

Women in Science : The Indian Story!

Indian Academy of Sciences, C.V Raman Avenue, PB No.8005
Sedashivanagar P.O., Bangalore 560 080
Tel: 91-80-23612546, 23614592, 23612943 Fax: 91-80-2361 6094
Email: womeninscience@ias.ernet.in



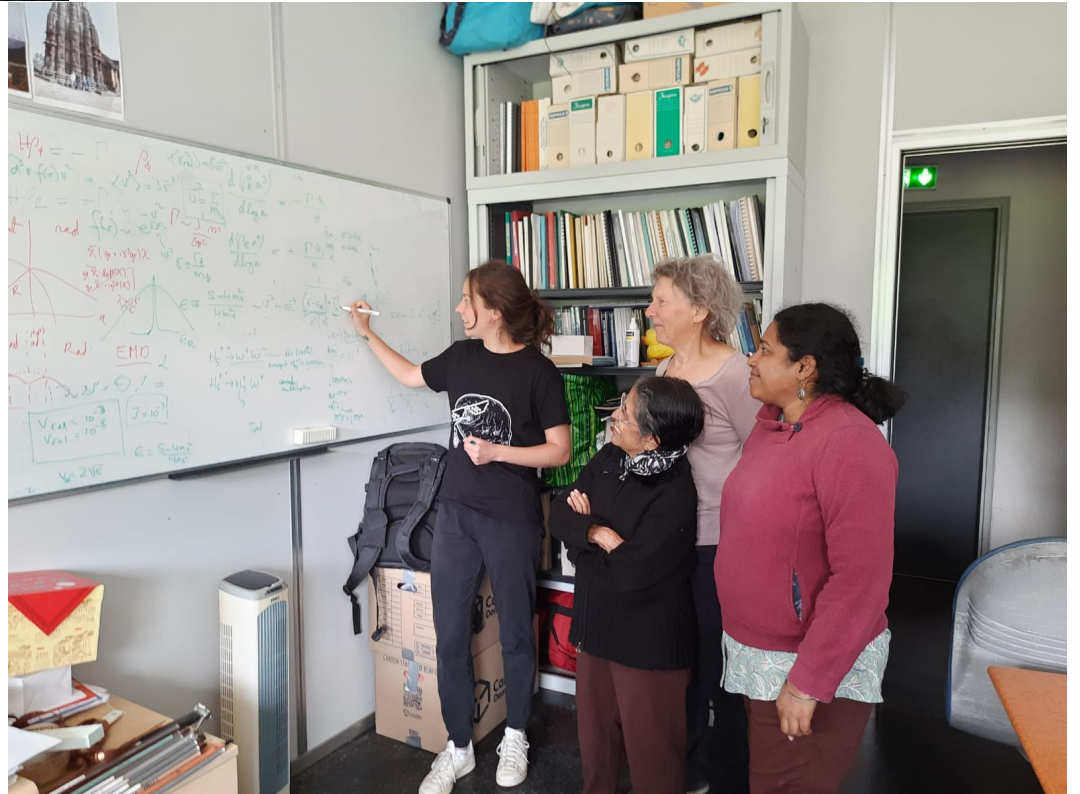
Rohini M. Godbole
Indian Institute of Science, Bangalore, India.

June 7, 2024 @ 





Annecy June 2024



Plan

Why is there a need for mainstreaming gender?

I want to first give my own take on it and then present the Indian story.

A few comments on what are measures of gender equity, how to define goals and how we are trying achieve them in the Indian context.

The issue of diversity (particularly WiS) has many facets, but there are common features which cut across cultures. Hence a cross-cultural discussion can only help.

What will be this based on?

Of course this is based on

- 1) My own experiences in Science as a Woman working in Theoretical Particle Physics over 40 years
- 2) Experiences of my co-travellers , of both genders, in this journey

But not just that

My Locus Standi to talk about WiS

An invited speaker (among 9) at the first IUPAP

International Conference on Women in Physics held in

Paris in 2001 & **involved with the IUPAP group on**

Women in Physics since then.

Involved in bringing out INSA report on '**Science Career for Women in India**' in 2004 .

Founder chair of the WiS panel of the Indian Academy of Sciences in 2006.

Member of the Standing Committee of the GOI for Women in Science.

Experience WiS

Chair of the WiS panel of the Indian National Science Academy and

Member Joint Panel of all the three academies for 'Women in

Science'. *Member also of a similar group for Association of*

Academies and Societies of Science of Asia (AASSA)

Author of survey-report: **'Trained Scientific Woman Power: what fraction are we losing and why?'**

I have been the chair of the thematic working group that looked at

India's Science, Technology and Innovation policy (STIP 2020) from

the point of view of 'Equity and Inclusion'.

Co- Editor (with R. Ramaswamy) books to encourage girls to take up Science: (<http://iisc.ac.in/womeninscience>)

**1) Lilavati's Daughters : Women in Science in India
(Publisher: Indian Academy of Science, 2008)**

**2) A Girl's Guide to Life in Science:
(Publisher: Young Zubaan, 2010)**

Some international connections:

“International career motives, repatriation and career success of Indian women in Science & Technology ” (**Journal of Global Mobility, 2014**). (With Reimara Valk et al, Utrecht Univ. /Tilburg Univ.)

The French Connection

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Events Diary

PAST EVENTS

4th IUPAP International Conference on Women in Physics (https://www.ias.ac.in/public/Resources/Initiatives/Women_in_Science/ICWIP2011.pdf)

This is the first announcement of the conference to be held in Stellenbosch, South Africa between April 5-8, 2011.

Indo French CEFIPRA seminar on "Women in Science"

The Seminar is jointly organized by Indian Institute of Science, Bengaluru, French Embassy in India, CEFIPRA and the WiS Panel of the Indian Academy of Sciences on [February 3-5, 2014](#) at Indian Institute of Science, Bengaluru



Women in Science
An Indian Academy of Sciences Initiative



REPORT

INDO-FRENCH “WOMEN IN SCIENCE” SEMINAR through CEFIPRA

❖ Panel Discussion “Issues of Women in Science: focus Indo French Cooperation”:



Panel Discussion on “ Issues of Women in Science: focus Indo-French Cooperation

cefipra2018wis

INDO-FRENCH 'WOMEN IN SCIENCE' SEMINAR

September 24-25 2018 Paris (France)



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Welcome

Jointly organised by the Indo-French Centre for Promotion of Advanced Research (CEFIPRA) and the Centre National de la Recherche Scientifique (CNRS), this seminar on 'Women in Science' is aiming at highlighting the scientific contributions and achievements of women working in collaborative Indo-French projects. Three years after the seminar held in Bangalore, this is a new opportunity for young women researchers to interact among each other and with experienced researchers. Moreover, gender equality issues will be addressed in three specific panel discussions.

Science and Diversity

Diversity (racial, gender, geographic) among practitioners of science is small across all sciences. Is that necessarily bad?

Yes. it is certainly not the optimal use of humanity's intellectual potential. Diversity can only be good for science, as for any creative activity.

Not clear how this point can be 'proved'....but enough pointers exist which are very compelling

More pragmatic reasons in Indian Context

*Changing economic realities mean, **at least in India**, that the number of women participating in science is going to increase **even more**.*

Almost always women move in to take over a vacuum.

*Important to discuss what efforts will make this more efficient and more effective! **Not just to create historical wrongs!***

There are also connections to development and gender inequity has economic dimensions too! So there are very pragmatic reasons for gender equity.

Diversity and Excellence in S&T

Gender Equity in general makes pragmatic sense. To the extent Science impacts Development discussions for Gender Equity in STEM makes sense too!

But that is not all!

Diversity increases the dimensionality/complexity of the STI ecosystem further. STI is the beneficiary. *Achieving equity and inclusion is not to be done ONLY with a sense of correcting a historical wrong or charity to poor women so that their creative abilities get expression.*

Backgrounds impact what we do and how?

The first woman doctor from India to get her degree in the USA, **Anandibai Joshee** did her thesis on gynaecological problems of women because she herself had lost a child at its birth, when she was 14!

Another interesting news item (research by **Joy Boulamwini**) Facial recognition programs are accurate only if you are white! Likely wrong as much as 35% if you are an african-american, woman

So how do we go about having Equity?

We need to know the problems!

Issues specific to discussion Gender Equity in WiS

In science as opposed to other professions there is gestation period after getting the degree of Ph.D. when one has to establish one's own niche in research. **Beginnings are crucial.**

It is also the time when one **should** start family and **set up** personal life! At least in the Indian context this has very strong implications.

This is unique to science. I mean family and career balance is common to all , but the simultaneous clicking of **body clocks** and **clocks of science** is special for WiS.

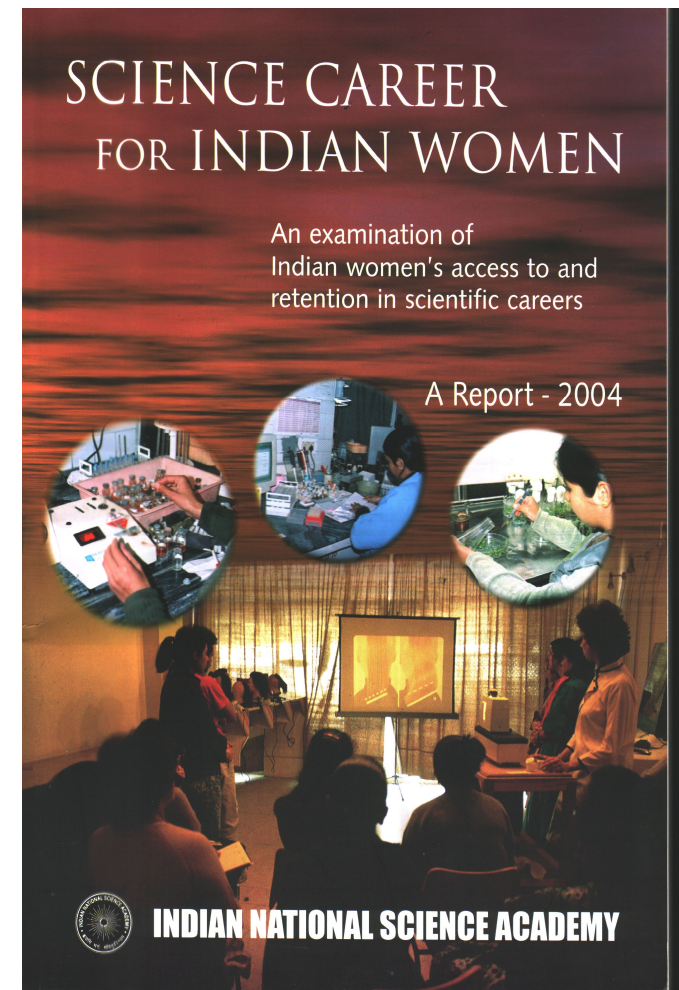
Sources for my numbers

1) A report brought out by the Indian National Science Academy (INSA) (**Mehtab Bamji, Rohini Godbole, Vinita Bal**) The report led to formation of a DST task force for women in Science.

2) The DST Task Force report,

Ed: M. Bamji.

This led to the formation of Standing committee on WiS of then Government of India.



