

# Cervical Cancer Screening and Treatment in a rural hospital in Malawi: A four-year comprehensive review

Presenters: Mai-Linh N. Tran, MD; Mary R. Perry, MD

Authors: Mai-Linh N. Tran, MD; Mary R. Perry, MD; Casey  
Graybill, MD; Karen Studer, MD, MPH; Marc  
Debay, MD, MPH, PhD.



AMERICAN ACADEMY OF  
FAMILY PHYSICIANS  
STRONG MEDICINE FOR AMERICA

# Disclosure

It is the policy of the AAFP that all individuals in a position to control content disclose any relationships with commercial interests upon nomination/invitation of participation. Disclosure documents are reviewed for potential conflicts of interest (COI), and if identified, conflicts are resolved prior to confirmation of participation. Only those participants who had no conflict of interest or who agreed to an identified resolution process prior to their participation were involved in this CME activity.

Dr. Mai-Linh Tran, Dr. Mary Perry, Dr. Casey Graybill, Dr. Karen Studer, and Dr. Marc Debay have indicated they have no relevant financial relationships to disclose.

# Introductions



Mai-Linh Tran, MD, PGY-3  
Family Medicine Resident  
Loma Linda University



Mary Perry, MD, PGY-3  
Family & Preventive Medicine Resident  
Loma Linda University

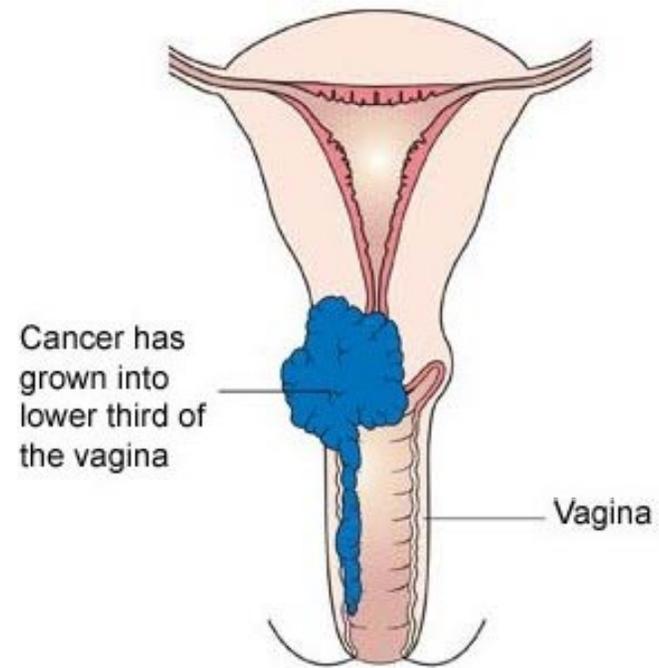
## Case Study Mrs. A

- 65 year old female, translator required
- Heavy vaginal bleeding (chitenje)
- Biopsy of cervix: squamous cell carcinoma



## Case Study Mrs. A (Continued)

- Palpable mass extended to lower 1/3 of vagina – Stage 3 Cervical Cancer
- Non-operable, no radiation therapy in Malawi
- Palliative Care – tramadol
- Prayer



## Case Study Mrs. B

- 37 year old female coming in for routine pap smear
- Returns 1 week later, results show LSIL
- Colposcopy done with cervical biopsy & endometrial curettage
- Focal CIN 3
- LEEP done – fully excised cancer



## Learning Objectives

- Understand the prevalence and outcomes of cervical cancer screening in a rural hospital in Malawi
- Identify the successes and challenges in maintaining and expanding a cytology-based cervical cancer screening program in a rural hospital in sub-Saharan Africa
- Appreciate how residents of a U.S. Family and Preventive Medicine residency program may contribute to the documentation and development of a new program at the training site of a curricular international rotation

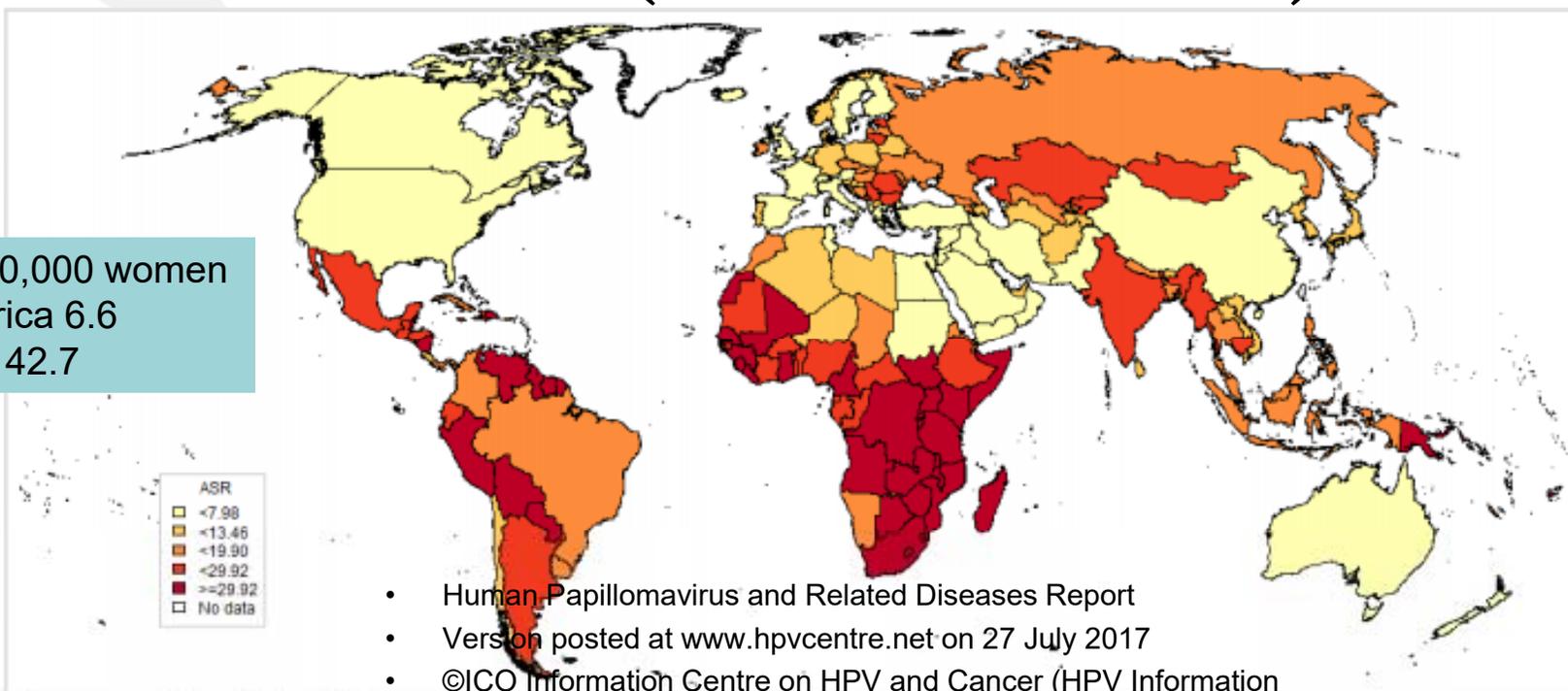
# Overview

- Burden of cervical cancer
- Prevention and treatment strategies
- Malamulo Adventist Hospital Cervical Cancer Screening Program (MAH CCS)
- Results from the data collection
- Successes and challenges of program implementation
- Resident's roles

# Global Burden of Cervical Cancer

- 2012: ~530,000 new cases, 270,000 deaths worldwide every year
- World population: 2,784 million women aged 15 years and older who are at risk of developing cervical cancer.
- **2<sup>nd</sup>** most common female cancer in the women aged 15 to 44 years in World
- **4<sup>th</sup>** most frequent cause of cancer in women
- 90% of deaths in 2015 occurred in low-middle income countries

# Age-standardized **incidence** rates of cervical cancer in the World (estimates for 2012)



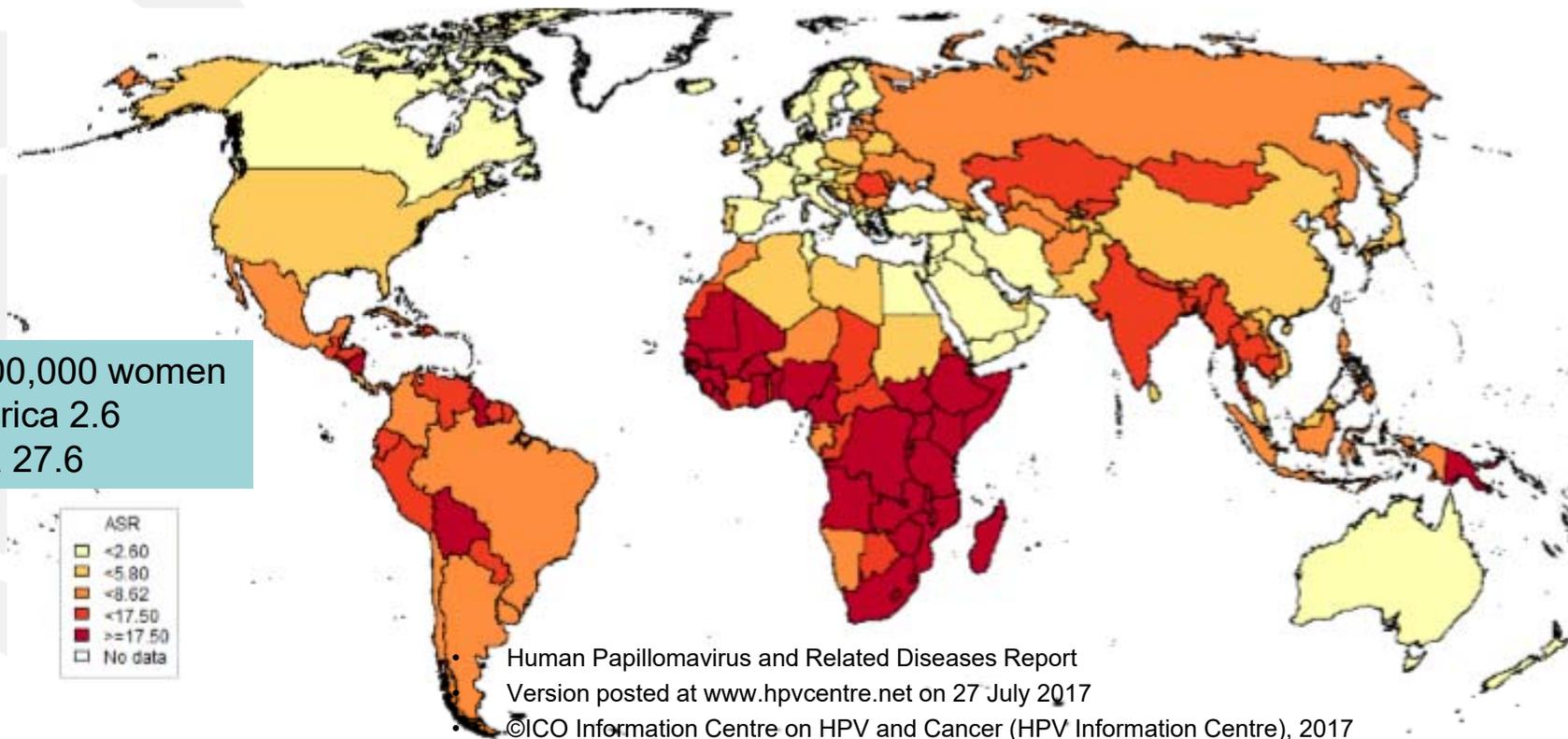
**Data accessed on 15 Nov 2015.**

Rates per 100,000 women per year.

