

Women and Mathematics in Africa

Marie Françoise Ouedraogo
Presidente of AWMA

- Introduction**
- Situation of african women mathematicians**
- Issues faced by women in mathematics in Africa**
- Associations and actions**
- Conclusion**

Introduction

- **Name:** Dr Marie Françoise Ouedraogo
- **Position:** Associate Professor in Mathematics
- **Institution:** Université Joseph Ki-Zerbo (former Université de Ouagadougou)
- **Country:** Burkina Faso
- **Domains of interest:** Pseudo-differential operators. There are extensions of differential operators with the help of Fourier transforms and the theory gives a fundamental tool for the study of some partial differential equations. Pseudo-differential operators are also used in the study of quantum field theory in physics. I am interested in the boundedness of such operators in some functional spaces.
- **Other position:** President of the African Women in Mathematics Association (AWMA)

Situation of african women mathematicians

- The situation of women mathematicians in Africa is very diverse and not very well documented
- No exhaustive statistics of female mathematicians in Africa

Situation of african women mathematicians

For the AMUCHMA-newsletter n°33 of the African Mathematical Union Commission on the History of Mathematics in Africa (<http://www.math.buffalo.edu/mad/AMU/amuchmapdf/amuchma33.pdf>)

- **1st doctorates: 1963**, Soraya Sherif (Egypt)
Grace Awani Alele-Williams (Nigeria)
- **1964**: Maassouma Mohamed Kazim (Egypt)
Fatma Moalla (Tunisia)
- **1967**: Elizabeth Eme Samson Etuk (Nigeria)
- **1969**: Laila Mohamed Fahmy Abd-El-Elal (Egypte)
Nawal Mohamed Mahmoud El-Samra (Egypte)
Jennifer Denise Key (Afr. Du Sud)
- **1971**: Joséphine Guidy-Wandja (Côte d'Ivoire)

Situation of african women mathematicians

- **First doctorate issued from African university 1971, Hendrika Cornelia Scott Swart (Afrique du Sud)**
- **From 1963 to 2005, 241 women doctorate holders in mathematics of mathematics education**



Grace Alele Williams (Nigeria, 1963)



Fatma Moalla (Tunisia, 1964)



Josephine Guidi-Wandja (Côte d'Ivoire, 1971)

