Summary

1. *Overall trend of science PG education is increasing in all the Universities except two in hilly area. Delhi University has highest out-turn percentage followed by Kurukshetra University.*

2. ***Social Science** has **highest percentage** of PG education in women followed by **Life Sciences**. In all the subject areas considered, there is an **increasing trend** of women participation except in **Life Sciences** where a **decline** has been observed in 1995.*

3. *About **80%** of Science PG women are in the age group **21-40 years**. It seems Science PG women have not received extension of their services after their superannuation except one. Less than **0.2%** students are of age ≤ **20** years. Minimum age of SPGW is reported as **19** years. **Average** age of studied SPGW is **30.7** years.*

4. ***More than 80%** science PG women students, research scholars and employees are of **upper caste**. Thus higher education in other castes in all three categories of women is less than 15%. Only 2% of Schedule caste women are in these categories.*

   *Even science PG women tend to marry in their own caste category. Only **one** incidence of **upper caste** woman employee **marrying** in **SC/ST** has been reported. In all **0.1%** inter caste marriage are reported.*

5. ***42.6%**, **13.6%**, **12.2%**, **7.9%**, **7.2%** and **5.6%** respectively, of parental residences of the studied Science PG women are from **UP**, **Punjab**, **MP**, **Haryana**, **Delhi** and **HP** respectively. Only **12.9%** are of **rural** origin and a majority **86.4%** are from **urban** area.*

6. *Highest percentage of **husbands** of married SPGW belongs to **UP** (**45.6%**) followed by MP (**14.3%**). Only **13.7%** of the women are married to **husbands** of **rural background**. Husbands from North India, South India and HP have allowed their wives to take up job in any part of the area under this study. Maximum percentage of East Indian husbands allow research by their wives, whereas those of Haryana and Delhi allow completion of post graduation.*

7. *Parents of SPGW have followed small family norm so that only **4.4%** have **more than 3 brothers** and only **6.6%** have **more than 3 sisters**.*

8. ***59.%** of SPGW are **unmarried**, **39%** are **married**, and **widow** and **separated/divorced** are **1%** each.*

There exists a general tendency of postponing marriage till completion of education, as there are only ***3.2%*** *and* ***17.9%*** *of* ***married post graduate women students*** *and* ***research scholars****, respectively.*

9. *Out of* ***559 married*** *SPGW* ***91.2%*** *were married* ***before 32 years****.* ***Marriage*** *of* ***80.1%*** *took place* ***between 1971 to 1995****. Highest percentage (****34.9%****) of women were* ***married between age 24-26 years****.*

   Among the postgraduate students and research scholars the ***highest frequency of marriage*** *is between ages* ***21-23*** *years, whereas it is highest in the age group* ***24-26*** *years for* ***SPGWE's****. So it appears that chances of marriage increase when women get job.*

10. ***68.5%*** *of the sampled women's marriage are* ***traditional and arranged*** *and* ***12.1%*** *are* ***self-chosen inter caste****.* ***97.1%*** *of married SPGW have a maximum of* ***2 surviving children****.*

11. *Of the 368 respondents (from the group of Science PG students out-turned during 1988-95) on the mailed Individual slips,* ***39.9%*** *have* ***joined a course*** *or are* ***still seeking job****.* ***31.8%*** *of these have* ***secured a job****,* ***14.9%*** *are engaged in* ***research activities*** *and* ***13.3%*** *are devoted to* ***house care****.*

12. *Of the 1366 sampled SPGW who responded during final survey,* ***44%*** *are* ***employees****,* ***37%*** *are* ***M.A./M.Sc. Final students****,* ***17%*** *are* ***research scholars****,* ***1%*** *are* ***RA/Pool officer*** *and* ***House wives*** *each, and there are only 5, who are seeking job.* ***71.0%*** *of these respondents belong to* ***Higher Educational organizations 16%*** *to* ***Inter College/High school****,* ***8.9%*** *to R & D organizations, and* ***less than 1.5%*** *are in each of the other organizations. This indicates that SPGW are* ***mostly attracted*** *towards teaching job.*

13. *Daughters of educated fathers have secured more job than illiterates.* ***59.5%*** *and* ***8.7%*** *of SPGW's fathers are in* ***Govt. Service*** *and* ***Business****. Hence educated fathers in Govt. Service and Business are encouraging their daughters to* ***go in science PG education*** *and subsequently to* ***take up job****.*

   It appears that ***Govt. servants*** *try to* ***look*** *for a* ***Govt. servant match*** *for their daughters, and* ***Business*** *is* ***not their next choice, over self employment*** *or* ***research****.*