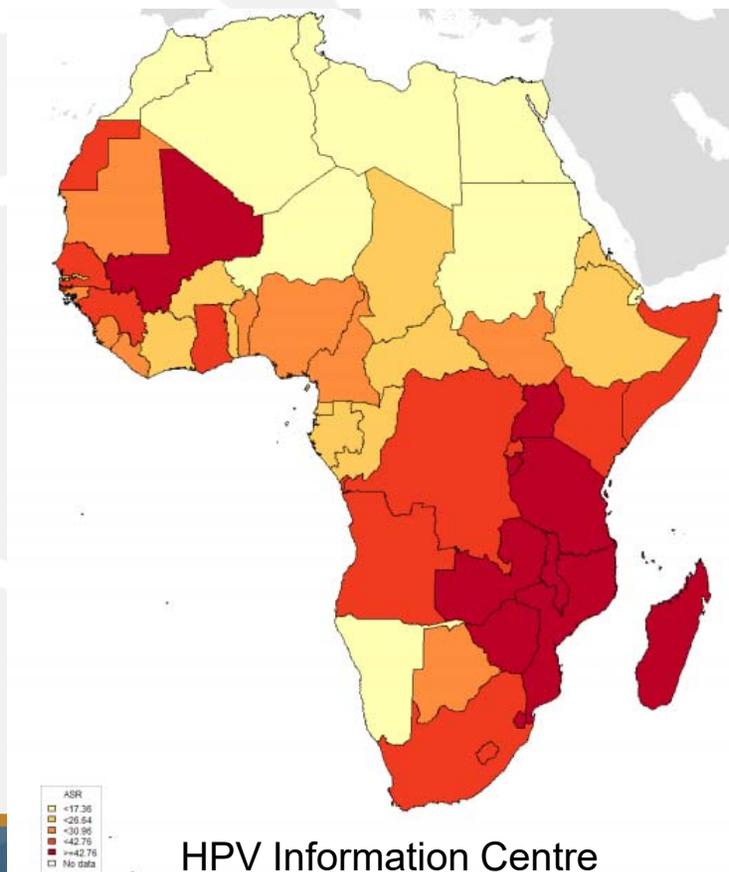
For Sudan, South Sudan: Estimate for Sudan and South Sudan

**Data sources:** Ferlay J, Soerjomataram I, Ervik M, Dikshit R, Eser S, Mathers C, Rebelo M, Parkin DM, Forman D, Bray F. GLOBOCAN 2012 v1.2, Cancer Incidence and Mortality Worldwide: IARC CancerBase No. 11 [Internet]. Lyon, France: International Agency for Research on Cancer; 2013. Available from: <http://globocon.iarc.fr>.

# Age-standardized **mortality** rates of cervical cancer in the World (estimates for 2012)

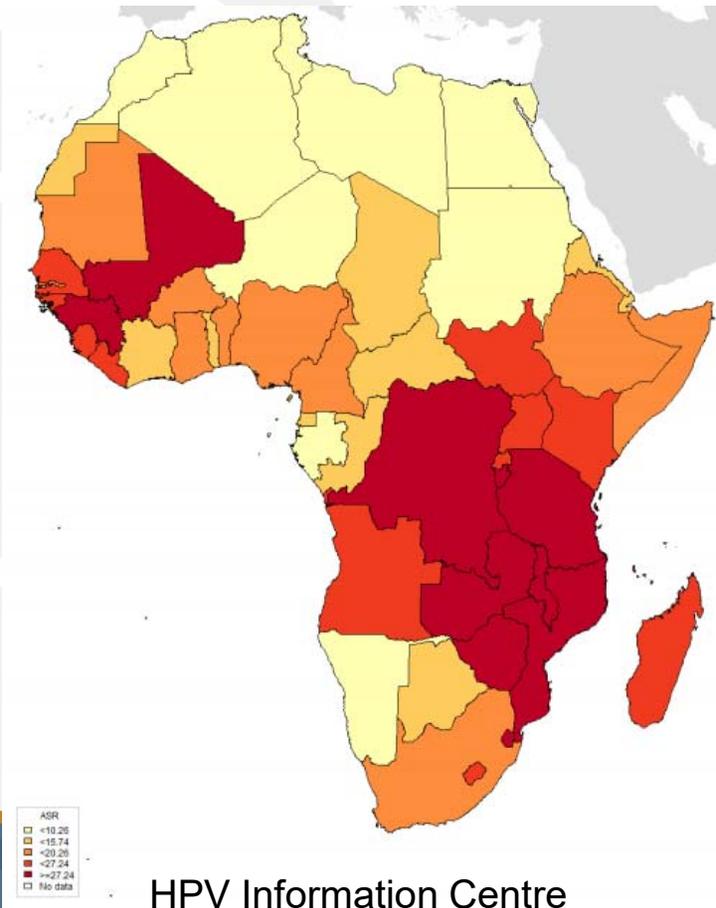


## Age-standardized **incidence** rates of cervical cancer in Africa (estimates for 2012)



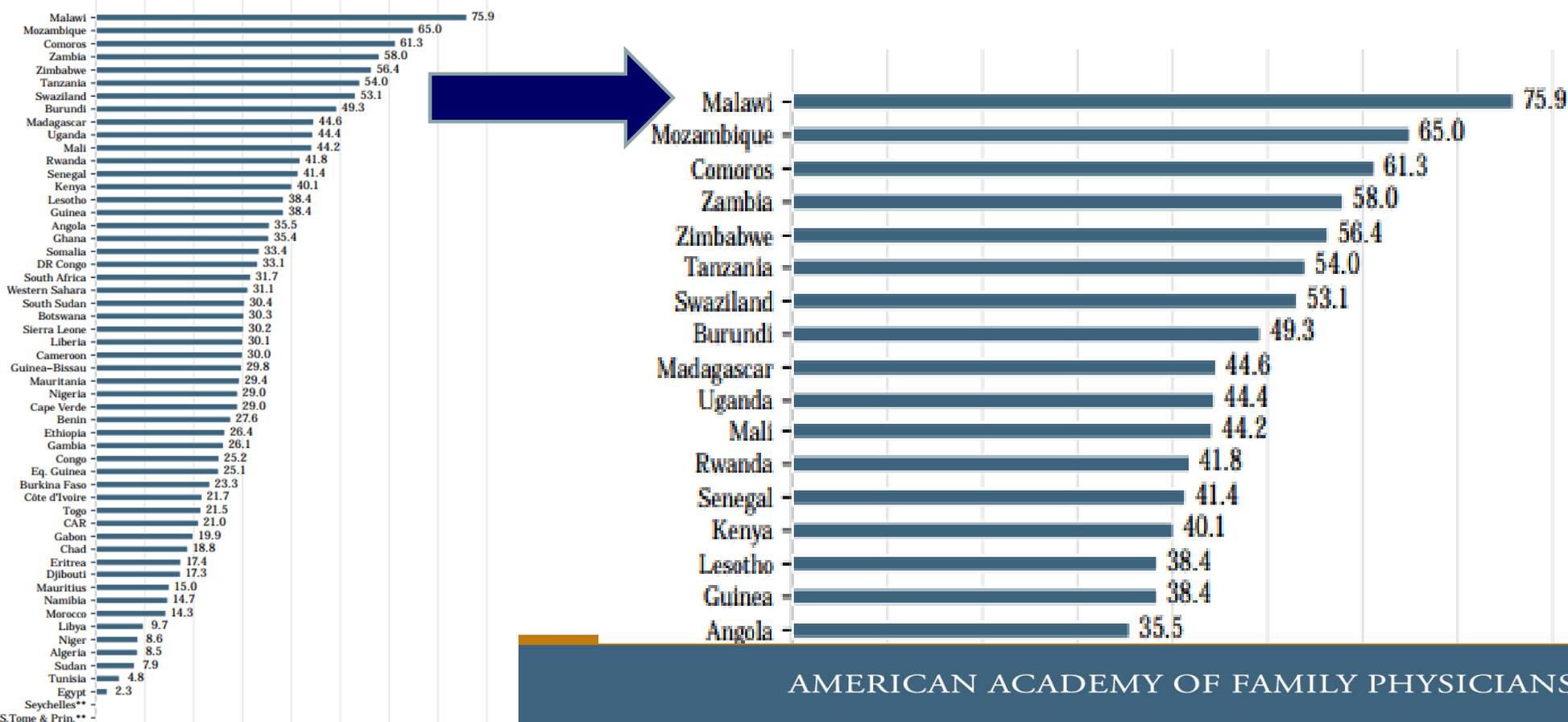
- ~99,038 new cases are diagnosed annually in Africa
- **2<sup>nd</sup>** leading cause of female cancer
- **2<sup>nd</sup>** most common female cancer in women aged 15-44 years

# Age-standardized **mortality** rates of cervical cancer in Africa (estimates for 2012)



- ~60,098 cervical cancer deaths occur annually
- **2<sup>nd</sup>** leading cause of female cancer deaths
- **2<sup>nd</sup>** most common female cancer deaths aged 15 to 44 years

# Age-standardized incidence rate of cervical cancer cases by country in Africa (estimates for 2012)



# Cervical Cancer Incidence & Mortality in Malawi (estimates in 2012)

- 4.76 million women ages >15 years at risk of developing cervical cancer
- 3,684 diagnosed with cervical cancer annually
- 2,314 deaths from cervical cancer annually
- 1<sup>st</sup> most frequent cancer & cause of cancer deaths among women