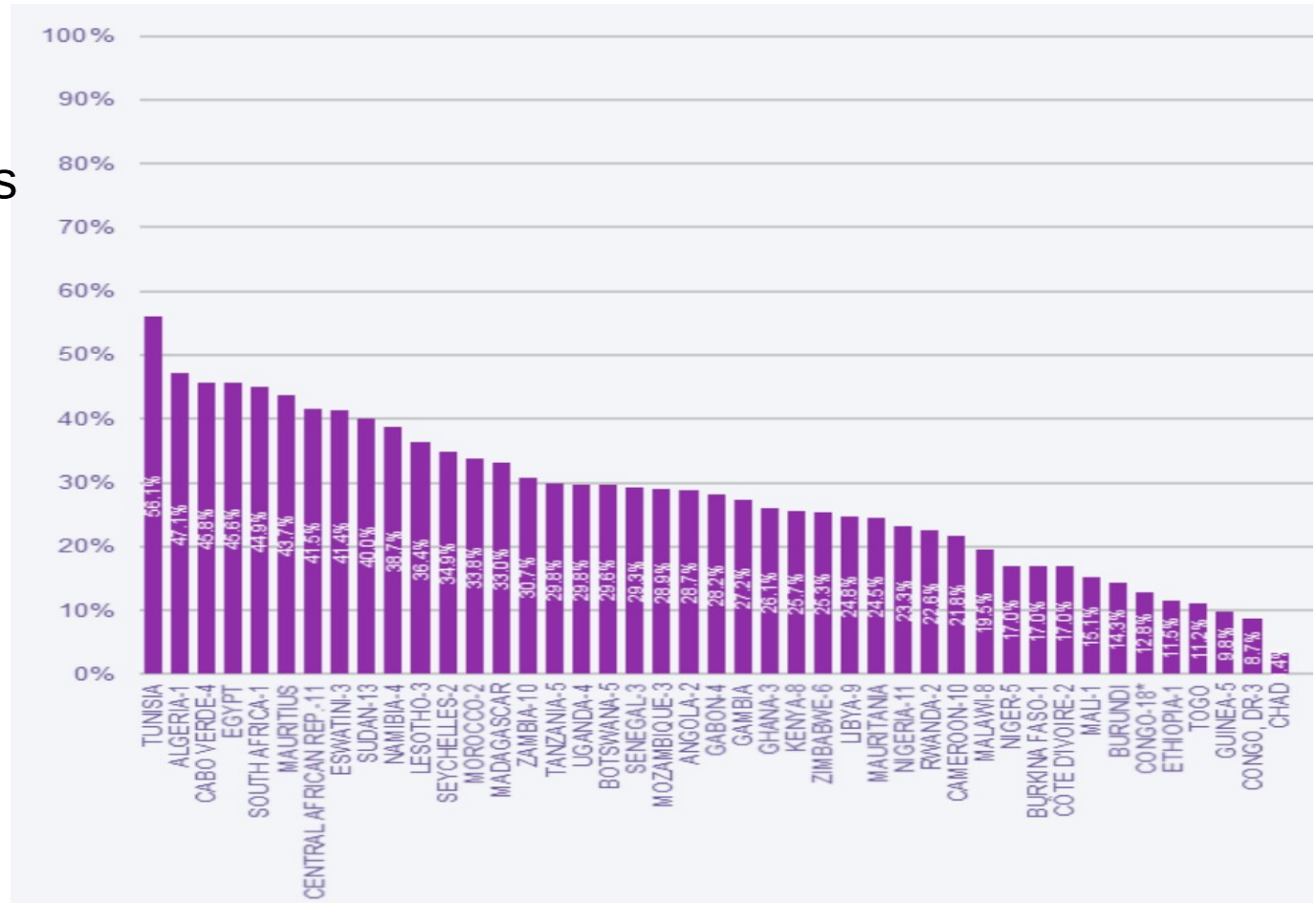


Hendrika Cornelia Scott Swart (South Africa, 1971)

Situation of african women mathematicians

For the UNESCO Institute for statistics (women-inscience-June 2020), the average of female researchers was

- **30% for the world**
- **31,1% for Sub-Saharan Africa**
- **56,1% for Tunisia**
- **17% for Burkina Faso**
- **04,4% for Chad**



Notes: -1 = 2017, -2 = 2016, -3 = 2015, -4 = 2014, -5 = 2013, -6 = 2012, -7 = 2011, -8 = 2010, -9 = 2009, -10 = 2008, -11 = 2007, -13 = 2005, -16 = 2002, -17 = 2001, -21 = 1997.

* based on FTE data.

Source: UNESCO Institute for Statistics, June 2020)

Situation of african women mathematicians

For the AMUCHMA-newsletter n°33 (2006), in the total of African doctorate holders

- **11% of females**
- **31% Malawi**
- **21% Egypt**
- **18% South Africa and Tunisia**
- **10% Burkina Faso**

For the case of Burkina Faso: the last three years

- **2019: 13 Ph.D. including 00 woman**
- **2020: 08 Ph.D. including 01 woman**
- **2021: 08 Ph.D. including 00 woman**



Issues faced by women in Mathematics in Africa

Some of the classical problems that have contributed to the scarcity and also underperformance of women in mathematics in some regions of Africa are follows:

- **Cultural and traditional bias** and **belief** that mathematics and hard sciences are for boys and men, and you see it everywhere in implicit or explicit ways.
- **Financial difficulties**. At individual levels, most women in Africa have no resources to support their education.
- **Family obligations** and **household chore** keep many girls in the kitchen while the male child enjoys doing his thing.
- **Few role models** and **senior women** in mathematical sciences. Historically, girls and women have not had the same access to education as their male counterparts have enjoyed in Africa.
- **Lack of government strategies** and **policies** to promote mathematics and increase access for all genders.
- ...

Associations and actions

To improve the situation of African women mathematicians, various associations have been created and actions are carried out. They all aim to promote mathematics and African female mathematicians.

AMUCWMA (founded in 1986): African Mathematical Union Commission on Women in Mathematics in Africa

- To generate activities and programs meant to encourage women to study and make careers in the Mathematical Sciences.
- To mobilise young girls all over the continent to show more interest in Mathematics.
- ...

