nutritional needs and resources in Andes children

The food groups typically eaten in the villages checked:

Carbohydrates - potatoes, corn, dehydrated tubers

Vegetables - broad beans, onions, carrots, turnip

Dried fish - Whitebait

Fruits - bananas, oranges

Potato and maize provide the necessary calories for daily metabolism of the food.

Potatoes contain vitamins and minerals: one medium sized potato with the skin provides 45% of vitamin C, 18% of potassium and 10% of vitamin B6.

Corn is rich in magnesium, zinc and iron. Corn has vitamin B and traces of C, A and E. Diets that rely heavily on corn may require the consumption of complementary foods to *supplement* its deficiency in certain minerals and vitamins.

Fava beans (broad beans, serving size: 170 grams, 14% daily iron) are rich in vitamin A and are an excellent source of *folate*, of protein and of phosphorus for the body, which is required for the formation of teeth and bones.

During the medical check-ups, we paid special attention to issues of hygiene and nutritional advice. We emphasised hand-washing, vitamin C, fruit and dark green vegetable intake. We noticed that a lot of mothers fed their babies up to the age of one year or more, exclusively with breast milk. For babies, we advised exclusive breastfeeding up to six months and then to start with the introduction of additional foods. Bolivian data shows that 62% of all children are breast fed up to 6 months, and up to an average of 20 months.

2: Anaemia (443, **52%**) (see tables 3 and 5)

Anaemia is the most prevalent micronutrient disorder. To date, no research figures exist on the number of children in Bolivia with anaemia as a result of poor health and nutrition as well as poor environment.

The prevalence of anaemia in the villages MCC checked was high (53%), and largely attributable to poor dietary quality (diets low in key nutrients) and high disease loads. To date, 95% of the anaemia is due to iron deficiency.

In Bolivia the SUMI is a national policy to provide iron supplements to pregnant women and young children up to 5 years of age. 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 integral interventions, addresses the various factors that play a significant role in producing anaemia in a given community. In addition to iron deficiency, other nutritional deficiencies, infectious diseases, such as worm infections, and other chronic infections, particularly tuberculosis, play a significant role.

We treated the children with anaemia (and their mothers if they were breastfeeding) with supplements for three months. One child showed a haemoglobin level below 5.0 mmol/l. To prevent anaemia, vitamin C intake is important because vitamin C facilitates the uptake of iron in the gut (just as milk and tea counteracts it). Cheap and available sources for vitamin C in Bolivia are lemons and oranges. The Ferrasol supplement prescribed includes 30 mg of vitamin C per 1 ml.

3: Worm treatment (79%) prophylactic, or therapeutic (14%)

In the locations checked, the prevalence of serious worm infestations was moderately high. Whipworm infections are widespread in Bolivia and most common amongst children, especially amongst those who play in soil containing mature eggs and who do not have good hygiene habits. Severe infections in young children can result in *trichuris dysentery* syndrome: bloody mucoid diarrhoea, anaemia and retarded growth.

If whipworm infection is serious, it causes intestinal lower or epigastric pain, lack of concentration, and fatigue. In severe and prolonged infections impaired physical or mental development in children results, most likely to be multifactorial, incorporating vitamin deficiencies and malnutrition caused by the abnormal functioning of the intestine.

On rare occasions a whipworm may be noticed when it crawls up into the throat, and exits through the nose or mouth.

A strong relationship exists between *Ascaris Lumbricoides*, or *T. Trichiura* infection and anaemia. We treated children prophylactically on the spot with one tablet of Mebendazol 100 mg (bi-annual anti-worm campaign).

On the spot health education was aimed at increasing awareness of worm transmission, the different problems caused by intestinal helminth and the importance of de-worming every six months.

Simple ways of improving personal hygiene and sanitation through hand washing, nail trimming, wearing of shoes and use of a latrine and clean water supplies were encouraged. Although all members of a population can be infected by intestinal parasites, those who are at most risk and would benefit most from preventive interventions are the pre-school and school children.

Pork T. solium can be treated with a single dose of niclosamide, though not widely available in many endemic regions. MCC wants to stock niclosamide for next year's mission. We recommend that local health centres have niclosamide in stock. We also advised the communities to invest in clean water projects and sanitation of dirt floors to reduce giardia and *E. Histolytica*.

4: Pneumonia or respiratory diseases

Only 1% of the children with an acute respiratory infection (ARI) were seen and treated with appropriate antimicrobials and home treatment advice.

During the months of April and May 80% of ARI is caused by viral infections, such as rhinovirus, Influenza and parainfluenza. The most common bacterial agents causing pneumonia in Bolivia are *Streptococcus Pneumoniae*, *Moraxella Catharalis* and *Haemophilus Influenza B*.

