Indian Women Scientists' Perceptions of the Nuclear Issue

Adluri Subramanyam Raju

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Contents

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Adluri Subramanyam Raju

Introduction

The *Scholar of Peace* Fellowships awarded by WISCOMP for academic research, media projects and special projects are designed to encourage original and innovative work by academics, policy makers, defense and foreign office practitioners, NGO workers and others. The series WISCOMP Perspectives brings the work of some of these scholars to a wider readership. The monograph *Indian Women Scientists' Perceptions of the Nuclear Issue,* the outcome of an academic project conducted by Adluri Subramanyam Raju, is the twelfth in the series of WISCOMP Perspectives.

The nuclear question in the subcontinent assumed a special significance when the nuclear ambivalence of India and Pakistan dissolved in 1998, following the overt testing of nuclear devices by the two countries in quick succession. In the initial years following Independence, India had taken a moral and ideological stand on the global nuclear regime that had divided the world into nuclear "haves" and "have nots". This had later given way to a policy of nuclear ambivalence. Pokhran II, as the nuclear tests of 1998 came to be known, marked the beginning of yet another phase – that of overt nuclearization.

In the months that followed the nuclear tests in the subcontinent, several critical questions were explored by policy makers, the media and the public. Many originating from outside South Asia focused on the implications of this step for Kashmir, the inducements and incentives as well as the sanctions and censure that the international community could apply on India and Pakistan, how far the two countries could go in weaponizing their nuclear capabilities, existing processes of command and control and so on. The perspectives from South Asia focused more on the linkages between domestic politics and nuclear power status, and the regional dynamics, particularly the new equations with China. From the point of view of global non-proliferation policy, the questions that were raised centered on expanding the nuclear "club" and the impact of this on other nuclear aspirants as well as larger questions of arms control and disarmament.

In the aftermath of the immediate and often impassioned responses to the nuclear question following the tests, several of these larger issues began to inform the public discourse and opinion formed over time were informed by these multiple and complex strands of the nuclear debate in the subcontinent. Subramanyam Raju conducted the interviews on the nuclear issue in 2002-2003, more than three years after India and Pakistan conducted their nuclear tests – when passions had cooled and more sober appraisals were in place, particularly among the members of the scientific community. A subset within this scientific community – women scientists – constitute the "universe" of this study.

Subramanyam Raju theoretically situates this research within the evolving discourses on women and war. The work is informed by the burgeoning literature in this field, including empirical studies conducted in other parts of the world on how women view weapons of mass destruction. This is however one of the first studies conducted in India in the aftermath of the nuclear tests that looks at Indian women scientists' responses to a range of issues related to the nuclear question – questions related to the importance of the nuclear issue (vis-à-vis terrorism, poverty, communalism, liberalization, for instance) the reasons for conducting the nuclear tests, the attitude towards further testing, the impact of the tests on bilateral and multilateral relations, the possibility of actually using nuclear weapons et al. The sample size of two hundred include women in four distinct fields of science – biology, physics, chemistry and engineering located in Hyderabad, Bangalore, and Mumbai – the nerve centers of the Indian nuclear program.

The study breaks new grounds in so far as it generates primary data on women's perceptions in an area that is largely perceived as a male preserve – namely the nuclear policy making arena. While it is true that the scope of the study does not extend to administering the same questions to men with similar backgrounds and consequently the study does not constitute a "gender perspective" in its present form, the significance of the research lies in the fact that it generates and analyzes gender disaggregated primary data. This is a vital first step in building up a holistic gender perspective on the nuclear issue in the long run. The questions posed by the study and the further opportunities for research that it presents can well enable fresh policy perspectives

to enter the arena of nuclear decision-making. This can pave the way for enhancing participatory democratic dialogue and civic engagement on an issue that affects not only states and governments but also citizens of South Asia.

The WISCOMP Research Team

Chapter-I
Setting the Conceptual Parameters

The purpose of this study is to investigate whether the perception of Indian women scientists on the nuclear issue is determined by their position as scientists or by virtue of being women. While the nuclear tests generated mixed reactions across the Indian subcontinent, no systematic study has been done on whether men and women reacted differently on the issues that emerged from the nuclear tests.

This study elicits the views of women scientists on nuclear programs and their views on India going nuclear. Since little work has been done in this area in India, the project probes the sensitivities of women scientists regarding the nuclear issue as the first step to building a gender perspective in this area.

Objectives and Formulation

The study focuses on the following objectives:

- To understand the perceptions of women scientists on the nuclear issue
- To locate the priorities of women scientists vis-à-vis the nuclear issue
- To analyze whether India's nuclear policy is consonant with the opinion of women scientists
- To outline the steps to be taken, according to women scientists, to reduce the misunderstanding over nuclear proliferation, and minimize tension between India and Pakistan

Two hypotheses are tested during the course of the study. These are:

- Women scientists, irrespective of their position, are peace loving and are against going nuclear
- Women scientists from different fields do not have differences on the various issues pertaining to the nuclear issue

Methodology

A survey was carried out in different institutions in three cities in India – Hyderabad, Bangalore and Mumbai. This study is descriptive and analytical, based on primary and secondary sources. Interviews with women scientists belonging to different fields – physics, chemistry, biology and engineering – constitute the primary sources, whereas secondary sources are books, articles and newspapers. A questionnaire was provided to the respondents to elicit their views on the problems, based on the snowballing method. The sample size was 200 (50 scientists from each field). The study tried to find out the difference of opinion on the nuclear issue by the respondents on the basis of their professional background. A statistical package for Social Sciences was used for cross tabulation and analysis and to ascertain the pattern of response.

Review of Literature

Feminist literature on women and war from the mid 1980s or women and the nuclear question in particular has yielded multiple viewpoints on the subjects. On one hand, there are essentialist writings that suggest that women are inherently more peaceful than men. Extrapolating this into the nuclear question would imply that women, in contrast to men, are inherently more opposed to weapons of mass destruction. On the other hand, there is also considerable literature by feminist writers that cites evidence to disprove this essentialist notion. This nature-nurture debate and the myriad strands that nuance both these sets of arguments are reflected in a body of literature that inform the broad contours of this study.

Consequently, at one end of the spectrum there are studies that reveal that women are more peace loving than men[1] and they oppose war and nuclear weapon activities. These writers posit that war and nuclear arms race are masculine behavior. They maintain that men compared to women are more aggressive, hierarchical and power seeking. Women oppose more than men to the spread of nuclear weapons.[2] This is apparent in the words of Ruddick: “There is a real basis for the conventional association of women with peace. Women are daughters who learn from their mothers the activity of preservative love and the maternal thinking that arises from it. These lessons from her mother’s

house can shape a daughter's intellectual and emotional life even if she rejects the activity, its thinking, or, for that matter, the mother herself. Preservative love is opposed in its fundamental values to military strategy…. A daughter, one might say, has been trained to be unsoldierly".[3] Unlike men "women are more peace loving, more nurturing and more connected with life, it is they who may be our only hope of salvation in the nuclear age".[4] Women are more concerned about nuclear hazards[5] because "…the anti-militarism of some women appears to be due to their desire to preserve their young and their family…. Having a personal responsibility for the lives of children seems to foster a concern for preserving life and for preserving the world their children will inherit."[6]

Other feminist writers have opened up alternative spaces on this issue. For instance, Christine Sylvester, in one of the chapters, in her book *Feminist International Relations: An Unfinished Journey*[7] focuses on feminists and peace projects. She maintains that it is not correct to say that all women are peace loving and notes that women from the third world have been involved in the national liberation struggle and have worked with violent paradigms. She concludes that it is difficult to argue that all women are peace loving.