   Highly educated ***husbands prefer*** *employment of SPGW much more than being a* ***research scholar*** *so that even* ***illiterate father-in-laws*** *have SPGW* ***employee daughter-in-law****.*

14. ***Fathers, Brothers and Sisters*** *of the studied SPGW are mostly* ***highly educated****. The percentages of* ***UG and PG*** *are more than* ***20%*** *for all and more than 16.0% of all of them have* ***Ph.D./Medical/ Engineering degree****.* ***Post-graduation*** *percentage of* ***41.4%*** *is largest for* ***sisters****. Husbands are also* ***highly educated*** *likewise.*

15. *A high percentage of SPGW (****40.7%*** *and* ***40.2%****) come from* ***low- income*** *and* ***poor parents****, but* ***their emoluments are spread*** *over the whole* ***range of Rs. 2000/- pm. to Rs. 15000/- and above pm.***

16. ***Teachers*** *and* ***parents score high*** *on their* ***paying proper attention*** *to SPGW* ***since childhood****. Brothers of* ***45.1%*** ***rank high****, rest on medium range.*

    It seems that SPGW are ***not happy*** *with the* ***sex-discriminating treatment*** *received from* ***parents****,* ***brothers*** *and* ***sisters*** *and* ***teachers****.*

    Overall scores *on attention and sex discrimination treatment received since childhood* ***follow the same pattern*** *as each of these for individual family members and teachers.*

17. ***More than 80%*** *of SPGW had* ***interest in reading and watching educational programs on TV*** *since childhood* ***till college days****.* ***More than 80%*** *enoyed* ***music, dance, drama, sewing, knitting etc. during childhood*** *but this* ***percentage decreased*** *during* ***college days*** *to about* ***60%****.*

18. ***51%*** *Senior researchers and employees are* ***highly interested*** *in* ***general reading****.* ***60%*** *had* ***average interest*** *in* ***household work****. A* ***high percentage*** *of women continued their* ***interest on the average*** *in almost* ***all the activities in the house*** *and* ***outside****. High interest is also inculcated by more than 14% of SPGW in various extra curricular activities.*

19. ***Married*** *SPGW are inclined to take* ***care of household work*** *by* ***themselves*** *or* ***engage servant****, instead of taking help of other family members.* ***Unmarried*** *SPGW are* ***helped*** *more by* ***family members*** *in caring household.*

    Almost ***one third*** *of the married SPGW are* ***helped by their husbands*** *in* ***domestic work*** *and* ***child care****.*

20. *A majority of* ***51.2%*** *of SPGW had* ***schooling in girls school****,* ***41.4%*** *from* ***coeducational school*** *and* ***7.4%*** *had schooling in* ***both types of schools****.*

21. *Though* ***64.3%*** *of sampled SPGW are from* ***Hindi speaking*** *families* ***35.3%*** *are with* ***non-Hindi mother tongue,*** *it is found that only* ***36.8%*** *have been* ***educated in Hindi medium.*** ***46.5%*** *of women had school education from* ***English medium school.*** *It is noted that percentage of* ***non-Hindi speaking SPGW opting*** *education from* ***English medium*** *school has* ***increased*** *from past.*

22. ***Science with Mathematics and Biology*** *is opted by* ***highest percentage*** *of SPGW followed by choice of Arts subjects.*

23. ***Self-assessment scores of personal qualities*** *which may contribute to achievement of academic goal seem to be* ***unrelated*** *to* ***level*** *of* ***educational performance.*** *This is because* ***percentage*** *of SPGW* ***with scores 4-8 and 9-16*** *are high even in the* ***1 and 2 first class*** *holders.*

24. ***85.4%*** *of SPGWE and RS1 had* ***problems of general nature*** *due to being of* ***science stream,*** *not because subject chosen.* ***6.1%*** *such women had* ***problems related to lab. work.*** ***5.0%*** *of women had problem in the subject of their choice* ***related to lab.*** *and* ***3.1%*** *of such women had* ***problem in the subject of choice*** *but it was* ***not in lab.***

25. *In all* ***73.5%*** *of SPGWE and RS1* ***planned*** *science as their career* ***at school final stage,*** ***17.0%*** *at* ***Inter College*** *and* ***7.6%*** ***never planned.*** *This pattern has not changed much according to PGYR. In each category of PGYR* ***more than 63%*** *planned at* ***School Final stage.***