Sources for my numbers



*Association of Academies and
Societies of Sciences in Asia:
AASSA report*

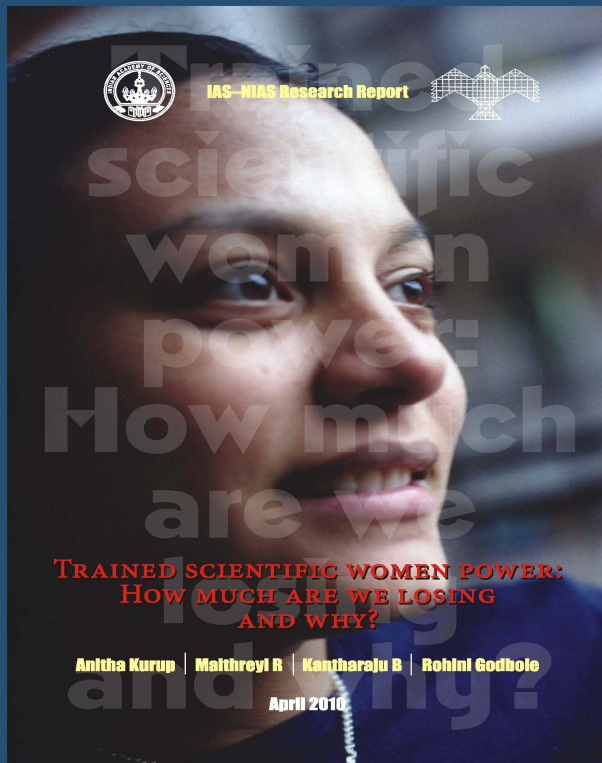


*India Report prepared by
Rohini Godbole and R.
Ramaswamy*

Sources for my numbers

Survey report is available from the web page of the WiS Panel:

http://www.ias.ac.in/womeninscience/surveyreport_web.pdf



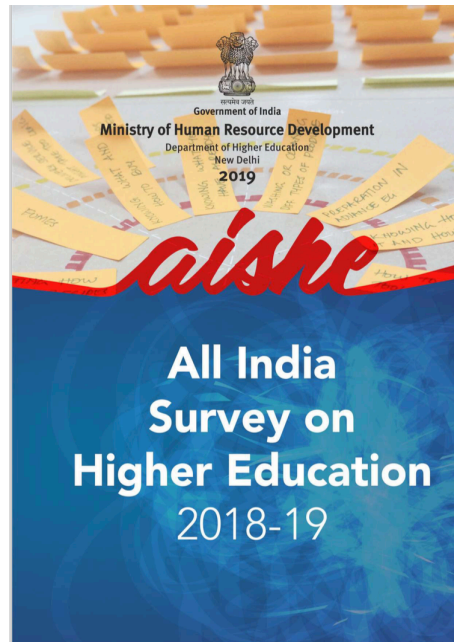
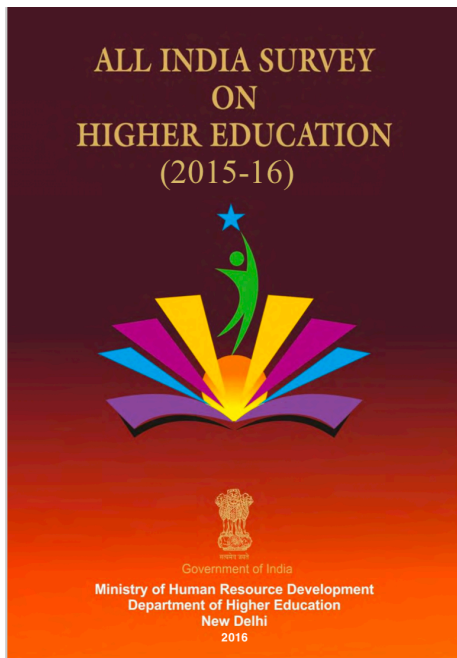
*Trained Scientific Woman Power:
How much are we losing and
Why?*

*A joint project between natural
scientists and social scientists.*

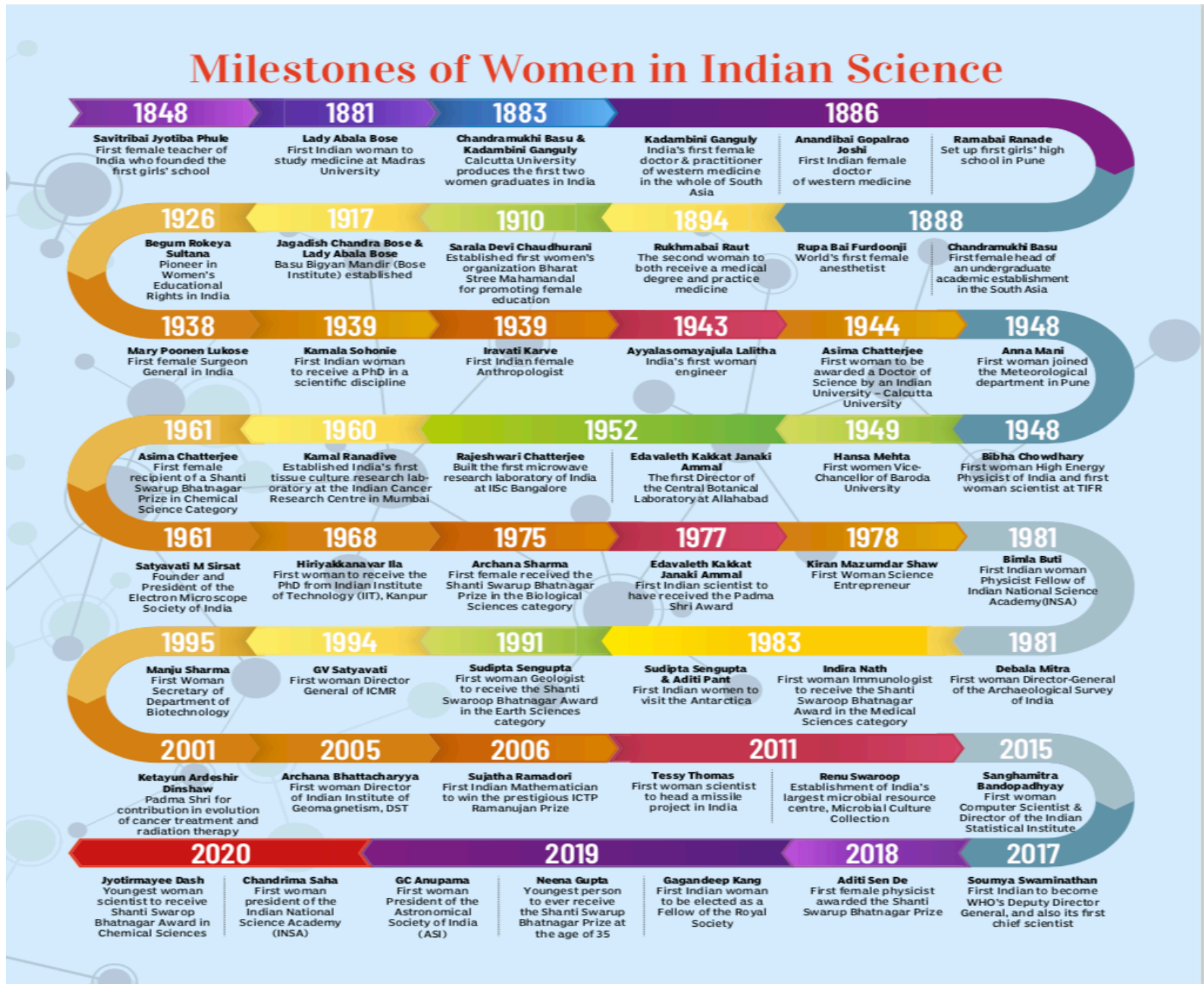
All India Survey of Higher Education

From 2013 there have been the surveys of Higher Education (<https://aishe.gov.in/aishe/gotoAisheReports>).

Not focussed on Science only and more on Higher Education. Includes studies of diversity and in particular women's participation in Education



Pioneers : without them we wont be here



Innate Abilities: Indian stories

At least in academia women are not perceived as being incapable of intellectual attainment in mathematics or science (many university prize winners in science are women). We dont seem to have our Larry Summers

But we still dont seem to be exactly inundated with women doing science!

Advance Summary (1)

India's record not too bad in recognizing the obvious obstacles. The commitment by governments toward this is high.

At Institutional levels there are not enough enabling processes to handle some of the obvious obstacles yet. Things are in progress. (IISc promotion policy)

Academics and academies have been proactive in holding training programs and mentorship programs.

'Indian Academy of Sciences' has recently brought out a statement expressing its commitment to Gender Equity and is now on its web page.

Advance Summary (2)

We learnt from the comments of Lilavati's Daughters as well as the respondents of the survey who left science AFTER a Ph.D. 'invisible bias' as an extremely important obstacle.

Recognition of this 'invisible bias' needs to permeate much further. Even understanding how the invisible bias works in the Indian context needs to be studied academically.

The proposal of developing an 'Equity and Inclusion' charter in STIP-2020 and having an 'Equity and Inclusion office' for each Institutions/govt department etc. will go a long way towards beginning to address this issue.

Women in Education

Table 2. Growth in % of women in university enrolment

Year	Total enrolment	Women (%)
1950-51	396,745	10.9
1960-61	1,049,864	16.2
1970-71	1,953,700	22.0
1980-81	2,752,437	27.2
1990-91	4,924,868	29.2
2000-01	8,399,443	39.4

