

Women scientists around the world: strategies for gender equality

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Introduction

- **Name:** Pr Marie Françoise Ouedraogo
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- **Domains of interest:** Pseudo-differential operators. Pseudo-differential operators, which give a fundamental tool for the study of some partial differential equations, used for quantum field theory in physics.
- **Other position:** President of the African Women in Mathematics Association (AWMA)

Introduction

High school

- Lycée Philippe Zinda Kaboré, Ouagadougou, Burkina Faso
- In the final year of high school: **19 students (1 girl)**
- I was encouraged by
 - ◆ my mathematics teachers,
 - ◆ my family
 - ◆ and some friends

Introduction

University

- **Third cycle thesis (Thèse de 3è cycle):** Université de Ouagadougou
- **PhD:** Université Blaise Pascal Clermont-Ferrand (France)
- And then successively, I was recruited as **assistant, assistant professor, lecturer** and **full professor**.

At the beginning of my career, something funny happened “When I arrived in the class, the students thought that I am one of their peers. When I took the chalk and started writing at the blackboard they realized that I am the professor, they paid attention and followed the course.

Even now, it happens that a student may call me Sir before realizing his mistake. He apologizes by saying that it is the first time he has a female Mathematics teacher.

Introduction

Some obstacles I faced

- **Socio-cultural obstacles:** girls and women are encouraged to take up short studies that enable them to get married, raise children and take care of their family.
- **The intolerance of some of my peers** who could not cope with the fact that a girl could compete in a field they consider is theirs. In the final year of high school, we had presentations to do in french class. There was one of my classmates who told me: I'm going to read your part of work to come and ask you questions and corner you. I told him: Go ahead, I'm waiting for you

Introduction

Some obstacles I faced

- **The scepticism of some professors or colleagues** which forces you to work harder in order to prove that you deserve the right to be where you are as much as any other person does.
- **The drastic lack of role models of African women mathematicians** to which one can refer to encourage oneself to go on. The first woman in science I knew was Marie Curie. She wasn't even in mathematics, she did physics and chemistry. And when, in undergraduate classes, I studied Fatou's lemma, in integration theory and I thought, finally, a woman mathematician. But it was not the case. His name is Pierre Fatou (1878-1929), a french mathematician!

Introduction

Some statistics at my University

- **Fonded in 1974 (51 years)**
- **The first public University of Burkina Faso**
- **13 Presidents of the University (01 woman)**
- **Students: 44 860 with 33% of girls**

At the department of Mathematics: the last three years

- **2023: 06 Ph.D. (00 woman)**
- **2024: 11 Ph.D. (00 woman)**
- **2025: (on going) 04 Ph.D. (00 woman)**

Issues faced by women in mathematics in Africa

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

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

Issues faced by women in mathematics in Africa

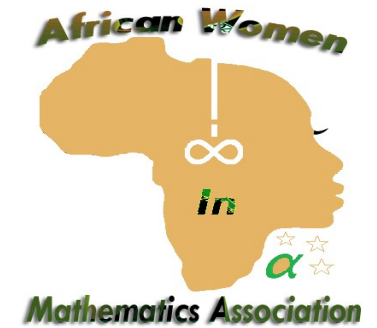
- 1. The cultural and traditional bias: there is still a strong bias** in such developing countries and **a belief** that mathematics and hard sciences are only for men, and you see it everywhere in implicit or explicit ways.
- 2. Poverty and human trafficking** : Many girls in the developing countries have stopped going to school because of poverty and human trafficking.
- 3. Lack of 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
- 4. Lack of government strategies and policies to promote mathematics** and increase access for all genders.

First actions

- **2009:** I began to be interested in the gender gap in Maths when I was appointed chair of the the Commission for Women in Mathematics of the African Mathematical Union
- **2010:** I started to contact some african women Mathematicians to initiate a mailing-list and to setup activities such as workshops, conferences and also to think about role models
- **2011:** I attended a meeting of the European Women in Mathematics where I got advice on ways to find the funding to organize an international workshop in Ouagadougou.
- **2012:** Workshop on African women mathematicians Ouaga. During this workshop many women asked to form an association to be able to define their criteria, their status, their internal regulations as they want, instead of being a commission of an organization that has its own rules.

Associations and actions : AWMA

- **Name:** **AWMA** - African Women in Mathematics Association
- **Date of creation:** 19 July 2013
- **Location:** Cape Town, South Africa, during the 2nd African Women in Mathematics Workshop



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

Other objectives

- To **encourage African women** to take up and continue their studies in mathematics and to promote mathematics among women.
- To **support African women** with or desiring careers in research in mathematics or Mathematics related fields.
- To **provide a meeting place** for these women.

Activities:

- **Organization of Workshops** in the five regions of Africa East, West, North, South and Central
- **Organization of regional meetings**
- **Website:** <http://africanwomeninmath.org/> (financial support of CWM)
- Database of Women Mathematicians and **Booklet of Role Models** from all Africa
- **Monthly webinars**, since the time of COVID19
- **Organization of Women in Sage Days** in Senegal, Nigeria, Uganda, Burundi and soon in Tunisia



AWMA activities are not strictly for women, while the role of women is systematically highlighted. In a workshop, the majority of lecturer are women. But among the participants, we take both men and women.

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)

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.

Thank you