

***Research Report***  
*Boston University OVC-CARE Project*

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**PRELIMINARY EVALUATION:  
IMPACT ON HEALTH STATUS OF ORPHANS AND  
VULNERABLE CHILDREN (OVC) IN NAMIBIA OF MOBILE  
PRIMARY CARE CLINICS PROVIDED BY THE MISTER  
SISTER PUBLIC PRIVATE PARTNERSHIP**

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**IMPACT ON HEALTH STATUS OF ORPHANS AND VULNERABLE CHILDREN (OVC) IN  
NAMIBIA OF MOBILE PRIMARY CARE CLINICS PROVIDED BY THE MISTER SISTER  
PUBLIC PRIVATE PARTNERSHIP**

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## EXECUTIVE SUMMARY

In October and November 2010, a mobile primary clinic operated by Pharmaccess Namibia first visited isolated farms, schools and encampments in Otjozondjupa Region of Namibia. From July 2011 to January 2012, the clinic, christened Mister Sister, provided a regular monthly service in the same region. Part of the costs for this pilot program were paid by farmers, who subscribed N\$417 per farm per month to have the clinic make monthly stops to treat their farm workers and dependents. For the six month period, USAID provided funding for Mister Sister to serve all orphans and vulnerable children (OVC)<sup>1</sup> along this route, including those at Otjozondjupa primary school, as well as Five Rand Camp and the Ileni Tulikwafeni nutrition program located there. This report presents an evaluation of the impact of mobile primary care services on health utilization and health status of orphans and vulnerable children (OVC) along this route. The report does not address the benefits of the mobile health clinic to employers or adult patients, nor measure the impact on workload of the Ministry of Health and Social Services (MOHSS) clinics.

428 children visited Mister Sister at both the beginning (July/August) and end (December 2011/January 2012) of the trial period. These children are referred to as the “longitudinal cohort” in this analysis. 635 children (including the 428 children in the longitudinal cohort) visited Mister Sister at the end of the period, and results for this larger group are discussed separately as the “general community.” Overall, approximately 7.5% of all children seen in the general community were orphans, 65.5% were otherwise vulnerable, and 26.8% not otherwise vulnerable. OVC were regular users of Mister Sister, with approximately 10% of the children in the longitudinal cohort single or double orphans, and an additional 80% vulnerable. Only 10% of the longitudinal cohort were non-orphan children not deemed vulnerable.

Clinic records show a marked reduction in the presence of worm infections of the skin during the trial. These infections fell from 15.7% of the longitudinal cohort at the beginning to none at the end, and from 14.1% to 0.2% among all the children in the community. Fewer children showed external signs of intestinal worm infestation, but these dropped from 1.4% to 0.2% of the longitudinal cohort over six months, and from 1.1% to 0.2 % in the general community. Recorded cases of anemia also decreased from 1.9% to zero in the longitudinal cohort and 1.8% to 0.7% in the general community.

In July 2011, when this trial started, most children seen by Mister Sister were current in their vaccinations. However, at the time of the initial visits in late 2010, 16% of all children, and 32% at Ileni camp, were delinquent in immunizations. Thanks in part to the mobile clinic visits at that time, only 6.5% of the longitudinal cohort and 4.8% of the general community were not current in immunizations at the start of the trial period in July 2011. By the visit at the end of the study period, only 0.7% of the longitudinal cohort and 1.1% of the general community

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<sup>1</sup> Orphans and vulnerable children (OVC) were defined using standard definitions from the Namibia Ministry of Gender Equality and Child Welfare, and include single and double orphans, children with HIV and economically vulnerable children

children were recorded as delinquent in immunizations. Regular visits by Mister Sister further improved the already high vaccination rates which resulted from the earlier pilot.

The data show some elevated risk for malnutrition in orphans at baseline, and we hoped to see a link between Mister Sister visits and improved nutrition status, but the data did not support that hypothesis. Severe stunting did decrease significantly during the trial period, but other malnutrition rates (weight/age and weight/height) ran 8% to 10% in the first Mister Sister visits, with no significant improvement six months later.

The unit cost of a patient visit during the trial period was N\$219. Payments by farmers and adult patients covered 11.5% of the costs of Mister Sister. With the mobile service in operation on this route, the marginal cost per visit of reaching the children at Ileni and Otjozondou School was N\$145. Mister Sister also benefited from the partnership with MOHSS which provided vaccines and essential drugs for free. The drugs dispensed were worth N\$15 per visit at the prices MOHSS paid, but would have cost Pharmaccess more than twice as much in the private market.

While we cannot directly compare the full cost of service at Mister Sister with the combined cost of treatment at an MOHSS site and patient transport to a fixed clinic site, we can compare the cost of travelling to the nearest clinic with the per patient transport cost for Mister Sister (fuel, maintenance, traveling allowances). At N\$1 per kilometer, the average for an OVC to travel to a clinic and back would be N\$141, while the per visit cost of transport related expenses for the Mister Sister clinic was only N\$57. It is clearly more efficient to bring the services to the children than for parents and guardians to pay to bring children to services at a distant site.

A survey of adult patients and farmers shows widespread satisfaction with the Mister Sister service, with 99% of interviewed patients claiming to be “satisfied” or “very satisfied” with the service, which they found accessible, effective and pleasant. Those who had sought primary care in the previous year had generally travelled to MOHSS hospitals, with only a few being seen at Ministry outreach clinics. Farmers were sufficiently satisfied that only one of the 53 farm owners announced the intention not to re-enroll workers with Mister Sister for 2012.

Payments by the farmers and adult patients reduce the costs that would otherwise be incurred for serving OVC populations along the route, but the remaining cost must be covered from other sources (such as USAID).

Although not every measure of health system access or health status proved useful and showed improvement, the significant reduction in worm infections, the further improvement in vaccination rates and the reduction in identified cases of anemia suggest that Mister Sister has made an important contribution to the health of children in this area. Since 70%-80% of these children are orphaned or vulnerable, the service is well targeted to a vulnerable population. The Ministry of Health and Social Services (MOHSS) which has been supplying essential drugs, vaccines and training for Mister Sister staff is pleased with the progress of this innovative public

private partnership, and Mister Sister will be expanding routes in two additional regions in 2012.

Recapping the significant results in the table below, we see that the Mister Sister partnership captured revenue from the private sector, reduced its costs through receipt of essential drugs from MOHSS, lowered transport costs per patient substantially, and produced statistically significant improvements in immunization rates, worm infections and anemia.

<b>Percent of Total Costs Covered by Employer/Employee Fees</b>				
11.5%				
<b>Drug Costs Per Patient</b>	<b>Private Market</b>	<b>Cost to MOHSS</b>	<b>Cost to Mister Sister</b>	<b>Saving</b>
	N\$ 41	N\$15	0	\$N26 \$N41
<b>Transport Costs Per Patient</b>		<b>Patient to MOHSS</b>	<b>Cost to Mister Sister</b>	<b>Saving</b>
		N\$ 141	N\$57	N\$84
<b>Outcome Measures (Longitudinal Cohort)</b>	<b>November 2010</b>	<b>July 2011 - August 2011</b>	<b>December 2011 - January 2012</b>	<b>Change</b>
<b>Immunization Rate</b>	84%	92.3%	96%	+12.0%
<b>Worm Infection (Skin)</b>		15.7%	0%	-15.7%
<b>Worm Infection (Intestine)</b>		1.2%	0.2%	-1.0%
<b>Anemia</b>		1.9%	0.5%	-1.4%

## I. BACKGROUND

### **1.1 Health Status of OVC**

DHS data in Namibia, as well as anecdotal evidence, suggest that orphans and vulnerable children (OVC) have inferior access to health care compared to other children. In running a mobile primary clinic on a rural route from October to December 2010, PharmAccess Namibia found that 8% of children at a primary school and 9% on remote farms had incomplete vaccinations. But 32% of vulnerable children at a feeding program at Ileni, an informal settlement outside Okahandja, had not completed the immunization protocol for their age. This is consistent with findings in other countries. The definition of OVC used in this study was drawn from Ministry of Gender Equity and Child Welfare guidelines (MGECW). Appendix One gives the categorization used.

