

# Setting Up a Cytology Laboratory for Cervical Cancer Screening in a Developing Country: A One Year's Early Experience at a Private Facility

Mwesigwa Boaz (✉ [mwesigwaboaz155@gmail.com](mailto:mwesigwaboaz155@gmail.com))

Cytology Society of Uganda

**Ngoma Febian**

Levy Mwanawasa Medical University

**Abila Derrick Bary**

Makerere University

**Othieno Emmanuel**

Soroti University

**Zahra Award Warsame**

Alzahra Specialty Hospital

---

## Research Article

**Keywords:** Cervical cancer, cervical cytology, Pap smear, laboratory

**Posted Date:** October 4th, 2021

**DOI:** <https://doi.org/10.21203/rs.3.rs-804082/v1>

**License:**  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

---

# Abstract

## Introduction

Widespread cytology-based method of screening such as Pap smear test has significantly led to a reduction in the incidence and mortality associated with cervical cancer in many developed countries. In these countries, facilities needed for early detection of cervical cancer such as cytology laboratories are existent and generally available to their population. In a developing countries like Somalia, access to cytology services for cervical cancer screening remains limited and as result majority of patients present with advanced stage disease (stage III & IV) that is too difficult to treat.

## Intervention

To address this challenge, the management of AL-Zahra Specialty Hospital contracted a cytologist based in Uganda to guide in setting-up of cytology laboratory in the heart of Mogadishu, Somalia so as to provide cervical cancer screening and diagnostics services to the population. Other interventions made by the visiting cytologist involved guiding the procurement officer in the purchase of basic equipment, reagents, consumables and training of health care staff. This resulted into conducting 1020 cervical cytological tests over a period of 12months (1<sup>st</sup> September, 2018 to 30<sup>th</sup> September 2019).

## Lesions learnt

In order to increase access to cytology services, we learnt that the federal government of Somalia should consider making cervical cytology (pap smear test) as part of routine screening policy for all sexually active women as part of health care package. An increase in sample volume may be improved through awareness campaigns and conducting community screening activities.

## Conclusion

Somalia, a developing country has made great strides towards addressing the limited facilities for cervical cancer screening by using very limited funding. We hope that our experiences shall provide technical guidance & direction to physicians, laboratory managers and investors who wish to establish similar cervical cytology laboratories in an economically constrained low-resource setting.

# Introduction

Globally, cervical cancer is the fourth most common cancer in women with an estimated 570,000 new cases and with about 311,000 deaths in 2018[1]. Up to 85% of these new cases occurs in the low-and middle income countries [2]. The highest incidence rates are observed in Latin America and the Caribbean, sub-Saharan Africa, and south and south-east Asia [3]. In Somalia, cervical cancer ranks among second leading cause of female cancer related deaths with an age-standardized incidence rate at 25.1 per 100,000 and a mortality rate at 20.2 per 100,000 [4] Widespread cytology based cervical screening has registered a marked reduction in the incidence of cervical cancer in developed countries. In

such countries the mortality and morbidity associated with cervical cancer has also significantly reduced [5]. Access to cytology services in Somalia remains a challenge due to a limited number of pathology laboratories and trained cytologists personnel for cervical cancer screening. As a result of this a majority of patients are forced to seek for cytology services in other neighbouring countries such as Kenya & Uganda where resources available for screening are as well as moderately available. Patients who are unable to access these services end up presenting with advanced stage of disease (stage III & IV) that is too difficult to treat. To address this challenge, the management of AL Zahra Specialty hospital contracted a cytologist to guide in the setting up of a cervical cytology laboratory. Terms of reference involved guiding in purchase of equipment, reagents, consumables, training of smear takers & laboratory technicians. In this article we share the experiences encountered by the team in the first twelve (12) months after establishing the said cytology laboratory.

