

Outline



- **The state of mathematics in Africa**
- **Models for strengthening capacity in mathematics**
- **A new model**



- **Towards a new collaborative model
for strengthening**
- **mathematical research in Africa**

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Outline



- **The state of mathematics in Africa**
- **Models for strengthening capacity in mathematical research**
- **A new model**
- **Concluding remarks**

The state of mathematics in Africa



- **Some recent history**
- **1970s: Maths was young in most Third world countries**
- **How do we go about building it?**
- **March 1978:**
- **1st Int'l conf. on Developing Maths in Third World Countries, Khartoum**



- **Recommendation to UNESCO:**
- **Establish 3 regional centres of excellence in maths, one each in Africa, Asia, L. America**



- **The result: CIMPA, Nice, France!**
- **1991:** Ford and Rockefeller Foundations review of African higher education – Coombe
- “strong evidence that the discipline of Mathematical Sciences is under particular stress in African universities, with large enrolments and depleted staff. The subject is



stereotyped as being exceptionally difficult, especially for girls. Chronic shortages of Mathematics teachers in schools mean that students are not well prepared when they enter university”



- 1994: TWAS report on the state of mathematical research and mathematics education in Africa – El Tom
- The state of both mathc'l res. and maths edu. In most sub-saharan African countries was poor. Most lacked a *critical mass*, and few could boast a single national PhD in maths edu



- Mathc'l res. output in the *Maghreb* countries, namely Algeria, Morocco, and Tunisia exhibited a spectacular rise during the period 1975 – 1994.
- the structure of mathematical research in all African countries, including Egypt and South Africa, was weak.