26. *SPGWE and RS1 of* ***higher educational organization*** *have* ***membership*** *of National and International professional societies, received* ***national and international awards*** *and local* ***fellowship/scholarship, medal*** *almost* ***as frequently*** *as those of* ***R & D organizations.*** *However, none except* ***one woman*** *of R & D is* ***holding office*** *in a National and International society, each. Those who* ***post-graduated after 1970*** *have participated* ***more in these activities.***

27. *SPGWE and RS1 of* ***higher educational*** *organizations and of* ***R & D*** *organizations are* ***quite active*** *in* ***research publications*** *and* ***participation in seminars etc.*** *Young women with* ***recent PGYR*** *are* ***more active*** *in these areas. On the* ***average 4 papers*** *in* ***National*** *and* ***2 in International journals*** *are in credit of SPGWE.* ***Maximum*** *in these two types of journals are very* ***high as 187*** *and* ***80,*** *respectively.*

As regards ***publication of books and monographs***, ***R & D*** *women employees* ***fare better***, *and regarding* ***popular books*** *and* ***popular articles***, ***higher educational*** *organization women* ***fare better***. *In both the organizations* ***younger women*** *are* ***more active*** *compared to their senior women colleagues.*

The characteristics of ***participation in conferences/Seminar*** *etc and* ***visiting positions*** *also have* ***same pattern*** *as numbers of research publications.* ***Average participations*** *per woman is* ***3***, *whereas* ***maximum*** *attended* ***in country*** *is* ***67*** *and* ***abroad*** *is* ***25***.

Consultancy in last two years *has been provided* ***more*** *by* ***young SPGWE of higher educational*** *organizations than by employees of R & D organizations. However,* ***senior colleagues*** *of* ***R & D*** *organizations have provided* ***more consultancy*** *in* ***other organizations*** *than by those of* ***higher educational*** *organizations.*

Employees of ***higher educational*** *organizations are* ***more active*** *in* ***organizing workshop/conference*** *etc. and* ***conducting training program*** *than those of R & D organizations. Moreover,* ***young employees*** *are* ***more active*** *in these areas than the senior colleagues.*

28. *Among the 684 SPGWE, a high percentage (****65.1%****) are in* ***teaching*** *line (****34.7%*** *in University or Degree College).* ***18.7%*** *are engaged in* ***R & D*** *organization but participation in office jobs in scanty.*

Pattern does not *seem* ***to change*** *with* ***year of post-graduation***.

29. ***Parity*** *and* ***job pattern*** *of SPGWE* ***are not independent*** *as* X^2*-test of independence is rejected at <0.001% level of significance.* ***Medium of schooling*** *and* ***occupation pattern*** *are also not independent (*X^2*-test is rejected at 0.1% level of significance).*

30. *Percentage of women who* ***post-graduated before 1981 increases*** *with* ***increasing monthly emoluments classes***. ***Father's economic condition does not*** *seem to* ***affect*** *the* ***monthly emoluments*** *of* ***unmarried SPGWE***.

31. ***Parents*** *and* ***Science teachers*** *have been* ***ranked high*** *as playing significant role in* ***influencing*** *SPGWE for* ***choosing science stream***.

32. ***74.7%*** *of SPGWE* ***could get*** *their* ***first job*** *in* ***their field of specialization***. ***68.6%*** *have their* ***present job*** *of their* ***first preference*** *and* ***70.8%*** *have* ***not changed*** *their* ***preference***. *Moreover, we observe that* ***54.1%*** *of these are such who* ***got*** *their* ***first job in***

their ***field of specialization****, their* ***preference*** *has* ***not changed*** *and their* ***present work*** *is their* ***first preference****.*

33. *The highest percentage (**41.8%**) SPGWE are engaged* ***in teaching*** *work, **17.1%** in* ***R & D*** *and **11.6%** in* ***Applied/laboratory*** *work. **27.6%** of them are at the top, and almost **50%** in all the activities are* ***at middle*** *of* ***administrative rank****. Hence these SPGWE are* ***continuously advancing on administrative ranks*** *in their area of work.*

34. ***A large percentage*** *of SPGWE* ***score highly*** *on qualities of* ***Job Satisfaction, Personal Adjustment, Management Skill, Social Relations, Motivational Orientation*** *and* ***Job Commitment****.*

Duration of service *appears to* ***increase proficiency*** *in first* ***three*** *of the above* ***traits*** *and it* ***decreases proficiency*** *on the* ***last three*** *traits; all related to job.*