AMU-PAMOC (founded in 1986): African Mathematical Union Pan African Mathematics Olympiads Commission

- Since 2015, Equality of Gender has been stimulated by imposing the participation of 3 boys and 3 girls In each team

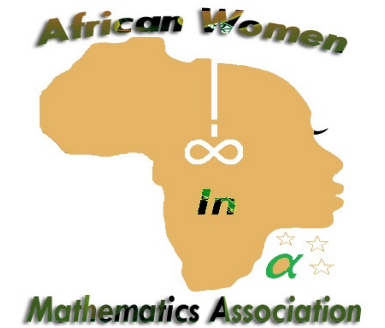


Associations and actions

AWMA (2013): The African Women in Mathematics Association

Main purpose:

The promotion of women in mathematics in Africa and
Promotion of mathematics among young girls and women in Africa



Activities:

- Website: <http://africanwomeninmath.org/>
- Organization of Workshops in the five regions of Africa
- Organization of regional meetings
- Creation of national associations
- Monthly webinars
- Organization of Women in Sage Days
- Database of Women Mathematicians and Booklet of Role Models



Invitation to join AWMA

- ❖ **Ordinary membership** is open to
 - Any woman working in or for Africa and who supports the purpose of the Association, in particular.
 - Practicing women researchers, teachers and learners of mathematics in Educational institutions
 - Women who are interested in or concerned with the researching, teaching, learning of mathematics, or with its application in Government, Commerce or Industry.
 - Organizations concerned with the mathematics and their applications.
- ❖ **An honorary member** shall have all the privileges of an ordinary member but shall not be liable to pay any subscription to the Association.
- ❖ **Fees:** AWMA members may pay fees every year.

Associations and actions

Following the foundation of AWMA, some regional associations have been created in some countries

- 2014 : Association of Nigerian Women in Mathematics (NWM)
- 2014 : Kenya Women in Mathematical Sciences Association (KWIMSA)
- 2015 : Tunisian Women Mathematicians Association (TWMA)
- 2015 : Association de Jeunes Filles en Mathématiques (AJFM) (Côte d'Ivoire)
- 2015 : Senegalese Women in Mathematics Association (SWMA)
- 2016: Cameroon Women in Mathematics Association (CAWOMA)
- 2017: Moroccan Association of Women & Mathematics (AMAFEM)
- 2021: Association Femmes et Maths Côte d'Ivoire (FMATH-SCI)

Participation in international meetings

- 16th Congress of European Women in Mathematics (**EWM-2013**), Bonn, Germany.



- International Congress of Women in Mathematics (**ICWM-2014**), Seoul, South Korea. Participation in the panel discussing “Mathematics and Women: Different Regions, Similar Struggles.”
- **(WM)²** , held in conjunction with the 2018 ICM in Rio de Janeiro, Brazil. Participation in the panel, “Networks of Women in Mathematics.”
- **(WM)²** 2022...in progress.



Associations et actions

Participation in international committees and projects

- **IMU's Committee for Women in Mathematics (CWM).** The only global organization for Women in Mathematics! CWM facilitates contacts between organizations for women mathematicians. A member of AWMA is involved in this committee since its founding in 2015. www.mathunion.org/cwm
- **Gender GAP in Science Project.** A global Approach to the Gender Gap in Mathematical Science, Computing and Natural Sciences: How to Measure it? How to reduce it? A multidisciplinary and multicultural project funded by the International Science Council (ISC) and lead by IMU and IUPAC <https://gender-gap-in-science.org/>
- **May12 initiative.** Voted by (WM)² attendees after a proposal from the Women's Committee of the Iranian Mathematical Society. May 12th is the birth date of Maryam Mirzakhani.

Conclusion

- Beside the problems cited above and other difficulties, we arrived to attract women, working sometimes alone in their institution to gather and to work together.
- The creation of AWMA highlighted the african women mathematicians at the level of similar organisations in the world.
- Nevertheless, a lot of work remain to be done in order to reduce the gender gap in Mathematics in Africa and to motivate young girls and women to choose mathematics for studies and careers.
- **Maryam Mirzakhani is a role model for many women mathematicians around the world. Various celebrations of May12 occur in Africa since four years. What a great way to inspire young girls and women mathematicians to pursue their dreams in science.**

Thank you