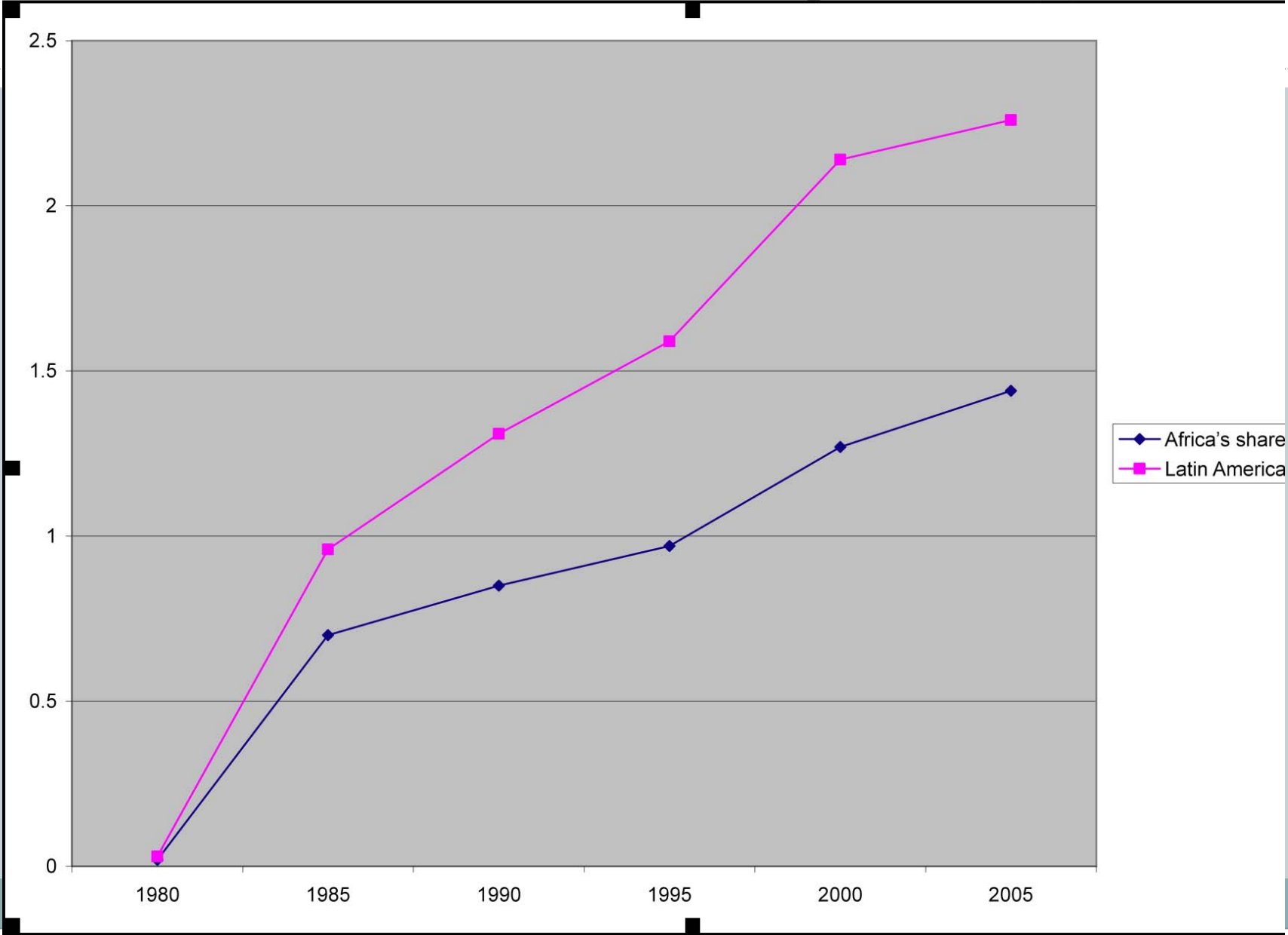


- 1980 – 2005
- Africa's and Latin America's share of total world mathematical research output, 1980 (5) 2005
-



(%)	1980	1985	1990	1995	2000	2005