According to the 2006/2007 DHS, under five mortality in Namibia was 69/1,000. Infant mortality was 46/1,000 live births and neonatal mortality 24/1,000 live births. In its 2009 report on Maternal and Child Health in Namibia, WHO estimated that AIDS was the largest cause of under 5 mortality (53%), followed by neonatal causes (39%). Diarrheal disease, acute respiratory infections and injuries each accounted for another 3% of mortality. Morbidity and mortality data are not generally sorted by OVC status, but the DHS did find that 27% of OVC under age five were underweight compared to 21% of non-OVC in the same age group.

The Namibian Government runs a health service that is essentially free except for modest user fees that can be waived for OVC, but the geography of Namibia provides a formidable obstacle to routine medical care in childhood. Many children live at a great distance from public health facilities. There is no public transport to these facilities, and parents or guardians of OVC may be unable (or unwilling) to take them for medical care. One alternative to increase OVC access to health care is to bring health services to the communities where OVC live through mobile clinics.

### **1.2 Mobile Primary Care Clinics in Namibia**

The Ministry of Health and Social Services (MOHSS) does provide some primary care services outside of fixed facilities through its outreach program. However, it has been difficult for MOHSS to provide such services on a regular schedule because of problems with vehicle availability, as well as conflicts with staff duties at fixed clinic sites. MOHSS has used existing buildings designed for other purposes (ie. schools) as sites for the outreach clinics since it does not currently have a fleet of specially adapted clinic vehicles.

PharmAccess Namibia is a non-profit organization affiliated with PharmAccess, a Dutch NGO committed to the expansion of HIV treatment in Africa and to expanding the availability of health insurance on the continent. PharmAccess Namibia has supported the development of low cost health insurance plans in Namibia that provide good AIDS treatment benefits. It began

a mobile HIV testing service at Namibian work sites, and developed this further into a mobile multi-disease screening program called “Bophelo!” Working in a partnership with the Namibian Institute of Pathology (NIP) and the Namibian Business Coalition on AIDS (NABCOA), PharmAccess designed and outfitted a van which is licensed as a clinic by MOHSS. The Bophelo! program tested for hypertension, diabetes, high cholesterol, anemia, Hepatitis B, HIV and syphilis, measured Body Mass Index (BMI) and asked standard screening questions for tuberculosis. Workers testing positive for any of these conditions were referred to private or Government clinics, depending on their health insurance status.

Employers shared part of the cost of the Bophelo! program, with the remainder of costs covered through the Global Fund and in-kind contribution (test validation and accreditation) from NIP. More than 5,000 Namibian workers were tested by Bophelo! between March and December 2009. Testing uptake by employees at the sites visited was very high, while costs for each HIV test were comparable to fixed site voluntary counseling and testing (VCT) clinics. Including the other screening tests increased the per patient cost by less than 20%. Thanks to the employer contribution, net public/donor costs were approximately one third less than the per test costs at the fixed site VCT clinics that were wholly donor supported. Bophelo! was successful in reaching male workers, who are more reluctant than females to seek voluntary counseling and testing. Many Namibians were tested who had not previously tested for HIV, particularly when Bophelo! visited remote farm sites in the south of the country.<sup>2</sup>

For some years, PharmAccess has been talking to the Agricultural Employers Association about ways to improve health care for the workers at remote farms, ranches and other rural workplaces in Namibia. The success of Bophelo! convinced PharmAccess to attempt a mobile primary care program that would reach these sites using clinic vans in an innovative public private partnership. Farmers would pay a modest sum per worker each month to give their workers access to the mobile clinics. Donors would provide additional funds. Because most of these workers and their dependents would otherwise have sought care at MOHSS sites, the Ministry would provide the mobile clinics with essential medicines and training, while PharmAccess would provide health data to the Ministry. The mobile clinic would be licensed by MOHSS and staffed with a qualified nurse practitioner and supporting personnel. Under a provision of Namibian law (known as Section 22A), nurses with advanced training are permitted to prescribe many essential drugs, independently perform antenatal and child screening, give vaccinations and family planning services, and treat many common conditions. When the condition is beyond the nurse’s scope of practice, he or she will refer the patient to a physician.

The mobile clinic program was initially supported by a grant from the Heineken Africa Foundation, through Namibia Breweries and the Ohlthaver and List Group. The Foundation

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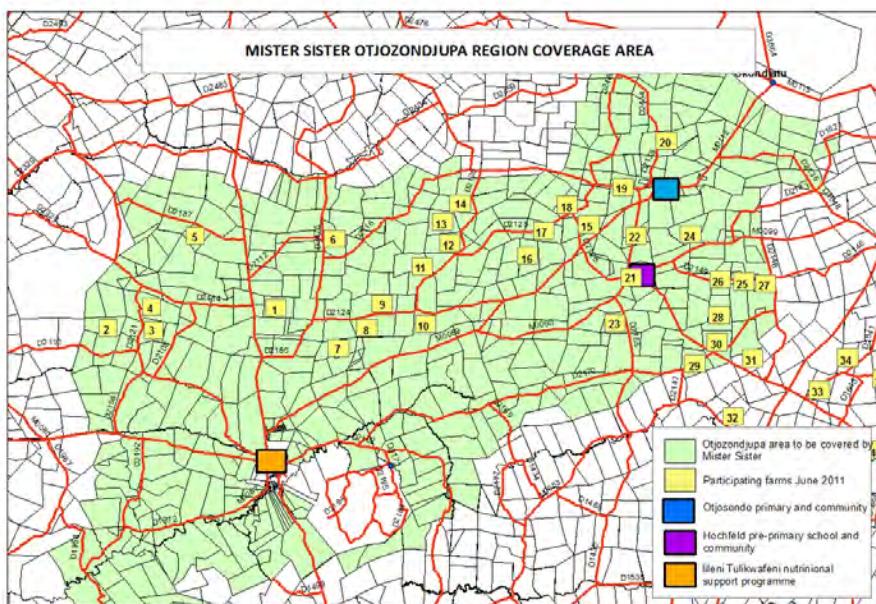
<sup>2</sup> A detailed discussion and cost analysis of the Bophelo! program is available in a report supported by USAID: [Comparison of Key Unit Costs and Outcomes for Mobile and Fixed Site Screening / Testing Programs in Namibia](#), August 24, 2010, by Feeley, Bindels, RinkedeWit and DeBeer. Analyses of the test results have been published in BMC Public Health 12:44 (2012), “Diabetes HIV and other Health Determinants Associated with Absenteeism Among Formal Sector Workers in Namibia” by Guariguata et al.

committed to purchase three clinic vehicles over a period of three years. Funding from the Dutch Foreign Ministry funded the initial pilot in 2010.

PharmAccess christened the new mobile clinic program “Mister Sister.” The first nurse practitioner was male, and clients started calling the van by this name. From October to December 2010, the mobile clinic provided service along a regular route in Otjozondjupa Region. In addition to stopping at selected farms, the clinic stopped at a large primary school (Otjozondo) and a growing informal settlement called Five Rand Camp, where a large number of OVC live and receive support through the Ileni Tulikwafeni program<sup>3</sup>. At this pilot stage, MOHSS only provided free vaccines. In addition to providing the service to rural employees and their dependents, the clinics treated all children at the sites for free. Extensive data was collected on the conditions treated, and a robust costing and budgeting model was created. The data showed a considerable backlog of required preventive and curative care, and patient response to the mobile clinic services was encouraging.