In her article on "Pacifying the Forces: Drafting Women in the Interests of Peace", [8] Sara Ruddick elaborates the differences between feminists and anti militarists. She maintains that feminists want to remove the discrimination between men and women and want to share the responsibilities and power equally with men. According to her, women fight to get equal representation in military establishment rather than oppose war and violence.

In particular, the study is informed by a body of literature outside the subcontinent that analyzes gender-disaggregated data on the nuclear issue. For instance, Richard P. Barke, Hank Jenkin-Smith and Paul Slovic, in their paper "Risk Perceptions of Men and Women Scientists",[9] analyze differences between men and women scientists on the nuclear issue. The paper reveals that a majority of women scientists, as compared to men scientists, are concerned with environmental hazards. Men scientists, according to the study, perceive less risk from nuclear technology than do women scientists.

In the paper "Differences by Sex in Support for Nuclear Power",[10] Charles J. Brody explains that women, as compared to men, feel that nuclear plants are less safe and are dangerous to health and human life. Women are also concerned about the effects of radiation on their health and on future generations, perhaps because they have reproductive roles.

The paper "Gender-specific Reactions to Environmental Hazards in the Netherlands"[11] by Jan M. Gutteling and Oene Wiegman reveals that women are more concerned about environmental hazards.

In his study "The Polls: The European Peace Movement and Deployment of Nuclear Missiles",[12] Connie De Boer explains different polls in different countries on various issues – the use of nuclear weapons, peace movements and anti-nuclear weapons' demonstrations. Many Europeans and Japanese opposed the use of nuclear weapons under any circumstances. The study indicated that women are more inclined to support peace movements than men in Germany, Britain and the Netherlands. Youth in Germany are active in the peace movement.

This study is also informed by an earlier survey[13] conducted by the author in four cities of India – Kolkata, Delhi, Hyderabad and Mumbai – following the Pokhran-II explosions in 1998 to elicit the views of young men and women in the age group of 20-35, from a cross section of society – lawyers, teachers, journalists, people working in non-governmental organizations, students and political leaders – on the nuclear issue. The study reveals that for a majority of the respondents, poverty and economic instability have higher salience than the nuclear issue. Instead of spending on nuclear/ military capability, they suggested that resources should be diverted towards social development. They felt that India has changed its policy from peaceful to military purposes. The tests conducted by India and Pakistan further increased tensions between them, they maintained. A majority of them said that under no circumstances should India use nuclear weapons against any country and it should not carry out further tests. However, they opposed India signing the nuclear Non Proliferation Treaty (NPT) and the Comprehensive Test Ban Treaty (CTBT), since neither of these treaties aimed at global disarmament, and only served to increase the gap between the nuclear haves and have nots.[14] They maintained that India,

Pakistan, China and the US were responsible for exposing South Asia to the arms race and found fault mainly with the US and China.

The present study is an attemp to build on this by generating and analyzing gender disaggregated primary data on the nuclear issue.

Notes:

[1] Elise Boulding, "Focus on: The Gender Gap", *Journal of Peace Research*, vol.12, no.1, March 1984, pp.1-3; Helen Caldicott, *Missile Envy: The Arms Race and Nuclear War* (New York: William Morrow), 1984; Jean B Elshtain, *Women and War* (New York: Basic Books), 1987; Scott B Hamilton et al, "In the Eye of the Beholder: Accounting for Variability in Attitudes and Cognitive/ Affective Reaction toward the Threat of Nuclear War", *Journal of Applied Social Psychology*, vol.17, no.11, December 1987, pp.927-952; Mark P Jensen, "Gender, Sex Roles, and Attitudes toward War and Nuclear Weapons", *Sex Roles*, vol.17, nos.5-6, September 1987, pp.253-267; James W Lamare, "Gender and Public Opinion: Defence and Nuclear Issues in New Zealand", *Journal of Peace Research*, vol.26, no.3, September 1989, pp.285-296; Michael Newcomb, "Nuclear Attitudes and Reactions: Associations with Depression, Drug Use, and Quality of Life", *Journal of Personality and Social Psychology*, vol.50, no.5, May 1986, pp.906-920; Snell Putney, & Russel, Middleton, "Some Factors Associated with Student Acceptance or Rejection of War", *American Sociological Review*, vol.27, no.5, October 1962, pp.655-667; Jane M Silverman & Donald, Kumka S, "Gender Differences in Attitudes toward Nuclear War and Disarmament", *Sex Roles*, vol.16, nos.3-4, February 1987, pp.189-203; Sandra Whitworth,, *Feminism and International Relations* (New York: St. Martin's Press, 1994), p.17.

[2] Charles J Brody, "Differences by Sex in Support for Nuclear Power", *Social Forces*, vol.63, no.1, 1984, pp.209-228; Conover, Pamela Johnston, "Feminists and the Gender Gap", *Journal of Politics*, vol.50, no.4, November 1998, pp.985-1010; Goertzel, Ted G, "The Gender Gap: Sex Family Income and Political Opinion in the Early 1980s", *Journal of Political and Military Sociology*, vol.11, Fall 1983, p.213; Richard P Bark et al, "Risk Perceptions of Men and Women Scientists", *Social Science Quarterly*, vol.78, no.1, March 1997, pp.167-176; Jan M Gutteling & Oene Wiegman, "Gender Specific Reactions to Environmental Hazards in the Netherlands", *Sex Roles*, vol.28, nos.7-8, 1993, pp.433-447.

[3] Cited in Sara Ruddick, "Pacifying the Forces: Drafting Women in the Interests of Peace", *Signs: Journal of Women in Society and Culture*, vol.8, no.3, Spring 1983, p.479.

[4] See Whitworth, n.1.

[5] Nelkin maintains "…their concern begins with the special effects radiation has on the health of women and on future generations…women are 'nurtures' or caretakers of life…", cited in Brody, n.2, p.211.

[6] Carol Bacchi, "Women and Peace: Through the Polls", Working paper no.8 (Canberra: Peace Research Centre), cited in James W. Lamare, "Gender and Public Opinion: Defence and Nuclear Issues in New Zealand", *Journal of Peace Research*, vol.26, no.3, 1989, p.286.

[7] Christine Sylvester, *Feminist International Relations: An Unfinished Journey* (Cambridge: Cambridge University Press, 2002).

[8] See Ruddick, n.3.

[9] Richard P. Barke, Hank Jenkin-Smith and Paul Slovic, "Risk Perceptions of Men and Women Scientists", *Social Science Quarterly*, vol.78, no.1, March 1997, pp.167-176.

[10] See Brody, n.2.

[11] See Gutteling & Wiegman, n.2.