Africa's	0.02	0.70	0.85	0.97	1.27	1.44
L. Amer	0.03	0.96	1.31	1.59	2.14	2.26

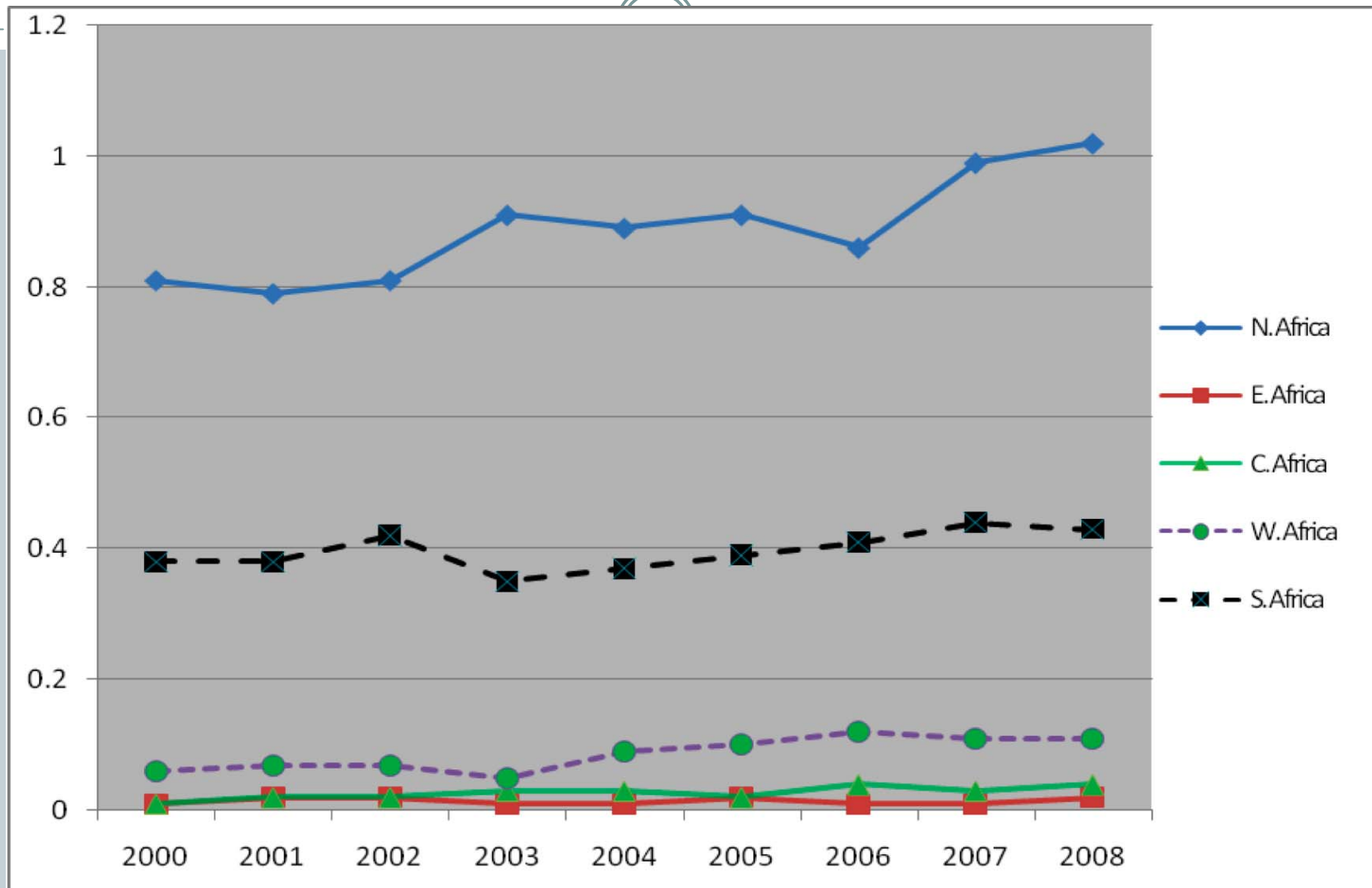
Figure 2: Africa's and Latin America's* share of total world mathematical research output, 1980 (5) 2005