The findings from the 2010 pilot (over 1,900 patient visits) were used by PharmAccess Namibia to design an ongoing mobile primary care clinic program. Negotiations were completed with the regional office of MOHSS so that the Mister Sister clinic could receive stocks of essential medicines from the Ministry to treat the patients seen. In addition, the clinic delivered refills of prescriptions for diabetes and hypertension drugs to chronic patients who would otherwise have been forced to travel to an MOHSS clinic for resupply. In July 2011, the Mister Sister clinic began making regular monthly stops along the route piloted the year before, including the Otjozondo school and Ileni camp (refer to Map #1).

**Map #1: Sites Served by Mister Sister Mobile Clinic. July 2011 - January 2012**



<sup>3</sup> Residents of Five Rand Camp are Namibians from other parts of the country who reside here temporarily in makeshift housing. There are few employment opportunities, but they do not have to pay rent.

### **1.3 USAID Support**

In March 2011, USAID approved funding to cover the cost of monthly visits by Mister Sister to serve OVC living along this route over a six month period. The Mister Sister program offered an innovation that could improve primary health care for OVC, a priority for USAID. Funding was provided by USAID for a six month trial with Mister Sister. The support was provided through an existing contract with Boston University for research on OVC, with additional funds covering the costs of this evaluation. The USAID funding enabled PharmAccess Namibia to specifically target Ileni and the Otjozondjupa primary school as part of the regular Mister Sister route from July 2011 to January 2012. The experimental visit by the mobile clinic in late 2010 had found large numbers of OVC at these sites.

## **2. RESEARCH QUESTIONS**

We sought to measure the impact of the Mister Sister mobile clinic on the health status of OVC. We provide here information on the status of children served, with some comparison to data on health status at the time of the prior visits along this route in October and November 2010. Using the clinic's own management system, we measured reported changes in several access and health status indicators during the trial period from July 2011 to January 2012. We hypothesized that regular monthly access to a (mobile) primary care clinic at the location where a vulnerable child lives will improve utilization of health services and result in improved health status for individual children, and collectively for the children living at the site. The data on patient services and health status is supplemented by estimates of relevant unit costs for the program.

Ethical approval for the research was obtained from the Boston University Institutional Review Board and the Ministry of Health and Social Services of the Republic of Namibia. The MGECD endorsed the study. Analysis was conducted using medical record numbers assigned by the Mister Sister project without any additional identifiers.

This report is not a complete evaluation of the mobile clinic pilot project. It does not look at benefits to employers or adult patients, nor measure any change in work load at MOHSS clinics. PharmAccess did conduct a separate evaluation on the experience of farmer "clients," as well as an "exit interview" survey with some adult patients. These results are reported briefly here. Based on the favorable response, the mobile clinic program is being expanded to two additional MOHSS regions (Omaheke and Khomas), which are participating on the same basis as Otjozondjupa Region.

### 3. METHODOLOGY

#### 3.1 Overview

Overall activity measures for the Mister Sister Clinic are reported for the trial period, with subsidiary breakdowns by:

- OVC status
- Location of visits
- Age of children seen
- Selected health conditions and health status

Changes in selected health indicators were measured using data collected by the Mister Sister clinic management system. Data recorded at the first visit to the clinic during the initiation period (July - August 2011) was compared to data collected on visits during the final months of the trial period (December 2011 - January 2012). Data was not available to compare to the earlier visits by Mister Sister in late 2010. OVC status of the enrolled children was collected using a typology developed for the study and entered into the electronic medical record. Separate categories of OVC were identified, including single and double orphans in various living situations and children with living parents deemed vulnerable due to a lack of household income or other factors (See Appendix One). For purposes of the analysis, the categories were collapsed into three:

- single and double orphans,
- children with living parents who were otherwise vulnerable due to low household income or other situations
- children living with their parents who were not deemed vulnerable

To look at the impact of the mobile primary care clinic on regular users, we compared several health status indicators (discussed below) for children seen both at the beginning and end of the study period, referred to below as the “longitudinal” cohort. This provides an indication of changes in health status made possible because of the regularly scheduled availability and use of the clinic. However, it does not capture children whose health status (such as immunization) was improved by the initial visit, but who did not visit the clinic at the end of the study period.

We also assessed the change in health indicators for the entire population using the clinic data collected at the beginning and end of the study period. For some patients, the visit at the end of the study period may have been the first clinic visit. This population includes the “longitudinal” group who used the clinic in the beginning and the end of the study period. To the extent the mobile clinic has an impact on the general health status of children in the community served, this should be shown by differences in health status measures for this larger population

One caveat is necessary in interpreting the study results. The population served by Mister Sister was not “naïve” to the mobile clinic intervention. The clinic stopped at these same locations during the pilot test eight months earlier. Thus, outcome indicators such as immunization status at baseline had been improved by the earlier service. We highlight the changes in the overall child immunization status from the initial visits in October - November 2010 through the completion of the six month operational period in January 2012.

### **3.2 Data Source**

Data for the study was extracted from an electronic data system based on an open access version of Excel spread sheet software. Each patient seen was assigned a unique medical record (Elixir) number in this system. Data on diagnosis and treatment at each encounter was entered into the system using this number. The system has since been replaced by a clinic management system based on the Access data base program, but the Elixir numbers have been migrated from the initial clinic data system.

### **3.3 Key Indicators**

The indicators maintained in the medical record data base and selected for the evaluation are shown below, along with the measurement used for the indicator, and the reason that the indicator was selected. Respiratory and gastrointestinal infections are common sources of childhood morbidity in the area, and we might have used a change in the frequency of these conditions as an indicator of the impact of the Mister Sister program. However, the prevalence of these conditions is heavily affected by climate, living environment, water quality, nutrition and maternal education. Mister Sister could not change these conditions during the six month trial period, so we did not use prevalence of acute respiratory infections or diarrhea as indicators.

#### **Immunization status**

**Reason** - Given the effectiveness and importance of childhood vaccination, this is an important indicator of access to and use of health services. Preventive care, such as vaccinations, may suffer because of the difficulty in reaching public facilities from these rural areas, and the intermittent availability of MOHSS vaccination outreach campaigns. Mister Sister carried all vaccines in the MOHSS protocol (supplied from Ministry stocks) and administered as required after reviewing the health passport.

**Measure** - Health passport shows that all immunizations required by national protocol for this age have been received prior to visit.

#### **Anemia**

**Reason** - Anemia is an important factor in child development, more likely to be low in a vulnerable child, and not necessarily causing acute symptoms that would result in taking the child to a clinic. Can be remedied by issuing iron supplements at the clinic.

**Measure** - Children were tested using the Hemocue test. The child was deemed anemic if the test showed blood hemoglobin concentrations of less than 13.0g/dl.

### **Worm Infection**

**Reason** - These are common infections to which the children in this area are heavily exposed due to poor hygienic conditions, lack of shoes, presence of large concentrations of domestic animals and other factors. Potentially damaging to child development.

#### **Measure**

**Skin:** Evidence of helminth based skin conditions on physical examination. Treatment administered accordingly.

**Intestinal:** Child or caretaker report physical symptoms (ie. anal irritation) consistent with intestinal worm infection. Stool samples were not taken for laboratory analysis, and all children were issued prophylactic worm treatment. Child is noted as positive for worm infection based on reported physical symptoms.

### **Dental problems**

**Reason** - In the absence of severe pain, dental problems would not usually result in seeking care at a remote clinic. Potentially damaging to the child's development.