5: Cardiac problems

The MCC carousel also includes a cardiac examination. We suspected 2 children of having a pathological heart murmur, which needed referral to a specialist in the Arco Iris Hospital in La Paz. Mitral regurgitation or ventricular atrial septal defects are the most common heart problems in the developing world.

The importance of brushing teeth was emphasised for children with suspected pathological heart murmurs and their caregivers. Besides this, they were told to give their child antibiotics when going to a dentist to have a tooth extracted.

6: Skin diseases

With respect to skin diseases we saw many children with infected wounds, pyoderma, tinea capitis, viral skin disorders (mainly molluscum contagiosum) pedicosis capitis, dermatitis reactions due to insect bites, and 2% scabies with or without secondary infections.

Antifungal cream (sometimes in combination with hydrocortisone) was given for fungal infections (dermatomycosis) and hydrocortisone cream was given for different forms of dermatitis.

Our Bolivian helpers told us about the benefit of herbal remedy for scabies. Neem is well known for its anti-infective properties and neem leaves are supposed to contain ingredients which can kill the scabies mites. In Bolivia benzyl benzoate lotion is the first line scabies treatment. We treated the children above 15 kg and their families with ivermectine. Older children were often absent and working in the fields and so we did not know their weight for the correct dosage of ivermectine to be prescribed. Preferably, soaps are needed to wash clothes and bed linen at high temperature (60C) to kill off the mites – but this was problematic – many people in the communities only have one set of clothes. A good alternative is to put infected clothes and bedding into a sealed plastic bag for 3 days in the sun. At the pharmacy no opportunity was missed to talk to mothers about the importance of diet, hydration and hygiene.

7: Eye problems (4% kerato-conjunctivitis)

A common complaint in the group of children above five years of age 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 ensuring that children's diets include adequate amounts of carotene containing cereals, tubers, vegetables and fruits. We treated children with painful eyes with extra vitamin supplements. Four children were seen with blocked tear ducts. These children were referred for further treatment.

8: Vitamin deficit (clinical vitamin deficit: 9%)

In total 77 children had a clinical vitamin deficit. The vitamin deficiency is mainly due to malnutrition and parasitosis. The prevalence of a clinical vitamin deficiency is high, especially in Alma de Los Andes, El Alto (16%) and in Titicachi (17%).

9: Dental (severe caries with pain: 24%)

In general high caries prevalence was found. Two fillings were encountered. No fluoride is added to the drinking water in Bolivia.

This MCC mission to Bolivia included 2 dentists. Their work consisted mainly of extractions (primary molars and permanent first molars) and in some cases occlusional ART (atraumatic restorative treatment) restorations in the permanent first molars. A lot of abscesses, root remnants and caries profunda were encountered.

The referrals (28%) of the MCC doctors to the dentists were limited to the most severe cases: profound caries with severe toothaches and in need of extraction. We stressed the importance of proper dental hygiene and the banning of sugary products to the children, their caregivers and their teachers.

Our findings match the results from a study done in the first half of 2008 in schools in Titicachi, Chuata and Kanihuaya. The results show that despite a certain level of knowledge and culture of preventing oral/dental disease in the population studied, disease is still prevalent. Therefore, many changes need to be made and, instead of emphasising restorative work, dentists should focus more on activities to prevent or reduce the oral/dental diseases most frequently seen, such as gingivitis, caries and malocclusion.

Therefore, the use of dental accessories (toothbrush and toothpaste) is not proportional to the results seen during check-ups and so these accessories are not being used properly and so are not effective.

Education health workers, caregivers and other local helpers:

One of the most important tasks of MCC is to encourage the continuation of health education of the caregivers and older children. During the week we talked about common diagnoses of frequent illnesses and medication. We especially focused on anaemia and malnutrition, balanced diet, infection, parasites and failure to thrive. Our information mainly focuses on nutritious food and vitamin supplements, as well as hygiene and health promotion issues.

Future medical needs and conclusions:

The results above show the need for preventive medical help for the children in Bolivia. Investing in knowledge about the circle of malnutrition, parasitosis and anaemia is essential. This can be done by joint venture of workshops and anti-worm programmes in and by the local community and preventive activities in child health by MCC. Alix Shand, presently doing her master's in public health in La Paz, was appointed by this year's mission leader Ines von Rosenstiel, to stimulate and to coordinate the activities at the local level.

Furthermore, the MCC medical team will compare the guidelines in Bolivia for treatment of pneumonia, dysentery and dehydration (texto de la catedra de pediatria ISBN 978 999 540 1382) with the MCC guidelines.

MCC will make an inventory of the possibilities of close cooperation with the Arco Iris Hospital with our contact people Doctor Heinz Welzel and Doctor Arrizbe head of pediatrics, with regard to MCC referrals (specialists, costs, waiting lists)

The medical report Bolivia 2011 will be translated into Spanish, so that our partners in the communities and local health centres will have access to the results and follow-up in years to come.