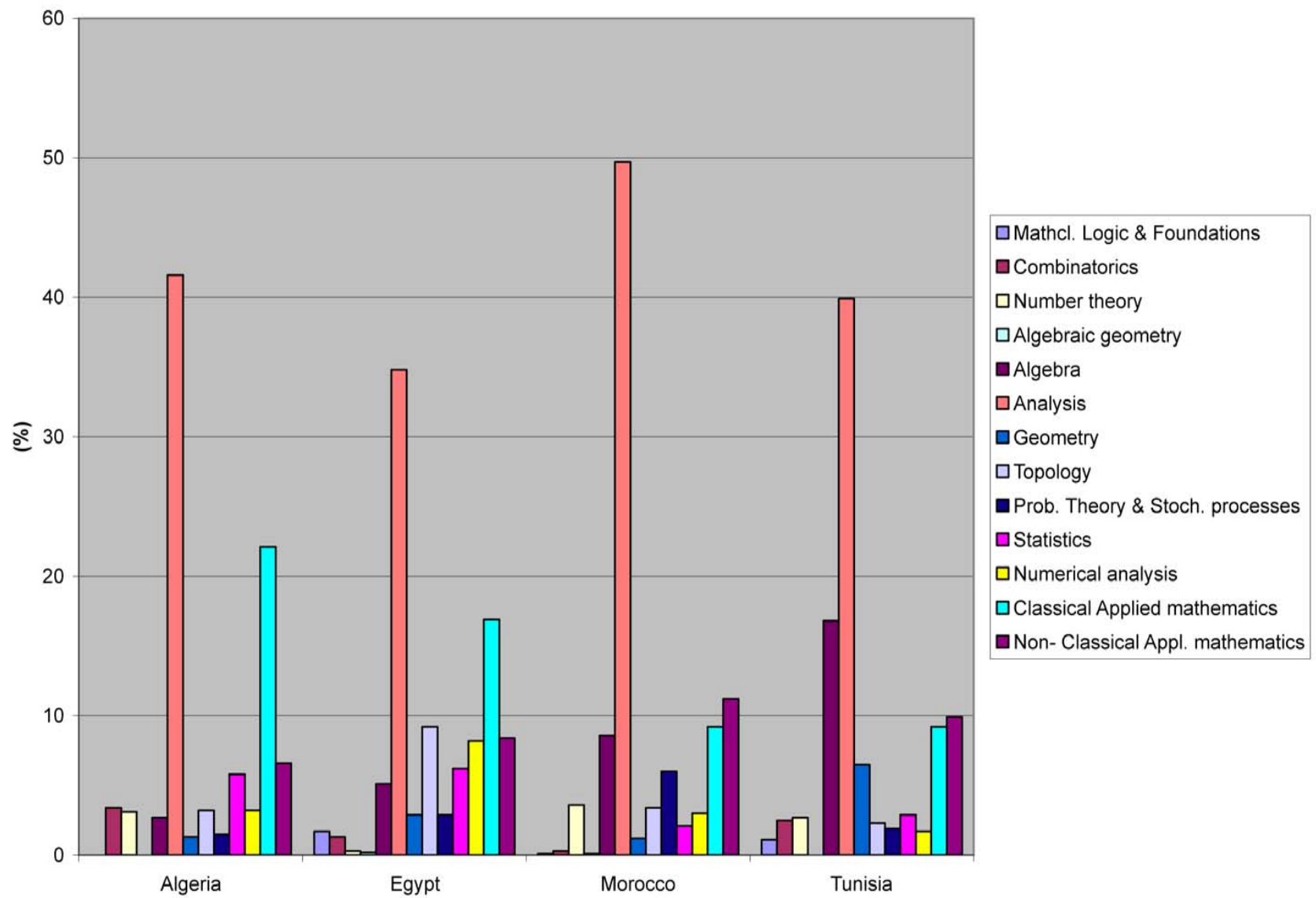


A regional perspective

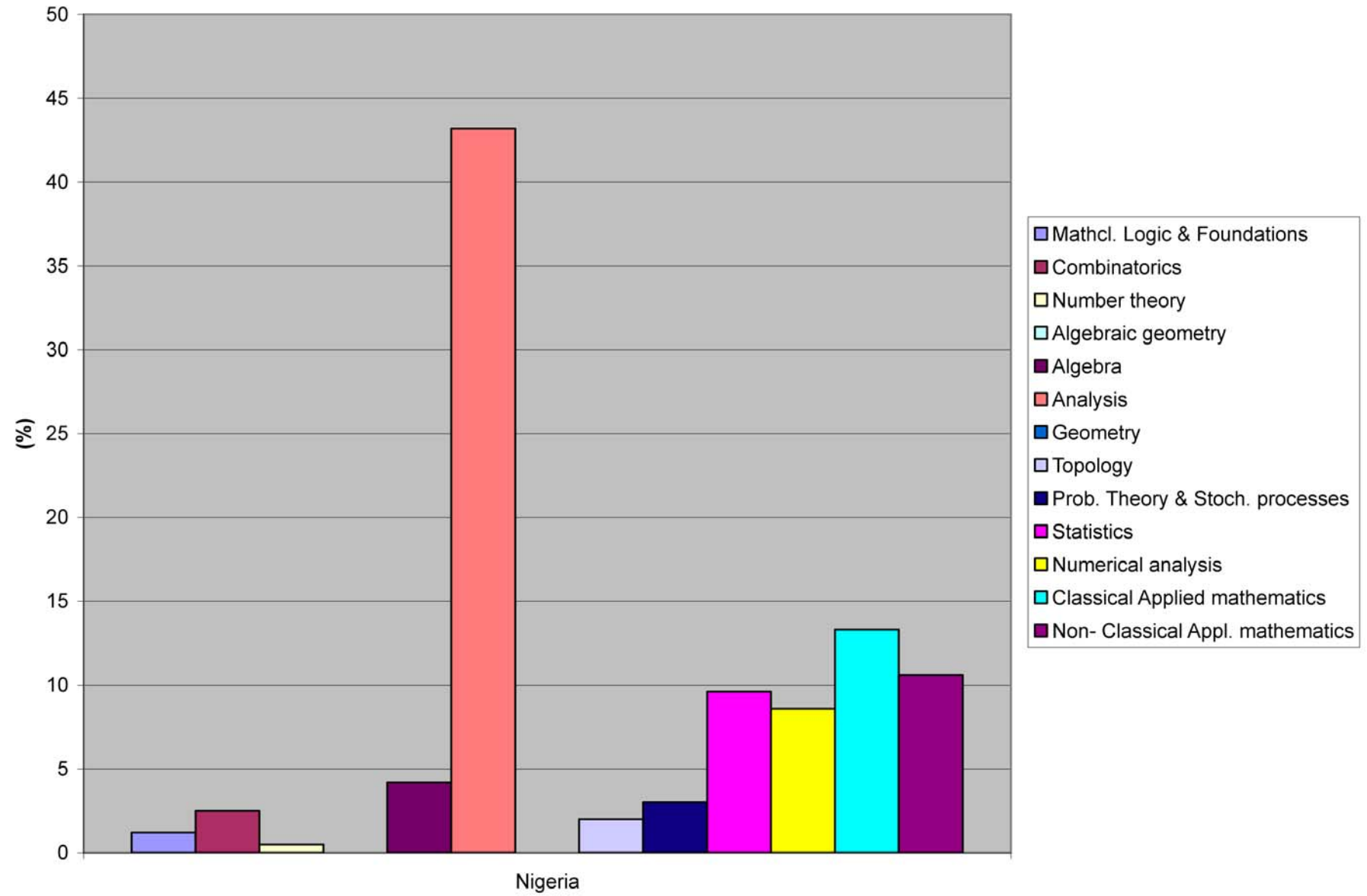


