I am very grateful to have had the opportunity to participate in the Luxottica One Site Global Eye clinic in Mamelodi, South Africa from September 17- September 27, 2010. I saw more varied and severe ocular disease than I have been exposed to here in our clinics at OSU and associated sites. I was grateful to be in an environment where patients in need of continued care for ocular or systemic diseases had access to professional services, medications and surgical interventions, if warranted.

During the ten days I spent in Mamelodi I was able to deliver eye care as part of a group of over sixty volunteers. During the course of the clinic we examined and provided glasses for more than 10,000 patients (Appendix 1). In addition to participating in clinical care, I was also able to gather information on how patients receive care on a normal day-to-day basis through the Bhopleong Hospice and the associated eye clinic. Dr Jason Singh (1998 OSU Optometry graduate) has been working at this clinic providing primary eye care for the people of Mamelodi for the past two years. I was able to discuss with Dr Singh how patient care would change in the future as the vision of Engage Mamelodi continues to take shape.
As a member of the Luxottica team I participated as a student doctor in the process of examining the eyes of patients who presented to the clinic September 21-24, 2010. Eye examinations, glasses and necessary medications were provided at no cost and follow up appointments were scheduled as needed with optometry or ophthalmology. The average time required to go through the clinic ranged from one to three hours, however, patients lined up outside early in the morning, patiently waiting for hours to enter the clinic doors.

Exams

The patients proceeded through eight separate stations before completing their eye examination and receiving any necessary medication, glasses or referrals. The stations are listed below and outlined in more detail on the following pages.

1. Dilation
2. Registration
3. Visual Acuity
4. Auto Refraction
5. Ocular Health
6. Special Testing
7. Prescription Evaluation
8. Eyewear Gallery

Above: Patients waiting to enter the eye clinic.

Left: A typical informal settlement. Many of the one million Mamelodian inhabitants live in similar conditions.
1. Dilation
   a. The patients would have their eyes dilated about 15 to 30 minutes prior to entering the clinic while they waited outside in tents.
   b. I was struck by the pleasant nature of the people of Mamelodi. Every culture has its own personality and waiting in long lines can often lead (understandably) to agitation and anger in other areas where I have participated in eye missions. The people of Mamelodi seemed continually patient, appreciative and eager for whatever help we could offer and quietly understanding when they waited in long lines only to hear that due to eye disease or varying conditions, we could not improve their vision with glasses.

2. Registration
   a. Upon entering the clinic the patient registered by completing a brief medical history and indicating any ocular concerns.

3. Visual Acuity
   a. Each patient had their vision checked.
   b. The tumbling E charts were used to determine visual ability because of language barriers with numbers and letters.
4. **Auto refraction**  
   a. Every patient was auto refracted to determine their glasses prescription.

5. **Ocular Health**  
   a. Each patient then had their anterior and posterior ocular health evaluated with direct ophthalmoscopy.
6. Special Testing

a. If any problems were noted during direct ophthalmoscopy the patients were sent to be further evaluated.

b. In the special testing area we had equipment to look at the anatomy of the eye in more detail.
   i. Slit lamp, tonopen, NCT, phoropter, BIO, reference books.

c. Referrals could be made to bring the patient back to the Bophelong Eye Clinic to see Dr Jason Singh or, if necessary, the patient could be referred to the Mamelodi Day Hospital to see an ophthalmologist.

d. Some of the ocular diseases I evaluated on this trip are included in appendix 1 with pictures.
   i. This was the first time I have seen many of these conditions. Even the conditions I have previously encountered in my rotation as a fourth year in the optometry program appeared much more frequently and were often much more severe in the Mamelodi patient population.
7. Prescription Evaluation
   a. Once the ocular health check was complete, the patients proceeded to the IMS station.
   b. Here their glasses prescription (which had been determined via auto refraction) was entered into a computer linked to the Luxottica inventory.
   c. The six closest matches popped up and a doctor determined which pair of glasses would be the best match for the patient’s prescription.

8. Eyewear Gallery
   a. The final station was the glasses dispensary where the patient would receive their prescription glasses, sunglasses and reading glasses depending on their visual needs.
   b. The glasses would be adjusted to fit the patient’s face and vision would be checked again with the glasses to ensure 20/40 vision or better.

Above: Doctors at the IMS station and part of the glasses inventory.

Above: Adjustments being made to a patient’s frame.
Right: A final vision check.
Patients in their new glasses
Other Mamelodi Experiences

On the third day of clinic I had one of the most eye opening experiences of the trip. Five of us went with two of the nurses who worked at the hospice on a home visit. We were scheduled to check on six HIV+ patients in order to verify they had the medications they needed, check on their overall health and well being and deliver food parcels.