**Measure** - All children received a brief oral examination by the clinic nurse. If problems (ie. extensive decay) were noted, the child was referred to the MOHSS dental clinic. Referral taken as an indicator of dental problems.

### **Referrals**

**Reason** - An indicator of serious health problems, including congenital defects, which were not in active treatment. Not noted if the condition was identified in the passport and the child was in treatment.

**Measure** - Any potentially serious medical problem detected by the clinic nurse which could not be treated at the clinic. Such children received a referral to an MOHSS clinic, which was noted in the record.

### **Malnutrition**

**Reason** - Indicators of malnutrition can result from several causes, often combined, including inadequate food supplies (too few calories, inadequate nutrients), inappropriate feeding practices, recurrent diarrhea, and intestinal worms. While remedy is not totally within the control of the health care system, primary care clinics could improve nutrition outcomes by counseling and educating parents, treating diarrhea and intestinal worms, and referring the most severely malnourished for supplementary feeding. Some improvement should be noted over time if these interventions are effective. Mister Sister collected patient height (length) and weight and compared to WHO development charts in categorizing the child and determining if corrective action was required. The results shown here were based on retrospective calculations done specially for the analysis, with the result compared to WHO tables for the child's age. Three specific indicators are discussed: weight for age, height for age, and weight for height.

#### **Measure**

**Weight for Age (available for children under 10):** Based on weight and age recorded at time of visit, and compared to WHO development tables in subsequent analysis. Ranges shown:

- Normal---within two standard deviations of weight for age in WHO growth tables
- Moderate---more than two but less than three standards deviation below median weight for age
- Severe---more than three standard deviations below median weight for age
- Above---more than two standard deviations above median weight for age

**Weight for Height (for children under 5):** Based on height and age recorded at time of visit and compared to WHO development tables in subsequent analysis. Ranges shown based on deviations from median as shown above.

**Height for age (available for children of all ages):** Based on recorded height and compared to WHO development tables in subsequent analysis. Ranges based on deviations from median as shown above.

### **3.4 Analysis**

The data was electronically extracted from Mister Sister files by PharmAccess staff, with all visits for a single patient linked by the Elixir number assigned by the PharmAccess data system. No other individual identifiers were provided to the analysts. Files were analyzed using SAS software, with analyses run separately for the population of children who used the clinic at **both** the beginning and end of the study period (longitudinal cohort), and separately for all children using the clinic at various times during these periods.

## **4. RESULTS**

### **4.1 Volume and Users of Services**

A total of 5,014 individuals enrolled with Mister Sister, but not all were actually treated during the study period. Over the study period of just less than seven months<sup>4</sup>, the Mister Sister clinic treated 1,821 individual patients with a total of 4,261 patient visits (2.34 visits/patient). Of the patients seen, 1,210 were children under 18, with a total of 3,188 visits by these children (2.63 visits per child).

Table 2 gives key characteristics for the children visiting the Mister Sister clinic in the trial period. This data includes multiple visits by the same child. There is no bias towards the treatment of male children. Approximately 67% (813/1210) of the children were seen at least twice in the trial period, and almost one third were seen four times in this period of seven months.

Over half the child visits were at the Otjozondo school. This is a primary school where most students are boarders because it is not feasible for them to travel from their homes every day. The school draws from an area even wider area than the Mister Sister route. Because most students living on farms travel here for primary schooling, most older children were seen here, and not on the farms.

Single or double orphans made up about 9% of the clinic visits. Children deemed vulnerable because of living status or household income were 73% of the visits. Only 18% of the children seen were classified as “not vulnerable.”

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<sup>4</sup> There was a three week hiatus in December and early January during the Christmas and summer holidays, as is traditional in southern Africa

**Table 1: Demographic Characteristics of Child Patients Seen**

<b>Key Variables</b>	<b>Number of visits</b>	<b>Percent</b>
<b>Gender</b>		
Male	1,552	48.7%
Female	1,636	51.4%
<b>Visits by Patient in Period</b>		
First	1,210	38.0%
Second	813	25.5%
Third	639	20.0%
Fourth	366	11.5%
More than Four	156	4.9%
Visit number missing	4	0.1%
<b>Location</b>		
Otjosondo School	1,739	54.6%
Ileni Tulikwafeni	719	22.6%
Orange Babies	78	2.5%
Other (farms)	652	20.5%
<b>Orphan Status</b>		
Single or Double Orphan	279	8.8%
Vulnerable, not orphaned	2,323	72.9%
Other children	584	18.3%
Status missing	2	0.1%

#### **4.2 Diagnoses and Conditions Treated**

Over half of all child visits (55.1%) resulted in at least one diagnosis for which treatment was provided. Over 15% of the visits resulted in more than one diagnosis with subsequent treatment. The top five conditions (in order of frequency) were:

- Common cold
- Tonsillitis
- Ringworm
- Upper respiratory tract infection
- Gastro intestinal diseases

Clearly, not all of these conditions would have resulted in a special trip to a distant clinic, but some were potentially serious.

Only 12 of the patients seen, about 1%, were identified as HIV positive. Children were not tested routinely, although the clinic could give a child an HIV rapid test if its condition suggested possible HIV infection. HIV positives were generally identified from the health passport or a statement by the child's caregiver. Table 3 shows the age and location of these 12 children.

**Table 2: Location and Age of HIV Positive Children**

<b>Key Variables</b>	<b>Frequency</b>
<b>Age</b>	
<1 year	2
1-5 years	4
5-12 years	3
12 and above (up to 18)	3
<b>Location</b>	
Ileni	5
Orange Babies	7

The relatively small number of HIV positive young children may be a testament to Namibia's efforts to reduce vertical HIV transmission. Orange Babies is a special feeding and support program for HIV positive women and their children, located in Okahandja, and it is therefore not surprising that the largest number of HIV positive children were found there. The HIV positive children did show higher rates of malnutrition. Two of those under ten years of age were below normal in weight for age. Five of 12 were below normal in height for age, and one out of six of the HIV positive children under five was below normal weight for height.

Because of the small number of identified HIV positive children, caution must be used in comparing the prevalence of various factors in HIV positive and negative children. However, Table 3 below gives the comparative prevalence rates at first visit for several conditions.

**Table 3: Prevalence Rates at First Visit**

	<b>HIV Positive n = 12</b>	<b>HIV Negative n = 1,198</b>
Incomplete Immunization	16.7%	4.3%
Skin Parasites	8.3%	10.4%
Intestinal Parasites	0	1.4%
Anemia	0	2.9%
Moderate/Severe Stunting	41.6%	23.8%
Moderate/Severe Underweight (for age, <10)	25%	10.2%
Moderates/Severe Wasting (for height, <5)	16.7%	5.6%

### **4.3 Location and Age of OVC**

Table 4 below shows the location and age of orphans (O) and other vulnerable children (VC) seen over the course of the study.

**Table 4: Location and Age of Orphans and Vulnerable Children Seen.**

	Ileni		OTJ School		Orange Babies		Other (farms)		Total		Total		
	Age	O	VC	O	VC	O	VC	O	VC	O	VC		
<1		1				2	14			3	2	18	46
1-5	2	66		1			10			14	2	91	134
5-12	22	147	22	256	1	1	1	18	46	421		85	
>12	9	39	30	170	2	1		2	41	212		24	
Missing age		23		23		3		2		51		35	
Total	33	276	52	450	5	29	1	39	91	794		324	

**Total 1209 children - OVC status is missing in one child**

The distribution of all children seen is similar to that for total visits: 65.5% of children were vulnerable, 7.5% were actually orphaned, and about a quarter (26.8%) were not otherwise vulnerable. Most of the actual orphans were seen at Ileni (37.5%) and the Otjozondou School (57%). The largest proportion of otherwise vulnerable children were also seen at the School (57%). Only one actual orphan was seen on the farms, and only 5% of other vulnerable children were seen there. Some of the vulnerable children seen at the school undoubtedly reside on the farms visited.