Women in STEM Education

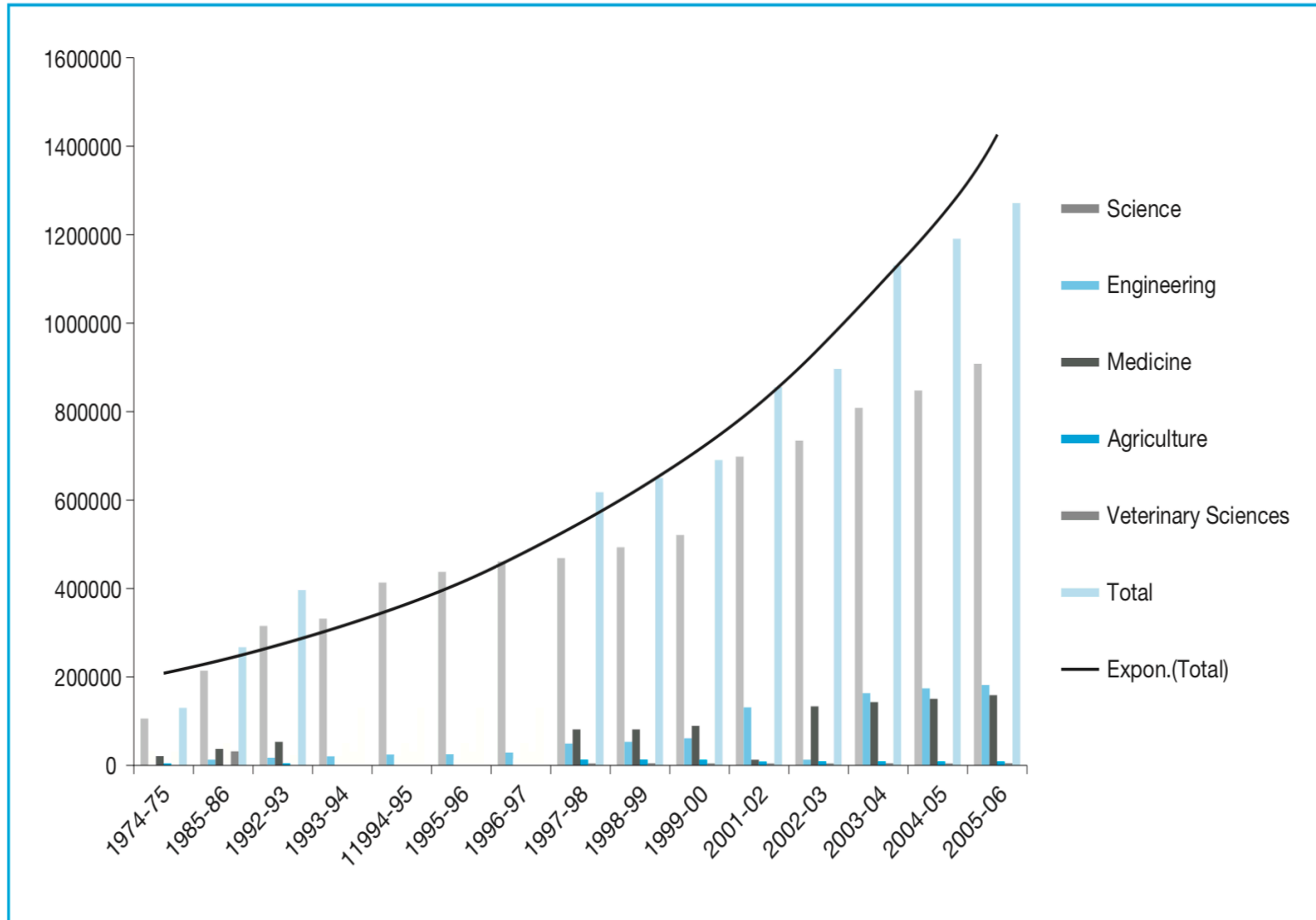
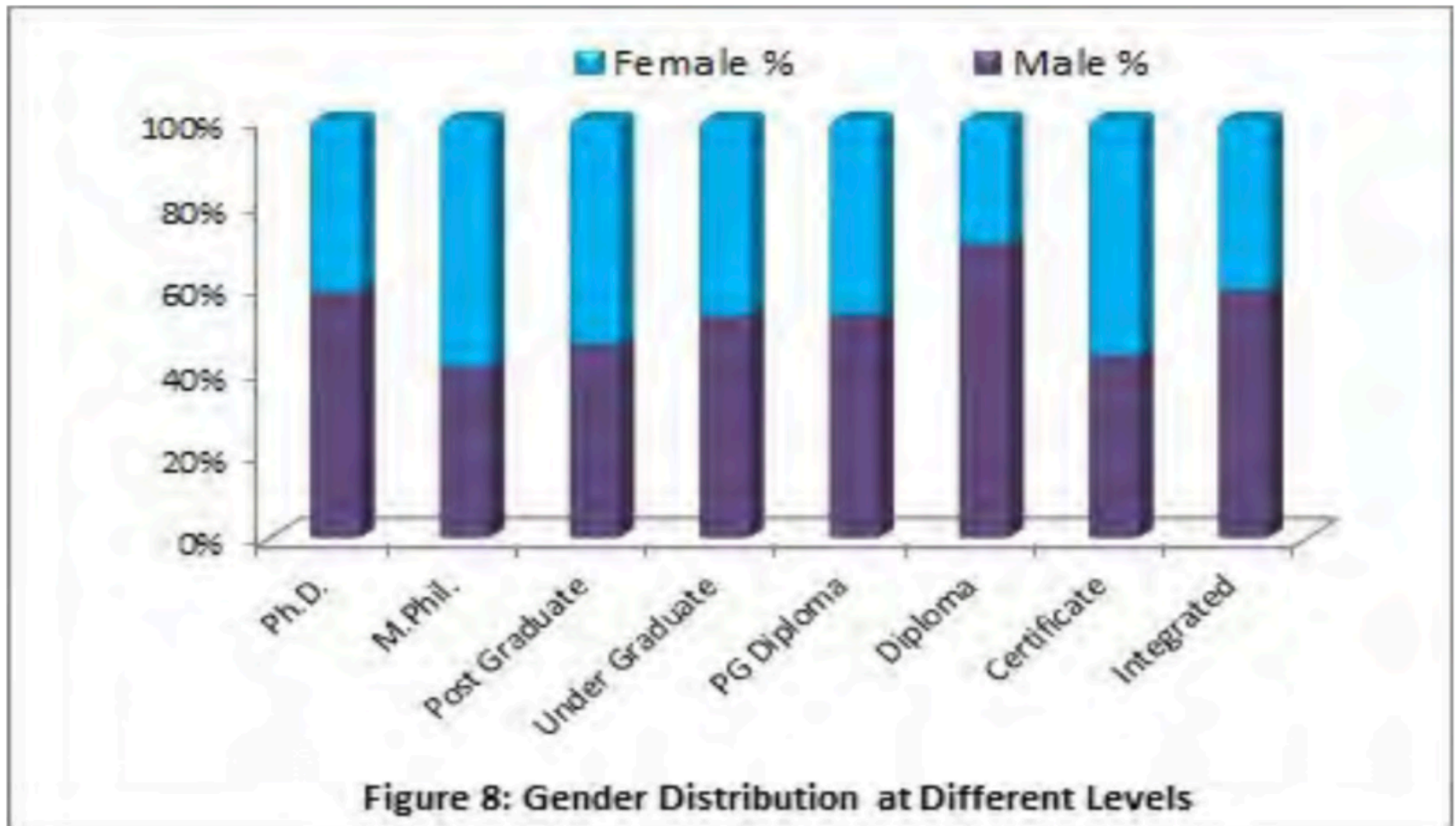


Figure 1. Growth in the absolute numbers of women with access to University education in STEM subjects from 1974-1975 to 2005-2006 [13].

Higher Education: More recent



Women's share in Education (further)

I could present also present numbers of women's share in teaching positions in Institutes of Higher Education That too will look quite good.

In fact, the AISHE Webpage will show you that the Gender Equity Index in Numbers is 1.0.

BUT....

Interpreting numbers is tricky and THE DEVIL IS IN THE DETAIL.

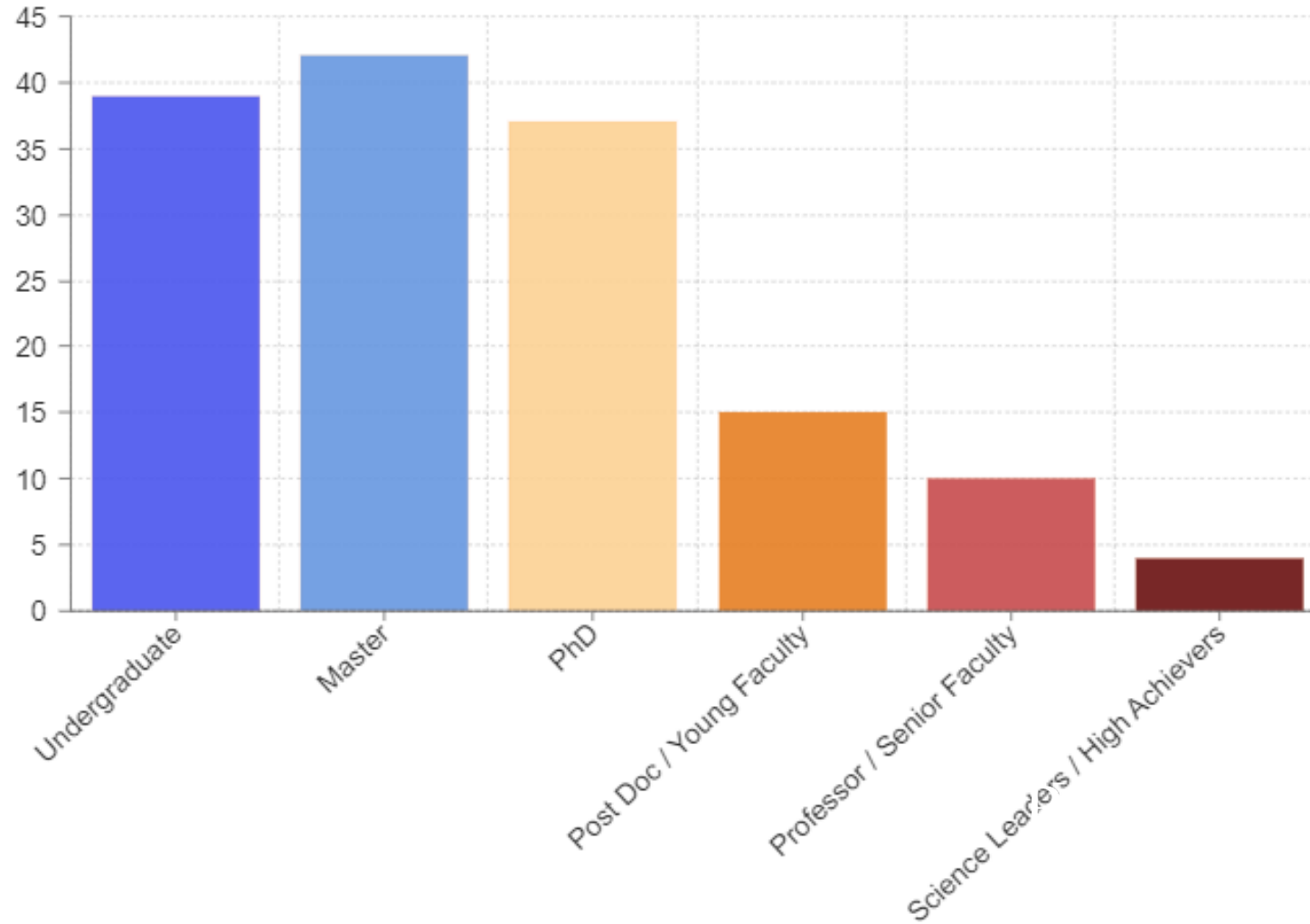
Some are more equal!

Share of female students is lowest in Institutions of National Importance followed by Deemed University-Government and then State Private University (24.7% compared with 43%)

