

Introduction

In the third week of march 2009 a Medical Checks for Children team visited Kenia, checked and treated children aged 12 years and below free of cost. The team consisted of nine doctors, Ines von Rosenstiel, Tamara Soeterik, Mireille van Stijn, Marianne Slee, Annekee Kramer-van Dijk, Joanna Wildenbeest, Brian Simons, Pamela Breas-Bakker, Matheos Demetriades and five non-medics Maria Schmitz, Tasoula Georgiou-Hadjitofi, project leader, Leonidas Kikis, Nick Veldhuis and Marina Shakola, Our host dunning the Kenia stay was archbishop Makarios, head of the Greek Orthodox Seminary Riruta.

The medical checks were organized in close cooperation with the Sophia Foundation for Children.

The nearest Clinic is the Riruta Clinic on the grounds of the archbishop Makarios and the nearest hospital Koptic Hospital, which MCC visited on an explorative mission in 2008.

Technical equipment and some of the supplies were brought from Europe by MCC team members. Most of the medication was ordered by Matheos Demetriades. Additional medication was purchased from local pharmacies in Nairobi.

The cooperation of the Sophia Foundation for Children and the Archbishop Makarios with MCC consists of the following (amongst others):

- Transfer of knowledge about expected diseases, through their earlier work in Kenia.
- Transfer of data on demographics.
- Selection of primary schools and orphanages.
- Providing board and lodging of all MCC team members.
- Transportation of the MCC team from Kilimanjaro airport to TPC and transportation to the diverse check locations.
- Announcement of the medical camp in the locations.
- Making copies of all necessary papers.
- Giving support in ordering and delivery of medication.
- Giving all kinds of support to the MCC team during the medical camp.

The MCC team was very satisfied with the cooperation with Archbishop Makarios and the Sophia Foundation. Our special thanks go to Marina Shakola and Matheos Demetriades, because their active, direct support and enthusiasm gave MCC the opportunity to work in Kenia and they facilitated the medical camp. Special thanks go to the translators and teachers. We would also like to thank Mathew, our guide. We enjoyed working together with all the local helpers. We hope they will continue to inspire their communities in the same way they inspired us. They play a vital role in spreading awareness and knowledge about health.

We are grateful to all the caretakers 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 and their caretakers who came to the checks, for their inspiring presence.

Medical Checks for Children on location:

The medical checks of the children were performed in seven days at different locations.

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

| | | | | | | |
|--------------|-------------------------------------|--------------|---|----------------------------|-----------------------|-----------------|
| 20-03-09 | 21-03-09 | 22-03-09 | 23-03-09 | 24-03-09 | 26-03-09 | 27-03-09 |
| St Paul (87) | Joy Divine (63) St Nicholas (74) | Riruta (216) | Joy Springs - Kibera (60) S George - Kibera (82) | Joy Springs - Kibera (192) | Nyeri Orphanage (131) | Mmemo NSA (103) |

During the free of costs medical checks, the children were checked following the MCC carousel:

1. Registration of the child
2. Measuring height and weight (saturation occasionally)
3. Blood test (haemoglobin)
4. Physical examination
5. Giving medication (pharmacy)
6. Education on tooth brushing (a tooth brush was given to each child)
7. Data input

And for quick data analysis we arranged a seventh station for data entry. Through this data entry we were able to make every evening a quick scan of children’s health.

At each station, mainly at physical examination and pharmacy, education was given to the children and their caretakers 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 1008 children.

Due to the high risk of mortality and morbidity in children under five years of age, the focus of MCC is checking young children. Of all checked children, 84% of the children had the age of twelve years or younger and 50% of the children had the age of five or younger.

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

| Age category | Total (%) | Joy Divine | Joy Springs | Mmemo | Nyeri | Riruta | St George | St Nicholas | St Paul |
|--------------|-------------------|-----------------|------------------|------------------|------------------|------------------|-----------------|-----------------|-----------------|
| < 1 year | 27 (2.7) | 1 (1.6) | 1 (0.4) | 4 (3.9) | 1 (0.8) | 11 (5.1) | - | 6 (8.1) | 3 (3.4) |
| 1 – 5 years | 287 (29) | 6 (9.5) | 70 (28) | 35 (34) | 21 (16) | 34 (16) | 39 (48) | 30 (41) | 52 (60) |
| 5 – 12 years | 540 (54) | 24 (38) | 177 (70) | 56 (54) | 53 (41) | 124 (57) | 42 (51) | 33 (45) | 31 (36) |
| ≥ 12 years | 154 (15) | 32 (51) | 4 (1.6) | 8 (7.8) | 56 (43) | 47 (22) | 1 (1.2) | 5 (6.8) | 1 (1.1) |
| Boy | 519 (52) | 49 (78) | 121 (48) | 27 (55) | 63 (48) | 110 (51) | 39 (48) | 36 (49) | 44 (51) |
| Girl | 489 (49) | 14(22) | 131 (52) | 46 (45) | 68 (52) | 106 (49) | 43 (52) | 38 (51) | 43 (49) |
| Total | 1008 (100) | 63 (100) | 252 (100) | 103 (100) | 131 (100) | 216 (100) | 82 (100) | 74 (100) | 87 (100) |