35. *Some of the* ***personal problems affecting career*** *of SPGWE are (i) Presence of* ***one or more small children at home*** *(ii)* ***Family needs time*** *for social religious and community activities (iii)* ***Husband's job related travel, job transfer, entertainment*** *etc. (iv)* ***Poor personal health*** *of respondent and (v)* ***Unfavourable attitude of family towards career*** *involvement are some of the numerous problems, which are reported to affect the career of **28.4%**, **26.9%**, **14.6%**, **10.4%** and **8%** of respondents.*

36. *A high percentage of SPGWE (**17.0%** **unmarried** and **28.2%** **married**) are of the opinion that* ***career has no effect*** *on* ***marriage prospects****. **21.2%** and **18.9%** of* ***married employees*** *feel that* ***career is very favourable*** *and* ***some what favourable*** *respectively for* ***marriage prospects****. The said SPGWE who have married after 1970 are almost* ***evenly distributed*** *over classes of* ***marriage year after 1970****.*

37. ***34.4%*** *of SPGWE feel that* ***career*** *has* ***no effect*** *on their* ***married life****. **14.9%** feel it is* ***some what favourable*** *and **9.1%** feel it is* ***very favourable*** *for their* ***married life****.*

38. ***50.7%*** *SPGWE's* ***husbands encourage*** *their* ***wive's career****, **26.0%** are* ***not against*** *but* ***do not participate*** *in* ***domestic work****, **3.5%** are* ***indifferent*** *and **13.2%** and **6.6%** feel that their* ***wives should care for child*** *and* ***household****, respectively.*

39. ***61.3%*** *of* ***married*** *employees and **18.4%** of* ***unmarried*** *employees had* ***no difficulty*** *in* ***getting job****, whereas **6.1%** of* ***unmarried*** *employees*

and ***11.4% of married*** *employees had to* ***pass through difficulties*** *to get a job.*

40. *Largest number of SPGWE rank* ***other family members*** *as* ***first*** *in* ***dissuading*** *them from* ***choosing science career.*** ***School friends*** *are ranked* ***second*** *by largest number of SPGWE.* ***Brothers*** *are ranked* ***third*** *by highest number of SPGWE.*

41. ***Reasons*** *for various* ***breaks in services*** *have been* ***reported*** *by only* ***166 respondents.*** ***Highest*** *percentage* ***34.3%*** *is due to* ***pregnancy,*** ***12.7%*** *due to* ***transfer of father or husband,*** ***10.2%*** *due to* ***marriage of respondent*** *and* ***9.8%*** *due to* ***professional environment.*** ***After break 32.6% resumed job*** *because of no other* ***reason*** *but that* ***they just wanted to resume.*** ***5*** *of them* ***resumed*** *it because they got separated/divorced/widowed.* ***5.4%*** *resumed for* ***other reasons*** *than listed but have* ***not specified*** *it.*

However, returning to job is not always possible. ***32.6%*** *of the sampled SPGWE* ***could not return*** *as a* ***suitable job was not available.***

Even after getting a job ***28.4% refused*** *it since it* ***was below standard*** *and* ***2.9%*** *reported* ***'other reason' with out specifying*** *it.*

42. *Among the SPGWE assigning* ***1st priority*** *to various* ***jobs,*** ***35.4%,*** ***21.2%*** *and* ***7.3%*** *are the highest percentages* ***opting teaching*** *in* ***University, R & D*** *organization and* ***Teaching in Schools.***

Priority *for teaching is* ***changed by much less*** *percentage (about* ***10%****) of SPGWE, whereas* ***change in 1st priority*** *for* ***R & D,*** *Administrative and* ***Office jobs*** *is* ***20% or more.***

43. *According to the ranks given by the sampled 684 SPGWE's for various* ***reasons for low representation*** *of women in* ***science education,*** ***three*** *major* ***causes*** *ranked first are (i)* ***Facility of Science Education is not Available*** *(ii)* ***Most Parents Discourage their Daughters*** *and (iii)* ***Non-acceptance of Co-education in Society.***

On similar grounds the reasons for ***low representation*** *of women in* ***science profession,*** *in the order of their effect are*

(i) ***Difficulty in getting suitable job at a place where father/husband reside*** *(ii)* ***Such job is too demanding for women to discharge their family responsibilities*** *(iii)* ***Women want to work only occasionally and on part time basis.*** *(iv)* ***Men resent women colleagues.***

44. *38 among 684 SPGWE have expressed their* ***firm unreserved advice favouring choice of science as career*** *for women. The* ***rest*** *have* ***not responded.***