### **4.4 Baseline Characteristics by OVC Status**

Two key indicators of child wellbeing are malnutrition and immunization status.

Table 5 shows the nutrition status of children (height for age) observed by Mister Sister according to the child's OVC designation. The percentages are the percentage of the children in the OVC category who are in each nutrition category.

**Table 5: Nutrition Status (Stunting) by OVC Status**

Indicator	Orphans	Other VC	Other Children
<b>Height for Age</b>			
Normal	60 (65.9%)	484 (61%)	84(25.9%)
Moderate Below	19 (20.9%)	132 (16.6%)	31 (9.6%)
Severe Below	9 (9.9%)	71 (8.9%)	27 (8.3%)
Above	1 (1.1%)	14 (1.8%)	8 (2.5%)
Value Missing	2 (2.2%)	93 (11.7%)	174 (53.7%)

**Total 1209 children - OVC status is missing in one child**

The height for age indicator is used because it is available for the full age spectrum of children (up to 18 years) served by Mister Sister. Orphans appear to be at higher risk of moderate stunting, although there is relatively little difference between categories in the percentage of children who are severely stunted.

Other indicators available for more limited age groups do indicate some elevated risk of malnutrition for orphans. At Ileni, 6.3% of orphans under 5 were below normal on the weight/height standard, while 5.5% of other vulnerable children in this age group were below normal. For the same age group on the farms, there were no orphans, but 20% of vulnerable children were below normal, while only 6% of non-vulnerable children recorded low weight for height.

For weight for age (10 and under), at Ileni, 18.8% of orphans and 11.2% of other vulnerable children were below normal. At Otjozondo School, all nine orphans had normal weight for age, but 9.1% of otherwise vulnerable children were below normal weight. On the farms, there were no orphans under 10, while 8.6% of the otherwise vulnerable children were below normal weight for age. However, 10.1% of children on the farms were below normal weight for this standard.

Unfortunately, a number of visits were missing some of the data necessary to calculate the malnutrition scores. On the most widely available measure ---height for age--- it does appear that orphans and other vulnerable children are more at risk of malnutrition.

Table 6 shows immunization status at baseline for orphans, other vulnerable children, and children not deemed vulnerable in the cohort followed throughout the Mister Sister trial. There is little missing data, and there is a statistically significant difference in the delinquent immunization rates. 25% of orphans were delinquent at baseline, and 5% of other vulnerable children. But none of the “non-vulnerable” children were delinquent.

**Table 6: Immunization Status by OVC Category  
(Longitudinal Cohort---Percent of Children in OVC Category)**

Immunization Status	Orphans	Other VC	Other Children
Complete	75%	94.2%	95.1%
Not Complete	25%	5%	0%
Unknown or Missing	0%	0.9%	4.8%
Total	100%	100.1%	99.9%

A similar story is told by baseline data from the longitudinal cohort for worm infections: 22.7% of orphans had skin infections, 16% of otherwise vulnerable children had these infections, but only 4.5% of the “non-vulnerable” children had such an infection. These differences are statistically significant.

#### **4.5 Longitudinal Changes in Health Status**

The real measure of the success of a health service intervention is not the baseline health status of those served, but the change in health status and burden of disease that occurs after the intervention has been in place for a time. In this section, we look at the key health indicators over time in the longitudinal cohort (seen at both the beginning and the end of the trial) as well as the general data on all children treated. In addition, we look at the progression of health indicators over successive monthly stops by the Mister Sister clinic.

##### *4.5.1 Immunization*

As previously noted, at the time of the previous mobile clinic experiment in October and November 2010, 32% of children at Ileni, 8% at Otjozondou School and 9% on the farms were not current on their vaccinations. OVC status was not recorded for children at that time. The mobile clinic vaccinated children as necessary, so many of the older children seen during these earlier visits remained “in status” for some time because additional vaccinations may not be required for a year or more.

By the time of the first Mister Sister visit in the trial period studied here, only 4.6% of all children seen were delinquent (95% C.I: 2.9%-6.9%). By the November/December visit, only 1.7% (95% C.I.: 0.8%-3.3%) of the 461 children seen in that cycle were delinquent in vaccination, a major improvement. For the longitudinal cohort followed throughout the trial, the percentage of children with delinquent vaccinations fell from 6.5% (95% C.I, 4.5%-9.2%) at baseline to 0.7% (95% C.I. 0.2%-1.9%) at follow up. Only 3/428 children receiving regular care from Mister Sister were missing a required vaccination at the end of the trial.<sup>5</sup>

##### *4.5.2 Anemia*

In the first month of visits, 9 patients (2.1%) tested positive for anemia. In January (the last visit), 1.9% of children seen tested positive. The clinic was not testing patients every month, but only performing the tests on those showing symptoms or who had been found anemic in prior testing. In the longitudinal cohort, however, the number of anemia cases fell from 1.9% to 0.5%, a statistically significant reduction over the course of the trial, suggesting that regular follow up was effective in reducing the burden of this disease.

##### *4.5.3 Worms*

The most startling improvement in health status over the period of the trial occurred for helminth infections of the skin, diagnosed by visual inspection. In the baseline period, 120 children (14.1%) were diagnosed with the condition and treated. By the end of the trial, only 1 patient (0.2%) was observed with the condition. For the longitudinal cohort, the improvement

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<sup>5</sup> A health passport was not submitted for these three children, so they were noted as not in compliance. It is possible that they were actually current on vaccinations

was even more dramatic, from a prevalence of 15.7% at baseline to 0% at the end of the trial. The orphan (22.7% prevalence) and vulnerable children (16%) in this cohort had higher initial infection rates than the non-vulnerable children (4.5%). At the end of the trial, none of these children were diagnosed with a visible skin infection. The results are statistically significant.

While Mister Sister provided regular deworming medication to the children, it did not take laboratory samples for analysis. However, physical symptoms suggesting intestinal worm infections were recorded. Though less common than skin infections, 1.4% of all children seen at baseline had these symptoms. By the end of the study, only one case was recorded. For the longitudinal cohort, prevalence fell from 1.2 % to 0.2%, a statistically significant drop.

#### *4.5.4 Nutrition*

Malnutrition data is most complete for height for age, since the standards are available for all children. Table 7a shows the results in the baseline and endline periods for all children seen and for the longitudinal cohort. There is some improvement in this measure for both groups.

In both groups, the prevalence of moderate and severe stunting seems to fall over the study period. For severe stunting, the 95% confidence intervals do not overlap, so the reduction in severe stunting is statistically significant. The confidence intervals do overlap for moderate stunting.