[12] Connie De Boer , "The Polls: The European Peace Movement and Deployment of Nuclear Missiles", *Public Opinion Quarterly*, vol.49, no.1, Spring 1985, pp.119-132.

[13] A. Subramanyam Raju, "Women and the Nuclear Issue", unpublished paper.

[14] The NPT is a landmark international treaty whose objective is to prevent the further spread of nuclear weapons technology. Opened for signature in 1968, the Treaty entered into force in 1970. The CTBT, which opened for signature in 1996, is intended to prohibit all nuclear weapon test explosions. Article XIV of the Treaty requires ratification by 44 named states before the Treaty can enter into force. Of these 44 states, three – India, Pakistan, and North Korea – have not signed the Treaty.

Chapter-II
A Background to India's Nuclear Program

India and Pakistan have, by and large, remained locked in an adversarial relationship following partition in 1947. In the 1990s, both countries explicitly declared their nuclear capabilities. In this chapter, an attempt is made to trace the trajectory of India's nuclear program as a backdrop to understanding the views of *women scientists* from India on the nuclear question.

Nehru's views on Nuclear Weapons

India's nuclear program started immediately after Independence. On August 27, 1947, the Atomic Energy Research Board held a meeting and consequently, the Atomic Energy Commission (AEC) was formed on August 10, 1948, under the Atomic Energy Act of 1948. Prior to the establishment of the AEC, India emphasized the importance of nuclear energy in the country's development and the need for peaceful uses of nuclear power. On January 22, 1947, speaking in the Constituent Assembly, Jawaharlal Nehru, the first Prime Minister of India, said: "The human spirit will prevail over the atom bomb".[1] India was firm that a nuclear program should be peaceful and should focus on economic development. It was against international control of atomic energy. While discussing US President Dwight D. Eisenhower's "Atoms for Peace" proposal, Nehru, in the Parliament on May 10, 1954, questioned: "Who were going to control atomic energy internationally". He stated: "We are prepared in this, as in any other matters, even to limit, in common with other countries, our independence of action for the common good of the world. We are prepared to do that, provided we are assured that it is for the common good of the world and not exercised in a partial way, and not dominated over by certain countries, however good their motives".[2] However, he also stated that his country would limit its independence of action in nuclear energy for the common good of the world. Nehru spelled out India's nuclear policy categorically at the inauguration of India's first nuclear reactor, Apsara, at Trombay, near Bombay, in January 1957. He stated: "No man can predict the

future. But I should like to say on behalf of my government and I think I can say with some assurance on behalf of any future government of India that whatever might happen, whatever the circumstances, we shall never use this atomic energy for evil purposes. There is no condition attached to this assurance, because once a condition is attached, the value of such an assurance does not go very far."[3]

On March 25, 1963, while discussing the allocation of grants to the Department of Atomic Energy, Nehru maintained that it was wrong to assume that by producing a bomb, India's defense would be strengthened or China, by conducting a nuclear test, would become militarily stronger. Nehru stated: "I say this from the most practical point of view, apart from the moral and ethical which are important, that it is right that we should adhere to our decision not to use atomic energy for the production of any weapons." Further he said: "On the one hand, we are asking the nuclear powers to give up their tests. How can we, without showing the ultimate in sincerity of what we have always said, go in for doing the very thing which we have repeatedly asked the other powers not to do."[4]

India's Reasons for not joining the NPT & CTBT

The NPT was signed on June 1, 1968, and came into force on March 5, 1970. The treaty recognized a Nuclear Weapon State (NWS) as one which exploded a nuclear weapon or nuclear device prior to January 1, 1967. Under this clause, the US, USSR, UK, France and China are considered as NWS. The rest of the countries have been branded as Non-Nuclear Weapon States (NNWS). The treaty restricts NNWS from developing nuclear weapons or nuclear bombs.

India considered the NPT as a discriminatory one: that divided nations into two categories, the 'nuclear haves' and the 'have nots'. Its rejection of the treaty centered on the following:

- The treaty was framed by the Super Powers and not by the Eighteen Nations Disarmament Committee, which was the genuine representative of the forces involved in international relations.[5]
- The treaty failed to provide equal treatment to NWS and NNWS. The former only agreed to negotiate to reduce their nuclear arsenals whereas the NNWS were required not to develop nuclear weapons.

- The treaty did not oppose the NWS's manufacturing arms but did not allow the NNWS to pursue nuclear programs even for peaceful purposes.
- The treaty violates Article I and II of the UN Charter [6] which envisages effective collective measures for the prevention and removal of threats to peace in the world and the principle of sovereign equality of all its members.

Criticizing the NPT, M.A. Hussain, Ambassador of India to the UN, said in a statement at the 57th meeting of the First Committee of the UN on May 14, 1968, that there were also several other reasons for India's objections to the NPT. They were as follows:

- The treaty did not ensure the non-proliferation of nuclear weapons but only stopped the dissemination of weapons to Non-Nuclear Weapon States without imposing any curbs on the continued manufacture, stockpiling and sophistication of nuclear weapons by the existing Nuclear Weapon States.
- The treaty did not do away with the special status of superiority associated with power and prestige conferred on those powers which are in possession of nuclear weapons.
- The treaty did not provide for balance of obligations and responsibilities between the Nuclear Weapon States and Non-Nuclear Weapon States while all the obligations were imposed on NNWS and not on NWS.
- The treaty did not take a step-by-step approach towards nuclear disarmament.
- The treaty did not stop any NWS to assist another NWS in nuclear programs.
- Article VI did not create a judicial obligation with regard to the cessation of nuclear arms race at an early date.
- The treaty imparted a false sense of security to the world.
- The treaty was discriminatory with regard to the peaceful benefits of nuclear expositions.
- The treaty was discriminatory with regard to the safeguards and controls which were imposed on the Non-Nuclear Weapon States.

- The security assurances to the Nuclear Weapon States could not be quid pro-quo for the acceptance of the treaty. This must be obligatory for the Nuclear Weapon States.[7]

India considered all States to be equal and it could not acquiesce with discrimination. It rejected the division of States into 'nuclear haves' and 'nuclear have nots'. It maintained that the NNWS must be given legal security against the use of nuclear weapons by the NWS. In addition to the treaty being discriminatory in nature, the perceived Chinese threat to its security was also a reason for its refusal to accede to the treaty.

Another treaty that has influenced global and South Asian debates on the nuclear issue is the Comprehensive Test Ban Treaty (CTBT) of 1996. The treaty calls every signatory state not to 'carry out any nuclear weapon test explosion or any other nuclear explosion.' However, it does not prohibit laboratory testing and simulations. These are not included because they do not constitute a nuclear explosion. India has been arguing that the CTBT should be linked to a time-bound program for the elimination of all nuclear weapons. Since the treaty prevents future testing and does not demand that the NWS destroy their existing weapons, India believed that this treaty, like NPT, would not help the cause of global disarmament.

Threat from China

The Chinese factor weighs in India's nuclear policy. The Sino-Indian war of 1962 made India and China adversaries. For Indian strategic thinkers, the nuclear tests conducted by China in 1964 added to the atmosphere of distrust. Its alleged transfer of nuclear weapons and designs to Pakistan has brought about a different dimension to the security of South Asia.