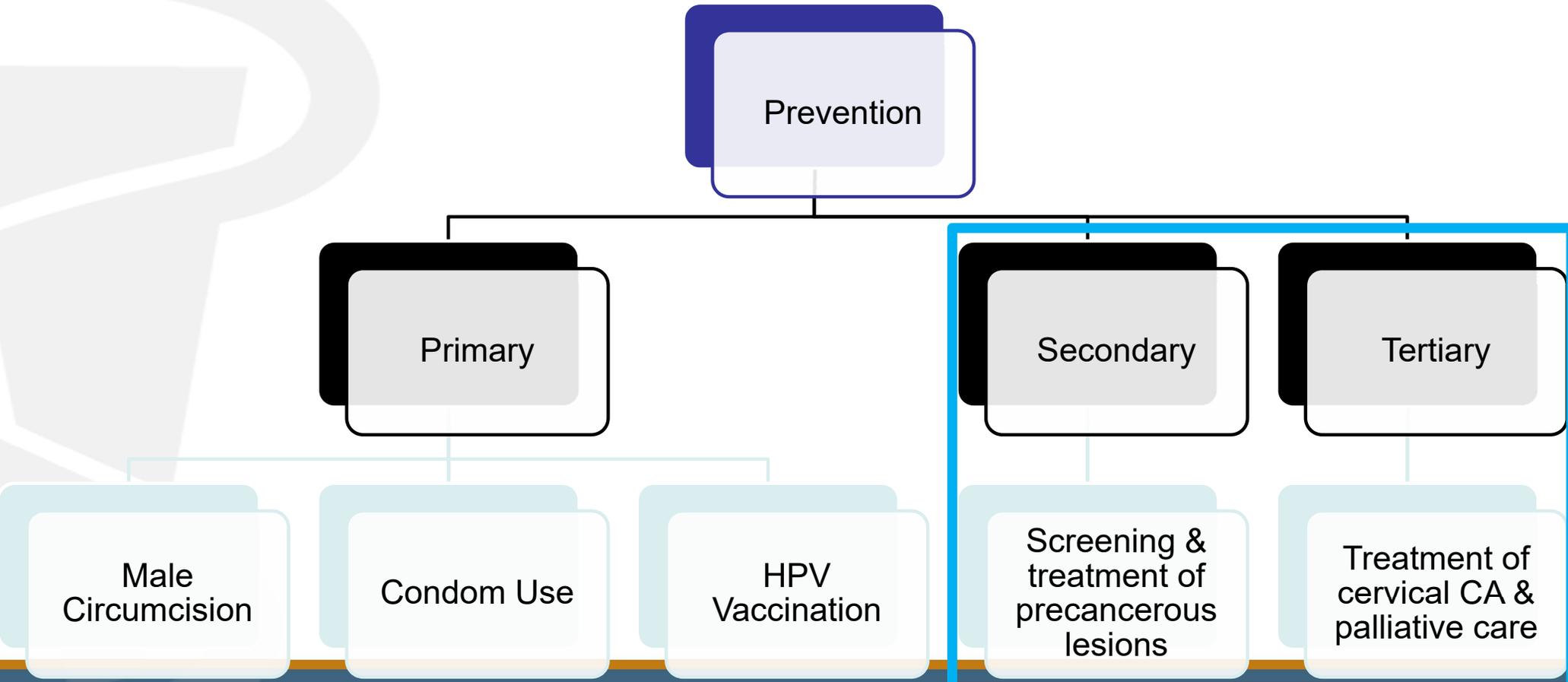


## Perspective

- Malawi has **highest rates** of cervical cancer incidence and mortality in the world
- Limited information about cervical cancer, screening, and treatment programs in Malawi

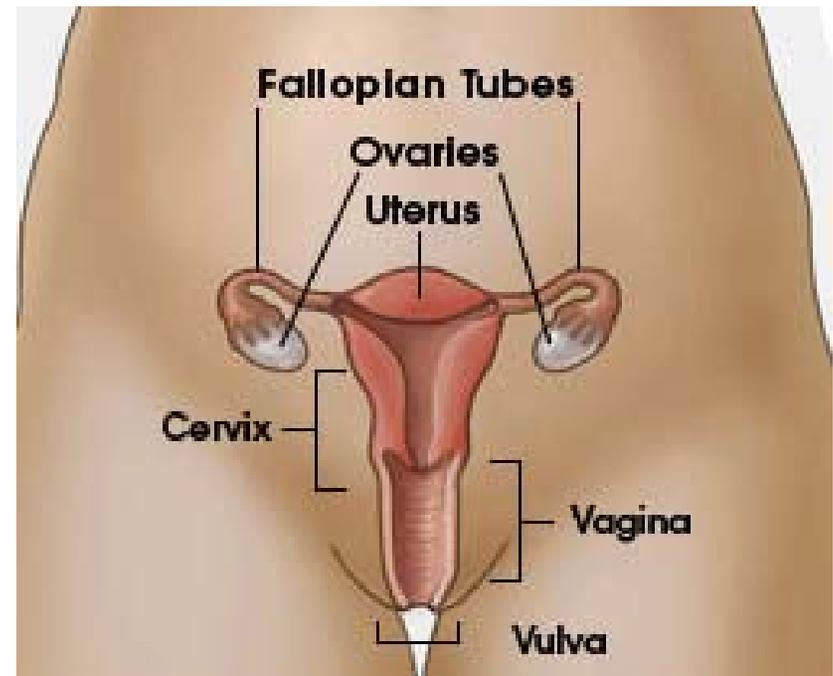
| <b>Cervical cancer</b> | <b>Incidence per 100,000</b> | <b>Mortality per 100,000</b> |
|------------------------|------------------------------|------------------------------|
| Malawi                 | 74.9                         | 49.8                         |
| United States          | 8.1                          | 2.4                          |

# Overview of Prevention Strategies



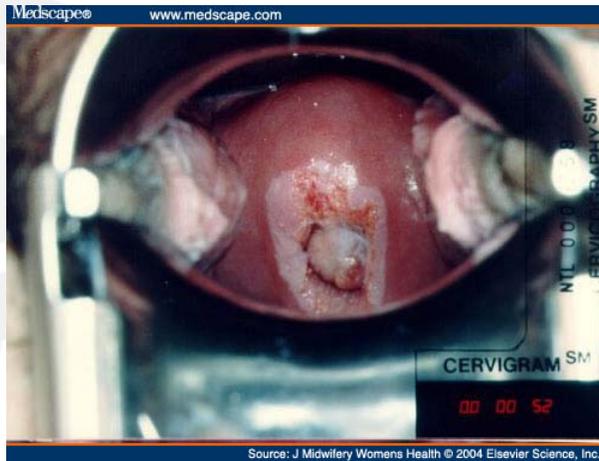
# Cervical Cancer

- Highly preventable in most high income countries
  - **screening tests**
  - a **vaccine** to prevent human papillomavirus (HPV) infection
- Highly treatable when found early
  - associated with long survival & good quality of life



# Factors Contributing to Developing Cervical Cancer

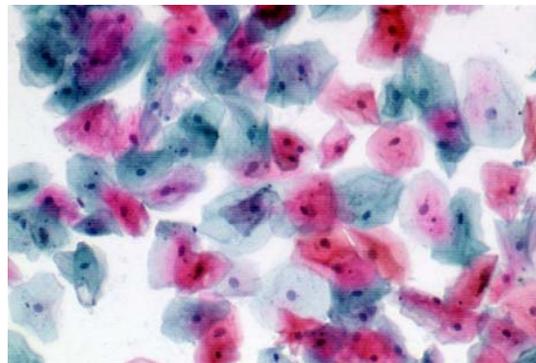
- **High Risk Types Human Papilloma Virus (HPV)**
- Risk factors
  - Tobacco smoking
  - High parity
  - Long-term hormonal contraceptive use
  - Co-infection with HIV
  - Co-infection with Chlamydia & Herpes Simplex Virus type 2
  - Immunosuppression



# CERVICAL CANCER SCREENING IN LOW RESOURCE SETTINGS

# Types of Cervical Cancer Screening

- Visual Inspection with Acetic Acid (VIA)
- Cytology based pap smear
- Human Papilloma Virus (HPV) testing
  - Not available in Malawi



# VIA vs. Cytology-based screening

## VIA

- Benefits:
  - Low cost, few resources
  - Limited infrastructure needed
  - Same-day treatment
  - Simple to learn
- Constraints:
  - Inter-user variability
  - Need for frequent re-training
  - Easy to miss lesions in post-menopausal women

## Cytology-based screening

- Benefits:
  - Widely used in high-income countries
  - Proven effectiveness to decrease cervical cancer
  - Training and quality control methods well established
- Constraints:
  - Higher cost
  - More infrastructure needed: lab, equipment, supplies
  - Results not immediately available

# VIA vs Cervical Cytology

Table 4. Characteristics of screening tests.

| Test     | Sensitivity |                   | Specificity |                   |
|----------|-------------|-------------------|-------------|-------------------|
|          | Range (%)   | Used in model (%) | Range (%)   | Used in model (%) |
| VIA      | 60–90       | 76                | 66–96       | 81                |
| HPV DNA  | 65–95       | 88                | 70–96       | 93                |
| Cytology | 45–85       | 63                | 80–98       | 94                |

Table 3. Results of once in a lifetime cervical screening in rural India.

| Results                           | HPV testing | Cervical cytology | VIA  | Controls |
|-----------------------------------|-------------|-------------------|------|----------|
| Positive screen (%)               | 10.3        | 7                 | 13.9 | N/A      |
| Advanced cervical cancer ≥stage 2 | 39          | 58                | 86   | 82       |
| Hazard ratio                      | 0.47        | 0.75              | 1.04 | 1.00     |
| Deaths                            | 34          | 54                | 56   | 64       |
| Hazard ratio                      | 0.52        | 0.89              | 0.86 | 1.00     |
| Negative screen cancers during FU | 8           | 22                | 25   | N/A      |

*FU: Follow up; HPV: Human papillomavirus vaccine; N/A: Not applicable; VIA: Visual inspection with acetic acid.*

AN Fiander. The prevention of cervical cancer in Africa. Women's Health (2011)

## Malawi: General CCS Guidelines

- CCS program available
- Type: Visual Inspection with Acetic Acid (VIA)
- Screening age: >25 years old
- Frequency: 2-5 years
- No quality assurance or supervision to monitor screening process





# **THE CERVICAL CANCER SCREENING PROGRAM AT MALAMULO ADVENTIST HOSPITAL**

# Background: Malamulo Adventist Hospital (MAH)



- Outpatient department
- Surgery
- Adult Medicine
- Maternity, Gynecology
- Pediatrics
- Radiology, and Laboratory
- **Women's Center for Cancer Screening**
- Community Department
- Dental Clinic, Eye Clinic
- several Satellite Clinics
- HIV/AIDS Treatment Center

- Founded in 1902
- 212-bed Christian mission hospital in the rural location of Makwasa, in Southern Thyolo District of Malawi



# Cervical Cancer Screening Program: Beginnings

- PAPS Team International, non-profit organization based out of Redlands, CA
  - Sept. – Oct. 2012
  - 1350 patients
  - Cytology based
- Stella Nyirenda, RN and Mary Panulo, LVN
  - Free! Wednesday women's clinic
  - 5899 pap smears by Dec. 2016
  - Outreach to additional communities
  - Same day referrals to OB/GYN

## Equipment Needed: Facilities



- Private room
- Exam table/bed
- Gloves
- Clean water / soap to wash hands
- Log books
- Patient record forms

## Equipment Needed: Paps



- Speculums (method to clean/maintain), lubricant
- Glass microscope slides, fixatives
- Cytology brush/spatula
- Microscope to review slides



## Equipment Needed: Follow-up

- Working electricity
- LEEP instruments
- Tenaculums
- Working colposcopy light
- Referral to surgery for hysterectomy
  - need facility that can manage