**Table 7a: Height/age**

	All Children		Longitudinal Cohort	
	Baseline	Endline	Baseline	Endline
Normal	501 (58.7%)	418 (65.8%)	266 (62.2%)	318 (74.3%)
Moderate Stunting	147 (17.2%)	68 (10.7%)	69 (16.1%)	48 (11.2%)
Severe Stunting	83 (9.7%)	22 (3.5%)	41 (9.6%)	15 (3.5%)
Above Normal	17 (2.0%)	13 (2.1%)	7 (1.6%)	9 (2.1%)
Missing Value	106 (12.4%)	114 (18.0%)	45 (10.5%)	38 (8.9%)

Tables 7b and 7c show less encouraging results. 7b shows weight for age for children less than 10 years

**Table 7b: Weight/age, children under 10 years**

	All Children		Longitudinal Cohort	
	Baseline	Endline	Baseline	Endline
Normal	384 (76.7%)	274 (70.4%)	200 (81.3%)	180 (73.2%)
Moderate Underweight	35 (7.0%)	38 (9.8%)	17 (6.9%)	27 (11.0%)
Severe Underweight	13 (2.6%)	13 (3.3%)	6 (2.4%)	9 (3.7%)
Above Normal	5 (1.0%)	7 (1.8%)	2 (0.8%)	4 (1.6%)
Missing Value	64 (12.8%)	57 (14.7%)	21 (8.5%)	26 (10.6%)

Over the trial period, the percentage of both moderately and severely underweight children increased in both the general population and the longitudinal cohort. Mixed results are seen for weight for height in children under 5. Moderate wasting increases over time in both groups. Although there is a small drop in severe wasting for the general population of children, there is no decrease in the longitudinal cohort. And there are more missing values for this measure than for the other nutrition measures. The results for these measures of malnutrition are not statistically significant..

**Table 7c: Weight for height, children less than five years**

	All Children		Longitudinal Cohort	
	Baseline	Endline	Baseline	Endline
Normal	100 (50.8%)	51 (35.4%)	32 (49.2%)	30 (46.2%)
Moderate Wasting	7 (3.6%)	6 (4.2%)	2 (3.1%)	6 (9.2%)
Severe Wasting	8 (4.1%)	3 (2.1%)	2 (3.1%)	2 (3.1%)
Above Normal	10 (5.1%)	4 (2.8%)	4 (6.2%)	1 (1.5%)
Missing Value	72 (36.6%)	80 (55.6%)	25 (38.5%)	26 (40.0%)

The malnutrition data is inconclusive, but many factors besides the availability of health care affect a child's development. A mobile clinic like Mister Sister can help with some patient education, as well as treatment of diarrhea and intestinal worms. But it can do nothing about the basic food supply, and even a successful education program will take more than the six months of this trial.

#### 4.5.5 Other Outcome Measures

The dental and general referral indicators were not useful in evaluating the Mister Sister project, at least for children. The number of dental referrals in the longitudinal cohort was small 21 (4.9%) at baseline. This value actually went up in the follow up period to 29 (6.8%). However, there were staffing changes in the last month of the trial, and the new staff may have diagnosed and recommended referral for dental conditions that were overlooked or not deemed sufficiently serious by the clinic staff on the initial visits. We cannot conclude from this result that referral care was not received, or that dental conditions actually deteriorated in the longitudinal cohort over the study period.

At the end of the trial period (January 2012), a dental hygienist from the Netherlands joined the Mister Sister team and conducted an independent evaluation of adult and child dental health. Her observations suggest that education in dental hygiene, as well as general prevention through tooth brushing and the use of fluoride toothpaste, could provide a marked improvement in the dental health of children. Observation of 72 children at the primary school showed that 5% of first graders had cavities and this rose to 40% in grade three. Plaque and gingivitis was seen in 100% of the children. Although these cases did not warrant referral, the need for toothbrushes, fluoride toothpaste and dental education was identified. PharmAccess is working to find a way to provide these services on the mobile clinics.

For all children, there were only 4 (<1%) medical referrals at the first clinic visit. Referral rates fluctuated around 1% for the next two months, then fell to zero in the visits in November and December. During the final visit (January), referrals rose to 20, or 6.5% of the patients seen. However, this occurred after a one month hiatus in the Mister Sister service for the summer/Christmas holidays, so additional conditions requiring referral would be likely to develop. The numbers of referrals are sufficiently small that we cannot assume an increase in “referable conditions” or a failure to follow up on the referral.

#### ***4.6 Conclusion: Impact of Mister Sister on Health Status***

Improvement in immunization levels is one of the most important outcomes of the Mister Sister program. Before the any mobile clinic visit (October 2010), vaccinations were delinquent in 9% of the children on farms, 8% at the school and 32% at Ileni. By the end of the trial period in January 2012, vaccination was delinquent in less than 2% of all children and less than 1% in the longitudinal cohort. The biggest improvement was after the first visit in 2010 that preceded the six month trial reported here, but the vaccination rate improved further over the six months of regular visits.

Improvements in worm infections and anemia were also statistically significant over the trial period. These are conditions for which a child would likely not be taken to a distant clinic and shows the benefits of regular primary care visits.

The Mister Sister trial seems to have little demonstrable effect on malnutrition. The clinic was unable to actually change food availability, and the impacts of health education or regular deworming may not have been visible over this limited period of time.

Dental and medical referrals turned out to not be useful indicators of program impact. Medical referrals were few; most major congenital defects were likely recognized earlier, and we would not expect many trauma referrals with the monthly visit pattern. A change in personnel on the Mister Sister van probably resulted in a change in the criteria for dental referral, explaining the higher referral rates at the end of the study period.

Overall, Mister Sister clearly improved vaccination rates and helped to control anemia and worm infections. By bringing the services to the people, the program facilitated regular primary care visits, even for this vulnerable population.

## 5. UNIT COST OF SERVICES

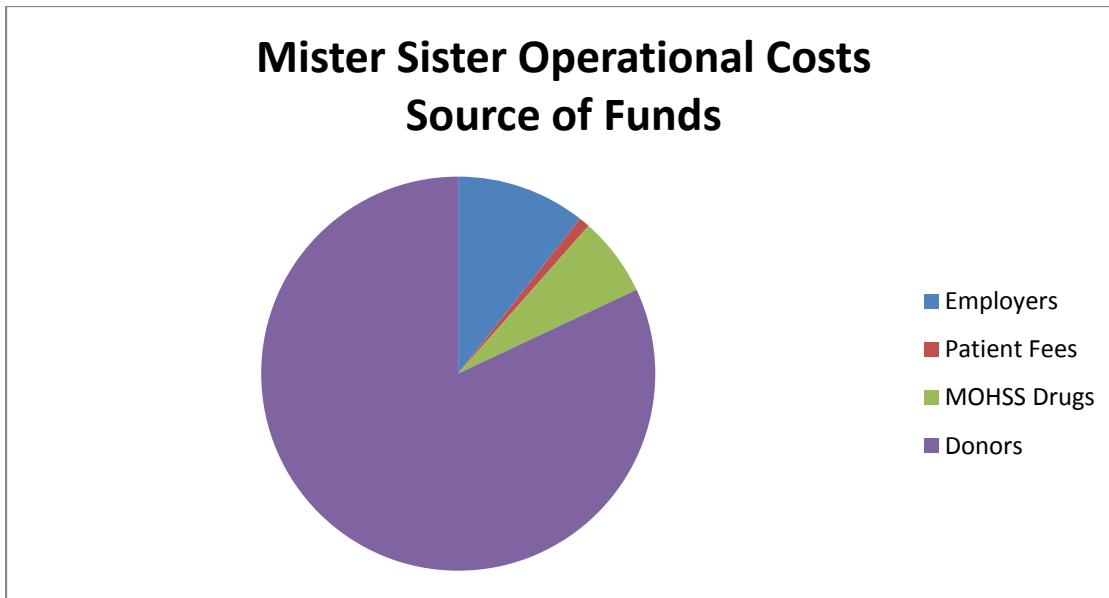
Over the trial period, Mister Sister had 4,261 patient visits and incurred N\$934,684 in costs, for a per visit cost of N\$219.36. Over 11% of this cost was offset by enrollment fees received from farmers and user fees collected from adult patients. While salaries were the largest cost item (46.5%), the costs associated with the clinic's mobility were substantial, as shown below:

Travel related costs	
<i>Staff accommodation</i>	19.2%
<i>Fuel</i>	4 %
<i>Other vehicle expenses</i>	5.7%
<i>S&amp;T allowance</i>	5.3%
<i>Total travel related</i>	34.2%
Clinic depreciation	7.6%
Medical equipment/supplies	6.8%
Other Costs	4.9%

During the trial, 1,824 different patients enrolled with the clinic, and many used it multiple times. As noted above, two thirds of enrolled children were seen at least twice, and a third were seen four or more times. However, every patient did not use the clinic at every visit. We calculated the cost per month for every patient actually seen (1,824) over the seven month study period. The result was N\$73.21, about 50% above the monthly contribution per worker originally sought from each farmer.