I was struck by the poverty of the living conditions as we drove through miles of small make-shift shacks. I was moved by the way the patients received us in their homes, two of the five people we visited spoke of how blessed they had been to receive a house with cement/stucco walls an upgrade from their previous tin sided dwelling. All of them were excited to receive the food, reading glasses and sunglasses. Such small things we had to offer were received with grateful appreciation.
Jason Singh, OD

- 1994: Miami University of Ohio
- 1998: Ohio State University College of Optometry
- 1999: Ocular disease resident, Cincinnati Eye Institute
- 2000-2006: Head of pediatrics department Cincinnati Eye
- 2006-2009: Private practice in Cincinnati
- 2009: Sold private practice
- 2009-present: Mamelodi, South Africa

General Information on Health Care in South Africa

With a population of 47 million people, South Africa is 79% black, 9% white and 12% colored (mixed race or Indian). Of these 47 million inhabitants, 5.5 million have been diagnosed with HIV. As much as 35% of some black township populations are known to be HIV positive and the actual percentage of the population infected is expected to be higher as there remains a stigma around being tested.

In South Africa, the separation between the wealthy and the impoverished is greater than in any other country in the world. This inequality is clearly visible in the current status of the health care system. Rooted in the apartheid era which spanned 1948-1994 when the doctor to patient ratio was 1:15,000 in the black townships as opposed to 1:1,700 in the rest of the white countryside.

Today health care expenditure is 6 times higher per person in the private sector which serves a 90% white patient population. Infant mortality is higher in the black population (67/1,000 black vs. 48/1,000 white). Life expectancy among the black population has decreased over the past twenty years from 70 years in 1997 to a mere 47 years in 2007. This loss of 23 years of life expectancy among the black population is a numerical representation of the health epidemics that have been a heavy burden on the population during the apartheid and in the years since the regime ended.

Four distinct health care epidemics have been identified in South Africa. First, the communicable diseases which include HIV, AIDS and TB. The standard required to start antiretroviral medication in a public hospital is a CD4 count of 200 or less. Unfortunately, of the estimated one million people who have CD4 counts below this level only 26% are currently on drug therapies. Poverty related illnesses; Infectious disease, maternal death and malnutrition constitute the second epidemic and non communicable disease (chronic in nature), hypertension and diabetes make up the third. Diabetes and hypertension are very widespread in the fifty-plus patient populations and while finding such a high prevalence of DM and HTN is counterintuitive based on the poverty level, it is almost the rule for people over fifty to have one or both of these conditions in South Africa. Finally, violence, trauma and injury combine to make the fourth epidemic and also the second leading cause of death in the country behind HIV.

Mamelodi is a post apartheid black township with a population of 1.5 million people living in an area similar in size of Dublin, Ohio. Serving this population’s health care need is one 100 bed hospital and seven government clinics. All operate on a first come first serve basis; none offer optometry services and only one clinic has dental capabilities. 1-2
The Bophelong Community Hospital was constructed in 2005 as a result of an effort of the Charity and Faith Church. This 100 bed AIDS hospice was added to a campus where a church, school and orphanage were already present. After the hospice was complete, construction began on facilities for the elderly and the disabled.

As the health care workers continued their work it became evident that home based care for patients with HIV/AIDS was more effective as the health care staff currently cares for over 400 patients through home based care. With an average of 10 -15 receiving in house care there was space available in the hospice.

Based on a survey conducted in 2006, the community identified eye care and dental care as two areas of importance. To attempt to meet this identified need extra space in the hospital was transformed into a community health clinic. In this facility there are two complete optometry exam lanes and an ophthalmic lab, two dental lanes complete with panoramic and intraoral x-ray capabilities and four medical exam lanes. The proximity of these exam lanes would be ideal for interdisciplinary communication when there are patients who need care in many areas.

Dr Jason Singh currently works in the optometry clinic two days a week. There are plans to have another optometry staff member join the team sometime in 2011, in addition to an OSU optometry extern to rotate through the site during fall quarter 2011.

Engage Mamelodi is working to hire a full time South African dentist early in 2011.

There are plans in place to have a medical mission group travel to Mamelodi each month throughout the year to provide additional staffing for the necessary care these patients need.
Above: Optometry Exam lanes

Right: Ophthalmic laboratory equipment

Below: Dental exam lanes and x-ray machinery
Cataract Evaluation and Extraction

Cataracts cause blurred vision and progressive visual loss which can happen quickly if resulting from trauma or more gradually over the course of months to years. Cataracts classically begin to develop after the age of fifty and are generally removed if vision is decreased to a level that interferes with activities of daily life. In the United States, surgical techniques are continually refined and the procedure has been reduced to a fifteen minute outpatient procedure. During surgery, the lens containing the cataracts is broken up and once the lens capsule is clean a posterior chamber IOL is inserted. The patient has follow up appointments one day, one week, and one month after surgery. If both eyes have cataracts that need to be removed, one eye will be treated and the second eye two weeks later if the healing process is going according to plan in the first eye.