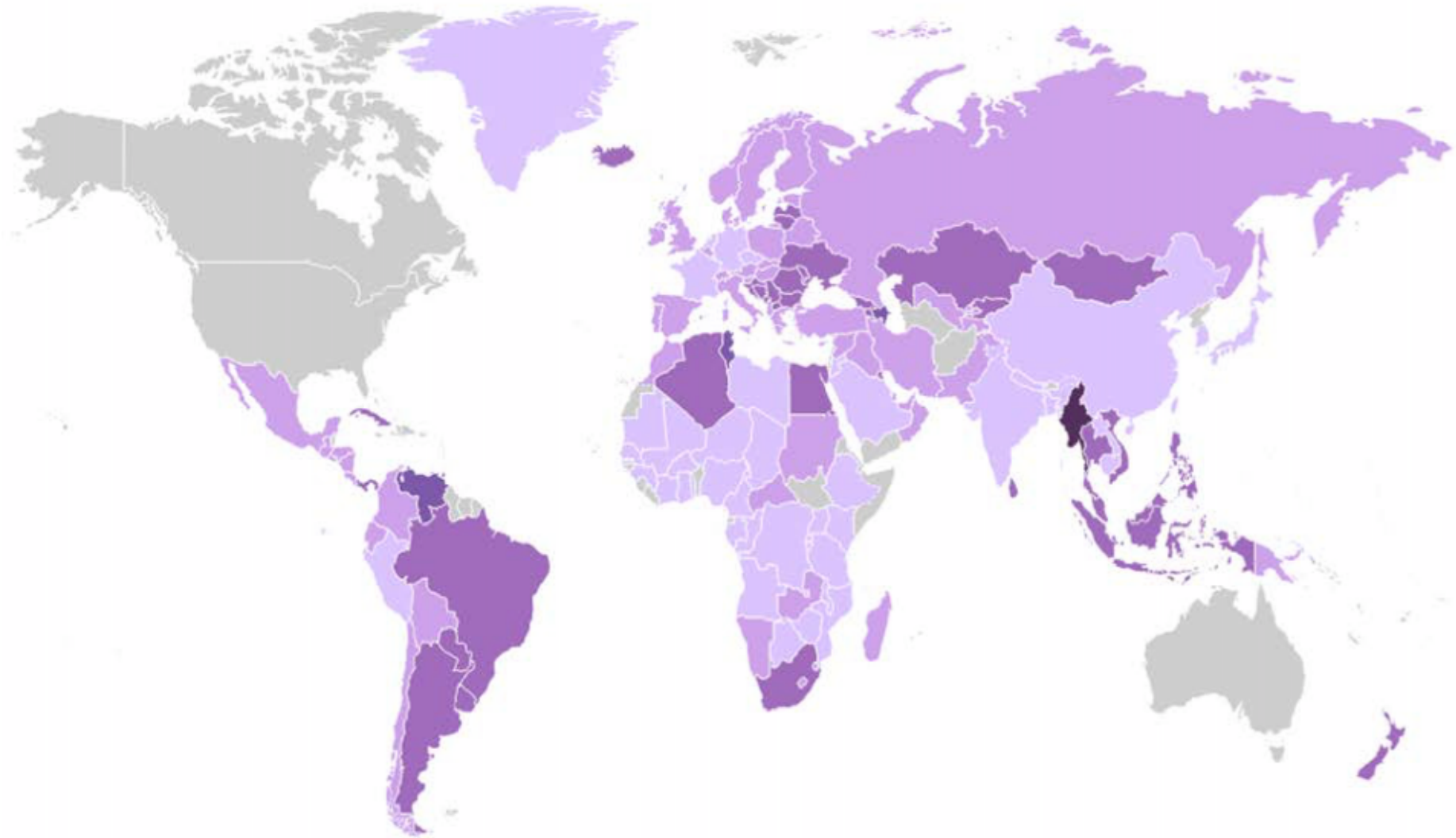
Similarly, the Gender ratio in Faculty is also more skewed as the Institutions' perceived level increases as well as the position in the hierarchy. (24 % to 15 % in professor's position for example)

Fraction of Women Professors, Directors, Deans, V.C.s etc. not equitable!

Women's share: Science careers



How do we compare with the world? (Unesco report-2019)



70.1%-100% 55.1%-70% 45.1%-55% 30.1%-45% 0%-30% No data

Women's share: Science careers

The presence of women students in Schools and Colleges high and their level of achievement high

However, fraction of Women doing Science is rather small

Serious leakages in the pipeline from college to university to scientific careers

Women's share: Science careers

Numbers decrease with level of Institution.

For example IIT's, IISER's, IISc: fraction of women students lower than Universities.

Same is true for faculty at prestigious universities and institutions! (Already told you this in the context of AISHE report)

Women's share: Science careers

Representations in science academies (about 5-7 %) fraction in prestigious awards are low (like 2 %) too.

Only two women academy presidents in 75 year history of three science academies.

*Many of the major science institutions have NEVER had a woman director! **Situation changing now!***

India is a land of contradictions . I will give an example for the academies.

Some things are better in India

Royal Society founded in 1660. Lonsdale and Marjory Stephenson elected in 1945. In 1979, Yvonne Choquet-Bruhat was the first woman elected to the French Academy of Sciences founded in 1666. Florence Sabin (1871-1953), elected in 1925, was the first woman member of the NAS (1863)

Whereas Janaki Ammal was a **Founding** Fellow of the Indian Academy of Sciences in 1934. Also the first director of Zoological Survey of Independent India.!

But first woman fellow, for example, in Physics division was elected in 1975 for one of the academies and in 1992 in the other!

Reasons for needing a cure!

Indian problem: *development* of human resource and human resource *deployment (for women)* !

Apart from losing the **advantages** that **diverse** work force brings, this is **pragmatically also** problem of **low return on investment**.

A country committed on path of innovation based progress can not afford this **'brain drain'**! **Loss of trained scientific human resource needs to be plugged!**

Challenges for an effective deployment of WiS

Obvious and visible:

1) **The ticking clocks of science and body:** The time period where one has to establish oneself in a research career and develop a niche is **ALSO** the time when biological clock is ticking.

2) **Negotiating career and family balance :**
Controlled by social conventions and expectations.
Expectations from the society, family as well as expectations from women themselves which are reinforced due to training. **These are stronger in the Indian contexts. Marriages are settled by the family still.**

Is this all?

Perception:

This is the one and only problem. Once we sort it all will be well.

Reality:

It is necessary but not sufficient.

Two pronged actions

1) Societal, Mind set etc.

Creating awareness that it is not impossible to maintain a career/family balance needs to spread to **parents**, the **family** and **colleagues** so that this is an acceptable option. **Sensitize the parents and co students alike!**

In India some efforts have been made but much more needs to be done.

Two pronged actions

2) Policy:

Many Policies exist in India to come back to a career after a break and have mobility schemes (directed only at women).

Policies needed to address gender imbalance from an early age: including proactively young girls in programs like Science Olympiads or INSPIRE (a recent initiative of the Department of Science and Technology). Offer financial independence through fellowships.

(Again some steps have been taken)

Inclusion of gender issue in STIP-2020

In India S&T ecosystem now the Importance of Equity and Inclusion in STEM is fully appreciated and Science Technology and Innovation Policy -2020 has a separate chapter on 'Equity and Inclusion'.

This chapter has recommendations for the policy actions to achieve Gender Equity.

I will come to that in the end after describing what are different actions that have been taken by government departments as well as academies.

Issues special to India.

India is many countries in one and therefore the optimal action plans have to be tailored differently in different parts of India and different sectors of the society

We need policy changes as well as changes in societal level.

Gender divide : Issues to be tackled are not always the same in rural vs. urban and hence solutions too are different.

Government programs (for students)

The Government S&T departments have many programs to boost students in STEM programs (Manad), women students in particular (Vigyan Jyoti) or boost the number of women students in the prestigious IIT programs (Supernumerary position),

Programs of DBT and DST to promote young women in Science careers etc. These are all necessary but not sufficient.

Government programs

Department of Biotechnology: DBT

A large number of similar enablers, schemes mostly to encourage young women to come back after a break.

Special schemes oriented towards biotechnology particularly successful.

Enablers: Governmental Schemes

The department of Science and Technology has been very proactive and started a 'Woman in Science (WOS) schemes around 2001.

WOS(A):

Directed at those who had to take a break in career. Research and travel grant + Fellowship for three years. In the first three years 600 fellowships were awarded.

WOS(B) and WOS(C): for retooling, retraining and entrepreneurship

Now the scheme has been operation for almost twenty years.

Effect of these efforts?

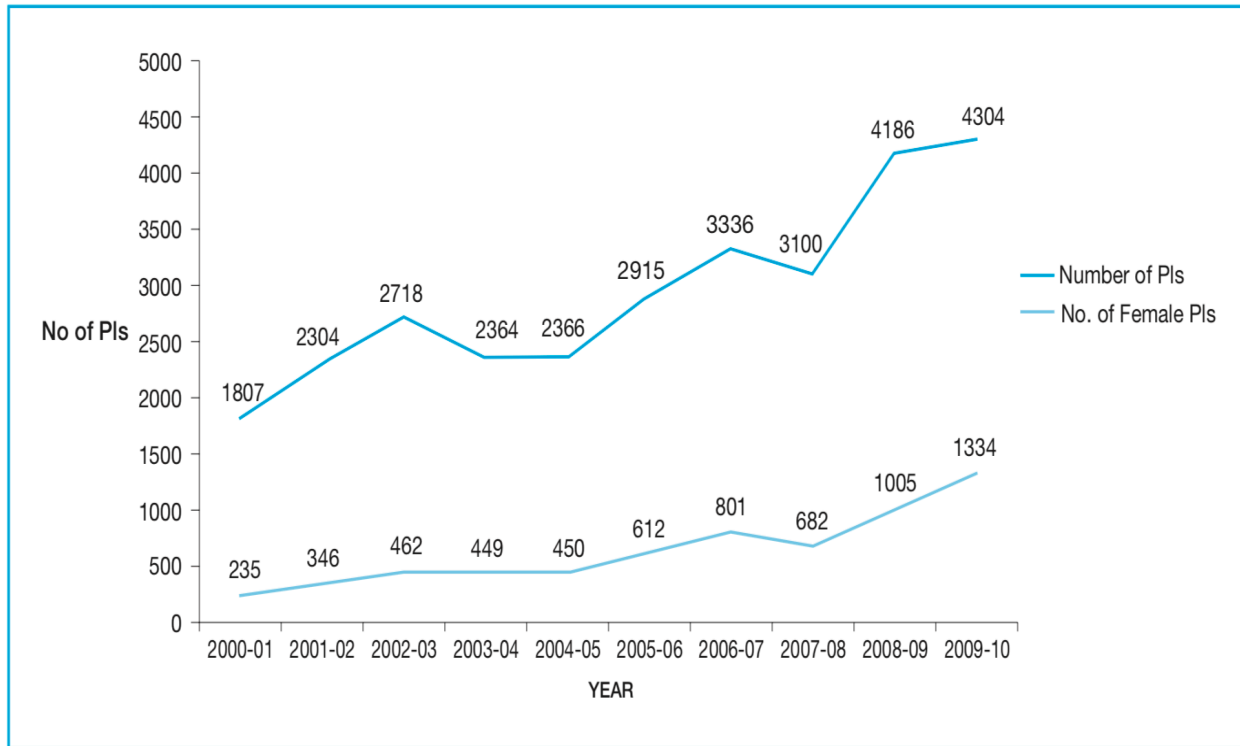


Figure 7. Gender participation in R&D projects supported by central S & T agencies, taken from the DST Annual Report 2011-2012 [14]

Effect of special schemes started in 2001 by the department of science and technology, DST. But these are basically soft money positions.

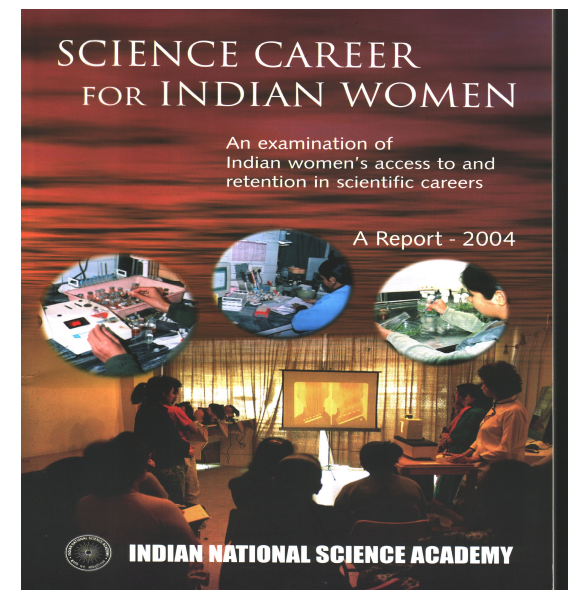
Efforts by the Academies.

[url:http://www.ias.ac.in/womeninscience](http://www.ias.ac.in/womeninscience)

The Indian Academy of Sciences constituted in 2005 a "Women in Science" panel to examine these questions in the Indian context.



The Indian National Science Academy had parallel effort, as did the Department of Science and Technology, with different emphases.



Action on behalf of Societies

Since I am at a Physics Institute I will mention the efforts in Physics and Astrophysics.