General

- It is important to stress, over and over again, the importance of regular (6-monthly) deworming of all children up to fourteen year of age. Maybe the health centres can help to organise an anti-worm program for the whole village. As all children were given preventive treatment with mebendazole in May 2011, follow-up should be given in November 2011.
- Like all the locations we visited, also in Bolivia 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 (including teaching how to prepare the food in a way the nutrition will stay locked in – not cooking vegetable soups for hours on end, for example).
- For children from 6 months up to 5 years old, Chispitas Nutricionales (Sprinkles) produced by Prodipasa could replace the multivitamins and the iron drinks. In these sachets iron and multivitamins are combined in one portion (12.5 mg Iron, 300 mcg Retinol, 5 mg Zinc, 30 mg Vitamin C, 160 mcg folic acid).
- Maybe the health centres can help to start a health education program for pregnant woman and young mothers with special attention on breastfeeding and good motherhood.
- 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).

Striking observations and future focus per location

El Alto:

A high prevalence of caries was seen, probably due to high consumption of sugary foods and drinks, and poor dental hygiene. Also a high prevalence of anaemia was present, probably due to high rates of chronic infection and poor diet.

Recommendations: The children should brush their teeth on entering and leaving the workshop. All sugary foods and drinks should be banned in the workshop. Set up nutritional workshops and bi-annual deworming programme.

Sococoni:

MCC saw 34% of the children for the second time. Overall there was a decrease in anaemia: from 73% to 57%. The same trend towards better health was seen in regard to wasting and underweight. Education on family planning was given to children from 13 years onwards by members of the MCC team.

Recommendations: The Sococoni health centre should set up a deworming programme. Education in the school on hand washing and dental hygiene on a regular basis is recommended. Also programmes on nutrition for families are recommended as well as stimulation of involvement and broadening of treatment in child dental care by the local dentist.

Chuma:

This year MCC checked 53% of the children for the second time. In comparison to last year's data, there was a significant increase in the prevalence of anaemia (from 19% to 40%). This might partly be explained by a higher percentage of older children being checked who do not participate in the SUMI project. Malnutrition, parasitosis and dental care remain the focus of future improvement.

Recommendations: Development of a bi-annual deworming programme is advised. Workshops on nutrition, diet and hygiene for children, parents and teachers is a necessary

cornerstone to improve global health as well as stimulation of involvement and broadening of treatment in child dental care by the local dentist.

Titicachi:

Of all the children checked 18% was seen for the second time. A positive trend towards a decline in malnutrition and anaemia was observed. The dental team treated 47 children, did 60 extractions and 4 fillings. The results and the recommendations were communicated to the communities via radio on the same day.

Recommendations: Development of a bi-annual deworming programme is advised. Workshops on nutrition, hygiene for children, parents and teachers are a necessary cornerstone to improve global health.

Mollo:

Although Mollo had not originally been included in this year's schedule, this location was able to participate due to the enthusiastic actions taken by the medical health team of Ayata. In comparison to last year we saw a younger group of children accompanied by their caregivers and teachers, of whom we saw 42% for the second year. A remarkable finding was that 6% of the children had infected wounds, especially on their legs.

Recommendations: Special attention should be given to personal hygiene, possibly given by the teachers in school.

Ayata:

Unfortunately, MCC checked fewer children than expected. Of the 121 children seen 33% were a revisit. The prevalence of anaemia remains high (68%). With respect to malnutrition a decline in stunting, from 42% in 2010 to 28% in 2011 was seen at the community level. The 3 ½ year old disabled girl who was severely dehydrated and critically ill last year, was our last patient showing the immense resilience of children.

Recommendations: Next year MCC should check in Ayata on a Saturday, which is a market day giving access to many people from the surrounding areas. Development of a bi-annual deworming programme is advised. Workshops on nutrition, diet and hygiene for children, parents and teachers is a necessary cornerstone to improve global health.

Last words:

Our second trip to Bolivia was a wonderful experience touching all of the team members. Witnessing the evolution of the programs and the development of local expertise is exciting. It is stimulating to work with team members from different cultural backgrounds, exchanging ideas and learning from each other, and other organisations.

We enjoy learning from the local cultures and experiencing the beauty of people at the different destinations. We are inspired by the efforts of our host country facing the vast medical demands with limited supplies.

The team hopes to return to Bolivia next year to see the children once again and work together with all the people who put their time and energy into creating a better world for all of us.

Special thanks to Paula, Antoon, Julia, Alix, Brigida, Grace, Marcos, Hannah and Mateo and the medical doctor from SEDES (Servicios Departamentales de Salud) with whom the MCC team would love to work together next year. We hope to see fruitful cooperation with the local communities, health centres and SEDES in the coming years in order to achieve the future goals.