Since both India and China had fought in 1962, the nuclear threat from China looms large with a possibility of India being blackmailed in future. This was further buttressed by the fact that China sent a ceasefire ultimatum to India during the Indo-Pakistan war of 1965. In 1971 also, China declared that it would firmly support the Pakistani government in safeguarding its sovereignty and national independence.

China's advocacy of a Nuclear Weapon Free Zone (NWFZ) proposal in South Asia, far from creating an atmosphere of security, generated further suspicion for the Indian foreign policy decision makers as it was felt that China intended the NWFZ to cover the territories of its potential adversaries.

On March 2, 1963, China and Pakistan entered into an agreement. The agreement covered the 300-mile frontier between China's Sinkiang Province and the Pakistan administered Kashmir, claimed by India. India questioned the agreement on the ground that China had no right to have a frontier treaty with a country with which it did not possess a common boundary.

The relationship between China and Pakistan caused a sense of uneasiness in India. In 1965, though China did not involve itself in the war between India and Pakistan, it supplied Pakistan arms worth $28 million that included T-55 tanks, the Chinese variant of MIG-19 fighters. In July 1966, both countries further signed an agreement according to which China agreed to supply arms worth $120 million which included 100 T-59 tanks, 80 F-6s and 10 IL-28 bombs. It also agreed to equip three infantry divisions and help found an ammunition factory near Dacca, which is now the capital of Bangladesh. It was estimated that from 1965 to 1985, China supplied arms to Pakistan worth $ 338.383 million. China transferred nuclear weapon designs to Pakistan, too.[8] In the early 1980s, Pakistan obtained enriched uranium from China for one or two bombs.[9] There were reports that China had helped Pakistan in developing a capacity to enrich uranium for weapon use.[10] Later in 1989, China designed a nuclear system for the Pakistani reactor PARR-II, which uses enriched uranium[11] and also supplied heavy water to the KANUPP reactor. It was reported that Pakistan, with the help of China, conducted nuclear tests in 1998.[12]

Pokhran-I

Indira Gandhi realized the importance of developing a nuclear program and therefore conducted a peaceful nuclear test at Pokhran on May 18, 1974, to develop nuclear technology for peaceful uses like developing of mines, and construction of dams and harbors. India's intention of conducting a peaceful nuclear explosion can be comprehended by the

statement of Indira Gandhi in the Lok Sabha on November 15, 1972. She said: "The Atomic Energy Commission is studying conditions under which peaceful nuclear explosions carried out underground could be of economic benefit to India without causing environmental hazards".[13]

The test at Pokhran was a peaceful test, carried out 107 meters beneath the ground, and was a part of India's research and development program. Indira Gandhi stated in an interview to Danish Television on June 28, 1974: "The thinking of the world has been conditioned by the fact that most nuclear countries have thought of nuclear energy only in terms of military uses. Therefore, they find it very strange that there is a country which has the capacity and which wants to use it merely for peaceful and development purposes."[14]

There was a debate in the Lok Sabha about the explosion. Several members of Parliament supported India's stance. They considered nuclear technology to be very useful and a boon for its economy. When the US and other NWSs criticized India's test, India stated that if 9,000 nuclear weapons belonging to the US, USSR and China were the best guarantee to world security, then India's ten kiloton explosion could pose no threat to the world's security.[15] Indira Gandhi maintained that the test was not for military purposes and India did not want to manufacture nuclear weapons.

With the test, India proved to the world that it had the ability, like the NWSs, to test a nuclear device. Had it tested the device before the NPT was signed in 1968, it could have got the status of NWS. Alternatively, it should have developed a nuclear infrastructure before testing so that dependence on external supplies for its nuclear plants could be avoided.[16]

In her keynote address at the inaugural session of the Non-Aligned Summit in New Delhi on March 3, 1983, Indira Gandhi said that only complete disarmament could provide peace and security; and as long as the imbalance prevailed, it would not be possible to stop proliferation.[17] India proposed that only dismantling of nuclear weapons could be the answer to proliferation.

Nuclear Program Developments in Pakistan

In the 1970s, Pakistan felt the need to develop its nuclear capability for two reasons: to retain the lost prestige consequent to the 1965 and 1971 conflict with India and to neutralize India's military power; and to pose a deterrent for future conflicts with India. Pakistan, like India, did not agree to be a party to the NPT since 1968. It has been, on the one hand, arguing that the treaty is discriminatory and on the other it has held that it would sign the treaty if India does. It has linked its nuclear policy with India's approach to nuclear proliferation. Pakistan tried to illegally obtain material for its nuclear weapons program.[18] There were a number of reasons that motivated Pakistan to pursue its nuclear program. They were:

- India's PNE in 1974 being reckoned as a security threat to Pakistan
- to develop a nuclear program as a bargain tool, which would increase Pakistan's bargaining power to make India join a mutually binding agreement against the production of nuclear weapons, strengthen its position in any future arms control and disarmament talks involving India
- to gain parity with India
- to use it as a deterrent against India
- The 1979 Afghanistan crisis forced Pakistan to acquire nuclear weapon capabilities
- not signing the NPT and link it up with India
- using the NPT as a diplomatic tool to establish its nuclear non-proliferation credentials. It sought to legitimize its nuclear program.

Pakistan considered India's tests as a threat to its security. It reacted immediately by conducting its nuclear tests in the same month. Thus, one can conclude that India played a role in Pakistan's decision to go nuclear.

Pokhran-II

The Bharatiya Janata Party (BJP), with its allies, formed the NDA government in March 1998. The NDA government[19] chose to conduct tests. Jaswant Singh, the then External Minister, explained the BJP's aspirations: "It is axiomatic that unless India gives some definition to

its vital national interests, it will fail to even conceptualize its strategic frontiers. Thereafter, a violation of any of those interests will, unfortunately, go entirely unchecked. In consequence, India's difficulties will be enhanced, future correctives will be made more difficult, and the country's national security will be adversely affected. This has been the root of India's past mistakes; this critical deficiency lies at the heart of its present immobility, both of thought and of action."[20] After 24 years, India, under the NDA government, detonated nuclear tests on May 11 and 13. There are strategic factors that drove India to conduct nuclear tests. India considered China as its potential threat number one. Apart from the Chinese involvement in South Asia, India became uncomfortable over Chinese intentions in expanding its influence – its strategic engagement with Myanmar, its intention to have control over the Spratly Islands, its naval expansion, its firing missiles against Taiwan, and its influence in Southeast Asia. As Subramanyam puts it: "It is not a question of Chinese aggression or military threat…. The only areas that do not have a balancing arrangement vis-à-vis the Chinese power and influence are South and Southeast Asia. China has already been exercising its power and influence on its South. It has proliferated to Pakistan both nuclear and missile technologies and is the largest arms supplier to that country. The Chinese interest in Burma is all too evident…. Its sale of CSS-2-long-range missiles to Saudi Arabia is history. It has maritime dispute with a number of Southeast Asian nations. It is logical to expect the presence of Chinese power and influence over the South, Southeast and Southwest Asia."[21]

India felt that it could play a role in international affairs if it becomes a powerful/nuclear weapon state because no one listens to a weak state and one can influence from a position of power. It was evident to the world that Pakistan had the capability to engage in a nuclear test competition with India. The tests in May ended the question of continuation of ambiguity on the nuclear issue. The difference between Pokhran-I and II was that the Indian government in 1974 maintained that the test was a peaceful explosion, whereas in 1998 there was no reference of peaceful tests and hence India claimed a nuclear weapon state status. India, though not party to the NPT, did not violate the rules.