The Astrophysics and Astronomy community is very active in the context. **ASI (Astronomical Society of India)** has a **Working Group on Gender Equity (WGGE)**.

The IPA has a **Gender in Physics Working Group (GIPWG)** since a few years and have been active.

Have formulated 'Hyderabad Charter' on gender equity in an International meeting. Just two days ago they held a common IPA-APS seminar on Gender equity. **Have brought out special issues of IPA's bulletins authored ONLY by women authors.....**

Efforts by the Academies.

All the three academies have come together in 2010 and have formed a common panel for women in science.

This panel has been reconstituted in 2020 and has formed a number of Task Forces and is proceeding on many fronts right now in terms of extending the data base set up a decade ago by Indian Academy of Sciences as well as a new database set by the DBT.

Role Model Programs

Initiatives:

1) Role Model programm:

Brought out book of (auto) biographical sketches of about 100 women Scientists:

a) Lilavati's Daughters: Women Scientists of India.

b) DST brought out a book called "The Balancing Act"

Now there are more such books : (for example)

"31 Fantastic Adventures in Science: Women Scientists in India"By Asshima Freidog and Nandita Jayaraj.

Role Model Programs

Initiatives:

*2) Holding a series of workshops for career in science!
(Both NASI, IASc) (Women in Science : a career in
Science: IASc workshops)*

*3) DBT, DST as well as CSIR also hold special workshops
for 'women' for leadership training and encourage young
girl students.*

Role Model Program



We felt that rather than look either to world history or to our own history for scientific heroines for inspiration, it was necessary to tell the story as it is **now!** Started in 2006 and published in 2008. Reprinted 5 times

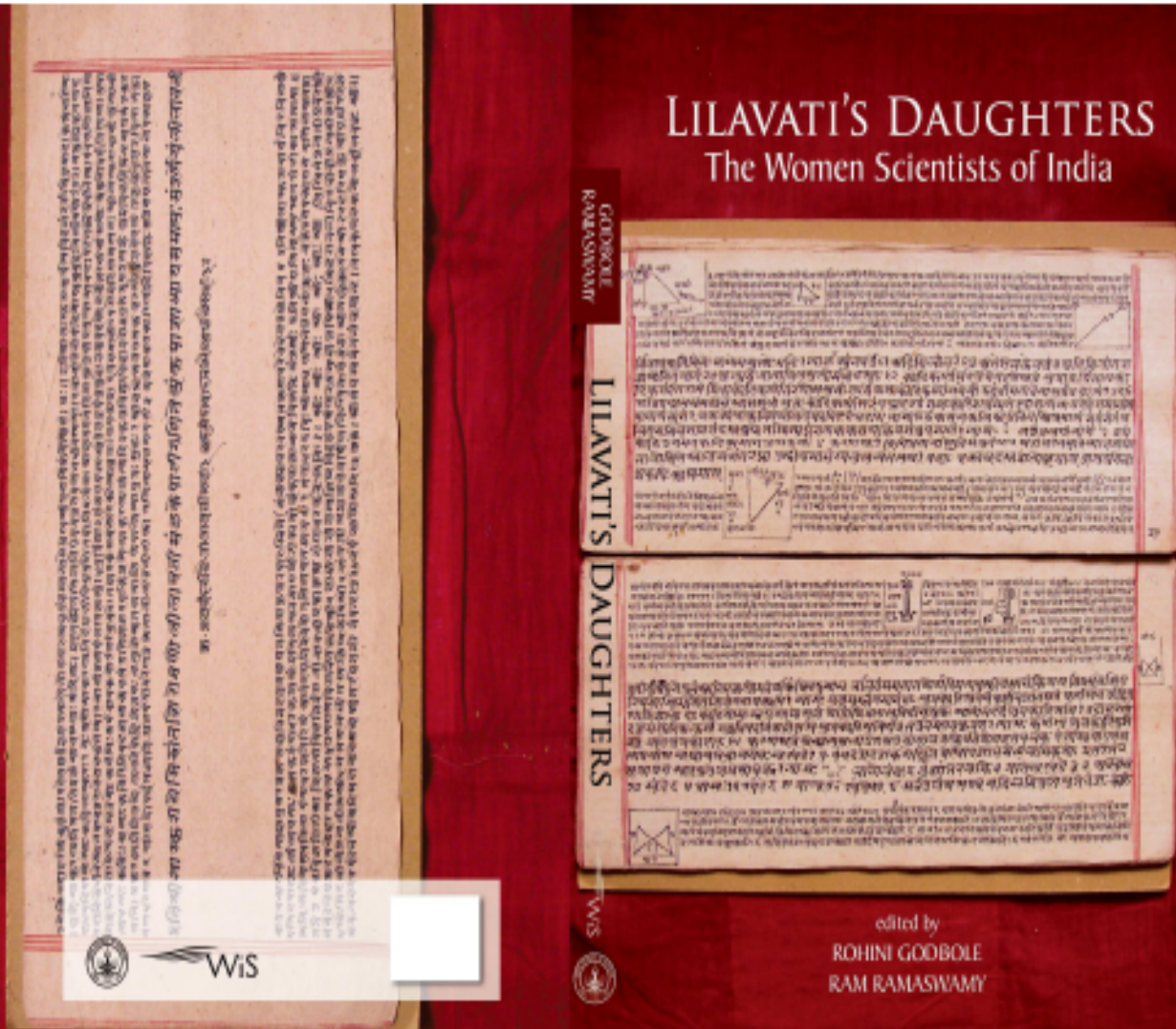
What does it take to be a woman scientist in India TODAY?

We invited about 200 women of achievement and profiled about 100 of them. All from our modern history.

Similar to program of Royal Society which put together stories of women on its webpage.

The book is available from Indian Academy. DST supported distribution of this book to schools and colleges, **Translations in some local languages.**

to science, what kept their interest alive, and what has helped them achieve some measure of distinction in their careers. The young student with research ambitions will find this an important collection where she or he can learn first-hand of women who functioned and achieved their goals in the Indian social and academic environment. We believe that others will also find the essays to be of value and interest for what they say. And also for what they do not say...

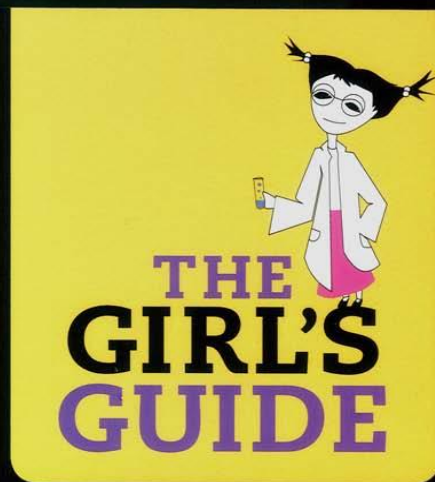


The Lilavati is a twelfth century treatise in which the mathematician Brahmagacharya addresses a number of problems to his daughter, Lilavati. Although legend has it that Lilavati never married, her intellectual legacy lives on in the form of her daughters- the women scientists of India. What makes a successful career in science possible for a woman? We believe that the many answers to this question can be found somewhere in the essays written by Lilavati's Daughters. This collection of biographical and autobiographical sketches is one of the initiatives of the Women in Science (WIS) panel of the Indian Academy of Sciences, Bangalore. Covering a range of disciplines, in these essays about one hundred Indian women scientists talk of what brought them



WIS
edited by
ROHINI GODBOLE
RAM RAMASWAMY

Mentorship programs of the Academy



THE GIRL'S GUIDE

TO A LIFE IN



EDITED BY
Ram Ramaswamy
Rohini Godbole
Mandakini Dubey

**A book for girls :
contains a small
description of the
Science done by
women whose
stories are in the
book .**

**They also discuss future
challenges in their area.
Stories of 25 women.**

India many countries in one!

Karnataka Govt. has launched a program called 'Chetana' for young girls from rural areas.

A cohort of about 280 was chosen and are being mentored for two years. SAMSUNG and INFOSYS supported part of it financially. IISc hosted a group for ten days exposing them to STEM subjects and widened their horizons.

Given India's rural population efforts of this kind need to be widened. (Tata group companies are looking into a similar effort in collaboration with the DST/British High Commission)

Encouraging Women Students

Fraction of girl students in the Indian Institutes of Technology (IIT) is small . It has special entrance exams and special preparatory coaching classes!

Govt. has created additional student positions as well as a month-long sensitization programs are held where women students spend a month at different IIT's

At the same time in Indian Institutes of Science Education and Research which do not have a special entrance examination the fraction of girl students is higher than in IIT's without any special measure! (Food for thought)

Lessons from Lilavat's Daughters.

Parental (and in-law) support.

Strong role models in schools and colleges, usually female.

Help during early career, especially for raising children.

Mentors, senior colleagues.

Chance.

These observations can then direct us to possible actions for retention and the aim is to remove Chance from the list!

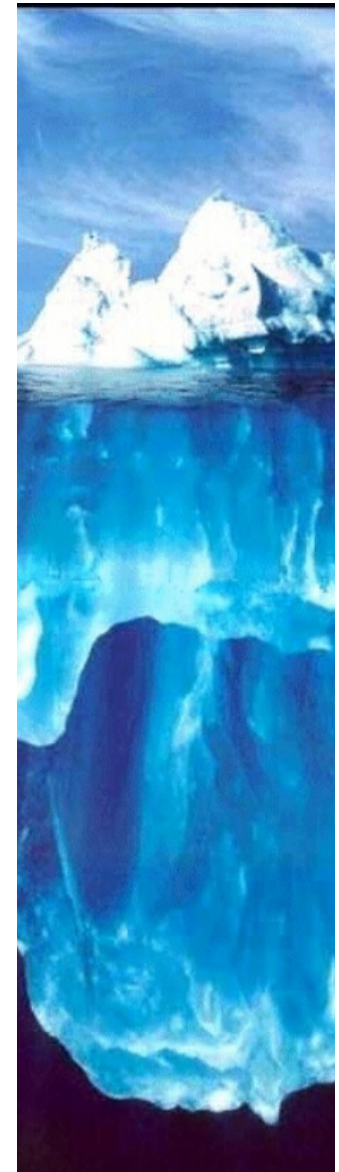


Societal & Familial Pressures

- “My husband did not want me to go away for a long time but somehow I could convince him...”
- “I fought a lot to convince my parents about the importance of going abroad for post-doctoral studies ... it was not common for a girl to stay on her own in distant places.”
- “I got married though I was not keen to get married, I had to fulfill my parents’ wishes.”
- “Upon the arrival of my son, I found it very hard to devote myself full-time to research.”
- “...my husband, a well-known astrophysicist, respected my wish to study mathematics, though he too did not wish me to prioritize career over family.”

The Chilly Climate

- “Not having a loud voice or aggressive personality is confused with not having confidence in one’s work”.
- “ I often heard my productivity dismissed as ‘She just writes many papers’, and my several single author papers seen as evidence of some kind of ‘inability to collaborate’.”
- “But how ... naturally do colleagues see a woman wanting to do physics as doing it primarily for ‘time pass’ until succed[ing] in finding a spouse.”
- “...whenever I applied for a job, the four-year gap [to have children] came up as a negative point.”
- “It was almost impossible for me, a woman scientist in a male-dominated field, to get nominated for prestigious awards...”
- My interest in ... research was not taken seriously by too many of my colleagues.”
- “...women are not as much a part of academic networks, which are important in furthering careers.”
- “A woman is expected to be docile and not ask too many questions.”



Loss of trained scientific women power

This problem is really serious. Survey report ready and available at the [WiS](#) web page.