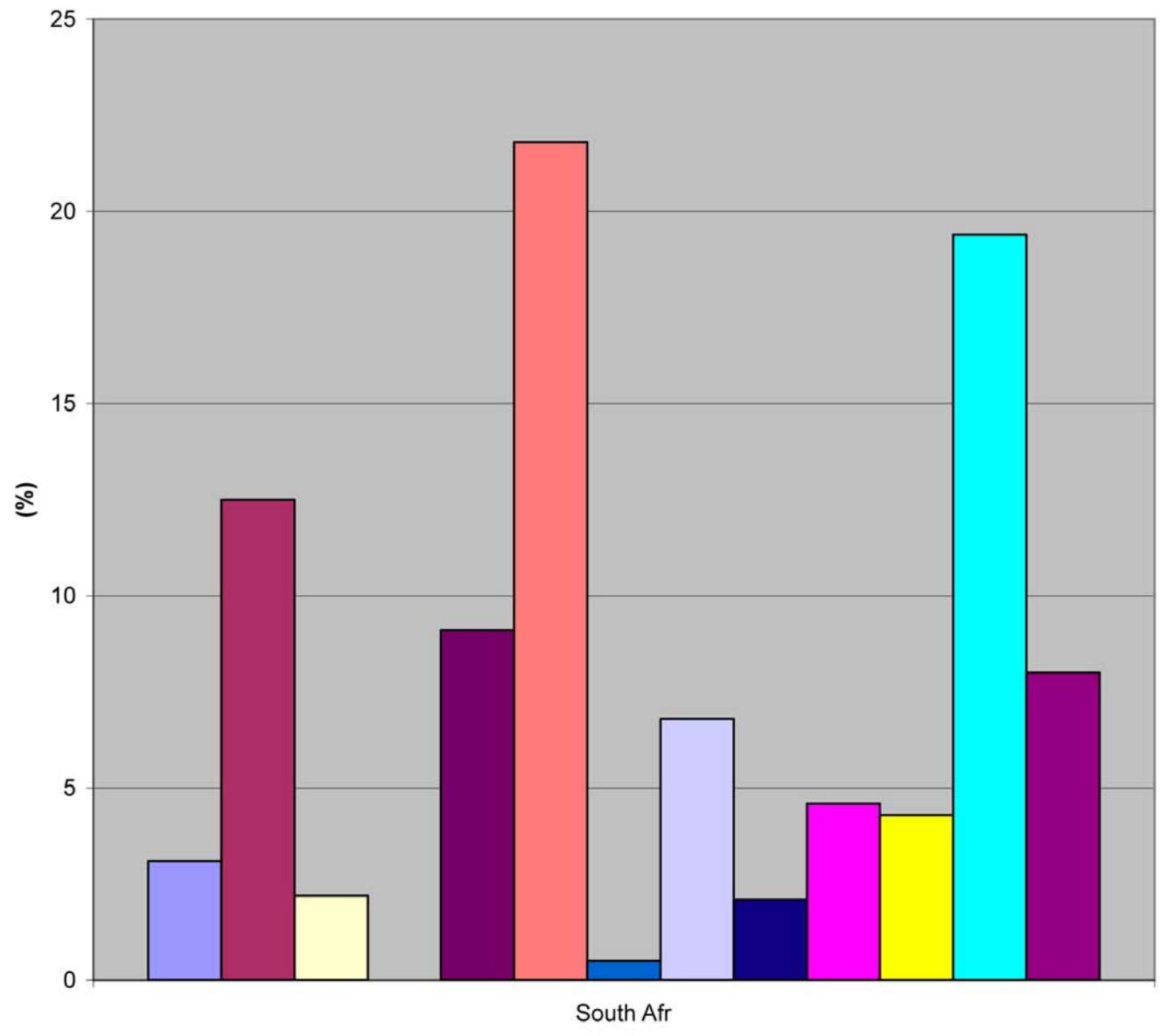
- **African Regions' share of total world mathematical research output, 2000-2008**