### *Facility description*

The cytology laboratory was established at AL Zahra Specialty Hospital which is a private hospital with a bed capacity of ten (10) beds, located along Liberia road, Hodan district, Mogadishu-Somalia. The hospital receives referrals from other neighbouring private, government hospitals for cytology mainly focuses on gynaecological cytology and maternity services. The hospital also participates in community cervical cancer screening programs in other states such as Somali land & Puntland

## **Description of intervention**

### *a) Planning and setting up*

The idea to set up a cytology started as early as February, 2018 which was followed by a series of talks and contractual agreements between the management of AL Zahra Specialty Hospital and with the cytotechnologist based in Uganda. Laboratory space measuring 5 by 2 square meters was acquired at the second floor of the hospital building for setting up a cytology unit. Different suppliers were contacted for invoices on equipment and reagents from which a supplier with the least quotation was selected for the service. At the beginning of the project a total amount of 8,601 USD was mobilized by the hospital management so as to kick start the project (see Table 1). By 26<sup>th</sup> August, 2018 installations of furniture and purchase of equipment, reagents, solvents and consumables had already started after having identified a potential supplier. Equipment that was purchased included a microscope (Olympus CX 23), tissue-tek slide staining set (sakura), laptop (dell), digital eye piece camera, colour laser printer and air conditioner (see fig 1). Reagents/solvents purchased included harris hematoxylin, eosin azure 50 (EA 50), orange G6, xylene and graded alcohols (see fig 2A &2B). Due to limitation of space, the specimen processing area was combined with the reporting area (see fig 3). In the absence of a cytologist (while on leave) a laboratory technician was trained to take images using a digital eye piece fitted on CX 23 microscope and transmit the captured images electronically to Kampala for reporting (see fig 4). For safety purposes, personnel protective equipment such as goggles, nasal masks and gloves was provided to the laboratory staff to minimize exposure to xylene and other toxic substances (see fig 5).

## *b) Training of health workers*

To acquire skills in cervical screening and diagnostics, the laboratory technicians and nurses underwent a three days CME in various aspects of cervical sample collection and processing. Nurses were trained on standard operating procedures for collecting of an adequate cervical specimen. Laboratory technicians received training in cytopreparatory procedures such as papanicolaou staining, mounting and coverslipping (fig 6A &6B)).

### **Challenges & mitigation;**

Somalia is a developing country with quite a high economically constrained health systems coupled with limited funding & no policies to tackle non-communicable diseases such cervical cancer. General challenges included failure to acquire local suppliers for cytology reagents and consumables. To minimize stock-outs, supplies were obtained from local distributors based in Uganda and shipped to Mogadishu via DHL. Insecurity in Mogadishu also affected the functionality of cytology laboratory as foreign workers (cytologists) were at risk of getting kidnapped by Al-Shabab militants. To address this challenge we developed a telemicroscopy system (telecytology) where digital images (microphotographs) were sent to the cytologist for reporting in Kampala. Local laboratory technicians were trained on how to take quality images which enhanced continuity of cytology services in the absence of an on-site cytologist.

### **Lessons learnt;**

In order to reduce the growing burden of cervical cancer & other non-neoplastic diseases in Somalia, setting up a cytology laboratory proved to be highly beneficial to the population. In order to increase access to cytology services, we learnt that the federal government of Somalia should consider making cervical cytology service (Pap smear test) as part of routine screening policy for all sexually active women and focus on including this in the algorithm of the health care package. An increase in sample volume may be improved through awareness campaigns and by conducting community screening activities.