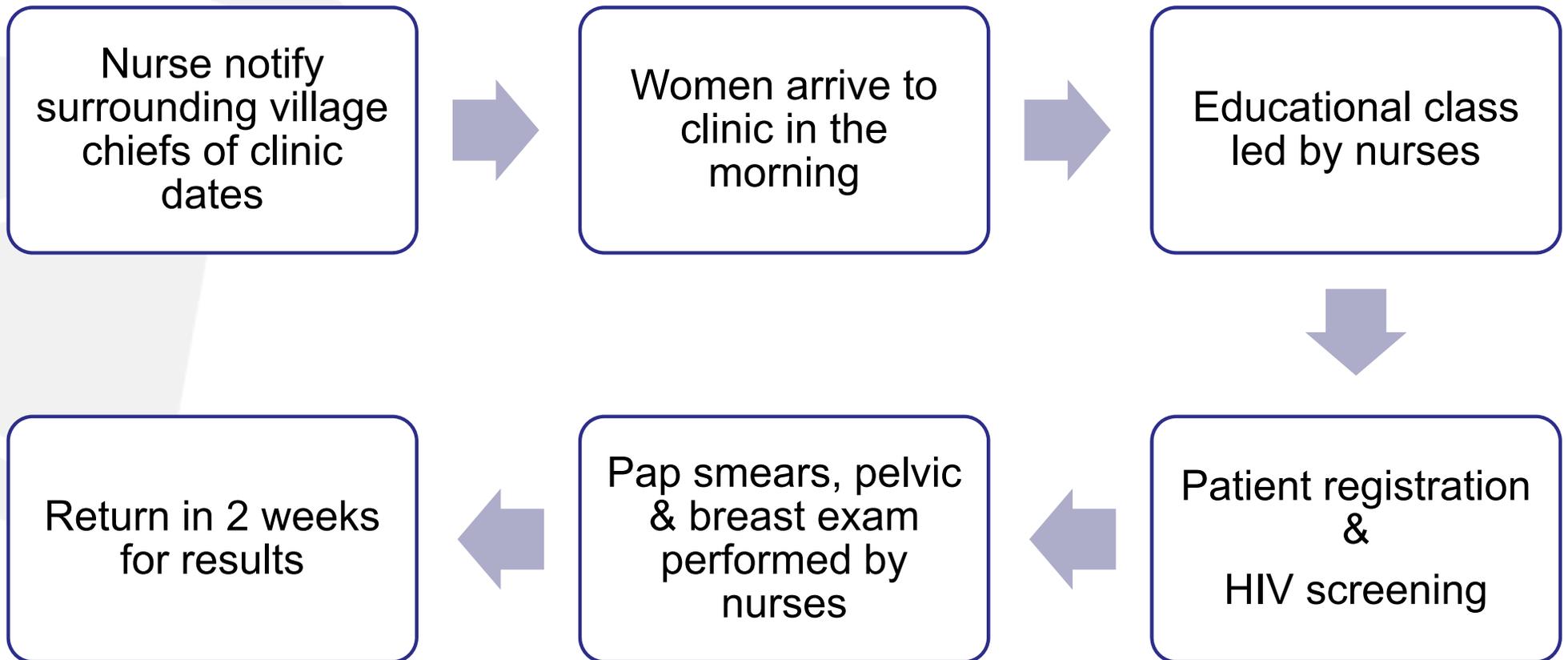


# People needed

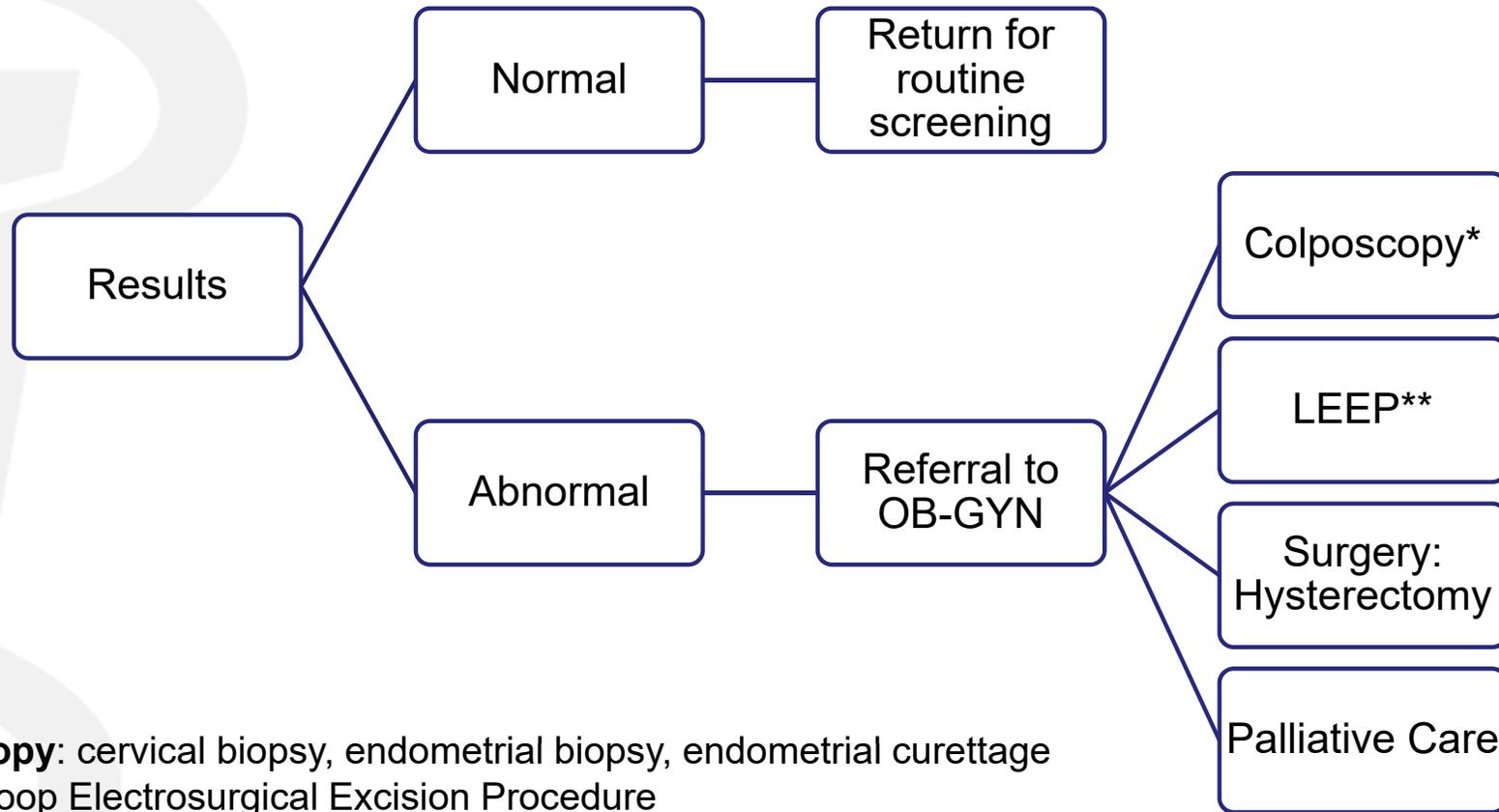
- Secretary, nurses, health workers
  - Enter demographics, intake data
  - Educate women about the process and importance of cervical cancer screening
  - Perform exam, collect pap smears
  - Record and disseminate results, coordinate follow-up
- Cytologist
  - Read pap smear slides
- OB-GYN
  - Follow-up abnormal pap smears
- Pathologist
  - Biopsy results



# MAH Women's Health Clinic Program

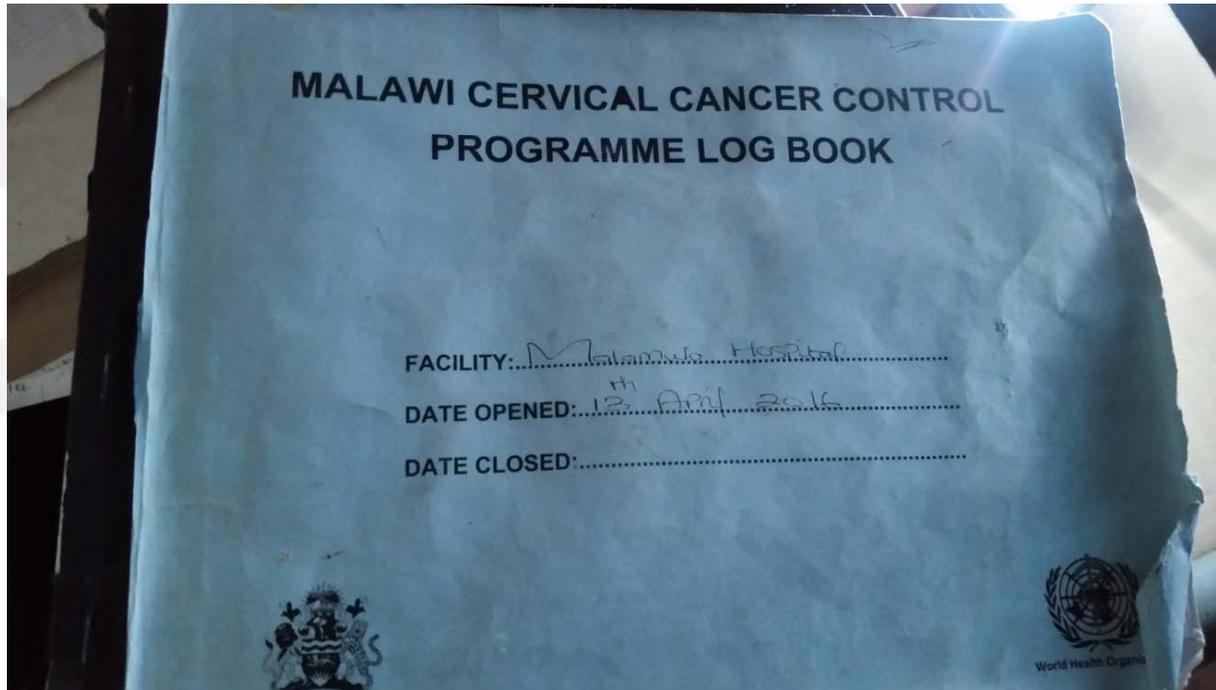


# Pap Smear Results



\***Colposcopy**: cervical biopsy, endometrial biopsy, endometrial curettage

\*\***LEEP**: Loop Electrosurgical Excision Procedure



# DATA COLLECTION

# Cervical Cancer Screening Program

- Intake (2 forms)
  - Age
  - Village
  - Pregnancy history
  - LMP
  - Previous pap
  - STD's
  - Symptoms
  - Exam findings
  - Risk factors:
    - Smoking
    - Birth control method

CERVICAL CANCER SCREENING CURSIL REGISTRATION FORM

Name: KITHWETHRE MULE (MURAGHATA) THYLO Age: 29 Village: \_\_\_\_\_

Program:  Yes  No (LMP) 3 @ 6000

Has a previous Pap been removed?  Yes  No

Has a Pap been done?  Yes  No Date of last Pap smear: 11/2/2015

Current birth control method: None Pills: \_\_\_\_\_ Condoms: \_\_\_\_\_ Intrauterine Device: \_\_\_\_\_

Have you had any of the following infections? (Circle all that apply)

|             |                     |             |             |
|-------------|---------------------|-------------|-------------|
| Trichomonas | Bacterial Vaginosis | Syphilis    | Herpes      |
| <u>NONE</u> | <u>NONE</u>         | <u>NONE</u> | <u>NONE</u> |

Have you had any of the following symptoms?

|                            |           |                           |           |                 |            |
|----------------------------|-----------|---------------------------|-----------|-----------------|------------|
| Bleeding after intercourse | <u>NO</u> | Genital Itching/Discharge | <u>NO</u> | Other (Specify) | <u>YES</u> |
|----------------------------|-----------|---------------------------|-----------|-----------------|------------|

Breast Exam Results:  WNL  Abnormal  
 Pelvic Exam Results:  WNL  Abnormal

Tenderness: No  Yes

Cervical Appearance: Normal

Date: 12/10/16 Examiner: [Signature]

# Cervical Cancer Screening Program

- Result forms

Specimen Adequacy: Satisfactory  Unsatisfactory:  ASC-US  ASC-H  LNIL  HSIL  SCC

Results: WNL  AGC  AIS  Adenocarcinoma

Other findings (specify):

Date specimen read: 23/10/16

Clinician: P. Chagwa

Patient ID/Number: 5599 Registration Date: 19-10-16 Interviewer: Chagwa

# Pathology results

**Kamiza Pathology Lab**  
Private Bag 341, Oshana, Siyanyoni 3  
Cell: 0999 370 705

**Lab Results for Pa**

|                   |                             |            |                |
|-------------------|-----------------------------|------------|----------------|
| Lab No            | 2017-T-40145                | Pay Method | and Malamulo   |
| Requesting Doctor | Hayton                      | Age        | Malamulo       |
| Date Received     | 18-January-2017             | Race       | 49             |
| Date Reported     | 21-January-2017             | Sex        | Black          |
| Fee Code          | ZT1                         | Site       | Female         |
| Specimen Type     | Bladder and cervical biopsy |            | Bladder + Cerv |

Procedure: Histology

**Brief Clinical Summary**  
Pelvic mass. Severe pain.

**Macroscopic Findings**  
1. 4 fragments 2mm x 1TE.  
2. 4 fragments x 1TE.

**Microscopic Findings**  
Sections from the bladder mucosa show an invasive squamous cell carcinoma with associated schistosoma ova.  
Sections from the cervix show chronic endocervicitis.

