



36

## In search of equality

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I was born in 1943 at Mohie (Ludhiana) in Punjab. My father Gursher Singh Hans was a doctor and he was posted in rural areas, so I spent my childhood in small villages in Ludhiana district. My mother, Gurdeep Kaur, was a housewife who continued her education privately and through correspondence courses after marriage. I was sensitive to the uncertainties of transfer and did not really like to move, but my experience was that we always moved to a better place ! The opportunities for education for girls were non-existent in villages: there were no schools for girls, and girls were not allowed to join schools for boys. So the first few years of my life were spent studying at home, longing to go to school. My parents encouraged and guided me in learning. Sometimes, I had the opportunity of going to school and attending classes unofficially, since my father knew the headmaster. I enjoyed these visits immensely.

I became intensely aware of the problems of women in our society while overhearing the hospital staff discussing these problems with my parents. From childhood I wondered why girls were not sent to school, why women did not have jobs, why they were discriminated against in all walks of life. I spent many long hours thinking about such topics and dreaming of a new world

where equality prevailed. So, very early in my life, I had somehow formed the idea that to overcome such problems one must study and get a job. Of course, I wanted to be a doctor like my father.

My father was transferred to Isroo when I was about six years old. This village boasted of a primary school for girls. The school was housed in an enclosure which had a large room and a courtyard. After an informal test I was admitted to the fifth class. Only one teacher somehow managed all the classes, so very little was taught and I was not interested in it. All my classmates were much older than I and did not like the fact that I knew much more than they did, so I had no friends. I was immensely bored but continued going to this school since it was the only available one. Then for one year I studied English, Arithmetic and Punjabi at home. My uncle Narsher Singh, who was naib tehsildar at Balachaur, very reluctantly agreed to let me stay with him and study at a school for boys, where I could only go posing as a boy. This was a secret between our family and the headmaster. My uncle was totally against the education of women and it was only after many requests from me and my father that he decided upon this course. I enjoyed wearing a turban and going to school with my brother !

Regular schooling for me started only when my father was transferred to Gujjarwal in 1953. This village had a high school for girls and I joined the eighth class. I found that in general, schools for boys were better equipped, and had better standards and facilities. This seemed very unfair !

Unfortunately, science and mathematics were not taught at my school, and noticing my interest, my father decided to help me in these subjects. But I could not appear for the university examination in science, after studying at home, because science had a practical component that required a laboratory. So my ambition to become a doctor ended and the road to become a mathematician opened up, although I was not aware of it at that time. I liked mathematics because of its precision and because I was better at it than others.

Throughout my educational and professional career I had the strong support of my parents and elder brothers Lakhbir and

Bhupinder. I had the blessings of my grandfather who had called me “Vidya” noticing my inclination towards learning at an early age. He was all praise for persons who were good at arithmetic and his encouraging words were invaluable to me. My parents made considerable effort so that I could study at good colleges. I graduated with honours in mathematics from Government College for Women, Ludhiana, standing first in Panjab University in the B.A. and second in mathematics honours.

I joined Government College for Men, Ludhiana, for the M.A. in mathematics. All the teachers were men and some had the opinion that women cannot and should not do mathematics. I took it up as a challenge to prove them wrong. Professor K.R. Chaudhary, who was also the vice-principal of the college, was encouraging and helpful, and proud of my achievement when I stood first in Punjab University in the first year of M.A., getting 98% marks. He strongly advised me to go in for the Civil Services. But the pursuit of further studies in Mathematics was calling me. I had earlier met the distinguished mathematician Prof. R. P. Bambah, who advised me to pursue research. I joined the Department of Mathematics in August 1962 as a research fellow.

The department had an intensive program including basic courses and research seminars. The first few months were really hard. The vastness of mathematical literature and unsolved problems overwhelmed me. Adjusting to the hostel environment, trying to come up to the expectations of the faculty and interacting with other research students: all seemed too much for me. I thought that Chandigarh was a very unfriendly place. I started working on open problems and by the end of 1963 had obtained results considered enough for a thesis. I was later awarded Narasinga Rao gold medal for two papers published from my thesis in the Journal of Indian Mathematical Society.

In the meantime, Prof. Bambah decided to go to Ohio State University, Columbus. All his research students were offered fellowships there. My parents were very encouraging and agreed to my going to the U.S.A. even though some close friends and relatives advised against it. I finished my course requirements in a short span, getting all A grades and received my degree in Decem-

ber 1965. I was the youngest Ph.D. from OSU up to then!

After taking up brief teaching assignments at OSU and University of Wisconsin, I decided to return to India. Life in the States was definitely more comfortable and there were more opportunities, but I preferred to live in India. I married Jagjit Singh Gill in 1968. He was at the IARI, Delhi. A major problem that we faced was that we could not get jobs at the same place. We decided not to compromise our careers. Soon little Ramneek and Hardeepak arrived and the help of my parents and parents-in-law was invaluable in bringing them up. With the moral and physical support of our families, we were able to resolve all major and minor problems.

For several years I was the only woman on the faculty of our department. I always tried to do my best so that my colleagues did not feel that women contribute less. My colleagues were mostly very helpful and readily tried to make time table adjustments whenever needed. My research is in the geometry of numbers: packings and coverings, Diophantine approximations, non-homogeneous indefinite quadratic forms and view-obstruction problems. I collaborated with my colleagues R.P. Bambah, V.C. Dumir, Madhu Raka at PU and A.C.Woods from OSU. Our efforts over many years led to a proof of the long standing conjecture of Watson on non-homogeneous minima of quadratic forms. I have been elected fellow of the three major science Akademies of India and also a fellow of TWAS.

Most persons hold mathematics in awe. Meeting a woman mathematician shocks them and they start narrating how scared they were of maths in school. I used to feel very amused till I started noticing that even my children were developing fear of mathematics!

Circumstances just guided me to mathematics. An eminent mathematician was my research guide, I have had wonderful collaborators, many bright students, and a healthy work environment at Punjab University. Above all, I had an understanding and supportive family. I have always enjoyed discussing mathematical problems. The happiness one feels on solving a difficult problem is indescribable.