### **Table 1: Start-up items used in setting up a cytology laboratory**

Item	Quantity	Cost (USD)	Manufacturer/ Origin	Distributor/Origin
<b>Equipment</b>				
<i>Olympus CX 23 Microscope</i>	1pc	1500	Olympus, japan	Crown Healthcare Uganda Limited
<i>Digital eye piece camera</i>	1pc	200	Amscope	Netkeep Healthcare Engineering, Kampala-Uganda
<i>Tissue-tek slide staining set</i>	1pc	2750	Sakura, Germany	Al Zahrawi Medical Supplies, LLC/ Dubai-UAE
<i>Printer</i>	1pc	140	N/A	N/A
<i>Dell laptop</i>	1pc	300	N/A	N/A
<i>Air conditioner</i>	1pc	400	N/A	N/A
<i>Furniture (chair, tables )</i>	1set	500	N/A	N/A
<b>Reagents and solvents</b>				
<i>Harris hematoxylin</i>	1ltr	286	RAL Diagnostics, France	Al Zahrawi Medical Supplies, LLC/ Dubai-UAE
<i>EA50 Papanicolaou</i>	1ltr	286	RAL Diagnostics, France	Al Zahrawi Medical Supplies, LLC/ Dubai-UAE
<i>OG6 Papanicolaou</i>	1ltr	286	RAL Diagnostics, France	Al Zahrawi Medical Supplies, LLC/ Dubai-UAE
<i>Bioclear (Xylene)</i>	5ltrs	150	BioGnost, Croatia	Al Zahrawi Medical Supplies, LLC/ Dubai-UAE
<i>Histanol (Ethanol absolute)</i>	5ltrs	150	BioGnost, Croatia	Al Zahrawi Medical Supplies, LLC/ Dubai-UAE
<i>Biomount DPX</i>	500ml	385	BioGnost, Croatia	Al Zahrawi Medical Supplies, LLC/ Dubai-UAE
<i>Oil immersion solution</i>	100ml	22	Cypress diagnostics, Belgium	Medilab Uganda
<b>Consumables &amp; accessories</b>				
<i>Coverslips (24x50mm)</i>	10x100/cs	385	Sakura, Germany	Al Zahrawi Medical Supplies, LLC/ Dubai-UAE

<i>Pap smear kits (25 per kit)</i>	4 boxes	216	Andwin Scientific, USA	Al Zahrawi Medical Supplies, LLC/ Dubai-UAE
<i>Disposable speculums</i>	150pcs	283	Advin Health Care	Laborex Uganda Ltd
<i>20 Slides folder white</i>	10/cs	308	Sakura, United Kingdom	Al Zahrawi Medical Supplies, LLC/ Dubai-UAE
<i>PPE (Mask, goggles)</i>	1pc	54	Bioptica, Italy	Histclear diagnostic supplies/ Kampla-Uganda
<b>TOTAL</b>		<b>8,601</b>		

## Conclusion

We hope that our experiences shall provide technical guidance & direction to physicians, laboratory managers and investors who wish to establish similar cervical cytology laboratories in an economically constrained low-resource setting.

## Declarations

### Data Availability

Data is available in hard copies and can be accessed on request.

### Conflict of Interest

The authors declare that there are no competing interests associated with the manuscript.

### Funding

There was no source of funding or grant from public or non-governmental organization rendered towards this research.

### Ethical consideration

This research followed all ethical standards for research without direct contact with human or animal subjects.

### Consent

Approval to publish this manuscript and images was obtained from the management of Alzahra Specialty Hospital.

### Acknowledgement

We extend our sincere gratitude to management of AL Zahra Specialty Hospital for the financial support and resources rendered in setting up the cytology laboratory. Special thanks to the Assoc. Professor Othieno Emmanuel for his continuous mentorship and support rendered towards the success of this project.

### **Authors' contribution**

MB wrote the manuscript. NF, ADB & OE revised the manuscript. All authors have read and approved the manuscript