Ines von Rosenstiel, medical mission leader MCC mission Bolivia 2011

David Kopsky, team member MCC mission Bolivia 2011

Annex: Medication list

Medication	Units	Ordered	Number at start mission	Number brought from NL	Bought during mission	Total	Number end mission	Used	Returned	In stock in Bolivia for 2012	Returned to NL	Content
IRON bottles FERRASOL 30 ml	30 ml	150	450	0	0	450	250	200	0	200	0	Per 1 ml: Ferrosulfaat 125 mg + VitC 30mg +0,25mg foliumzuur
IRON tablets, 200mg, 1000 tablets per fles			19000	0	0	19000	2430	16570	0	16570	0	Ferrosulfaat 200 mg, equivalent van 65 mg Fe++
IRON tablets, 200 mg, 100 per doosje	tabl 200 mg	12 000		0	0	0		0	0	0	0	Ferrosulfaat 200 mg
Multivitamines IDA 5000 tablets per fles			32500	0	0	32500	6030	26470	0	26470	0	Per tablet: VitA 2500 IU, VitB3 7,5mg, VitB1 1mg, VitC 15mg, VitB2 0,5mg, Vit D3 300IU
Multivitamines JARABE bottles 100 ml	100ml	600	166	0	0	166	0	166	0	166	0	Per 5ml: Vit A 5000 U.I., Vit D3 1000 U.I., vit C 60 mg, Vit B1 1,4 mg, Vit B2 1,6 mg, Vit B3 18 mg, Vit B6 2,0 mg, Vit B12 0,004 mg, D-Pantenal 6,0 mg, Follumzuur 0,4 mg.
Multivitamin + C ACUO bottles 15 ml			200	0	0	200	153	47	0	47	0	Per 1ml: VitA 5000 UI, VitD 1000 UI, VitC 50 mg, VitB1 3mg, VitB2 0,3mg, Nicotinamida 3mg, Vit B6 2mg, VitB12 8ug, Potatenato de calcio 2mg
Multivitamines tablets , 100 per doosje		12 000		0	0	0		0	0	0	0	Vit D3 400 U.I., Vit A (acetato 500) 5000 U.I., Vit E (50% type) 2,2 mg, Follumzuur 0,2 mg, Vit B1 2,0 mg, Vit B2 2,0 mg, Vit B6 2,0 mg, Vit B12 0,005 mg, Calcium 10 mg, Vit B3 20 mg.
Anti-worm (chewing) tablets: mebendazole 100 mg	tabl 100 mg	1000	3500	0	0	3500	1750	1750	0	1750	0	Mebendazole 100 mg
Anti scabies skin treatment, IVERMECTIN 3 mg	tabl 3 mg	0		72	0	72	50	22	0	22	0	Ivermectin 3 mg
Anti scabies skin treatment, SARNOL Lotion bottles 100 ml	100 ml	40	50	0	0	50	15	35	0	35	0	Benzylbenzate 20 %
Metronidazol (Metrogyn)	200 ml		20	0	0	20	20	0	0	0	0	Per 5 ml: Metronidazol 250 mg
Amoxicillin, bottles 60 ml, liquid/susp. 250 mg/5 ml VITA	250mg/5 ml	202	50	0	0	50	26	24	0	24	0	Per 5 ml: Amoxiciline 250 mg
Amoxicillin, bottles 60 ml, liquid/susp. 125 mg/5 ml VITA	125mg/5 ml	45	50	0	0	50	42	8	0	8	0	Per 5 ml: Amoxiciline 125 mg
Amoxicillin, Tablet/capsules 500 mg	tabl 500 mg	500	300	0	0	300	120	180	0	180	0	Amoxicilline 500 mg
Cotrimoxazol forte (Fuerte Vite): 800mg+160 mg per tablet			100	0	0	100	82	18	0	18	0	Per tablet: 800 mg sulfametoxazol + 160 mg Trimetoprim
Cotrimoxazol forte (SULFATRIM FORTE): 60 ml syrup	100 ml	10	20	0	0	20	5	15	0	15	0	Per 5 ml: Sulfametoxazol 400 mg, Trimetoprim 80 mg.
Clarithromycine (Klacid) susp 250 mg/5 ml bottle 80 ml	250mg/5ml	2		0	0	0		0	0	0	0	*
Clarithromycine (Infex=Klacid) susp 125 mg/5 ml bottle 80 ml	125mg/5 ml	2	20	0	0	20	17	3	0	3	0	
Clarithromycin (Laboratorio Chile) 500 mg tablet	tabl 500 mg	70	25	0	0	25	25	0	0	0	0	Clarithromycine 500 mg
Chloranfenicol 0,5%, flesje van 10 ml			40	0	0	40	32	8	0	8	0	Chloor Amfenicol 0,5 % = 5 mg per 10 ml
Ofal Vitamincina (ear/ eyedrops) bottles 10 ml	10 ml	15		0	0	0		0	0	0	0	Chloor Amfenicol 0,5 %
Flutisone (hydrocortison) tube 10 gr	crème	50	50	0	0	50	48	2	0	2	0	Fluticasona 0,05%
Cipromax cream (antibacterial= Fuzcidine) tube 15 gr	crème	50	75	0	0	75	56	19	0	19	0	Ciprofloxacine 0,5% p/p
Antifungal and hydrocortison cream (Donomix=Dactacort), tube 15 gram	crème	30		0	0	0		0	0	0	0	*
Antifungal cream (Dermoxyl=dactarin),	crème	50	30	0	0	30	20	10	0	10	0	Per 100 gr: Terbinatina Clorhidrato 1 gr
Iodine lotion (YODOPOVIDONA), flesje 60 ml	lotion	20	20	0	0	20	15	5	0	5	0	Per 100 ml: 10 gr Yodopolivinylpirolidona
Flammazine (QUEMACURAN-L), tube van 60 g			10	0	0	10	8	2	0	2	0	per 100mg: 1g Sulfadiazina argenticca, 0,5 g Lidocaine
Neutral cream, 50 gr/potje	crème	donatie		0	0	0		0	0	0	0	*
Injectiespuiten 20 ml		37	50	0	0	50	0	50	0	50	0	
Injectiespuiten 10 ml		1	50	0	0	50	0	50	0	50	0	