**BLADDER BIOPSY** : Invasive squamous cell carcinoma in background of schistosomiasis.  
**CERVICAL BIOPSY** : Chronic endocervicitis.

Signed:  
Dr. S. Kamiza, MB,BS (MCh), FCPATH(SA)anast.

- Negative
- Positive
  - ASCUS, LSIL, ASC-H, HSIL, Cancer (SCC)
- Other: schistosomiasis, candida, cervicitis

**Microscopic Findings**  
Sections from the bladder mucosa show an invasive squamous cell carcinoma with associated schistosoma ova.  
Sections from the cervix show chronic endocervicitis.

**Conclusion**  
**BLADDER BIOPSY** : Invasive squamous cell carcinoma in background of schistosomiasis.  
**CERVICAL BIOPSY** : Chronic endocervicitis.

# Malawian Patient Charts: Health Passports

LIKUNI HOSPITAL  
MALAWI  
HEALTH PASSPORT  
WOMAN HEALTH PROFILE

NAM  
DZINA

DATE OF BIRTH  
TSIKU LOBADWILA day / month / year 16/4/03

VILLAGE MALILI  
Mudzi

Please bring this book each time you come to see the nurse or doctor  
Chonde bweletsani kabukuka podzolenana ndi bwele kapena namwino

Signature of issuing person

Issued date:

LIKUNI MISSION HOSPITAL  
HEALTH PASSPORT  
P.O. BOX 90, LIKUNI, LILONGWE

- Stays with patient
- Summary for each episode of care
- Record pap ID number, date, and results

# Transferring Paper into Electronic Data

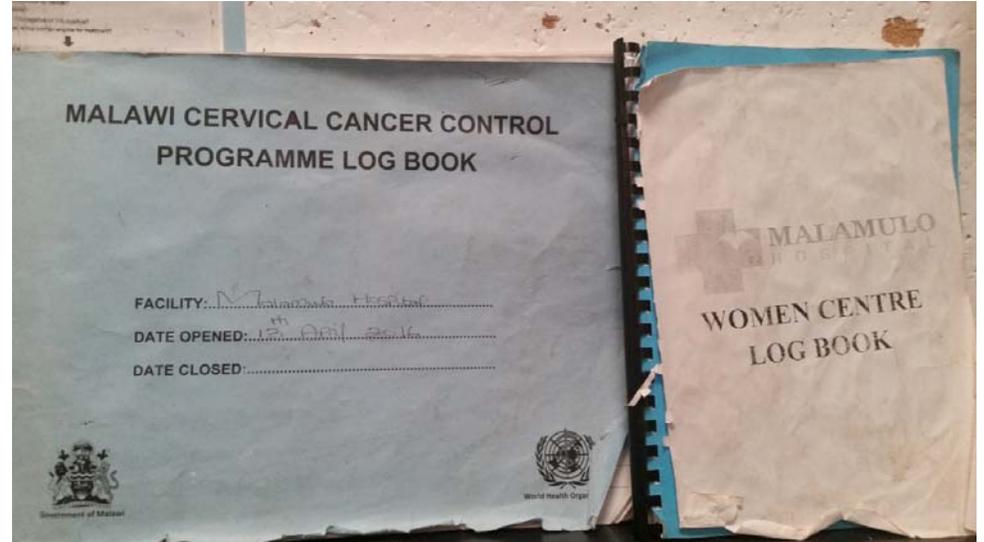


**CERVICAL CANCER CONTROL PROGRAMME LOG BOOK**

Area: Hoop CODE: 3111 MONTH: MAY YEAR: 2016

| Address and Phone no. | Age | Marital status | WV status | Reason for visit | Result of screening | Reason for Referral | VIA provider Name | Management of VIA (+) | Clin. Note |
|-----------------------|-----|----------------|-----------|------------------|---------------------|---------------------|-------------------|-----------------------|------------|
| M. H. H. H.           |     |                |           |                  |                     |                     |                   |                       |            |
| Beke                  | 3   | 4              | 3         | 1                | 1                   |                     |                   |                       |            |
| H. H. H. H.           |     |                |           |                  |                     |                     |                   |                       |            |
| Beke                  | 2   | 2              | 1         | 1                | 1                   |                     |                   |                       |            |
| H. H. H. H.           |     |                |           |                  |                     |                     |                   |                       |            |
| Beke                  | 1   | 2              | 1         | 1                | 1                   |                     |                   |                       |            |
| H. H. H. H.           |     |                |           |                  |                     |                     |                   |                       |            |
| Beke                  | 2   | 2              | 1         | 1                | 1                   |                     |                   |                       |            |
| H. H. H. H.           |     |                |           |                  |                     |                     |                   |                       |            |
| Beke                  | 2   | 2              | 3         | 1                | 1                   |                     |                   |                       |            |

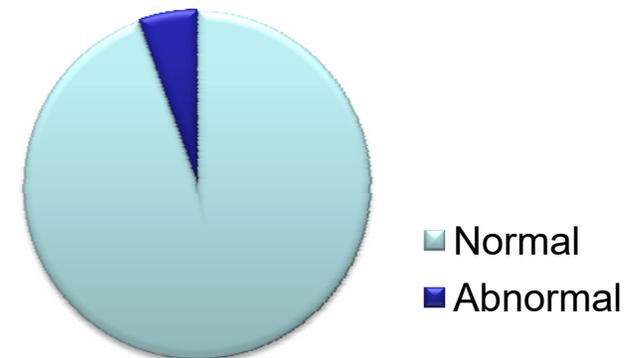




## RESULTS FROM MAH

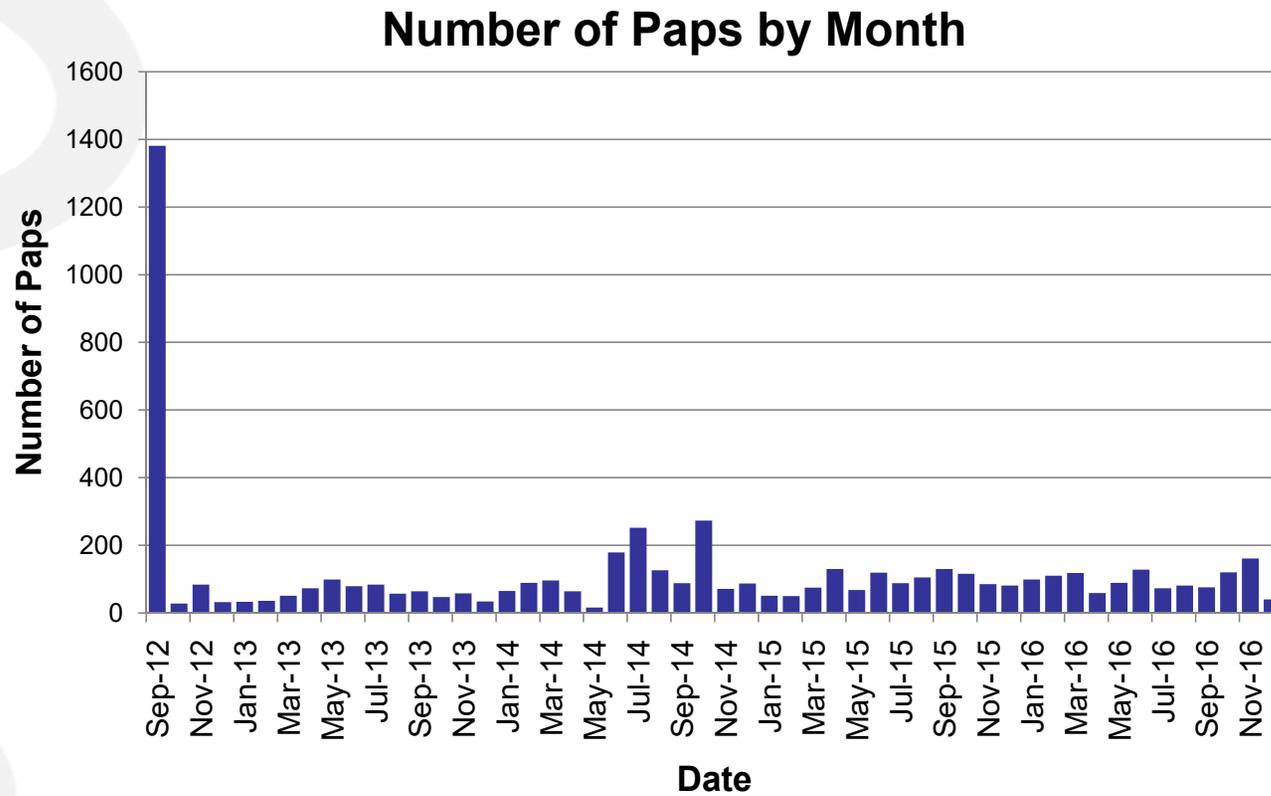
## Overview: by the numbers

- Approximate population served by Malamulo Adventist Hospital:
  - Total population of catchment area: 38,713
  - Women of child-bearing age: 9,804
- Total number of recorded pap smears from 2012 – 2016: **5,899**
  - Normal pap smears: **5,577**
  - Abnormal pap smears: **322 (5.5%)**