Only 3% of those who have dropped out, **said they dropped out due to family responsibilities.**

66% said they did not find jobs commensurate with their expertise!

Transparency in jobs, women friendly practices such as creches and on campus housing can go a long way.

Policy changes are happening

Major policy changes are being initiated.

But most are limited to providing re-entry possibilities or follow the spouse (so to say) and still continue engagement in science 'after a fashion'. **Important to introduce 'gender neutral' interventions.**

Current measures presupposes that responsibility of navigating family and career is to be shouldered by woman alone! This needs to change!

Actions: simple and immediate

Simple things to implement (included in our recommendations)

1) A good creche on every campus (**has happened**)

2) High priority to young couples for on campus housing (**beginning to be taken seriously**)

3) Proactive hiring policies for helping couples manage dual careers. (**This needs more work**)

4) Encourage and reward excellence shown by women (**some schemes exist**).

Actions: simple and immediate

Simple things to implement (included in our recommendations)

1) Consider academic age while hiring and NOT biological age! In fact not just for hiring but all career advancement scheme. Recommended in the current Science, Technology policy. Implemented by some institutes to some extent.

2) Improve work climate: including harassment issues. The last has now started receiving attention.

Summary(1)

India's record not too bad in recognizing the obvious obstacles. The commitment by governments toward this is high.

At Institutional levels there are not enough enabling processes to handle some of the obvious obstacles yet. Things are in progress. (IISc promotion policy)

Academics and academies have been proactive in holding training programs and mentorship programs.

'Indian Academy of Sciences' has recently brought out a statement expressing its commitment to Gender Equity and is now on its web page.

Summary (2)

As was apparent from the comments of Lilavati's Daughters as well as the respondents of the survey who left science AFTER a Ph.D. 'invisible bias' as an extremely important obstacle.

Recognition of this 'invisible bias' needs to permeate much further. Even understanding how the invisible bias works in the Indian context needs to be studied academically.

The proposal of developing an 'Equity and Inclusion' charter in STIP-2020 and having an 'Equity and Inclusion office' for each Institutions/govt department etc. will go a long way towards beginning to address this issue.

Policy changes are happening

Necessary to continue analysis of the situation to identify crucial policy changes. Involve women in Science in making these policies!

Some changes need to be mandated by govt. but in some cases the institutions have to come out to charter new paths! Happening but not enough!

Many actions at the levels of Institutions are required
More attention to be paid to **'invisible bias'**

Indian version of Athena-SWAN charter

GATI : Gender Advancement for Transforming Institutions

The *GATI* Charter (Provisional)

The *GATI* Charter is based on ten key principles. As a signatory to the Charter, we believe that it is a moral imperative for all institutions to provide equal opportunity to women, particularly those in Science, Technology, Engineering, Medicine and Mathematics (STEMM) areas, at all levels. By being a part of this progressive charter, we commit to adopting its guiding principles within our policies, practices, action plans and culture for transformative change.

A long way to go

Successful implementation of many policies require both Institutional processes and change as well as change in societal processes and mindset. Appreciation of 'invisible bias' needs to grow and so also measures to avoid it!

Commitment from different structures is necessary

That can come only from creating awareness

Awareness that this is beneficial not just for women but also for science and that it makes pragmatic and economic sense

In the words of my colleague Prof. R,
Ramaswamy, (ex) President Indian Academy of
Sciences:

*A real commitment to gender sensibilities is
needed, and not just a patronizing attitude that
facilitates women's careers*

My own comment:

*We need to do it not JUST for women but to
add to our efficiency of doing science!*

What is my take on future vision?

CURRENT SCIENCE

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GUEST EDITORIAL

Women in STEMM: involve the institutions!

Last word

In conclusion, let me just assert the following. Basically consideration of how to increase the 'tribe' needs to be ALWAYS in minds of 'powers that be' and not just restricted to days like the 'International Day for Women and Girls in Science', 'Science Day' or 'International Women's Day'. Then and only then can we come up with solutions which will work for us in India. A day will come soon when we will just speak of scientists/engineers and not their gender. The way to achieve this, surprisingly, goes through the path of being aware of the gender and gender gap for a while.

Rohini M. Godbole

Thank you

Backup information

How have things changed?

In 2012-2013 General Enrollment Ratio was 21.5 %
whereas now it is 27.1%

For males it has changed from 22.7 % then to 26.9%
now

For females it has changed from 20.1% then to 27.3%
now.

Numbers look encouraging and are increasing. Are we
there yet?

Women's share: Science careers

Some more data on Women's participation in conferences, workshops etc. is available from BiasWatch India: <https://biaswatchindia.com/>

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BiasWatchIndia - Documenting women representation and combating gender-biased panels in Indian Science conferences, meetings and talks

Base rate of women faculty in science: 11.2%

tAct
THE ACADEMY TRUST
The Academy Trust

DAV PUBLIC SCHOOL
DAV Public School

INDIAN ACADEMY OF SCIENCES
Indian Academy of Sciences

A Celebration of Science

27 August 2021

WebEx link: <https://bit.ly/3mpIGGE> YouTube link: <https://youtu.be/oyGIN2uaT6s>

4:50 PM
Purpose of the Celebration
Partha P. Majumder
President, Indian Academy of Sciences

5:00 PM
The Prime Numbers
Tirthankar Bhattachayya
Indian Institute of Science, Bangalore

6:00 PM
Biology in the 21st century and how we got here
Amitabhi Joshi
Jawahar Lal Nehru Centre for Advanced Scientific Research, Bangalore

28 August 2021

WebEx link: <https://bit.ly/2WgPOFa> YouTube link: <https://youtu.be/Dhambor4enT4>

5:00 PM
Some physics discoveries in the last decade: Gravitational Waves, Higgs Boson, and Photographing Black Holes
Bedangadas Mohanty
National Institute of Science Education and Research, Bhubaneswar

6:00 PM
Chemistry is Fun!
Uday Maitra
Indian Institute of Science, Bangalore

ALL ARE WELCOME

For inquiries email: trust@ias.ac.in

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High Points of STIP-2020

Suggestion for Gender measures of STIP-2020

GENDER-NEUTRAL CHILDCARE BENEFITS

➤ Creation of **equity-and-inclusion charter** to tackle discrimination

➤ At least **30% women in decision-making positions** across S&T ecosystem

➤ Retirement and **spousal benefits for LGBTQ+ community**

➤ **Flexible timings** and gender-neutral childcare benefits



➤ **Dual recruitment policy** so couples don't have to 'choose' spouse's career over theirs

➤ **Equal access to all** irrespective of caste, religion, race or geography

Gender distribution across social categories

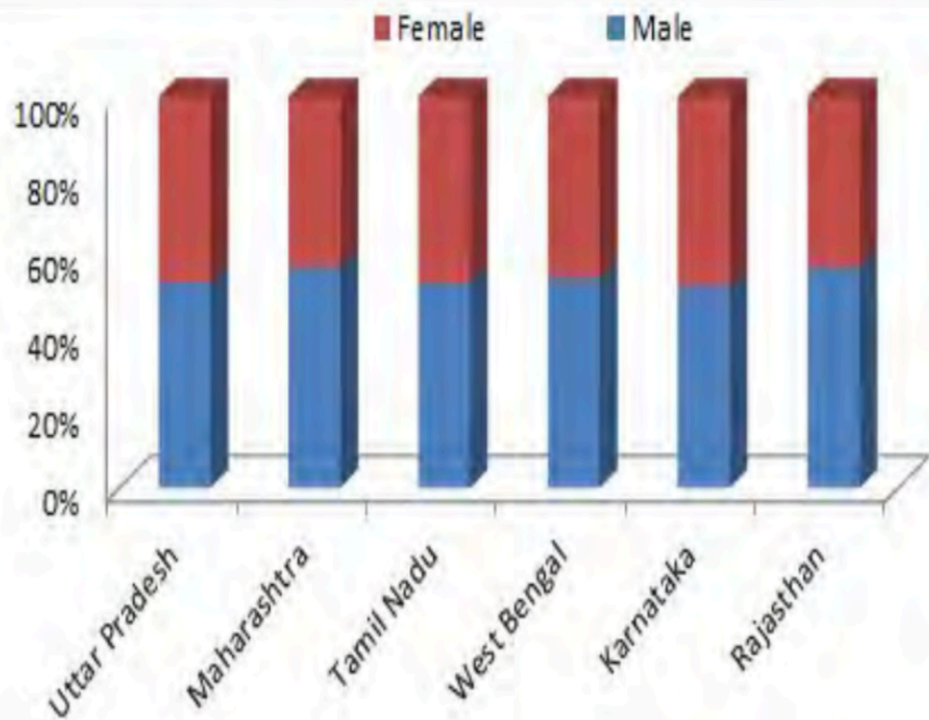


Figure 9: Top 6 States as per Enrolment and Representation of Male: Female

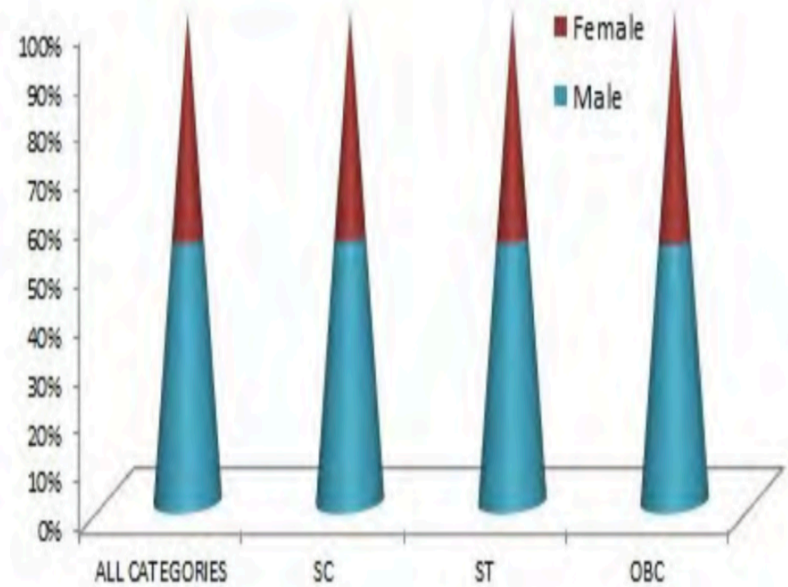
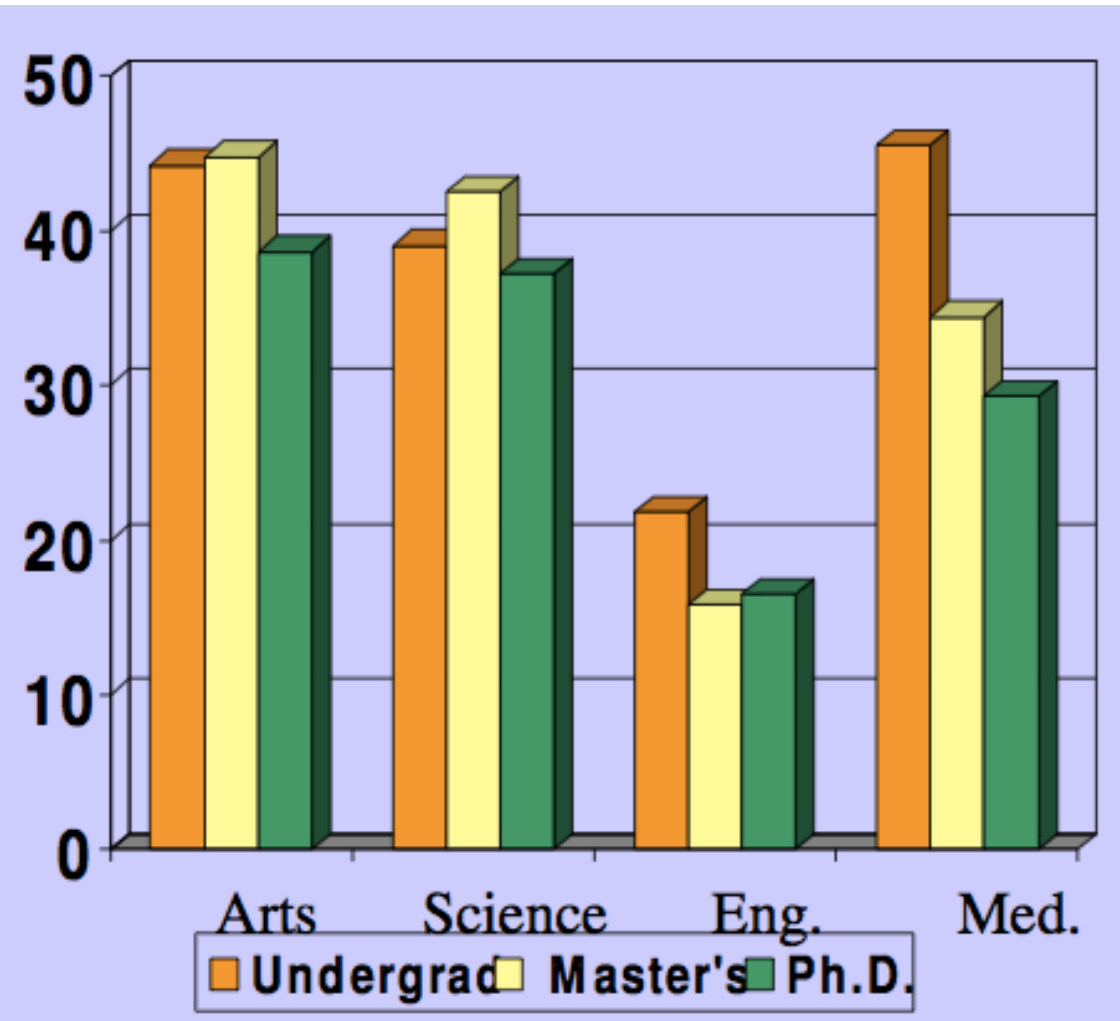