Annex: Detailed results tables

SUMMARY of NUMBER OF CHECK-UPS per GEOGRAPHICAL LOCATION by AGE and GENDER, total 2011

LOCATION	Alma de Los Andes		Sococoni		Chuma		Titicachi		Mollo		Ayata		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Total	50	100%	149	100%	165	100%	217	100%	159	100%	121	100%	861	100%
Age														
>=0 and <1	3	6%	11	7%	6	4%	5	2%	2	1%	6	5%	33	4%
>=1 and <5	13	26%	24	16%	22	13%	36	17%	26	16%	22	18%	143	17%
>=5 and <12	34	68%	114	77%	132	80%	154	71%	119	75%	87	72%	640	74%
>=12 and <18	0	0%	0	0%	5	3%	22	10%	12	8%	6	5%	45	5%
Boy	23	46%	74	50%	86	52%	115	53%	68	43%	57	47%	423	49%
Girl	27	54%	75	50%	79	48%	102	47%	91	57%	64	53%	438	51%

Frequency of revisits and number of school-children per GEOGRAPHICAL LOCATION, total 2011

LOCATION	Alma de Los Andes			Sococoni			Chuma					
	n	N	%	n	N	%	n	N	%			
Revisit	0	50	0%	39	116	34%	81	154	53%			
School	38	50	76%	100	149	67%	131	165	79%			
LOCATION	Titicachi			Mollo			Ayata			Total		
	n	N	%	n	N	%	n	N	%	n	N	%
Revisit	39	216	18%	62	146	42%	38	116	33%	259	798	32%
School	197	217	91%	140	159	88%	97	121	80%	703	861	82%

Prevalence of Weight/age at or under P3 per GEOGRAPHICAL LOCATION by AGE and GENDER, total 2011

LOCATION	Alma de Los Andes		Sococoni		Chuma				
	n / N	%	n / N	%	n / N	%			
Total	2 / 46	4%	6 / 139	4%	10 / 149	7%			
Unknown	4 / 50	8%	10 / 149	7%	16 / 165	10%			
Per age category									
>=0 and <1	1 / 3	33%	3 / 11	27%	0 / 6	0%			
>=1 and <5	0 / 13	0%	1 / 24	4%	2 / 22	9%			
>=5 and <12	1 / 30	3%	2 / 104	2%	8 / 121	7%			
>=12 and <18	0 / 0	n.a.	0 / 0	n.a.	0 / 0	n.a.			
Boy	0 / 23	0%	2 / 70	3%	5 / 77	6%			
Girl	2 / 23	9%	4 / 69	6%	5 / 72	7%			
LOCATION	Titicachi		Mollo		Ayata		Total		
	n / N	%	n / N	%	n / N	%	n / N	%	
Total	5 / 162	3%	11 / 137	8%	11 / 110	10%	45 / 743	6%	
Unknown	55 / 217	25%	22 / 159	14%	11 / 121	9%	118 / 861	14%	
Per age category									
>=0 and <1	0 / 5	0%	0 / 2	0%	1 / 6	17%	5 / 33	15%	
>=1 and <5	1 / 36	3%	4 / 26	15%	2 / 22	9%	10 / 143	7%	
>=5 and <12	4 / 121	3%	7 / 109	6%	8 / 82	10%	30 / 567	5%	
>=12 and <18	0 / 0	n.a.	0 / 0	n.a.	0 / 0	n.a.	0 / 0	n.a.	
Boy	3 / 85	4%	3 / 61	5%	4 / 49	8%	17 / 365	5%	
Girl	2 / 77	3%	8 / 76	11%	7 / 61	11%	28 / 378	7%	