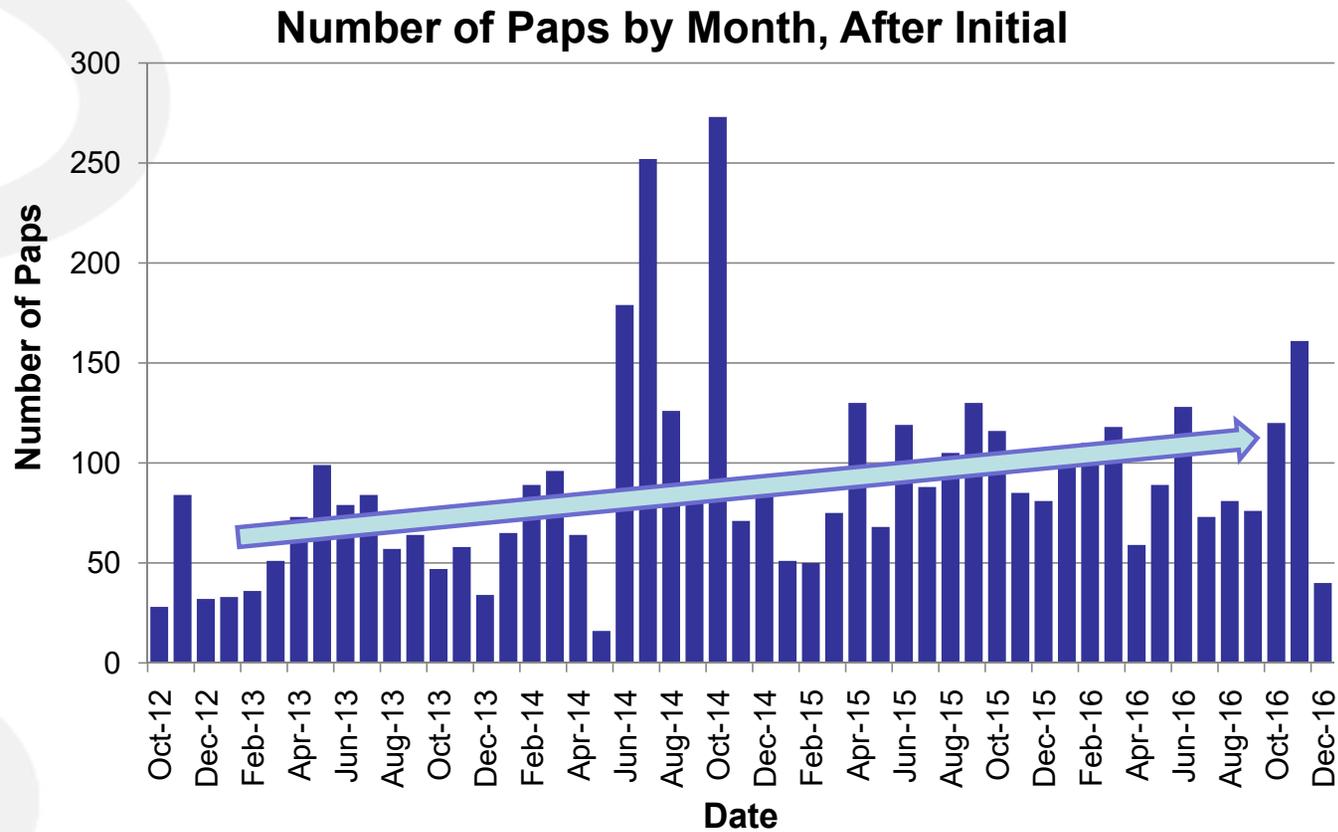


**Pap results**

# Women getting pap smears by month of year

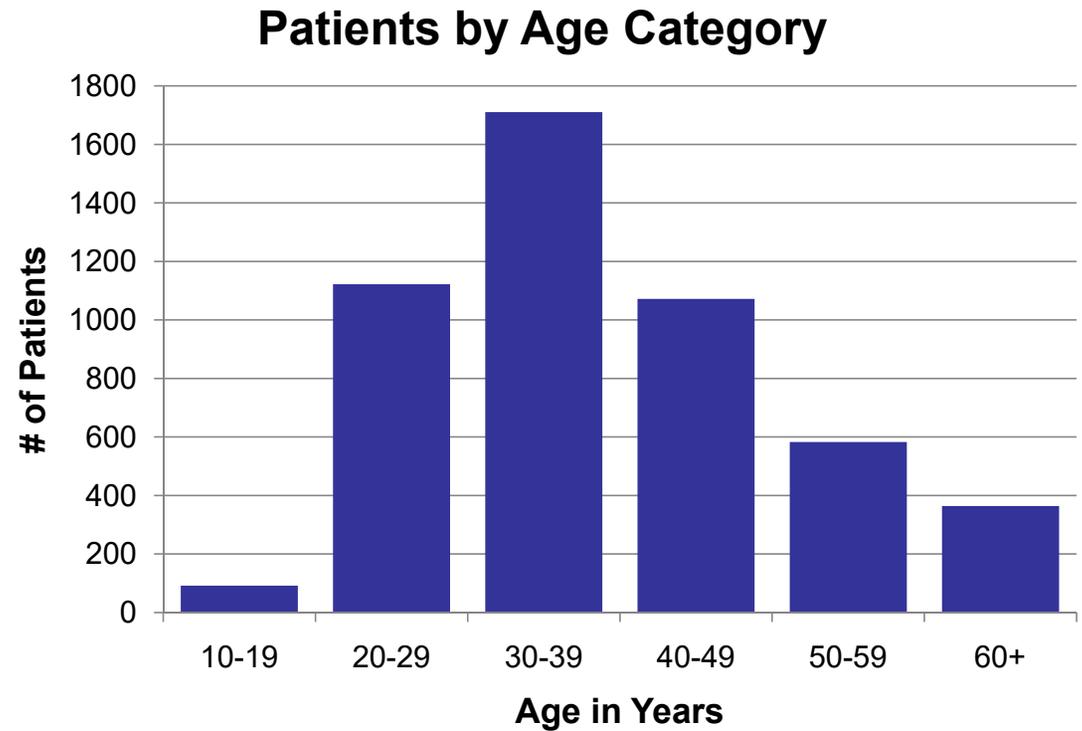


# Women getting pap smears by month of year

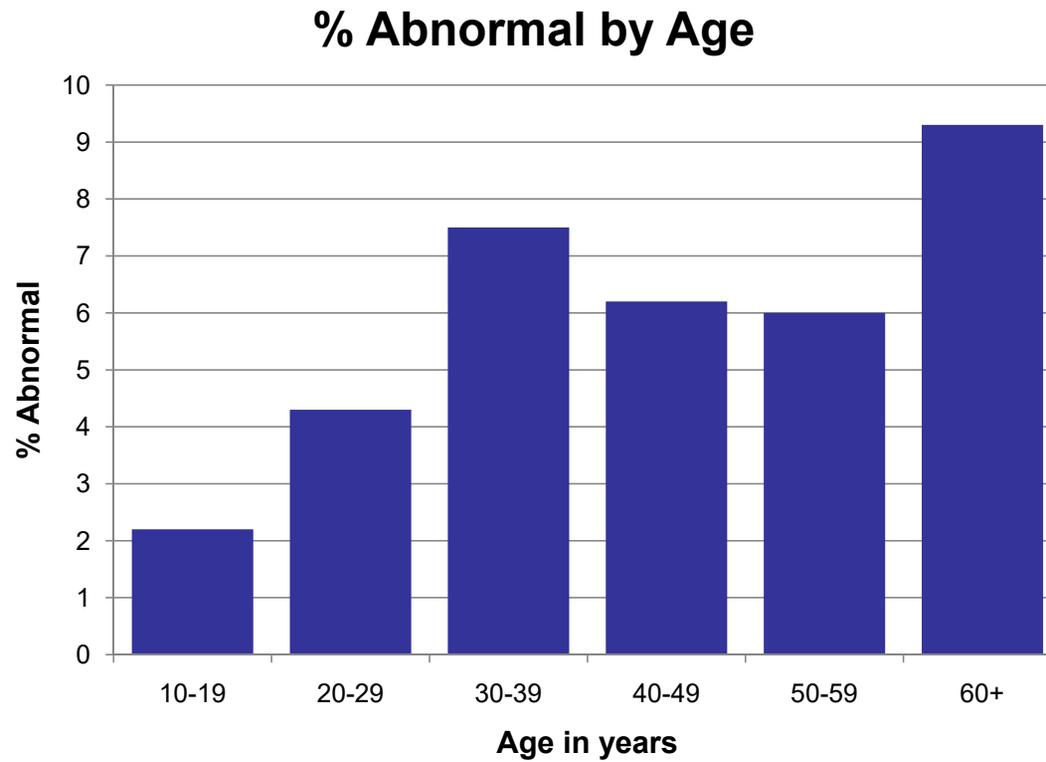


# Women Screened by Age

- Average age: 38.5 years
- Range: 14-90 years old

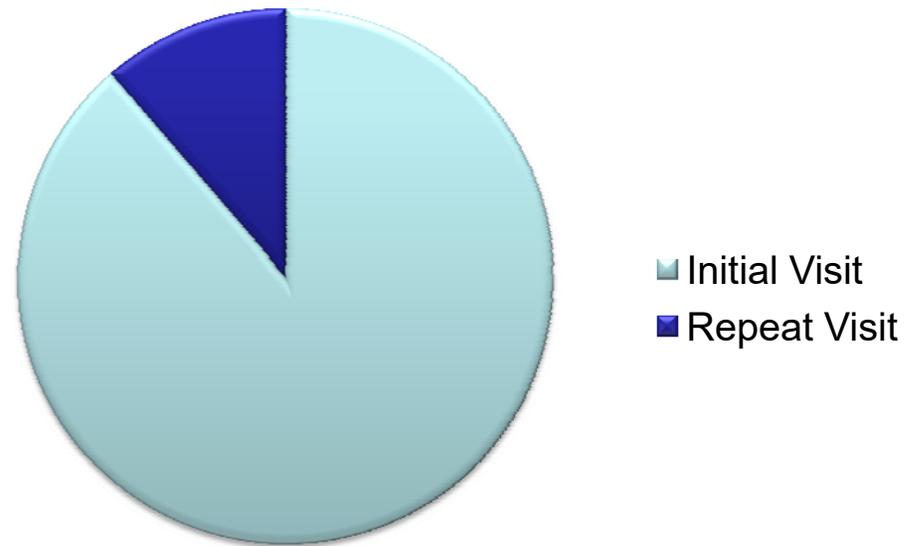


# Abnormal Pap Smears by Age

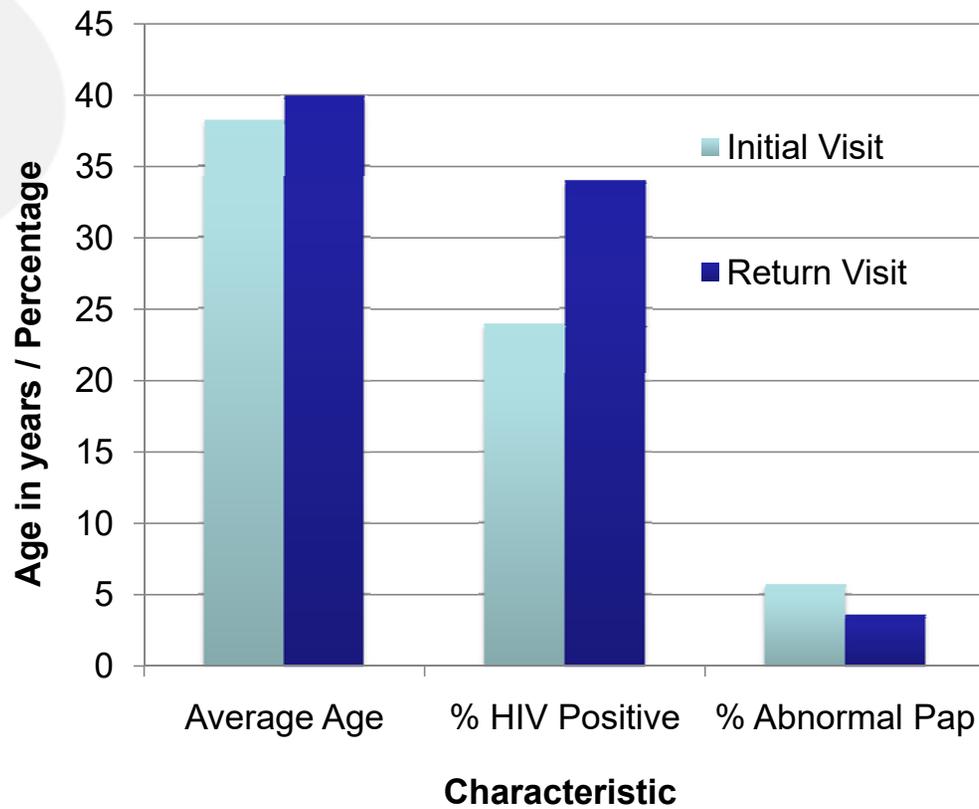


## Number of Initial visit vs Return visits

- As program became more established, more women came for return visits and repeated pap smears
- Most given a new ID number, which was not linked to previous pap smears
- # of initial visits: **5,229**
- # of return visits: **668**