Conclusion

India's nuclear policy is guided by the disarmament approach to security. It has a strong desire to acquire nuclear capability, as this would compel the world to give it respect and prestige. It believes that real security is possible only through global disarmament and not by disarming the non-nuclear nations. It wants to halt both vertical and horizontal nuclear proliferation. India rejected the NPT and CTBT because they are discriminatory. These treaties failed to provide equal treatment between the NWS and NNWS. India considers all nations to be equal. It does not believe in dividing the states into 'nuclear haves' and 'nuclear have nots'. Since the pursuit of global disarmament has become practically futile, India's nuclear policy was confined only to South Asia.

It is in this backdrop that the survey findings outlined in the next chapter must be placed.

Notes:

[1] Cited in Jawaharlal Nehru, *India's Foreign Policy: Selected Speeches September 1946- August 1961* (New Delhi: Publication Division, Government of India,1961), p.193.

[2] Cited in Jawaharlal Nehru, *India's Foreign Policy: Selected Speeches September 1946- August 1961* (New Delhi: Publication Division, Government of India,1961), p.193.

[3] Cited in Jawaharlal Nehru, *Jawaharlal Nehru's Speeches 1953-57* (New Delhi: Ministry of Information and Broadcasting Publication Division, Government of India, 1958), p.507.

[4] Cited in G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p.28.

[5] Ziba Moshaver, *Nuclear Weapons Proliferation in the Indian Sub-Continent* (London: Mc. Millan Academic and Professional Limited, 1991), p.119.

[6] See *Charter of the United Nations and Statute of the International Court of Justice* (New York: United Nations, 1990), pp. 3-5.

[7] Cited in K. Subrahmanyam, "Indian attitudes towards the NPT" in *SIPRI Year Book 1974* (Stockholm: The MIJ Press, 1974), pp.259-260.

[8] The US suspected Chinese involvement in the Pakistan nuclear weapon program. See P.Stobdan, "China's Post-Cold War Security Doctrine", *Strategic Analysis*, vol.15, no.10, January 1993, pp. 979-994.

[9] Leonard Spector (et al), *Tracking Nuclear Proliferation* (Washington, DC: Carnegie Endowment for International Peace, 1995), p.49.

[10] See *New York Times*, 19 September 1982.

[11] See *Nucleonic Week*, 9 August 1990.

[12] Terence Taylor, Deputy Director of the International Institute of Strategic Studies, said that "There has been evidence of Chinese technology transfer of M-11 missiles to Pakistan and one can deduce that the new Pakistani missiles had large components of Chinese technology." In *Arms Control Reporter*, 1998, p.706 B 254, cited in Savita Pande, "Proliferation After the Cold War" in Jasjit Singh (ed), *Nuclear India* (New Delhi: Knowledge World, 1998), p.111.

[13] *Lok Sabha Debates*, vol.20, no.3, 15 November 1972, col.125.

[14] Brahma Chellaney, *Nuclear Proliferation: The U.S-Indian Conflict* (Hyderabad: Orient Longman, 1993), p.39.

[15] There was a debate in the Lok Sabha on 8 August 1974.

V.P. Singh, Member of the Lok Sabha (congress I) supported India's action. While reacting to Samar Guha's statement he said that there was a vital difference between the explosion over Hiroshima and the Pokhran test. He stated, "We are categorical that the philosophy of Hiroshima must end and the philosophy of Pokhran must spread". See *Lok Sabha Debates*, vol.17, no.14, 8 August 1974, col.210.

Reacting to the point raised by Guha that since India was a poor country, it would be costly and would weaken its economy, he said: "… because we are poor, we need Pokhran. May I ask what was the condition of economy when (the) USSR, China and Britain started their nuclear programs? Their nuclear programs were not for development but for mutual destruction. The economy of Russia (sic) and Britain was in shambles after the II world War. China had not recovered from the great fall of its great leap", *ibid*, col.211.

P.V.G. Raju, another Congress member of the Lok Sabha emphasised the importance of nuclear technology for producing energy. He quoted Professor Swamy Gnanand, Professor of Nuclear Physics in Andhra University, who told him when China attacked India that "It is very important that we hold the area (north Assam) because it is very important for us to develop nuclear energy, electric energy in the area". According to Swamy "… the Brahmaputra reaches India in that area… and then it flows into the valley on the right hand side and the left had side of the valley… about 5,000 to 7,000 meters high, and the Brahmaputra flow in between. Swamiji told that it is possible to produce electricity by blasting tunnels in those mountain and allowing water to flow into these tunnels. We can have first class hydroelectric machinery there. We could produce electricity in that area as much as what the whole of Europe is producing today". Cited in *Ibid*, cols.226-227.

Hari Kishore Singh, another congress member of the Parliament told in the Lok Sabha that "there is a possibility now that our voice may be heard with the respect to the country of nations particularly by those who have acquired nuclear technology for war like purposes". Cited in *ibid*, col.236. For others who supported the explosion, see *ibid*, cols. 254-257.

[16] P.R.Chari, *Indo-Paki Nuclear Stand Off: The Role of the United States* (New Delhi: Manohar Publishers, 1995), p.52.

[17] See *Economic Times*, 4 March 1983.

[18] Hedrick Smith, "A Bomb Ticks in Pakistan", *New York Times*, March 6, 1988.

[19] The coalition parties were not consulted prior to the tests. It was the BJP, which decided to conduct nuclear tests.

[20] Jaswant Singh, *Defending India* (New Delhi: MacMillan India, 1999), p.278.

[21] K. Subrahmanyam, "Nuclear India in Global Politics". *World Affairs*, vol.2, no.3, July-September 1998, p.22.

Chapter-III
Survey Findings

The present study was conducted in Hyderabad, Bangalore and Mumbai in 2003-2004 by interviewing women scientists in four fields—biology, physics, chemistry and engineering. The sample range was 200 (50 scientists from each field). This study provides descriptive information about women scientists' perceptions of nuclear issues.

Importance of the Issue

India, as one of the developing countries, faces many problems. The respondents were asked to give priority in their preferences regarding the problems being faced by India. Only two per cent of the respondents considered the nuclear issue to be an important concern facing the country. Majority of the respondents ranked poverty, terrorism, communalism, liberalization and the Kashmir issue above the nuclear issue(Table 3.1).[1] Since they were pre-occupied with many problems, nuclear issue is in no way a cause of concern for majority of the respondents. However, in response to a separate question, 35 per cent of them treated the issue as very important (Table 3.1).