## **References**

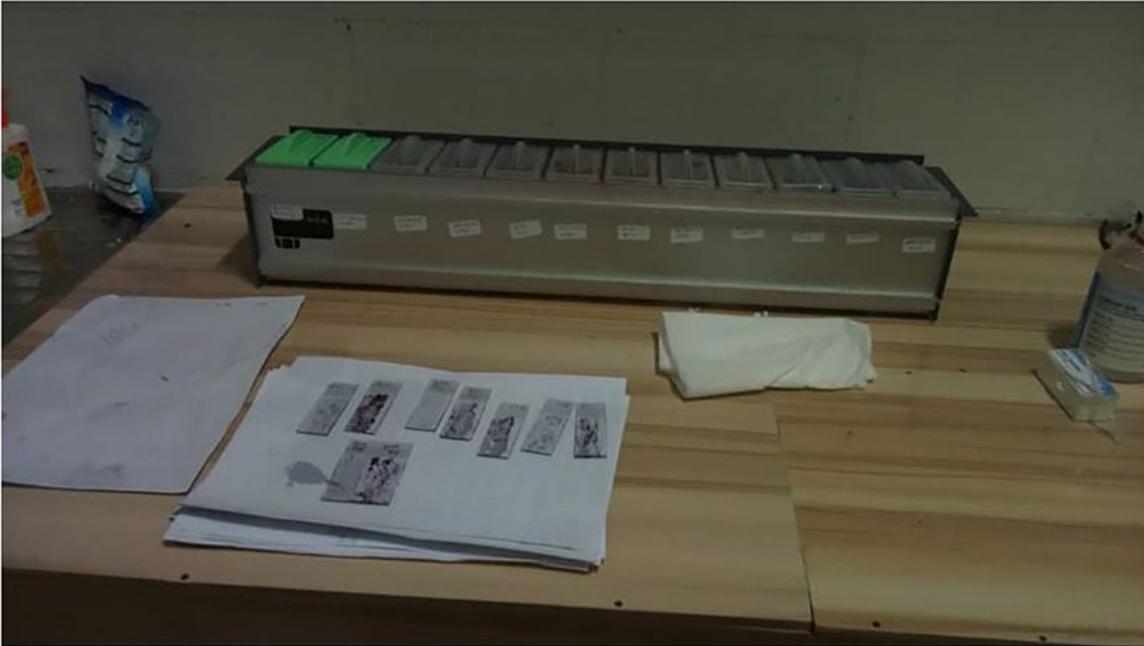
1. World Health Organization. Cervical Cancer. Geneva, Switzerland; 2019 Available from: [https://www.who.int/health-topics/cervical-cancer#tab=tab\\_1](https://www.who.int/health-topics/cervical-cancer#tab=tab_1) [Accessed 31<sup>st</sup> July 2021]
2. Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, Znaor A, Soerjomataram I BF. Global Cancer Observatory: Cervix Uteri Fact Sheet [Internet]. Lyon, France: International Agency for Research on Cancer; 2018. Available from: <http://gco.iarc.fr/today/data/factsheets/cancers/23-Cervix-uteri-fact-sheet.pdf>
3. IARC Handbooks of Cancer Prevention, Cervical Cancer Screening; 2005. Volume 10. Available from: <https://publications.iarc.fr/Book-And-Report-Series/Iarc-Handbooks-Of-Cancer-Prevention/Cervix-Cancer-Screening-2005>
4. Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, Znaor A, Soerjomataram I BF. Global Cancer Observatory: Somalia Fact Sheet [Internet]. Lyon, France: International Agency for Research on Cancer; 2021. Available from: <http://gco.iarc.fr/today/data/factsheets/populations/706-somalia-fact-sheets.pdf>
5. Catarino R, Petignat P, Dongui G, Vassilakos P. Cervical cancer screening in developing countries at a crossroad: Emerging technologies and policy choices. *World J Clin Oncol* 2015; 6(6):281-290 Available from URL: <http://www.wjgnet.com/22218-4333/full/v6/i6/281.htm>

## **Figures**



**Figure 1**

Shows an air conditioner, Olympus CX23 microscope, laptop, printer, chairs and tables