Nigeria





- Mathcl. Logic & Foundations
- Combinatorics
- Number theory
- Algebraic geometry
- Algebra
- Analysis
- Geometry
- Topology
- Prob. Theory & Stoch. processes
- Statistics
- Numerical analysis
- Classical Applied mathematics
- Non- Classical Appl. mathematics

mathematical research in Africa



- **Traditional model**
- **African students -----→ Europe, USA**
- **Expensive**
- **Risky**
- **Quality**
- **Maths education**



- **ISP model**

Based at Uppsala University, Sweden

- **1961: Fellowship programme (Physics)**
- **: Project programme**





- **University-based**
- **Supports res. Groups and/or institutions rather than individuals**
- **support is long-term and offered in response to needs as defined by those demanding it;**



- **projects emphasize strengthening local scientific environments (equipment, periodicals, reference texts, consumables, workshops and conferences, postgraduate sandwich training, etc.); and**
- **national programme and may involve institutions in Nordic or other European countries.**



- **Effective**
- **Flexibility of mode of operation**
- **Owners of projects by local partners**
- **Sandwich scheme for training**



- **Drawbacks**
- **Sensitive to political orientation of government of the day**
- **Operation limited to few countries**

New model



- Problem general ---→ Pan-African approach
- Enhances strengths and mitigates weaknesses



- Establish world class Pan-African Centre for Graduate Studies in Mathematics
- How?
- Africa <----- Europe, USA
- Collaboration: African host univ (AHU)
Prestigious western univ. (PWU)

Collaboration governed by charter



- **Role of PWU**
- **Award degrees ---→ programmes, faculty, assessment, infrastructure**



- **Role of AHU**
- **Create environment allowing for sound development of PACM --→ academic and financial autonomy + students' welfare**
- **Provide adequate space for PACM**
- **Ensure long-term commitment of govt. project**



- **Students:** selected from all over the continent (excluding North African countries, Nigeria, and South Africa) based on *merit* and offered full scholarship
- **Faculty:** Vacant positions announced internationally, appointment merit-based



- **Director: Employable as full Professor in both AHU and PWU**
- **Finance: Externally-funded**
- **Sustainability: Campaign launched by govt. host country to establish adequate endowment fund.**