Figure 10: Social Categories and Gender Distribution in Student Enrolment

54% participation from 6 states, gender distribution more or less the same in all these states. Same is true for gender distribution among the categories!

Science versus other subjects

Source: Unesco report (via S. Narasimhan in DST Task Force Report)



1/3 students in science women! Increasing!

Drop off not after M.Sc.

The leaking pot is not here!

Even at Ph.D. level # in science not too small wrt arts and medicine.

More data in the back up slides. We can look at that later .

Action Serious and long term

Gender Audit:

All Institutes should give on the web page information on fraction/distribution of women in faculty, students etc. and a commitment to gender equity.

Should be required to set up graduated goals after determining their feasibility.

The goals need to be specific to sectors and discipline

Two points

1)

Lack of numerical representation is a symptom and achieving numerical targets does not mean problems are solved! Achieving the goals will be necessary but NOT sufficient.

2)

The Goals need to be specific to sectors and Discipline.

Level playing field at all levels

Beware: excellence always works is a little bit of a myth!

CNRS study: performance index for women almost 1.5 to 2 higher! There is a swedish atudy published in Nature which proves the same!

'Epistemic Injustice' : Miranda Fricker.

An awareness of this in the community is needed!

Level playing field at all levels

A personal remark:

By and large need to provide level playing field for women and the rest will take care of itself!

Very little of that level playing fields comes from Policy changes!

Summary

**First medical graduate: Anandibai Joshi (1885)
After 125 years women are equal participants in
medical education, research and practice**

**For other areas we should not have to wait for
another 125 years. Learn from there.**

***Important to collect statistics of women in science
sector wise and analyse.***

Anandibai Joshee (1865-1887)

Anandibai Joshee, the first Hindu woman to obtain a medical degree in the US at the University of Pennsylvania.

Her thesis was on Obstetrics as she lost her child at birth at the age of 14!

Learnt alphabets (marathi) at the age of 12! went to the USA at 17/18. She died in Poona back in India, at the age of 22.



D Sc (1931, Michigan),
Founder Fellow of the Indian
Academy of Sciences.

First DG of Indian Zoological
Survey, **Civilian honour:
Padmashri.**

Renowned botanist and plant
cytologist who made
significant contributions to
genetics, evolution,
phytogeography and
ethnobotany.

Remained single by choice!





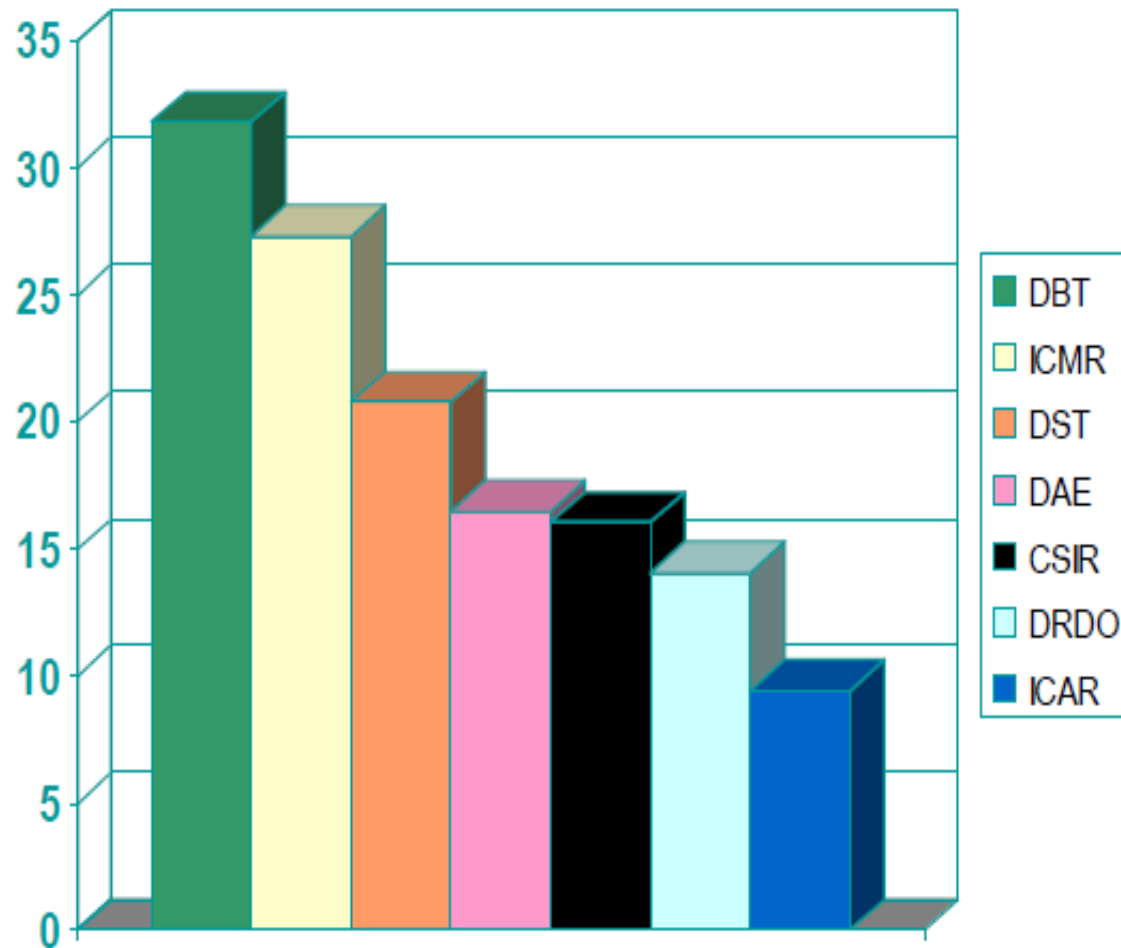
R.J. Hans Gill, Ph.D. 1965
FTWAS, FNA, FNASc,
FASc



Representative picture!

R.J. Hans Gill dressed as a boy so she could go to a school where they taught mathematics!

Percentage of Women Scientists



Source: Mantab Bamji, Task Force on Women in Science

The number of women in different organisations.

Science and Diversity?

Issues in science one chooses to investigate can be investigated by cultural/racial/gender background!

The first woman Indian doctor did her thesis on gynecological problems of Hindoo women as she herself had lost a child at birth at the age of 14!

*Another interesting news item (research by Joy Boulamwini)
Facial recognition programs are accurate only if you are white!
Likely wrong as much as 35% if you are african-american,
woman*

Lack of diversity and loss of science?

Clearly it is silly to say that lack of gender balance has impeded development of excellent science.

Question is can we point out something where the lack of opportunities for women clearly caused science to lose something . In other words achieving gender equity will avoid such losses

Sophie Germain (1776-1831)

Self taught. Had to fight against the family and society. **It was not proper for a 'middle' class girl to study mathematics and science!**
Lack of formal training!

Women not allowed in Ecole Polytechnique
Used a pen name of a friend to communicate with Lagrange, Gauss.

Important work on theory of elasticity and Fermat's last theorem

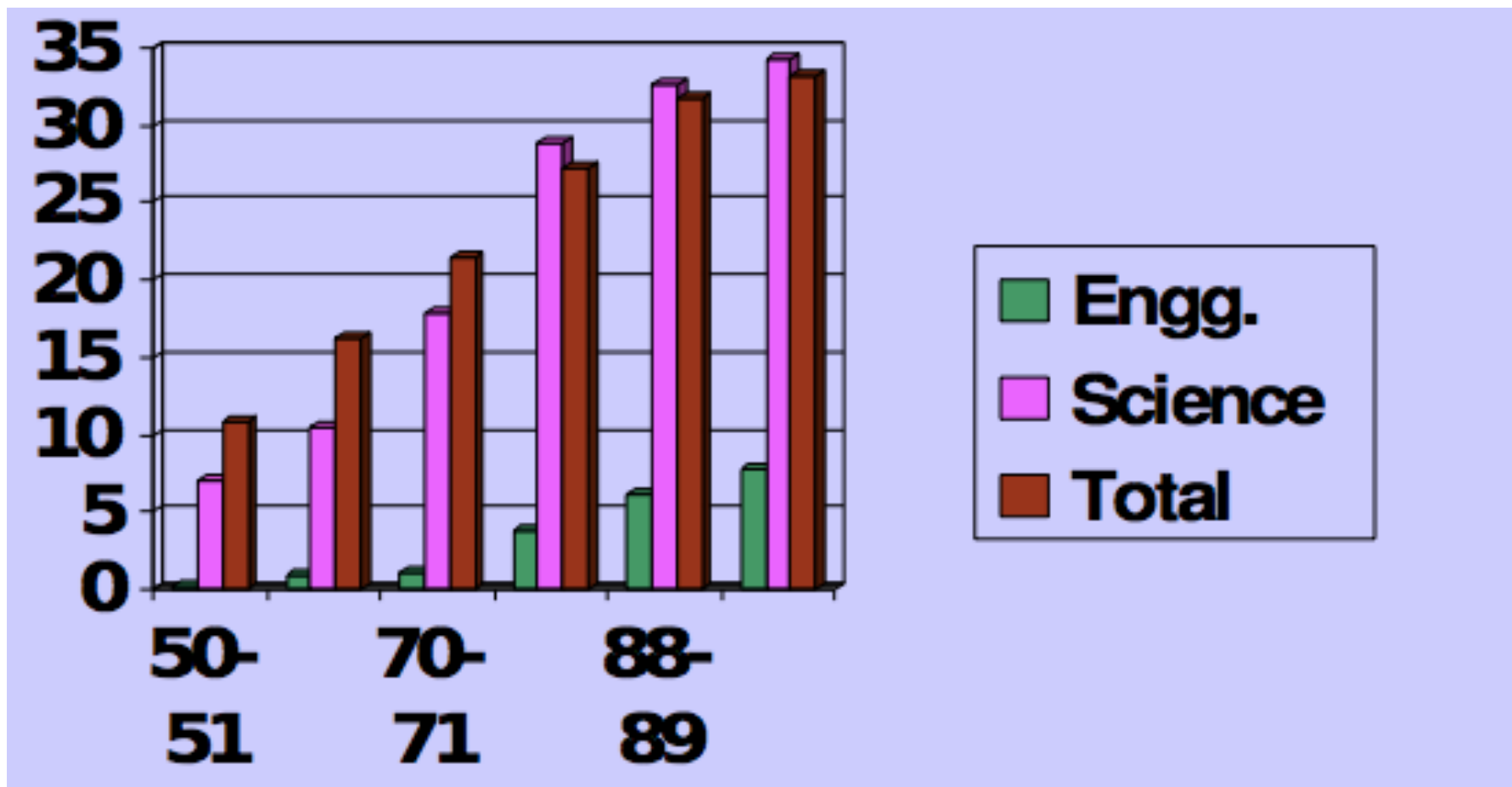
First woman to win a prize from French Academy