Prevalence of Height/age at or under P3 per GEOGRAPHICAL LOCATION by AGE and GENDER, total 2011

LOCATION	Alma de Los Andes			Sococoni			Chuma					
	n / N	%		n / N	%		n / N	%				
Total	3 / 50	6%		48 / 146	33%		65 / 164	40%				
Unknown	0 / 50	0%		3 / 149	2%		1 / 165	1%				
Per age category												
>=0 and <1	0 / 3	0%		5 / 11	45%		0 / 6	0%				
>=1 and <5	1 / 13	8%		7 / 24	29%		11 / 22	50%				
>=5 and <12	2 / 34	6%		36 / 111	32%		52 / 131	40%				
>=12 and <18	0 / 0	n.a.		0 / 0	n.a.		2 / 5	40%				
Boy	2 / 23	9%		22 / 73	30%		32 / 85	38%				
Girl	1 / 27	4%		26 / 73	36%		33 / 79	42%				
LOCATION	Titicachi			Mollo			Ayata			Total		
	n / N	%		n / N	%		n / N	%	n / N	%		
Total	46 / 217	21%		57 / 159	36%		34 / 120	28%	253 / 856	30%		
Unknown	0 / 217	0%		0 / 159	0%		1 / 121	1%	5 / 861	1%		
Per age category												
>=0 and <1	0 / 5	0%		0 / 2	0%		1 / 6	17%	6 / 33	18%		
>=1 and <5	5 / 36	14%		14 / 26	54%		12 / 22	55%	50 / 143	35%		
>=5 and <12	35 / 154	23%		36 / 119	30%		21 / 86	24%	182 / 635	29%		
>=12 and <18	6 / 22	27%		7 / 12	58%		0 / 6	0%	15 / 45	33%		
Boy	20 / 115	17%		25 / 68	37%		18 / 56	32%	119 / 420	28%		
Girl	26 / 102	25%		32 / 91	35%		16 / 64	25%	134 / 436	31%		

Prevalence of Weight/height at or under P3 per GEOGRAPHICAL LOCATION by AGE and GENDER, total 2011

LOCATION	Alma de Los Andes			Sococoni			Chuma		
	n	N	%	n	N	%	n	N	%
Total	0	28	0%	0	101	0%	1	103	1%
Unknown	22	50	44%	48	149	32%	62	165	38%
Per age category									
>=0 and <1	0	2	0%	0	10	0%	0	6	0%
>=1 and <5	0	12	0%	0	23	0%	0	22	0%
>=5 and <12	0	14	0%	0	68	0%	1	75	1%
>=12 and <18	0	0	n.a.	0	0	n.a.	0	0	n.a.
Boy	0	11	0%	0	50	0%	0	53	0%
Girl	0	17	0%	0	51	0%	1	50	2%

LOCATION	Titicachi			Mollo			Ayata			Total		
	n	N	%	n	N	%	n	N	%	n	N	%
Total	1	133	1%	1	103	1%	4	92	4%	7	560	1%
Unknown	84	217	39%	56	159	35%	29	121	24%	301	861	35%
Per age category												
>=0 and <1	0	5	0%	0	2	0%	1	6	17%	1	31	3%
>=1 and <5	0	36	0%	0	26	0%	2	22	9%	2	141	1%
>=5 and <12	1	91	1%	1	75	1%	1	64	2%	4	387	1%
>=12 and <18	0	1	0%	0	0	n.a.	0	0	n.a.	0	1	0%
Boy	1	63	2%	0	50	0%	1	45	2%	2	272	1%
Girl	0	70	0%	1	53	2%	3	47	6%	5	288	2%