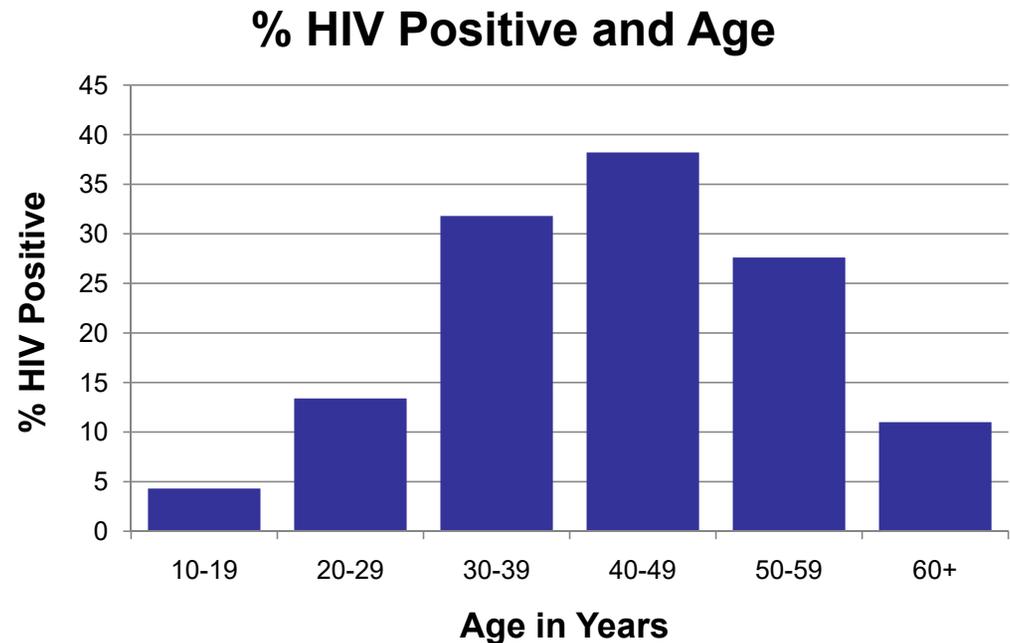


# Return Visit Characteristics

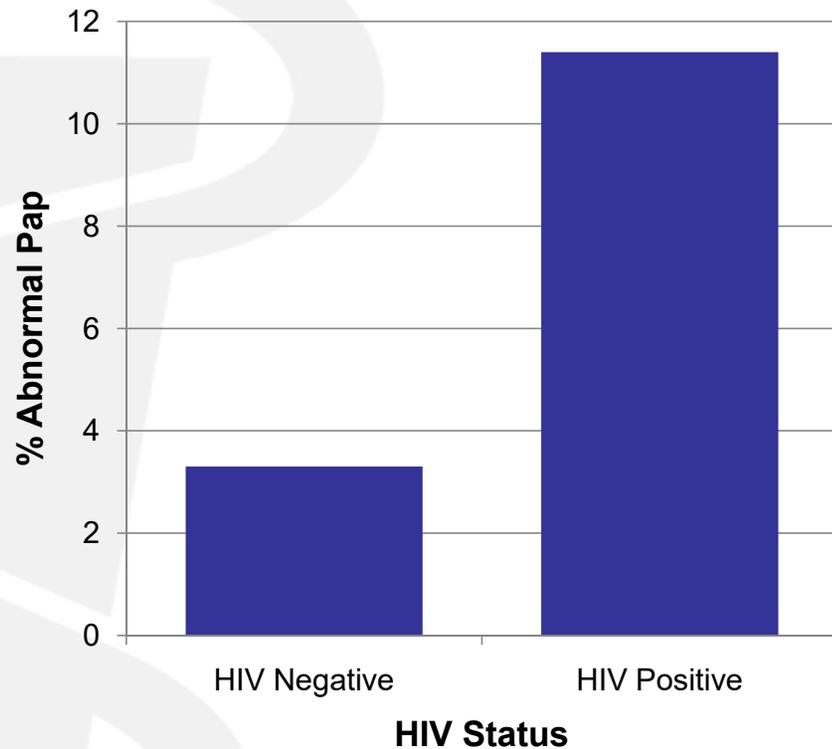


# Women Screened by HIV status

- HIV by the numbers
  - Negative: 4,123
  - Positive: 1,479
- Positive HIV rate: **25.1%**
  - Previously reported HIV (+) rate: **26%**
  - Prevalence adult HIV (+) in area: **9%**
- Average age for HIV (+): **39.7 years**

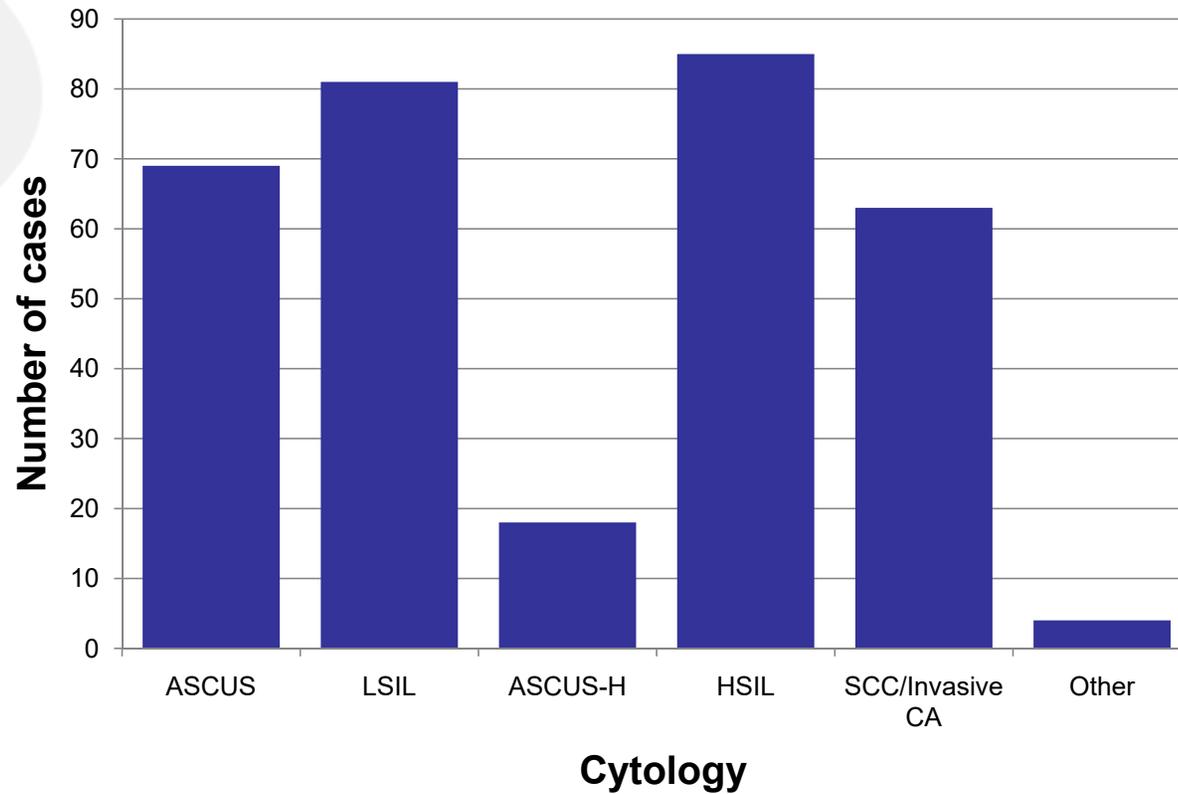


# HIV and Abnormal Pap Results

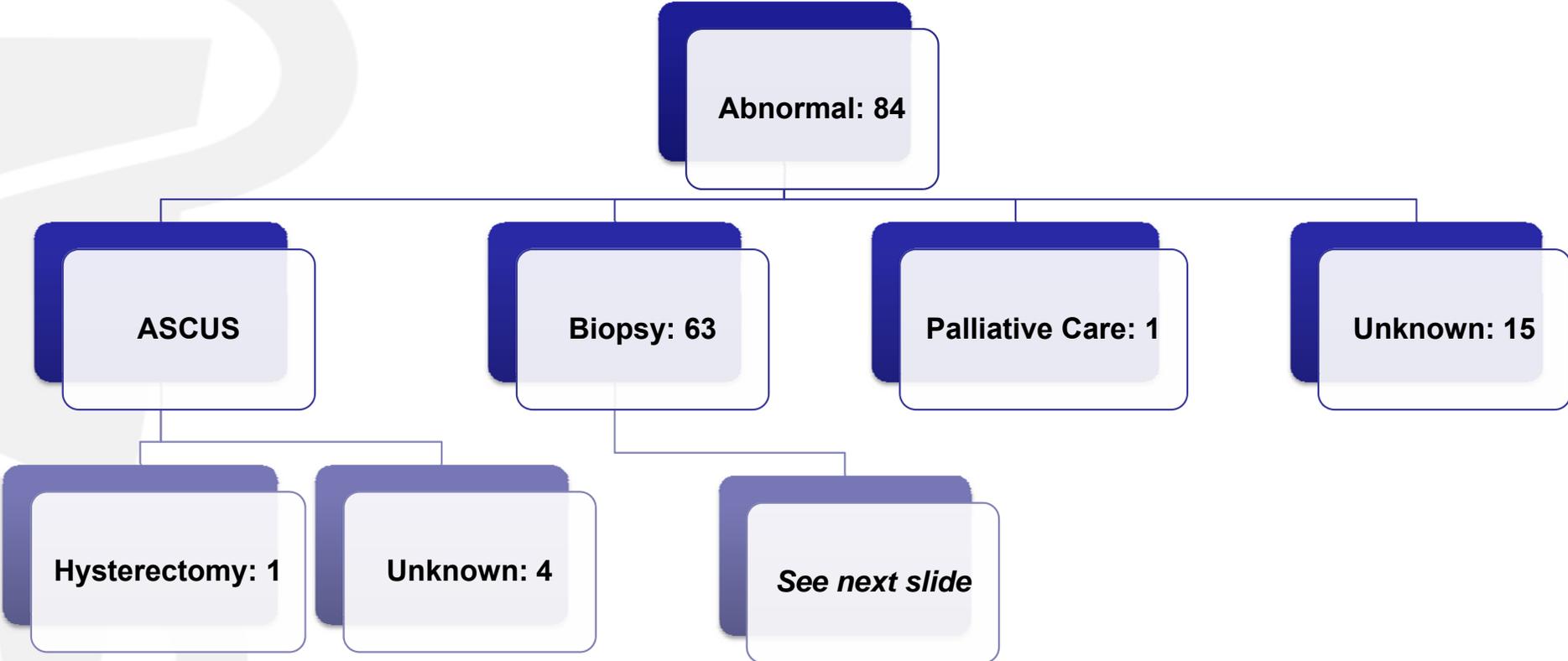


- Abnormal pap:
  - HIV positive: 11.4%
  - HIV negative: 3.3%
- Relative Risk: 3.46,  $p=.000$ 
  - The risk of being HIV+ and having an abnormal pap result was 3.46 times that of being HIV+ and having a normal pap result
- Logistic Regression
  - Unadjusted OR 3.78,  $p=.000$
  - Adjusted for age OR 3.57,  $p=.000$
  - After controlling for age, the odds of being HIV+ and having an abnormal Pap was 3.57