Table 3.1 – Importance of the Issue

Problem	%	Importance	%
Poverty	48	Very imp	35
Terrorism	33	Important	56
Communalism	9	Not important	2
Liberalization	5	Neither/ nor	7
Nuclear	2		
Kashmir	3		

India's Nuclear Tests

Fifteen per cent of them understood that the nuclear test conducted by the government of India in 1998 was a political decision; whereas 45

per cent felt that it was a matter of national pride. For six per cent of them, it was and an attempt to divert people's attention. Twenty five per cent gave preference to all the above, whereas nine per cent said that India conducted tests to capitalize indigenous scientific capability (Table 3.2).

Table 3.2 – Opinion on India's Nuclear Tests

Opinion	%
A political decision	15
An issue of national pride	45
An issue to divert people's attention	6
All the above	25
Others	9

Reasons for conducting Tests

The reason for India testing nuclear devices[2] according to majority of the respondents (62 per cent) was to enhance India's international status. They felt that the nuclear tests conducted were more for status than security needs and were an attempt to challenge the nuclear hegemony of the select few and to put an end to nuclear apartheid. Nine per cent of them felt that India perceived danger equally from both Pakistan and China, whereas 14 per cent of them considered that threat might come from the US, three per cent from Pakistan and seven per cent from China. Five per cent of the respondents gave the following reasons (Table 3.3):

- It was long overdue
- To keep going towards scientific advancement and self-sufficiency
- It was a political strategy of the BJP coalition government to capture votes and to create a sense of national pride among the people
- India realizes the fact that it can play a role in international affairs if it becomes a nuclear weapon state because no one listens to a weak state

Stance on further Nuclear Tests

Majority of the respondents (64 per cent) supported India going further nuclear tests,[3] whereas remaining 36 per cent opposed the tests (Table 3.3).[4]

Table 3.3 – Opinion on India's Nuclear Tests

Reasons for conducting test	%	Opinion on further tests	%	Strained relations with whom	%	Did India change its policy	%
US	14	Yes	64	Pakistan	23	Yes	19
Pakistan	3	No	36	China	5	No	67
China	7			US	24	Difficult to say	
Pak & China	9			All the above	28		14
Enhance Status	62			All countries	17		
Others	5			Others	3		

Strained Relations with whom

When India conducted nuclear tests, there was an opposition from different parts of the world. Respondents were asked whether India had strained relations with any country as a result of the nuclear tests. Twenty three per cent of the respondents felt that nuclear tests strained relations with Pakistan; five per cent said with China; whereas 24 per cent felt with the US and 28 per cent stated that with all the mentioned countries. Another 17 per cent were of the opinion that the problem existed with all the countries. Remaining three per cent (others) (Table 3.3) maintained that India's strained relations with many countries were not because of nuclear tests.

Opinion on India's Peaceful Nuclear Program

Nineteen per cent of the respondents felt that Pokhran-II tests marked a departure from the continuation of India's peaceful nuclear policy, whereas 67 per cent did not agree and some of them felt that the tests only end the question of a continuation of ambiguity on the nuclear issue. Fourteen per cent felt that it was difficult to comment (Table 3.3).[5]

Opinion on conducting Nuclear Tests with public support

In India, like in many other countries, a few decision-makers secretly take decisions related to nuclear tests. In this regard, 62 per cent of the respondents expressed the view that the Indian government has to take public opinion into consideration. Since India is a democracy, in their opinion, importance should be given to public opinion on such issues (Table 3.4).[6] They maintained that the question of security matters and information about the nuclear program should be made public. It is important to note that the Indian government, under the Atomic Energy Act of 1962, under Section 18 (1) of the Act, can restrict the disclosure of information.

India's superiority over Pakistan

Opponents of India going nuclear argued that India is superior to Pakistan in conventional weapons, hence there was no need for nuclear tests. They argued that India's nuclear tests were followed by Pakistan's, which resulted in Pakistan attaining parity with India. In this regard, the majority of the respondents (97 per cent) expressed that India did not lose its pre-eminence over Pakistan, whereas three per cent of them disagreed with this view. (Table 3.4).[7]

Table 3.4 – Opinion on India's Nuclear Policy

Public support	%	Did India lose pre-eminence over Pakistan	%
Yes	62	Yes	3
No	38	No	97

The Possible use of Nuclear Weapons

Majority of the respondents (60 per cent) opposed using nuclear weapons against Pakistan, whereas 30 per cent favored using nuclear weapons and the remaining ten per cent maintained that India should use nuclear weapons when Pakistan uses its nuclear weapons against India and should use it only as a last resort (Table 3.5). With reference to a question as to under which circumstance could India use its nuclear weapons, respondents gave different options[8]: (a) 33 per cent were of

the opinion that under no circumstance should India use its nuclear weapons because in a nuclear war no one is a winner.[9] (b) Forty per cent felt that India could use them if Pakistan uses nuclear weapons against India. (c) Fourteen per cent wanted to use them if China attacks with nuclear weapons and (d) Five per cent said if the US attacks with nuclear weapons (Table 3.5). However, in another question, the respondents (nine per cent) opined that India conducted tests because it perceived threat equally from both Pakistan and China (Table 3.3). Here, perceptions of respondents vary regarding using nuclear weapons against both countries. Only 14 per cent of them wanted to use weapons against China, whereas 40 per cent of them wanted to use them against Pakistan. The respondents might have thought that India is yet to get parity with China. The remaining eight per cent gave the following reasons:

- India should use its nuclear weapons only when there is no alternative
- If security of India is threatened by any country
- India should use nuclear weapons if any country with nuclear weapons attacks it

Table 3.5 – Opinion on India using Nuclear Weapons

Should India use nuclear weapons against Pakistan	%	India should use nuclear weapons	%
Yes	30	If Pakistan attacks	40
No	60	If China attacks	14
Only as a last resort	10	If US attacks	5
		Under no circumstances	33
		Others	8

Impact of Nuclear Tests on Kashmir

Kashmir is the major source of tension between India and Pakistan. Though three wars were fought and a number of talks were held between the two countries, not much progress could be made towards finding a

solution to the Kashmir dispute. The failure resulted in mutual distrust and suspicion over the years. To a question whether the tests conducted by both the countries would increase tension between them on the Kashmir issue, 37 per cent of the respondents maintained that the tests increased tensions between them, whereas 17 per cent opined that the tests ruled out the Indo-Pak war on the Kashmir issue. Perhaps they agreed with Kenneth Waltz's argument that international stability would be possible by nuclear proliferation and more nuclear weapon states would create less international aggression. Another 23 per cent felt that the tests internationalized the issue, whereas 23 per cent opined that there was no impact on the Kashmir issue (Table 3.6).[10]

Table 3.6 – Impact of Nuclear Tests on Kashmir

Opinion	%
Increased tension between Indo-Pak	37
Ruled out war	17
Internationalized the issue	23
No impact	23

Opinion on India signing the NPT and the CTBT

With regard to signing the NPT and the CTBT,[11] majority of the respondents (41 per cent) opposed India signing the treaties. They maintained that India never violated any treaty pertaining to non-proliferation.[12] For 31 per cent of them, India should sign them, whereas 21 per cent supported signing only the NPT and seven per cent were for only the CTBT (Table 3.7). Among the majority, some of them gave the following suggestions: (a) Certain biased clauses of the treaties should be amended; (b) India should sign if it is included in the nuclear club.[13]