Prevalence of ANAEMIA per GEOGRAPHICAL LOCATION by AGE and GENDER, total 2011

LOCATION	Alma de Los Andes		Sococoni		Chuma				
	n / N	%	n / N	%	n / N	%			
Total anaemia	31 / 50	62%	85 / 149	57%	76 / 163	47%			
Hb unknown	0 / 50	0,0%	0 / 149	0,0%	2 / 165	1,2%			
Per age category									
>=0 and <1	3 / 3	100%	7 / 11	64%	2 / 6	33%			
>=1 and <5	11 / 13	85%	19 / 24	79%	13 / 21	62%			
>=5 and <12	17 / 34	50%	59 / 114	52%	57 / 131	44%			
>=12 and <18	0 / 0	n.a.	0 / 0	n.a.	4 / 5	80%			
Boy	14 / 23	61%	44 / 74	59%	42 / 84	50%			
Girl	17 / 27	63%	41 / 75	55%	34 / 79	43%			
LOCATION	Titicachi		Mollo		Ayata		Total		
	n / N	%	n / N	%	n / N	%	n / N	%	
Total anaemia	92 / 217	42%	76 / 158	48%	83 / 120	69%	443 / 857	52%	
Hb unknown	0 / 217	0,0%	1 / 159	0,6%	1 / 121	0,8%	4 / 861	0,5%	
Per age category									
>=0 and <1	4 / 5	80%	1 / 2	50%	1 / 6	17%	18 / 33	55%	
>=1 and <5	20 / 36	56%	15 / 26	58%	17 / 21	81%	95 / 141	67%	
>=5 and <12	60 / 154	39%	54 / 118	46%	60 / 87	69%	307 / 638	48%	
>=12 and <18	8 / 22	36%	6 / 12	50%	5 / 6	83%	23 / 45	51%	
Boy	52 / 115	45%	30 / 68	44%	43 / 57	75%	225 / 421	53%	
Girl	40 / 102	39%	46 / 90	51%	40 / 63	63%	218 / 436	50%	

Only one child showed an Hb < 5.

Prevalence of selected DIAGNOSIS, total 2011

LOCATION	Total		
	n	N	%
Vitamin deficit (clinical signs)	77	861	9%
Pneumonia (clinical diagnosis)	9	861	1%
Dysentry	12	861	1%
Active worm infection	112	861	13%
Caries n.o.s.	200	861	23%
Caries with pain	206	861	24%
Dermatomycosis	23	861	3%
Lice	34	861	4%
Scabies	15	861	2%
Infected wounds	18	861	2%
Psychomotoric retardation	9	861	1%
Physiological murmur	8	861	1%
Pathological (suspected) murmur	2	861	0%

Prevalence of vitamin deficit (clinical signs) per GEOGRAPHICAL LOCATION by AGE and GENDER, total 2011

LOCATION	Alma de Los Andes			Sococoni			Chuma		
	n	N	%	n	N	%	n	N	%
Total Vitamin deficit (clinical signs)	8	50	16%	6	149	4%	4	165	2%
Per age category									
>=0 and <1	0	3	0%	0	11	0%	0	6	0%
>=1 and <5	3	13	23%	1	24	4%	1	22	5%
>=5 and <12	5	34	15%	5	114	4%	3	132	2%
>=12 and <18	0	0	n.a.	0	0	n.a.	0	5	0%
Boy	6	23	26%	2	74	3%	4	86	5%
Girl	2	27	7%	4	75	5%	0	79	0%

LOCATION	Titicachi			Mollo			Ayata			Total		
	n	N	%	n	N	%	n	N	%	n	N	%
Total Vitamin deficit (clinical signs)	37	217	17%	12	159	8%	10	121	8%	77	861	9%
Per age category												
>=0 and <1	1	5	20%	0	2	0%	0	6	0%	1	33	3%
>=1 and <5	4	36	11%	2	26	8%	4	22	18%	15	143	10%
>=5 and <12	30	154	19%	8	119	7%	6	87	7%	57	640	9%
>=12 and <18	2	22	9%	2	12	17%	0	6	0%	4	45	9%
Boy	20	115	17%	5	68	7%	4	57	7%	41	423	10%
Girl	17	102	17%	7	91	8%	6	64	9%	36	438	8%

Prevalence of active worm infection per GEOGRAPHICAL LOCATION by AGE and GENDER, total 2011

LOCATION	Alma de Los Andes			Sococoni			Chuma					
	n	N	%	n	N	%	n	N	%			
Total Active worm infection	3	50	6%	28	149	19%	20	165	12%			
Per age category												
>=0 and <1	0	3	0%	0	11	0%	0	6	0%			
>=1 and <5	0	13	0%	9	24	38%	7	22	32%			
>=5 and <12	3	34	9%	19	114	17%	13	132	10%			
>=12 and <18	0	0	n.a.	0	0	n.a.	0	5	0%			
Boy	0	23	0%	14	74	19%	7	86	8%			
Girl	3	27	11%	14	75	19%	13	79	16%			
LOCATION	Titicachi			Mollo			Ayata			Total		
	n	N	%	n	N	%	n	N	%	n	N	%
Total Active worm infection	20	217	9%	24	159	15%	17	121	14%	112	861	13%
Per age category												
>=0 and <1	0	5	0%	0	2	0%	0	6	0%	0	33	0%
>=1 and <5	2	36	6%	10	26	38%	5	22	23%	33	143	23%
>=5 and <12	15	154	10%	14	119	12%	12	87	14%	76	640	12%
>=12 and <18	3	22	14%	0	12	0%	0	6	0%	3	45	7%
Boy	10	115	9%	12	68	18%	9	57	16%	52	423	12%
Girl	10	102	10%	12	91	13%	8	64	13%	60	438	14%