Sophie GERMAIN (portrait del. à l'âge de 11 ans.

The family took away her candles so that she should not study at night!

College Education: women participation



35.3% of university science students are women; number has been increasing. The percentage in **science** (but not **engineering**) is comparable to the **overall** percentage.

Table 5. Gender distribution of the fellowship for INSA (2012)

Subject	Women	Men	Percentage for Women
Medical	17	52	25
Mathematics	6	64	8.5
Physics	4	116	3.3
Chemistry	1	117	0.08
Plant & Animal Science	20	200	10
Total	49	816	5.6

Subject and gender distribution of fellowship

IASc, Bangalore (January 2012):

Subject	Women	Men	Percentage
Total	68	1002	6.8%
Medical	18	60	23%
Math	6	78	7%
Physics	7	187	3%
Chemistry	2	161	1%
Plant and Animal Sciences	31	200	15%

Subject and gender distribution of fellowship

TWAS, Trieste (January 2012):

Subject	Women	Men	Percent
Total	6	83	6.8%
Medical	16	112	11.3%
Math	11	108	9%
Physics	10	340	< 1%
Chemistry	11	108	11%
Biological Sciences	21	225	8%

Bhatnagar Awardees (January 2012)

Subject	Women	Men	Percentage
Total	14	416	

Division among disciplines of 14

Medical	4
Math	2
Physics	0
Chemistry	2
Eng.	2
Biology	2

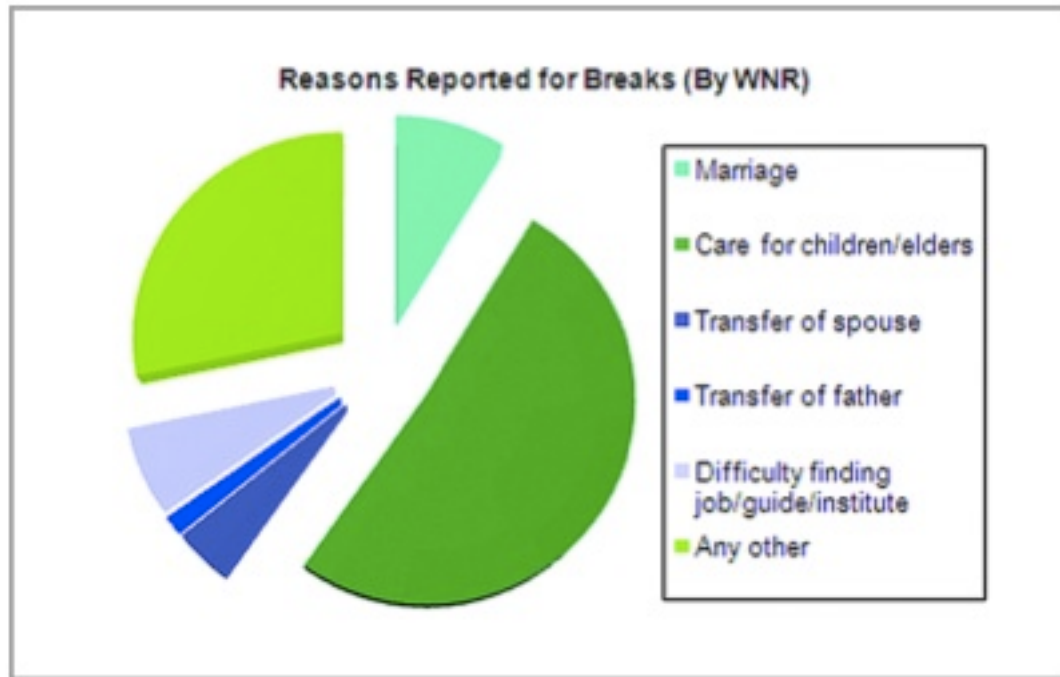
Bhatnagar Awardees (March 2015)

Subject	Women	Men	Percentage
Total	15	446	

Division among disciplines of 15

Medical	4
Math	2
Physics	0
Chemistry	3
Eng.	2
Biology	3
Earth Science	1

WNR : reasons for break

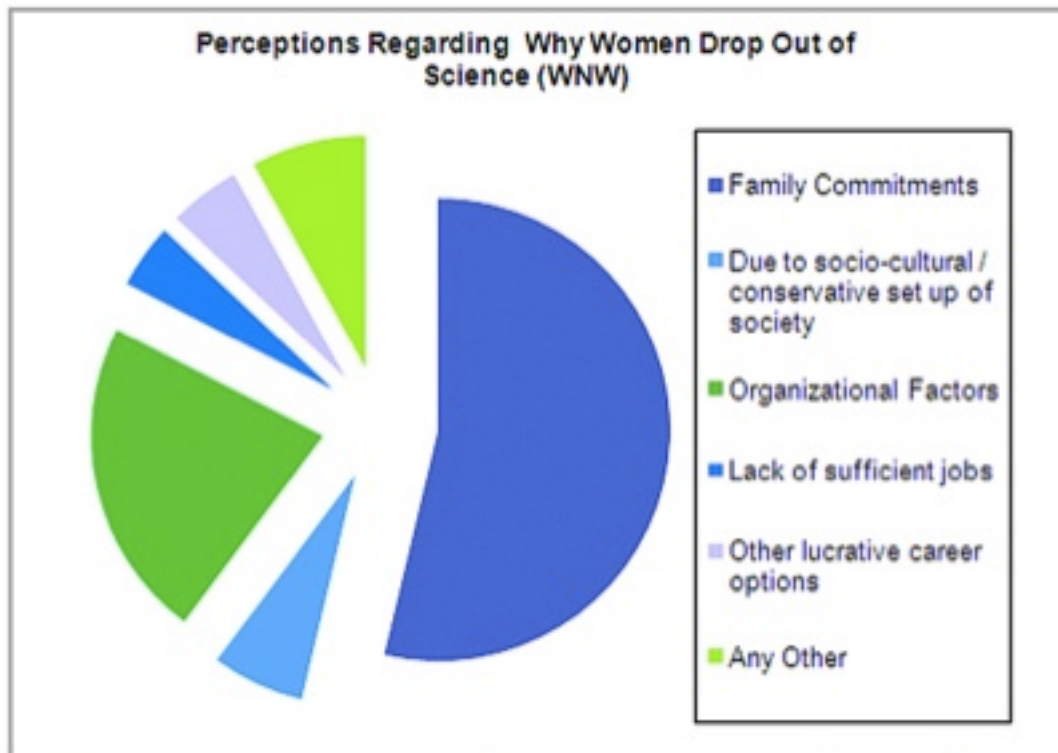


Note: The question was a multiple response question and the total number of responses received exceed the actual number of respondents

Note child care/elder care is a reason only in 50% cases

WNW : perceptions

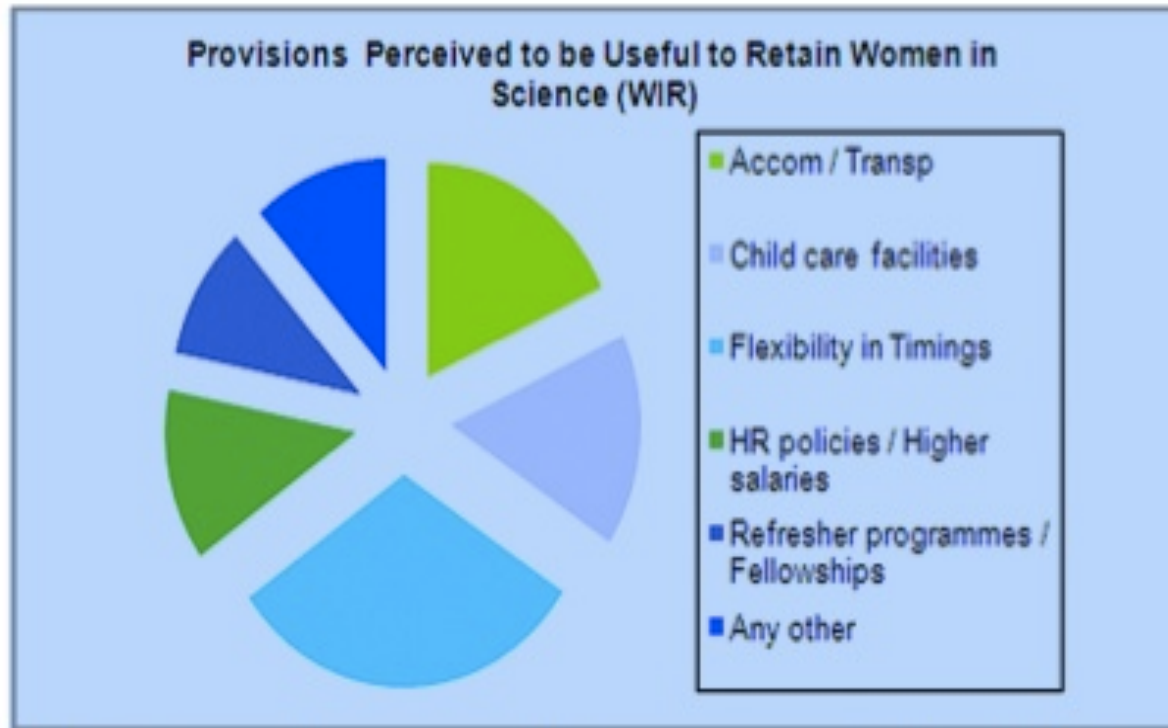
Perceptions Regarding Drop-out from Science and Provisions to Retain Women in Science



Note: The question was a multiple response question and the total number of responses received exceed the actual number of respondents.

Note **nonavailability** of jobs as a **big factor too in addition**

WIR : measures for improvement



Note: The question was a multiple response question and the total number of responses received exceed the actual number of respondents

Overlaps with measures suggested by other surveys!

For WNW distribution among diff. measures diff.

One size does not fit all!

Need to talk to all of them!