Except of the 456 (38%) cases of anaemia, 55 (5,4%) and 224 (22%) with probably worms other major diseases were diagnosed (see table 3).

The diagnosis confirmed HIV and "TBC" were either caregivers who told us spontaneously or on request, they were on treatment for the disease.

Most of the ailments, except the dental problems, could be treated on the spot.

We referred 76 children (6.4%) to the medical specialist in the Koptic Hospital for further diagnoses and/or treatment.

Table 4: Disease prevalence among all 507 children, total and per area. Figures represent absolute numbers with percentages of children in area between brackets.

| Major diagnoses | HIV+ | Active worm inf.* | Scabies | Pneum. | TBC (confirmed) | Path. Murmur | Psych. motor. retard. |
|--|-----------------|-------------------|----------------|-----------------|-----------------|----------------|-----------------------|
| Joy Divine | 0 (0) | 9 (14) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) |
| Joy Springs | 2 (0.8) | 71 (28) | 0 (0) | 5 (2.00) | 1 (0.4) | 3 (1.2) | 2 (0.8) |
| Mmemo | 3 (2.9) | 22 (21) | 0 (0) | 1 (1.0) | 0 (0) | 0 (0) | 0 (0) |
| Nyeri | 14 (11) | 0 (0) | 4 (3.1) | 0 (0) | 0 (0) | 0 (0) | 0 (0) |
| Riruta | 1 (0.5) | 67 (31) | 0 (0) | 4 (1.9) | 0 (0) | 2 (0.9) | 1 (0.5) |
| St George | 3 (3.7) | 39 (48) | 3 (3.7) | 0 (0) | 0 (0) | 2 (2.4) | 0 (0) |
| St Nicholas | 0 (0) | 16 (22) | 0 (0) | 3 (4.1) | 0 (0) | 0 (0) | 0 (0) |
| St Paul | 0 (0) | 0 (0) | 0 (0) | 1 (1.1) | 0 (0) | 0 (0) | 0 (0) |
| Total | 23 (2.3) | 224 (22) | 7 (0.7) | 14 (1.4) | 1 (0.1) | 7 (0.7) | 3 (0.3) |
| * How was active worm infection defined? | | | | | | | |

1: Growth abnormality and malnutrition:

(underweight: 10% (86/852), wasting: 10% (72/704), stunting: 15% (150/1004)

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

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

Malnutrition is thought to account for one third of all deaths of children under five years of age (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 has to be noted that reference data were only available for certain heights, weights and ages (as specified above), leading to the following general prevalence's of growth abnormalities in Mtakutja:

Table 3: Growth indices of checked children per location.

| | Total (%) | Joy Divine | Joy Springs | Mmemo | Nyeri | Riruta | St George | St Nicholas | St Paul |
|-----------------|--------------------|------------|--------------|------------|------------|-------------|-----------|-------------|------------|
| Weight/age < P3 | 86/852 (10) | 4/30 (13) | 11/247 (4.5) | 20/93 (22) | 12/95 (13) | 20/146 (14) | 9/82 (11) | 8/74 (11) | 2/85 (2.4) |

| | | | | | | | | | |
|--------------------|--------------------------|---------------|----------------|----------------|----------------|----------------|---------------|---------------|---------------|
| Height/age < P3 | 150/1004 (15) | 8/62 (13) | 38/251 (15) | 20/103 (19) | 34/131 (26) | 24/214 (11) | 18/82 (22) | 7/74 (9.5) | 1/87 (1.1) |
| Weight/age < P3 | 72/704 (10) | 1/23 (4.3) | 6/199 (3.0) | 16/79 (20) | 11/84 (13) | 14/91 (15) | 9/78 (12) | 7/74 (9.5) | 8/76 (11) |

Data on stunting were complete as opposed to underweight and wasting data. However, estimation of age is sometimes troublesome without official documents stating date of birth and children or caregivers not knowing children's age, making the stunting data less reliable than wasting data.