Prevalence of caries with pain per GEOGRAPHICAL LOCATION by AGE and GENDER, total 2011

LOCATION	Alma de Los Andes			Sococoni			Chuma		
	n / N	%		n / N	%		n / N	%	
Total Caries with pain	15 / 50	30%		33 / 149	22%		44 / 165	27%	
Per age category									
>=0 and <1	0 / 3	0%		0 / 11	0%		0 / 6	0%	
>=1 and <5	2 / 13	15%		3 / 24	13%		4 / 22	18%	
>=5 and <12	13 / 34	38%		30 / 114	26%		37 / 132	28%	
>=12 and <18	0 / 0	n.a.		0 / 0	n.a.		3 / 5	60%	
Boy	8 / 23	35%		15 / 74	20%		19 / 86	22%	
Girl	7 / 27	26%		18 / 75	24%		25 / 79	32%	

LOCATION	Titicachi			Mollo			Ayata			Total		
	n / N	%		n / N	%		n / N	%	n / N	%		
Total Caries with pain	43 / 217	20%		37 / 159	23%		34 / 121	28%	206 / 861	24%		
Per age category												
>=0 and <1	0 / 5	0%		0 / 2	0%		0 / 6	0%	0 / 33	0%		
>=1 and <5	2 / 36	6%		2 / 26	8%		3 / 22	14%	16 / 143	11%		
>=5 and <12	39 / 154	25%		32 / 119	27%		30 / 87	34%	181 / 640	28%		
>=12 and <18	2 / 22	9%		3 / 12	25%		1 / 6	17%	9 / 45	20%		
Boy	23 / 115	20%		15 / 68	22%		17 / 57	30%	97 / 423	23%		
Girl	20 / 102	20%		22 / 91	24%		17 / 64	27%	109 / 438	25%		

Prevalence of selected treatments per GEOGRAPHICAL LOCATION by AGE and GENDER, total 2011

LOCATION	Alma de Los Andes		Sococoni		Chuma	
	n / N	%	n / N	%	n / N	%
Ferro	10 / 50	20%	30 / 149	20%	39 / 165	24%
Multivitamins	19 / 50	38%	51 / 149	34%	70 / 165	42%
Preventive antiworm treatment	43 / 50	86%	110 / 149	74%	132 / 165	80%
Acute worm treatment	3 / 50	6%	33 / 149	22%	20 / 165	12%
Amoxicilline	1 / 50	2%	6 / 149	4%	3 / 165	2%
Mupirocine = Bactroban	0 / 50	0%	0 / 149	0%	0 / 165	0%
Dactarin cream	1 / 50	2%	2 / 149	1%	5 / 165	3%
Fusidin cream	0 / 50	0%	1 / 149	1%	3 / 165	2%
Eyedrops	0 / 50	0%	0 / 149	0%	1 / 165	1%
Mother iron	2 / 50	4%	10 / 149	7%	6 / 165	4%

Prevalence of selected treatments per GEOGRAPHICAL LOCATION by AGE and GENDER, total 2011

LOCATION	Titicachi		Mollo		Ayata		Total	
	n / N	%	n / N	%	n / N	%	n / N	%
Ferro	42 / 217	19%	22 / 159	14%	31 / 121	26%	174 / 861	20%
Multivitamins	74 / 217	34%	87 / 159	55%	62 / 121	51%	363 / 861	42%
Preventive antiworm treatment	184 / 217	85%	122 / 159	77%	90 / 121	74%	681 / 861	79%
Acute worm treatment	23 / 217	11%	24 / 159	15%	18 / 121	15%	121 / 861	14%
Amoxicilline	4 / 217	2%	4 / 159	3%	6 / 121	5%	24 / 861	3%
Mupirocine = Bactroban	1 / 217	0%	3 / 159	2%	3 / 121	2%	7 / 861	1%
Dactarin cream	7 / 217	3%	3 / 159	2%	3 / 121	2%	21 / 861	2%
Fusidin cream	6 / 217	3%	6 / 159	4%	3 / 121	2%	19 / 861	2%
Eyedrops	1 / 217	0%	2 / 159	1%	1 / 121	1%	5 / 861	1%
Mother iron	5 / 217	2%	8 / 159	5%	5 / 121	4%	36 / 861	4%

Frequency of selected Follow-ups, total 2011

LOCATION	Total	
	n / N	%
Dentist	241 / 861	28%
Specialist in hospital	11 / 861	1%
Revisit	6 / 861	1%