The respondents were asked under what circumstances, can/ should India sign the treaties. Thirty five per cent of them wanted India to sign unconditionally, 47 per cent maintained that it should sign only if Pakistan adheres to the treaties; whereas the rest 18 per cent gave the following reasons:

- If all countries signed
- If all developed countries signed
- When all countries agreed to destroy their nuclear weapon
- It is better to exhibit restraint rather than signing the treaties

Table 3.7 – Opinion on India signing NPT and CTBT

Should India sign the treaties?	%	If India should sign, it should be	%
Yes	31	Unilateral	35
No	41	If Pakistan signs	47
NPT only	21	Others	18
CTBT only	7		

Pakistan's Nuclear Tests

Pakistan has linked its nuclear policy with India's approach towards nuclear proliferation. It considered India's nuclear development and nuclear tests as threat to its security. Pakistan was involved in an armed conflict with India in 1948, 1965 and 1971 and perceives that India may attack it in future, too.[14] With reference to Pakistan's nuclear tests in 1998, respondents gave the following options: (a) It was a political decision (20 per cent); (b) It was an issue of national pride (19 per cent); (c) It was an issue to divert people attention (30 per cent); (d) All the above (31 per cent) (Table 3.8). If a comparison is made, majority of the respondents felt that nuclear tests conducted by India are more for national pride, whereas majority of them opined that nuclear tests conducted by Pakistan were: a political issue, a matter of national pride and a move to divert people's attention.

Table 3.8 – Pakistan and Nuclear Tests

Opinion	%
A political decision	20
An issue of national pride	19
An issue to divert people attention	30
All the above	31

Security vs. Economic Development

It was reported that the cost of India's nuclear program over the next decade would be around Rs. 80,000 crores. Critics of the nuclear weapons program argued that since India has been facing many social and economic problems, it should not spend more money on military causes. With regard to expenditure on the nuclear weapons program, majority of them (57 per cent) felt that India was spending more money than required and it was affecting economic development in India. However, 36 per cent were of the opinion that expenditure on nuclear weapon program is no way effecting economic development, whereas 7 per cent said that it was difficult to comment on it (Table 3.9).

Seventy eight per cent of the respondents argued that India's expenditure on defence was reasonable, whereas 17 per cent argued that it was too much and the remaining five per cent maintained that it was too little (Table 3.9).

Table 3.9 – Opinion on Security and Economic Development

Do you think that expenditure on nuclear programs affects economic development?	%	India's defence expenditure is	%
Yes	57	Too little	5
No	36	Too much	17
Can't say	7	Reasonable	78

Public Awareness

Regarding the question related to awareness about the fallout of nuclear tests, respondents gave the following reasons: (a) no exposure to nuclear issue in India (73 per cent); (b) no debate on it (20 per cent); and (c) it is not of people's concern (seven per cent, Table 3.10)

Table 3.10 – Public Awareness on Nuclear War

Opinion on fallout of nuclear tests	%	Should people be educated?	%	Do you support demonstrating against the spread of nuclear weapons?	%
No debate on nuclear tests	20	Yes	93	Yes	30
		No	7	No	21
No exposure to such issues	73			Support to some extent	41
				Oppose to some extent	8
It is not of people's concern	7				

When a question was asked whether people should be educated on the effect of nuclear war, overwhelmingly, 93 per cent said yes and the remaining seven per cent opposed it (Table 3.10). Thirty per cent of the respondents supported demonstrating against the spread of nuclear weapons; 21 per cent opposed it, whereas 41 per cent supported to some extent and the remaining eight per cent opposed to some extent (Table 3.10).

India and Pakistan Relations

Most of the respondents (83 per cent) did not see a relationship between the Kashmir issue and nuclear tests, whereas the rest of them felt that the Kashmir issue would lead to a nuclear war between India and Pakistan (Table 3.11).

Impact of Nuclear Tests on Indo-Pakistan Relations

India and Pakistan carried out a series of tests in May 1998. In this regard, the respondents were asked about the impact of the tests on Indo-Pakistan relations. Majority of the respondents (75 per cent) felt that there was no impact of nuclear tests on Indo-Pakistan relations. Twenty per cent agreed that there was an impact on Indo-Pakistan relations. Remaining five per cent were of the opinion that it was difficult for them to answer (Table 3.11).

While responding to a different question whether they approved the nuclear tests conducted by India and Pakistan, 43 per cent partly approved the tests whereas 33 per cent approved and remaining 24 per cent expressed a negative view (Table 3.11).

According to respondents, the best way to reduce the threat of war between India and Pakistan was: (a) Freeze arms race in South Asia (42 per cent); (b) Through balance of power between India and Pakistan (25 per cent); and (c) Reduce weapons procurement (33 per cent; Table 3.11). Majority of the respondents (52 per cent) felt that war is an outmoded way of settling differences between nations, whereas a few respondents (12 per cent) felt that war is necessary to settle the differences between nations and the remaining 36 per cent were of the opinion that it was difficult to say (Table 3.11).

Order of Preference in Indo-Pakistan Relationship

Of all the respondents, 39 per cent sought to solve the problem peacefully and amicably, while eight per cent felt that relations will be improved only through economic cooperation[15] and 25 per cent gave importance to national security while dealing with Pakistan. Twenty eight per cent gave preference for all the above three (Table 3.11).

Table 3.11 – Opinion on India and Pakistan and the Nuclear Issue

Opinion	%	Opinion	%
Will the Kashmir dispute lead to a nuclear war?		Opinion on Indo-Pak relations in order of preference:	
Yes	17	National security	25
No	83	Economic cooperation	8
		Peaceful co-existence	39
Will the nuclear tests impact Indo-Pakistan relations?		All the above	28
Yes	20		
No	75	CBMs that should be established between India and Pakistan:	
Not sure	5	Greater people-to-people contact	10

Contd...

Table 3.11 Contd...

Do you approve of the nuclear tests conducted by India and Pakistan?		More discussions between intelligentsia of India and Pakistan	7
Approve	33	More open official talks between both the governments	15
Disapprove	24	Improve trade relations	3
Partly	43	All the above	65
Best way to reduce the threat of war between India and Pakistan:		Should India initiate a dialogue with Pakistan?	
Freeze arms race	42	Yes	64
Through balance of power	25	No	36
Reduce weapons procurement	33		
War is an outmoded way of settling differences:			
Agree	52		
Disagree	12		
Can't say	36		

India initiating a Dialogue with Pakistan

Majority of them (64 per cent) felt that India should initiate a dialogue with Pakistan and the remaining 36 per cent opposed any initiative with Pakistan (Table 3.11).

CBMs between India and Pakistan

No two neighboring countries in the world have as much misunderstanding as India and Pakistan have had earlier. In this regard, the respondents were asked about the steps to be taken to reduce prevailing misunderstanding between India and Pakistan: ten per cent of the respondents felt that there should be greater contact between the people of both countries (Table 3.11).[16] The author, who has participated in some workshops – particularly in summer workshops organized by Kings College (University of London), Regional Center

for Strategic Studies (Colombo) and Women in Security, Conflict Management and Peace (New Delhi), had an opportunity to discuss these issues with Pakistani scholars. During their discussion, they acknowledged the fact that their respective governments were following policies based on mistrust. They believed that a dialogue between India and Pakistan was necessary to solve the conflicts and to restore confidence among the people. Such conferences would certainly promote more understanding between them.