During the medical check-ups, we gave all children, and their caretakers, hygiene and nutritional advice. We emphasised on hand-washing, vitamin C and vegetable intake, so the 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. For babies without a mother or a mother with not enough milk we discussed the possibilities of breastfeeding by another mother. We noticed this policy is quite normal in early days in the hospital but when a baby is at home a lot of fathers are against getting milk from another woman. This is because of culture believes and the fear of being in debt with the husband of the milk giving woman.

2: Anaemia (341, 34 %) (see table 4)

Anaemia is the most prevalent micronutrient disorder. In Kenia 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. Through integrative interventions, the various factors that play a significant role in producing anaemia in a given community are addressed. Besides iron deficiency, anaemia can be seen because of infectious diseases (such as worm infections), chronic infections (particularly HIV-AIDS and tuberculosis), malaria, nutritional deficiencies, and also because of side effects of HAART medication.

Maize porridge and some green leafy vegetables dominate the menu on a daily basis; complemented by beans, rice and green bananas.

As in other populations, we found a larger percentage of anaemia in children less than one year of age (56%) and children one to five years of age (45%). Because of fear for blood taking, haemoglobin levels were not determined in 26 children (2.1%); four of them were diagnosed as anaemic based on signs and symptoms.

Table 4: Anaemia prevalence among 999 children from who successful blood samples were obtained, total and per age category and area. Figures represent absolute numbers with percentage of children in age category between brackets.

Children under 0.5 years are included (N = 4).

| Age category | Total (%) | Joy Divine | Joy Springs | Mmemo | Nyeri | Riruta | St George | St Nicholas | St Paul |
|--------------|-----------|------------|-------------|---------|---------|---------|-----------|-------------|---------|
| < 1 year | 14 (56) | 0 (0) | 0 (0) | 3 (75) | 1 (100) | 5 (46) | - | 4 (67) | 1 (100) |
| 1 – 5 years | 127 (45) | 3 (50) | 33 (47) | 14 (40) | 8 (38) | 13 (39) | 19 (49) | 15 (50) | 22 (45) |
| 5 – 12 years | 167 (31) | 4 (17) | 66 (38) | 18 (33) | 11 (21) | 27 (22) | 15 (37) | 14 (42) | 12 (39) |
| ≥ 12 years | 33 (21) | 13 (41) | 2 (50) | 1 (13) | 8 (14) | 7 (15) | 0 (0) | 1 (20) | 1 (100) |

| | | | | | | | | | |
|--|-----------------|----------------|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Hb ≤ 5.0 mmol/l | 12 (1.2) | 2 (3.2) | 0 (0) | 0 (0) | 0 (0) | 4 (1.9) | 0 (0) | 3 (4.1) | 3 (3.7) |
| Total | 341 (34) | 20 (32) | 101 (40) | 36 (35) | 28 (21) | 52 (24) | 34 (42) | 34 (46) | 36 (44) |
| 192 anaemic children were treated with iron supplements 108 anaemic children were treated with vitamin supplements 19 anaemic children were treated with both iron and vitamin supplements 22 anaemic children were not treated 130 non-anaemic children were treated with vitamin supplements | | | | | | | | | |

Anaemia was less prevalent in children living in Nyeri compared to the other children. This difference reflects the benefits of the school food program of to SF, which confirms the importance of nutrition in respect to anaemia and, hence, to health in general.

We treated the children with anaemia (and their mothers if they were breast fed) with supplements for three months. Of 1008 children, 192 (19%) were given iron tablets or iron syrup and 108 children (10%) were given multivitamins, based on the MCC protocol.

In 12 children the haemoglobin level equals or was less than 5.0 mmol/l. These children were referred to the Koptic Hospital for further diagnostic procedures. We asked for a re-check of the haemoglobin level, HIV test, malaria test and exclusion of sickle cell anaemia (an inborn malformation of the red blood cells). At the time of writing this report we were not yet informed about the test results.

When it comes to the prevention of anaemia; fruit, vegetable and 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 Kenia 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 (224 (22%) prophylactic or therapeutic)(see table 3)

A strong relationship exists between worminfection like Helminth, Ascaris Lumbricoides, Hookworm or T. Trichiura infection and anaemia. In the last years a de-worming program was established in Kenia where there is a high prevalence of these infections in (school-aged) children. This de-worming program does not have a 100% coverage.

We treated the (22%) children, who were not in the de-worming program, on the spot with Albendazol and left medication for repeating the treatment after six months.

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

Simple ways of improving personal hygiene and sanitation through hand washing, nail trimming, wearing of shoes, use of a latrine and clear water supplies 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 (14; 1,4%) (see table 4)

The 14 children with a severe acute respiratory infection (ARI) were treated with appropriate antimicrobials and home treatment advice.