45. *The SPGWE's perception and the extent to which they agree to various competing facets of values in their personal and professional lives are on the whole clear. There is almost a* ***consensus*** *on* ***their importance*** *in* ***managing house front, discharging responsibilities of child rearing*** *and* ***for running smooth family life.*** *Side by side they are* ***also conscious*** *and* ***confident*** *of their* ***professional responsibilities*** *and* ***career advancement.***

They are ***not comfortable*** *if* ***husband looked after all the domestic work*** *but* ***do not hesitate*** *to* ***take help*** *and* ***cooperation from husband*** *and* ***family members.*** *They are* ***confident*** *that they can* ***efficiently advance*** *in* ***career*** *as well as* ***manage house also nicely.***

Almost all the SPGWE ***feel safe*** *with their* ***men colleagues.*** *They* ***disagree*** *with the idea that* ***"Women Liberation Movement"*** *has* ***inspired*** *them to* ***take up job.*** *In the* ***event of conflict between husband's and wife's career,*** *almost all of them are of the view that* ***husband's career*** *should be given* ***more importance.***

All of them were clearly stating their opinion that ***work structure*** *should* ***be modified*** *so that* ***break in service does not arise*** *during* ***child birth*** *and* ***child rearing period.*** *They have* ***clearly ruled out*** *the notion that* ***women in career should not marry and have children.***

47. *Data suggest that* ***Academic Achievements*** *and* ***Professional Efficiency*** *can be* ***best measured*** *by* ***Present Monthly Emoluments*** *(v24) and* ***Management Skill*** *v(109).*

Five variables *are* ***sufficiently good*** *to predict* ***Present Monthly Emoluments*** *and* ***six*** *variables may be used to predict* ***Management Skill quite safely.***

Starting Salary, Number of Job Changes, Duration of Service *and* ***Management Skill*** *contribute* ***positively*** *and* ***Last Designation*** *is* ***negatively*** *contributing for* ***prediction*** *of* ***Monthly Emoluments.***

For ***predicting*** *the second* ***(Management Skill), Job Satisfaction, Motivational Orientation, Social Relation, Present Monthly Emoluments*** *and* ***Last Designation*** *contribute positively and* ***Difficulty in Chosen Science Subject*** *affects* ***negatively.***

82% variation can be ***explained*** *in the* ***first*** *by the said* ***5 variables*** *and* ***37%*** *in the second by the* ***said 6 variables.***

Concluding Remarks

In brief the main findings may be summed by the following remarks :

1. *Women in Northern India are keeping a very balanced approach of advancing to the highest position in science education and subsequent jobs. However, more facilities for science education are still needed to enable all desirous and bright girls enter in science career.*
2. *Teaching is still most opted profession of women, but they have now started making way in R & D organizations also.*
3. *Despite laborious science education, teaching and research activities the Science PG women of Northern India are observing old traditions of family practices, social norms, faithful marital relations full of gentle behaviour and mutual respect.*
4. *They are confident that they can progress in career at par with men, in an atmosphere of mutual cooperation, and also discharge their responsibilities towards family and bringing up children. However, they feel that work structure for women in job should be modified to prevent service break during child birth and child rearing.*
5. *Academic and Professional effectiveness can be measured by only 2 variables : their Monthly Emoluments (y_1) and Management Skill (y_2). These can be predicted by the following two equations quite nicely :*

$$y_1 = .235 + .62\ v(23) + .19\ v(20) + .13\ v(51) - .14\ v(22) + .08\ v(109) \text{ and}$$

$$y_2 = -.395 + .29\ v(106) + .23\ v(110) + .19\ v(108) + .14\ v(24) + .12\ v(22) - .08\ v(102)$$

where,

v(20) : ***jbc*** *= number of changes in job*
v(22) : ***ldsg*** *= last designation*
v(23) : ***emol1*** *= starting monthly salary when joining 1st job*
v(51) : ***dser*** *= duration of service*
v(109) : ***s612*** *= total score on management skill*
v(24) : ***lemol*** *= present monthly emoluments*
v(65) : ***difsub*** *= difficulty in science subject chosen*
v(106) : ***s69*** *= total score on job satisfaction*

v(108) : ***s611*** *= total score on social relations*
v(110) : ***s613*** *= total score on motivational orientation*

6. *While some respondents were very cooperative in providing information but non-response is also quite high. It appears that more persuation by investigators was required so that questionnaires could be filled more completely to obtain more useful and reliable conclusions. A followup study of some science PG women seems necessary. Some way to include science PG housewives also is worth exploring.*