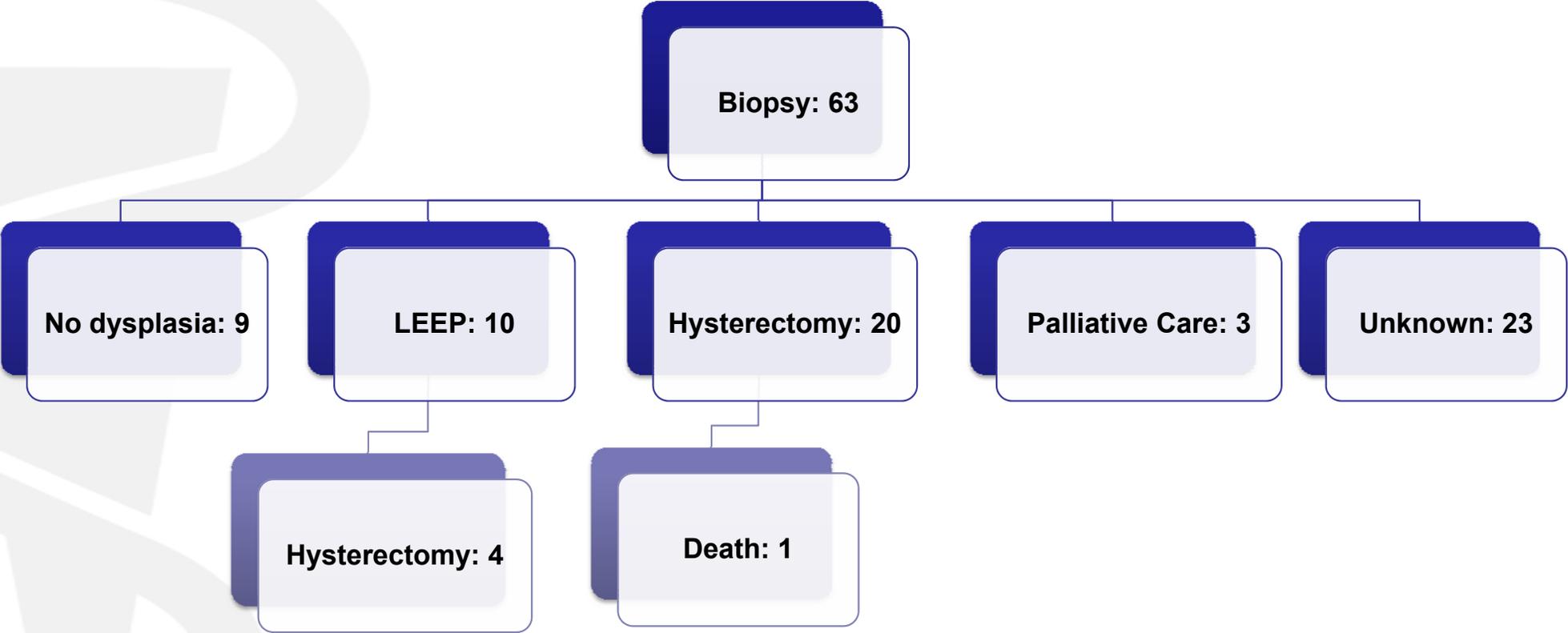
# Abnormal pap smears: Cytology results



# 2015-2016 Abnormal Pap Smear Outcomes



# 2015-2016 Abnormal Pap Smear Outcomes



# 2015-2016 Abnormal Pap Smear Outcomes

## Correlated Totals:

- Abnormal: 84
- Biopsy: 63
- No dysplasia: 9
- LEEP: 10
- Hysterectomy: 24
- Palliative Care: 4
- Death: 1

## Log book totals:

- Biopsy: 138
- Hysterectomy: 43
- Palliative Care: 10



## SUCSESSESS AND CHALLENGES

# Successes

- Patient benefits
  - Over 6,000 paps completed
  - Screening for HIV
  - Referral for other health concerns
  - Education
  - Free of cost
  - Many life-saving procedures/operations completed
- Technique
  - Only cytology-based screening program in Malawi



# Successes

- Facility
  - Dedicated location for Women's Health Clinic
  - Dedicated location for educational classes
  - Private rooms
  - “No structure” community outreach
  - Community education



# Successes

- Partnerships
  - LLU Family/Preventive Medicine, OB-GYN, Internal Medicine, and Surgery residents, Medical students
  - Pan-African Academy of Christian Surgeons (PAACS) training site
- Staff
  - Dedicated, determined, community health workers actively track down patients with abnormal results
  - Outreach to village chiefs from distant villages
  - MAH sponsoring a clinical officer for additional OB/GYN training



# Successes

- Sustainability
  - Ongoing donor support
  - 5-year family donor fund specifically for Women's Center
  - Number of pap smears performed has increased over the years
  - Women coming back for return visits
  - Community ownership: locals comprise majority of staff



# Challenges

- Socio-cultural barriers
  - Travelling distance
  - Lack of transportation (most women walk)
  - Language barriers: Limited number of translators available
  - Cultural barriers
    - Outreach to women only with approval from village chief
    - Misconceptions and fear among women
- Treatment
  - Palliative care options limited to pain medication (Tramadol)
  - Limits to treatment, i.e. no radiation therapy
  - Loss to follow-up



# Challenges

- Limited time and talent:
  - Secretary for intake and to enter the data into logbooks (borrow from another department), enter results
  - Dedicated pathologist / cytologist (volunteer time)
  - OB-GYN specialist
    - US trained OB-GYN, PAACS\* surgical resident, Clinical officers
  - Nurses to collect pap smears, perform pelvic, breast exam
  - Clinic only open once a week
  - Under utilization of the clinic buildings

\*Pan-African Academy of Christian Surgeons



# Challenges

- Data collection & Management
  - Duplicate patient ID numbers, i.e. new vs. return
  - Multiple locations for documentation:
    - Ministry of Health log book, binders, registries, etc.
  - Inconsistencies with documentation practices
  - Government requirements for data reporting
    - VIA forms
  - Transcribing paper data from various sources to a centralized electronic format



# Challenges

- Sustainability:
  - Funding from US donors
  - Cost for the women (currently free)
  - Dedicated staffing (cytologist, OB-GYN)
  - Training health care workers
  - Transportation



## Future

- Mobile clinics for women in distant villages
- Expand MAH's women's health clinic to more than one day a week
- Possible community needs assessment
- Hospital or community ownership and funding options
- HPV vaccine – coming soon
  - Clinical trials to implement vaccinations underway for 2-shot quadrivalent vaccine series



# RESIDENT ROLES



# Family & Preventive Medicine Residency Program

- Started in 2006
- 4-year program
- Dual board certification
  - Family Medicine
  - Preventive Medicine
- MPH in Population Medicine
- 4 residents/year



LOMA LINDA  
UNIVERSITY

## Malamulo Rotation

- PAPS Team International: Sept. 2012
- Site evaluation: May 2013
- Started data evaluation
  - Coded forms, started logging, trained local staff, donated a Macbook
- Became required international OB rotation for residents
- First FPM resident to go: Feb. 2014

# Residency Project

- Required rotation x 1-2 years
- 10 residents over course of 4 years
- Assisting with clinic duties
  - Performing pap smears
- Collecting data
- Entering data into computer



# Strengths of Resident Project

- Sustainability with consistent resident participation
- Application of statistical and population management principles learned in MPH course work
- Collaboration among residents



# Barriers to Residents Participation



- Attendings have multiple clinical duties (limited time)
- Ability to find/access paper data
- Partnering with a person who knows about the project at MAH
- Interest in the project
- No longer required rotation

# Opportunities for Future Endeavors



- Continue data analysis of follow-up for patients with abnormal results
- Log and analyze data on longer intake forms
- Expand cervical cancer screening beyond Thyolo district
- Duplicate cervical cancer screening program in other locations in the developing world

## Conclusions

- Cervical cancer is a treatable and preventable disease that disproportionately affects those in low-middle income countries
- Cervical cancer screening programs, such as the one in Malawi, are challenging to initiate and maintain, but can be successful in detecting and treating pre-cancerous lesions
- Family Medicine residents can play an important role in data collection and community outreach programs

# Acknowledgements: Special Thank You!

- Malamulo Adventist Hospital
- Dr. Casey Graybill, Dr. James Crouse, Dr. Ryan Hayton
- Dr. Marc Debay, Dr. N. Margarete Ezinwa, Dr. Karen Studer
- Stella Nyirenda, RN and Mary Panulo, LVN
- Staff & administrators at MAH
- Residents from Loma Linda University
  - Previous research contributors: Dr. Christina Miller, Dr. Sumedh Mankar, Dr. Jacqueline Uy, Dr. Stewart Wilkey, Dr. Marcus Heisler
  - Additional rotation participants: Dr. Kelsey Cherepuschak, Dr. Jeffrey Cho, Dr. Edward Perry
- Mrs. Kam for helping enter data



**Questions?**

# Resources

- [http://apps.who.int/iris/bitstream/10665/144785/1/9789241548953\\_eng.pdf?ua=1](http://apps.who.int/iris/bitstream/10665/144785/1/9789241548953_eng.pdf?ua=1)
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4989288/>
- <http://www.panafrican-med-journal.com/content/article/22/247/full/#.WRptCFTys1I>
- <https://bmcwomenshealth.biomedcentral.com/articles/10.1186/s12905-016-0306-6>
- <http://www.who.int/reproductivehealth/publications/cancers/en/>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4989288/>
- <http://www.who.int/cancer/prevention/diagnosis-screening/cervical-cancer/en/>
- <http://www.asccp.org/asccp-guidelines>
- <https://report.nih.gov/nihfactsheets/viewfactsheet.aspx?csid=76>

# Resources

- Bruni L, Barrionuevo-Rosas L, Albero G, Serrano B, Mena M, Gómez D, Muñoz J, Bosch FX, de Sanjosé S. ICO Information Centre on HPV and Cancer (HPV Information Centre). Human Papillomavirus and Related Diseases in the World. Summary Report 27 July 2017. [3 Oct 2017]
- Bruni L, Barrionuevo-Rosas L, Albero G, Serrano B, Mena M, Gómez D, Muñoz J, Bosch FX, de Sanjosé S. ICO Information Centre on HPV and Cancer (HPV Information Centre). Human Papillomavirus and Related Diseases in Malawi. Summary Report 27 July 2017. [3 Oct 2017]
- WHO guidance note: comprehensive cervical cancer prevention and control: a healthier future for girls and women. 2013.
- AN Fiander. The prevention of cervical cancer in Africa. *Women's Health* (2011) 7(1), 121–132
- Finocchiaro-Kessler et al. Cervical cancer prevention and treatment research in Africa: a systematic review from a public health perspective. *BMC Women's Health* (2016) 16:29
- Lynette Denny, MD, PhD Louise Kuhn, PhD Michelle De Souza, MD Amy E. Pollack, MD, MPH William Dupree, MD Thomas C. Wright, Jr, MD. Screen-and-Treat Approaches for Cervical Cancer Prevention in Low-Resource Settings A Randomized Controlled Trial. *JAMA*, November 2, 2005—Vol 294, No. 17
- Karly S. Louie, Silvia de Sanjose, and Philippe Mayaud. Epidemiology and prevention of human papillomavirus and cervical cancer in sub-Saharan Africa: a comprehensive review. *Tropical Medicine and International Health*. Volume 14 no 10 pp 1287–1302 october 2009.
- Phiri, Beatrice Chikaphonya. Reducing Cervical Cancer Prevalence in Malawi Policy Brief. July 2016.