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

For a doctor, normally working in Europe, it is amazing to see how few children have asthma in Kenia. We saw 4 children with symptoms of bronch(iol)titis. None of the children was diagnosed with asthma.

The principles of the Integrated Management of Childhood Illness (IMCI, see www.who.int/child-adolescent-health/integr.htm) for recognition and treatment of a pneumonia were transferred to the local workers and caretakers.

5: Suspected pathological Cardiac Murmurs (7; 0,7%) (see table 3)

The MCC carousel includes a cardiac examination. We suspected 7 children of having a pathological heart murmur, mainly due to a septal defect.

Mitral regurgitation or ventricular 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 to prevent medical problems. Therefore children with suspected pathological heart murmurs were stressed on teeth brushing procedures. Besides this, they were told to give their child antibiotics when going to a dentist for a teeth extraction.

6: Skin diseases

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

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. Posttraumatic pyoderma is seen often on legs and less commonly on ears (because of septic ear piercing). The 20 (1.7%) 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 children with tinea capitis with griseofulvine as there were limited supplies and the great majority heals spontaneously when in puberty.

Scabies is an infective skin disease caused by a mite (*Sarcoptes scabiei*) and is transmitted in situations of poor hygiene and prolonged physical contact (15 min) with an infected person or contaminated bed sheets or clothing. The female mite burrows just beneath the upper skin layer, producing 0.2 - 0.6 cm long lines on the skin, primarily between and on the fingers, palms, wrists, around nipples (women) and genital areas (men). In severe cases, the mite spreads even to the skin of the belly and sometimes the back. Itching and sometimes secondary infection of scratch lesions are the main symptoms. Chronic severe scabies infection may lead to dark (hyperpigmented) spots on the skin. Lice infection were not seen.

Four children with severe burns were referred to an American plastic surgeon organisation, for arranging skin transplants or physiotherapy.

7: Eye problems (12 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 effect 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. This is due to dietary insufficiency, increased requirements, intestinal malabsorption, or transport- and metabolism-impairments 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, which is found in cereals, tubers, vegetables and fruits.

8: Dental (painful caries: 30, 2.9%)

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

The number of cases mentioned probably underestimate the prevalence of dental disease in the children we checked with severe toothaches and caries. We stressed the caretakers of children with painful caries to take their child to the dentist in TPC Hospital.

We had the impression that the more wealthier the people, the more painful the caries we saw. This may be because people have more money to spent on sweets and cookies.

After the check local volunteers distributed toothbrushes and educated the people in teeth brushing.

9: Neuromusculair and Skelet problems

In this population of 1008 children we found only 3 children with a psychomotoric retardation, of which one child had a congenital disease and one child was retarded due to meningitis at the age of three months.

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 organised teaching sessions on common diagnoses of frequent illnesses and treatment. 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 children in the locations visited need more clean water for drinking and hygiene purposes.

Especially providing a source of clean drinkingwater at the schools is 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 the importance of regular (six monthly) de-worming of all children up to fourteen year of age. The Sophia Foundation can take over the anti-worm program in Nyeri orphanages.

- In all locations visited, 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. The local teachers have good knowledge about the health issues and should be encouraged to start a health education program for their children and parents.

- There is a need to find a method for keeping relevant medical information with the child (like the need of antibiotics before dental extraction in children with a cardial septal defect).

- Maybe in the future, a dental camp can be planned shortly after the check of Medical Checks for children. In this way MCC can select the children with the most urgent dental problems.

- The recommendations made in 2008 were implemented in a high standard way by the Sophia Foundation, responsible for Nyeri orphanage.

Last words:

My second trip to Kenia has been again one of the wonderful experiences in my life and in the lives of the team members.

Over the last 10 years I have participated in medical missions in different places in Asia and Africa. 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 and cultural backgrounds, exchanging ideas and to learn from each other.

I enjoy learning from the local cultures and experiencing the beauty of people at the different destinations. I am inspired by the efforts of our hosts facing the vast medical demands with limited supplies.

Both medical and non-medical volunteer work is fantastic and I am proud to work with such kind and generous individuals.

My special personal thanks go to Tasoula Hadjitofi and Matheos Demetriades who organised the MCC mission in a perfect way working together in a very tide time schedule, Marina Shakola for her contribution as a **photographer** to the Medical Checks for Children organisation to Nick en Luc amount of work in analysing the computer data.

I hope to return to Kenia 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.

We are planning to return to Kenia in march 2010 with two teams. One team serving the locations mentioned in this report and one other team which will go to Western Kenia.

Ines von Rosenstiel, medical mission leader MCC mission Kenia 2009