The above costs are an average for adult and child visits. When visiting sites with a large number of OVC, such as Ileni and the Otjozondou School, the clinic can see a large number of patients every hour, particularly when unmet needs such as vaccination have been met. This could lower the cost per child or OVC patient served. While we cannot separately cost each individual visit for a child or OVC, we do know the number of days on which the clinic visited these two sites, and the number of patients seen on those days. Thus, we can calculate a cost per patient visit at the sites where we saw most of the OVC. We adjusted the salaries, depreciation and "other" costs to reflect reduced travel for this more limited service, leaving an estimate of the marginal costs to serve all patients at Ileni and Otjozondou of N\$368,936, or 39.5% of the full program cost over the trial period. With 2,452 visits occurring at these two sites, the marginal per visit cost at sites with OVC concentrations is N\$145.14, or about 66% of the average cost per visit of serving the entire route. While the employer contributions are insufficient to fully cross subsidize the service to the sites with a high concentration of OVC, the coverage for some of the basic program costs reduces the marginal cost of serving these OVC

The graph below summarizes the contribution of employers and employees (employer fee and patient payments), the MOHSS (essential drugs) and donors to the total cost of Mister Sister in this time. This does not include the cost of vaccines donated by MOHSS .



Two supplementary cost questions should be asked:

- *What is the impact of the partnership under which Mister Sister receives vaccines and essential drugs from MOHSS stocks?*
- *What savings are realized by patients with the mobile service, since they do not incur costs to travel to a fixed site clinic?*

The drugs received from MOHSS stores and used by Mister Sister had a value of N\$68,400 (at prices paid by MOHSS) during the trial period, or about 7% of the costs incurred by PharmAccess. Where prices were available in the private sector, the drugs used would have cost 2.73 times the public price if purchased by PharmAccess. Thus, the public private partnership reduced drug costs for this service by N\$118,000, a significant saving.

Mister Sister also receives vaccines from MOHSS stocks. This is a major saving to PharmAccess, as list prices for vaccines in the private sector vary from seven to twenty-two times the cost paid by MOHSS. Almost all of the children treated would have received their vaccinations from an MOHSS clinic or program.

One way to look at travel costs is to determine what the Mister Sister program paid to transport the facility to the patients, and compare this to what patients would have paid for transport to an MOHSS clinic. We plotted the location of children (OVC and not) and the nearest MOHSS facility (usually a district hospital). The average one way distance for an OVC to reach a facility is 70.5 kilometers. For non OVC (many living on isolated farms), the average one way distance would be 101 kilometers. The variable costs of a vehicle capable of driving on these roads would be approximately one Namibian dollar per kilometer. This is a conservative estimate, barely sufficient to cover petrol. Most of these patients would not have easy access to a vehicle.

The minimum average round trip cost of transporting a single child to the nearest MOHSS facility would be N\$141 for OVC's and N\$202 for other children. In contrast, the vehicle transport component of the Mister Sister cost per visit is only N\$57. The individual patient transport costs does not take into account any costs incurred by the guardian accompanying the child, such as wages foregone. The frequency of visits are likely higher when the clinic comes to the patients. But ---per visit--- it clearly costs less to transport the Mister Sister clinic to the patients than it would have cost to bring all of these patients to visit MOHSS facilities.

## 6. CLIENT SATISFACTION

In late November and early December, PharmAccess conducted a patient survey at 36 of the 51 farms using the Mister Sister clinic, interviewing 203 adult patients<sup>6</sup>. Caregivers for children were not interviewed, in part because they may not have been aware of the pattern of care for the child in the previous year. Eighty four percent of the survey respondents reported household incomes less than N\$2,000 per month. At an average household size of 6, this equates to an income of less than US\$1.50 per day, or barely more than US\$2 per day for a household of four.

Ninety-nine percent of these adult users expressed overall satisfaction with the Mister Sister services. In general, they found the service clean, friendly and effective, and they particularly appreciated the convenience of receiving the service at or near their place of residence.

167 out of the 203 respondents experienced health complaints in the previous year, and most of these patients (162/167, 97%) had sought primary care treatment for a health condition. Almost all of the care had been received at Government hospitals, most frequently Okahandja Hospital. Only 13% (21/162) had received services at Government outreach clinics. As expected, the population served by Mister Sister is dependent on Government health facilities for care and must travel long distances for service. Satisfaction with the primary care services previously received (54%) was much lower than for Mister Sister. Only 7.4% sought service from another primary health care facility since the start of the Mister Sister service.

Twenty percent of the respondents had been referred for follow up by Mister Sister, all to a Government facility. This is a much higher referral rate than occurred with the children seen by Mister Sister, and is not surprising, since Mister Sister screened for silent conditions such as high blood pressure and blood sugar, which might not cause a patient to travel all the way to an MOHSS clinic. Over a third of the referred patients never took up the referral, often citing the difficulties in obtaining transport.

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<sup>6</sup> B Rinjen, E Afriakner, E Shityuwete and I DeBeer. "Patient and Client Experience Assessment of Mister Sister" PharmAccess Foundation, Windhoek, 2012.

Interviewers also reached 23 of the farmer “clients.” They too generally reported satisfaction with the Mister Sister service. Eighteen (78%) definitely planned to re-enroll for the Mister Sister service in 2012, four had not yet made a decision, and only one farmer stated that he would not enroll with Mister Sister for the coming year.

## 7. LIMITATION

The study has a number of limitations. Funding permitted a follow up period of only six months, and the results might have been different ---better or worse--- after a longer period of continued mobile clinic care. In addition, Namibia has a very mobile population, with many Namibians moving back and forth between population centers in the north and employment opportunities elsewhere in the country. Over a longer period, there likely would be more movement in the study population, with a relatively smaller proportion of the total population treated included in the longitudinal cohort.

A more significant limitation may be created by the previous pilot test of the mobile clinic in this region. Many older children who were behind in their immunizations prior would have received the necessary vaccinations from the first test of the mobile clinic in late 2010, before the trial reported here. They would then be current at the start of this study period. Thus, the improvement in vaccination rates may be less than would be seen in a rural population with no prior exposure to a mobile clinic.

The study data is limited to those patients who actually visited the clinic. We do not have a measure of the proportion of the catchment population who actually visited Mister Sister. Enthusiasm for the service is documented in the client survey, and the observations of the clinic staff suggest that demand for Mister Sister services was widespread at each stop. However, we cannot estimate the proportion of the population actually served, nor estimate the health status or use of other health services by those who did not visit Mister Sister. Also, because the study is based entirely on the clinic’s own records, we do not have a control group through which we could establish care patterns and outcomes in the absence of the mobile clinic.

## 8. CONCLUSION

The clinic data document that Mister Sister had a positive effect on immunization status, symptoms of worm infection and anemia in a population of children where 70% to 80% are orphaned or vulnerable.