Common ocular finding after cataract surgery include trace to grade one cells and flare in the anterior chamber the first day after surgery. Corneal edema may be present in the form of thickening, microcysts, or decemet folds. Visual acuity on day one can range from 20/20 to 20/200 depending on the amount of swelling and any uncorrected astigmatism.

All of these finding should be less evident at the one week post operative visit and the eye should be completely healed by one month. At the one month visit a new glasses prescription can be released to correct any residual astigmatism that could be present depending on the type of implant the patient selected.

In South Africa, 66% of new cases of blindness are attributed to cataracts. Cataracts are one of the leading diseases attributed to decreasing the number of healthy functional years of life coming in behind HIV, TB and diabetes.

Something that is corrected with an uncomplicated surgical procedure in the United States can progress leaving people with vision of hand motion or count fingers unable to function productively in the world.

During apartheid times, it was not uncommon for non-medical social workers to perform cataract surgeries in the black townships. This resulted in many botched surgeries and an understandable reluctance for patients when presented with the option to have cataract surgery on the second eye. Current surgical methods used in the public South African Hospitals still include intracapsular cataract extraction. This method required an incision to be made through which lens and lens capsule can be completely removed and once the posterior chamber is clear a new lens can then be inserted into the anterior chamber.

In South Africa there is a much greater patient population in need of cataract surgery than can be met by the ophthalmologists employed at public hospitals. In addition to a shortage of ophthalmologists a cultural reluctance remains as a result of poor surgical outcomes during apartheid years.
Mamelodi, South Africa
September 2010
**Appendix 1.** Number of patients examined each day during the Luxottica One Sight Clinic in Mamelodi, South Africa 2010.

<table>
<thead>
<tr>
<th>Day</th>
<th>Goal</th>
<th>Number of patients seen</th>
<th>Tickets collected</th>
<th>% of tickets returned</th>
<th>Chubellas made</th>
<th>Urgent Referrals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday, Sept 21</td>
<td>700</td>
<td>653</td>
<td>495</td>
<td>0.70714286</td>
<td>35</td>
<td>48</td>
</tr>
<tr>
<td>Wednesday, Sept 22</td>
<td>1200</td>
<td>1235</td>
<td>801</td>
<td>0.6675</td>
<td>50</td>
<td>97</td>
</tr>
<tr>
<td>Thursday, Sept 23</td>
<td>1400</td>
<td>1676</td>
<td>839</td>
<td>0.59928571</td>
<td>150</td>
<td>82</td>
</tr>
<tr>
<td>Friday, Sept 24</td>
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<td>1514</td>
<td>764</td>
<td>0.50933333</td>
<td>110</td>
<td>65</td>
</tr>
<tr>
<td>Monday, Sept 27</td>
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<td>77</td>
</tr>
<tr>
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<td>80</td>
</tr>
<tr>
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<td>157</td>
<td>80</td>
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<td>35</td>
</tr>
<tr>
<td></td>
<td>10000</td>
<td>11819</td>
<td>5309</td>
<td>53.10%</td>
<td>766</td>
<td>564</td>
</tr>
</tbody>
</table>

Chubellas are circular lenses that come in a variety of spherical and cylindrical powers. They are very useful when a prescription has a high amount of cylinder and the axis is very important and a good match may not be available in donated glasses. Because the lenses are completely circular the lens can be rotated to any desired axis and then clamped into a frame. This can provide an exact prescription for astigmatic refractive errors.
Appendix 2. A brief list of conditions encountered during clinical care in Mamelodi, SA; most of these conditions were seen multiple times each day.

- Glaucoma
- Diabetic retinopathy
  - Mild, moderate, and proliferative
- Hypertensive retinopathy
  - Mild, moderate and malignant
- Cataracts
  - Hypermature, traumatic, congenital, and secondary to topical steroid medications.
- Albinism
- Trachoma
- Coloboma
- Brown’s Syndrome
- Retinitis Pigmentosa
- Aphakia
- Solar Retinopathy
- CNVM in pathological myopia
- Corneal scars
- Strabismus
- Amblyopia
- Retinal detachment
- Histoplasmosis
- Toxoplasmosis
- Papilledema
- Strabismus
References