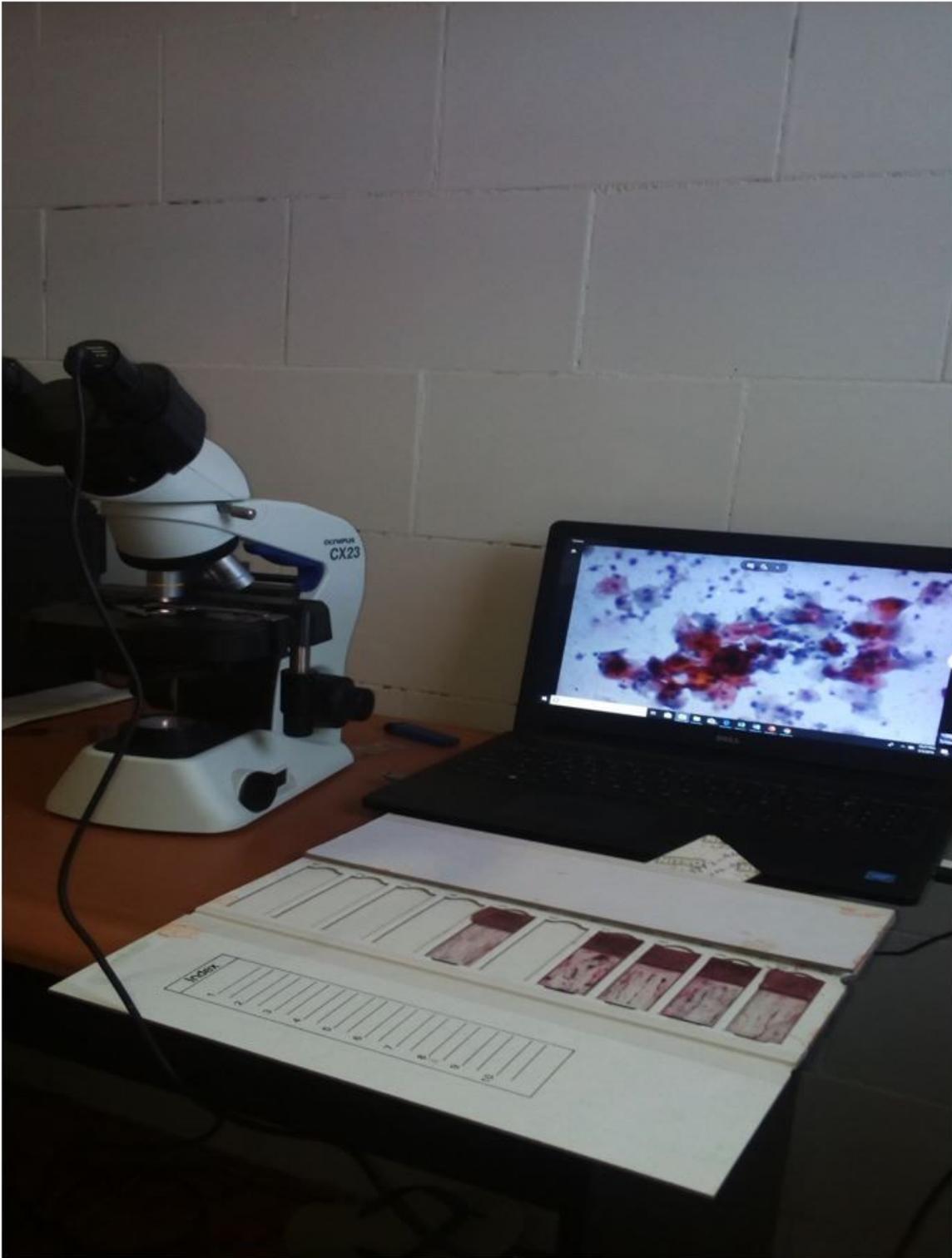
**Figure 2**

A: Shows slide staining set for Papanicolaou staining. From Right to Left jars contain; 1-95% alcohol, 2-harris hematoxylin, 3-70% alcohol, 4-95% alcohol, 5-OG6, 6-95% alcohol, 7-EA50, 8-95% alcohol, 9&10-100% alcohol, 11&12-Xylene. B: Slide staining with an entire staining area.



**Figure 3**

Reporting area



**Figure 4**

Shows a digital eye microscope taking photos of slides (microphotographs)



**Figure 5**

Shows staff conducting a procedure while wearing personnel protective equipment



**Figure 6**

A: Training session for laboratory technicians in telemicroscopy & cytopreparatory techniques. B: Facility staff at Al-Zahra hospital undergoing CMEs.