The number of vulnerable children served is impressive. 428 children were regular users, seen at both the beginning and end of the study period. More than 854 different children sought

services at the beginning of the study, and 635 visited in the final month. While less than 10% of the children served were actually orphans, 66% of all patients, and 80% in the longitudinal cohort, were deemed vulnerable (but not orphans). The service is effectively targeting OVC. This targeting is further confirmed by client surveys, which indicate that Ministry facilities were the only health resource previously used by almost all adult Mister Sister patients. Most of this service had been received at MOHSS hospitals, relatively little at Ministry outreach clinics. The Mister Sister service is reaching a vulnerable population that has trouble accessing alternative health resources.

The direct cost of the service was approximately N\$219 per visit. Drugs donated from MOHSS stocks saved about N\$15 per visit. If PharmAccess had been forced to purchase these drugs in the private market, the cost per visit would have increased by 19%. We have no comparable cost for similar primary care services provided at Ministry facilities, and such costs would likely exclude depreciation and the full cost of employee fringe benefits that are included in the Mister Sister estimate. However, the cost (per visit) of transporting the clinic to the patients is clearly less than the cost of transporting an individual patient to an existing Ministry facility.

Monthly contributions by farmers to provide the mobile clinic service to their workers would be insufficient, in themselves, to cover the costs of serving the large population of vulnerable children served by Mister Sister in this trial. Payments by the farmers and adult patients reduce the cost that would be incurred to serve this route by approximately 11%, and the marginal cost per visit of serving the sites with the most OVC was only N\$145. The “private” portion of funding for the Mister Sister partnership should continue, and hopefully expand, based on the satisfaction expressed by both patients and client farmers.

However, payments for serving the farms are not sufficient to cross-subsidize all the costs of serving locations like Ileni and the Otjozondou school, where there are no workers covered by the Mister Sister monthly fee but there are large numbers of vulnerable children. OVC at these locations are now totally dependent on MOHSS services in the absence of Mister Sister. The Government of Namibia is providing the essential drugs dispensed to this population by Mister Sister under the partnership agreement. But a Government or donor agency must contract for the mobile clinic services if they are to serve these concentrated populations of vulnerable children. As this report is written, Mister Sister services are being supported in part by another USAID project (SHOPS).

Since a very high rate of vaccination coverage was maintained in Mister Sister patients, and indicators of anemia and worm infection improved, continuation or expansion of the program has clear benefits to this vulnerable population. Going forward, thought should be given to possible nutrition interventions integrated with Mister Sister. Health status benefits to the adult population should be measured as well. Data developed for this study can be used for a longer term study of impact on OVC along the Otjozondjupa route.

## 9. POLICY IMPLICATIONS

In the thin and widely dispersed population in this area of Namibia, a well-run mobile primary care clinic is an effective intervention, improving immunization coverage and reducing the prevalence of worm infections and anemia. The transportation costs of “bringing” primary care to the rural population are less than the aggregate costs that caregivers would incur in bringing children to a fixed site clinic. OVC had worse health status at baseline, and their caregivers had more limited ability to take them to existing MOHSS care sites, so the intervention did have a differential effect in improving the health status of OVC.

The Mister Sister experiment also illustrates the potential for public private collaboration in the financing and operation of primary care systems. MOHSS provided essential drugs and vaccines because the Ministry recognized that most of the population served by the mobile clinic would be able to access these for free at MOHSS clinics. Mister Sister is serving the Ministry’s target population. Rural employers were willing to pay a monthly fee to have Mister Sister bring primary care services to their employees, rather than being forced to transport employees and their dependents to MOHSS clinics. These contributions helped to reduce the marginal cost of serving sites along the clinic route where the OVC population was particularly high, but continuing donor or Government contributions will be necessary to cover the cost of serving these “OVC hotspots.”

Operation of the mobile clinic by an NGO, rather than the Government, made it possible to more reliably maintain the clinic vehicle. Mister Sister also did not experience the conflicting demands for staff which inhibit MOHSS outreach campaigns. As a result, the primary care clinic was more reliable in meeting the monthly schedule of stops, which increased patient confidence and willingness to seek care.

The study did not observe a significant improvement in most indicators of malnutrition. The intervention period studied was limited (six months), the time for maternal education was limited, and there were no direct nutritional interventions associated with Mister Sister. In the future, mobile clinics should probably provide more education on nutrition to mothers, and perhaps be linked directly with supplemental feeding programs. The impact of these changes should be studied over a longer period of time.

A well run mobile primary care clinic is not inexpensive---the cost per visit at Mister Sister was N\$219. We could not compare this directly with costs at MOHSS clinics. However, it is likely that the combined cost of patient travel and MOHSS fixed site care may be as much or more than this amount. Future research should test this hypothesis. The number of children who were seen regularly at the mobile clinic (the longitudinal cohort) give us confidence that Mister Sister did reduce the barriers to primary care for OVC and improve their health status.

## 11. RECOMMENDATIONS

Mobile primary care clinics staffed by nurse practitioners---the model tested by the Mister Sister program in Namibia---appear an effective way to improve health status of OVC in widely dispersed populations. While program costs can be partially covered by fees for serving employment sites and workers, continued subsidy will be necessary to reach OVC concentrations. Through the SHOPS program, USAID supported the Mister Sister program after the conclusion of the trial reported here, but other donors or the Government of Namibia must step in for the long run. MOHSS should also continue the practice of providing essential drugs and vaccines to mobile clinics such as Mister Sister. In impoverished rural areas, such clinics serve populations that must otherwise rely on MOHSS services, including a high concentration of OVC.

To further benefit OVC, consideration should be given to integrating two additional programs with the mobile clinic. Enhanced nutrition services, possibly including food subsidies, should address the continuing burden of malnutrition which Mister Sister observed. The effect of such an intervention should be evaluated over a longer period of time than was available for this analysis.

The persistent level of dental problems could be addressed by using the mobile clinic to support oral hygiene programs with parents and schools. However, caution is in order to avoid loading the mobile clinic with so many functions that it cannot focus on the most important primary care objectives.

If mobile clinics become well established, with a good base of “paying customers” at farms and other rural employment sites, it would be worthwhile to compare the unit costs of mobile clinic care with the unit costs of comparable services at fixed MOHSS sites PLUS the costs of patient transport to access these sites. Since Pharmaccess measures the full cost of the Mister Sister service, including employee fringe benefits, management and depreciation, care must be taken that the costs measured at public sites include all these cost elements as well, and not just those costs included in a facility’s annual operating budget.

## APPENDIX ONE

Definitions of Orphans and Vulnerable Children (OVC), taken from Ministry of Gender Equality and Child Welfare

### Orphan

- Single orphan (one parent deceased)
- Double orphan (both parents deceased)

### Vulnerable

Both parents alive, but:

- o Child not living with either parent (but not including children living in boarding school)
- o Child is HIV Positive
- o Child has a significant disability (blind, deaf, Down's syndrome)
- o Child has a chronic illness of more than 3 months duration (TB)
- o Child resides in a household with obvious economic hardship (both parents out of work)
- o Included children identified by teachers as lacking shoes or warm clothes
- o Child from a traditionally marginalized minority (Khoisan)
- o Child has obvious signs of maltreatment of domestic abuse

**Table 1: Categorization of Orphans and Vulnerable Children used for Mister Sister Evaluation**

OVC Code	Definition	Category in Analysis
1	Single Orphan---no other vulnerability, vulnerability as defined in OVC 7, or has HIV	Orphan
3	Double Orphan---no other vulnerability, vulnerability as defined in OVC 7, or has HIV	Orphan
4	Single or Double Orphan Living in Institution	Orphan
5	Single or Double Orphan With No Formal Living Arrangements	Orphan
6	HIV Positive Non Orphan	Vulnerable
7	Children from poor families, children with disabilities or children from disadvantaged tribes (as defined by Ministry of Gender)	Vulnerable