Seven per cent opined that there should be more discussions between the intelligentsia of India and Pakistan, whereas three per cent of them suggested improvement of trade relations between them and 15 per cent felt that there should be more open official talks between the governments of two countries at frequent levels. The remaining 65 per cent, which constitute a majority, suggested all the above steps to improve relationship between India and Pakistan (Table 3.11).

South Asia and the Nuclear Issue

India and Pakistan's Nuclear Weapons Program and South Asian Security

An overwhelming 80 per cent of the respondents did not agree that India's nuclear weapon program destabilized South Asia, whereas a few of them (nine per cent) were of the view that India's nuclear weapon program was responsible for the present situation in South Asia. The remaining 11 per cent opined that India's nuclear weapon program was responsible, but it was limited to some extent (Table 3.12).

Fifty five per cent of the respondents maintained that there was no impact of Pakistan's weapon nuclear program on South Asian stability and 22 per cent felt that certainly Pakistan's nuclear weapon program had an impact on stability of South Asia. The remaining 23 per cent were of the view that impact was limited to some extent (Table 3.12).

Responsibility for Nuclearization of South Asia

Majority of the respondents (58 per cent) expressed that India, Pakistan, China and the US are equally responsible for nuclear proliferation in

the South Asian region. Seven per cent opined that India was responsible; eight per cent felt that Pakistan was responsible, whereas 13 per cent said that China was responsible and for 14 per cent of them, it was the US which was responsible (Table 3.12).[17]

Nuclear Tests and Regional Cooperation in South Asia

Regarding regional cooperation, majority of them (51 per cent) felt that partly the nuclear tests conducted by India and Pakistan became an obstacle to forging cooperation in South Asia. However, 24 per cent of the respondents maintained that the tests became an obstacle whereas 25 per cent of them felt that the tests did not prevent regional cooperation in South Asia (Table 3.12).

Table 3.12 – South Asia and Nuclear Issue

Opinion	%	Opinion	%
Is India's nuclear program destabilizing South Asia?		Country responsible for nuclearization of South Asia?	
Yes	9	India	7
No	80	Pakistan	8
To a limited extent	11	China	13
		US	14
Is Pakistan's nuclear program destabilizing South Asia ?		All the above	58
Yes	22	Nuclear tests conducted by India and Pakistan impinge regional cooperation:	
No	55	Yes	24
To a limited extent	23	No	25
		Partly	51

Role of Women and the Nuclear Issue

Women's involvement in the Decision-making Process

Overwhelmingly, respondents (94 per cent) supported women's involvement in the decision-making process related to the nuclear program. Remaining six per cent opposed women's involvement in the decision-making process. However, they said that it is not a gender issue, both men and women should participate in the decision-making process.

Those who supported women's involvement gave the following reasons: (a) They are equal to men (20 per cent); (b) They are part of society (69 per cent), and (c) They can better appreciate the effects of nuclear weapons on society (11 per cent; Table 3.13).

Table 3.13 – Role of Women and the Nuclear Issue

Opinion	%	Opinion	%
Should women be involved in the decision-making process related to the nuclear program?		Do you support women's opposition of the nuclear weapon program?	
		Yes	45
Yes	94	No	36
No	6	Can't say	19
If yes, because:		Are women more peace loving than men?	
They are equal to men	20	Yes	48
They are part of society	69	No	5
They can appreciate better the effects of nuclear weapons on society	11	Depends on the situation	47

Women's Opposition of the Nuclear Weapons Program

Forty five per cent of the respondents supported women's opposition of the nuclear weapons program, whereas 36 per cent responded in the negative and a few respondents (19 per cent) said that it was difficult to comment on it (Table 3.13).

Women and Peace

Forty eight per cent of the respondents opined that women are more peace loving than men,[18] whereas five per cent did not accept it because by nature, all human beings are peace loving. Another 47 per cent of the respondents maintained that every human being acts depending on the situation. They refused to accept the essentialist position that women are inherently more peace loving than men (Table 3.13).

Nuclear Power Plants in India

Importance of Nuclear Power Plants

Twenty per cent of the respondents were of the opinion that atomic power plants create less pollution of the air and water than electric power plants using oil and coal. However, majority of them (46 per cent) argued that the nuclear power plants are as polluting as other plants. Remaining 34 per cent maintained that nuclear power plants to some extent create less pollution (Table 3.14).

A high proportion of the respondents (62 per cent) felt that nuclear power plants are operating more efficiently, whereas remaining respondents (38 per cent) answered in the negative (Table 3.14).

Supporters for the development of nuclear power plants argue that nuclear plants are an inevitable option for developing countries to meet the requirements of electricity. Nuclear power plants not only produce cheap electricity but also play a significant role in desalination of seawater, hydrogen energy systems and in the medical sector. In this regard, 60 per cent of the respondents maintained that nuclear power plants produce cheaper electricity compared to other power plants and remaining 40 per cent did not agree (Table 3.14). Regarding the question whether India should build more nuclear power plants, 56 per cent realized the importance of them. Those who opined the importance of the plants felt that there are 80,000 villages in India which are yet to be electrified. The remaining respondents (44 per cent) did not support building more nuclear power plants (Table 3.14).

Table 3.14 – Opinion on Nuclear Power Plants

Opinion	%	Opinion	%
Does a nuclear power plant create less pollution of the air and water?		Does a nuclear power plant produce cheaper electricity?	
Yes	20	Yes	60
No	46	No	40
To some extent	34		
Does a nuclear power plant operate more efficiently?		Should India build more nuclear power plants?	
Yes	62	Yes	56
No	38	No	44

Security of Nuclear Power Plants

A question was posed about the possibility of terrorists stealing fissile materials from a nuclear power plant. The respondents gave the following answers: (a) There is every chance that the terrorists will steal fissile materials from a nuclear power plant (55 per cent); (b) It is not easy for them to steal fissile materials (45 per cent; Table 3.15).

Nuclear Accidents in India

It was reported that an accident occurred at Kalpakkam Atomic Plant and some workers received high doses of radiation in January 2003. The Bhabha Atomic Research Center (BARC) took six months to acknowledge the incident. The Director of BARC, Dr. B. Bhattacharjee, said though the incident was the worst accident in the history of organization, it was a minor one.[19] Till date, no one knows the exact radiation dose received by the workers. This incident raised doubts about safety of the workers at nuclear installations in the country. In this regard, a question was asked related to the safety of nuclear power plants. The respondents gave the following answers: (a) Very safe (nine per cent); (b) Safe to some extent (57 per cent); (c) Not safe (14 per cent) and (d) Dangerous (20 per cent; Table 3.15).

About the chances of nuclear accidents in India, 53 per cent of the respondents expressed that chances for accidents would not be much, whereas 42 per cent of them opined that nuclear accidents would happen, however they maintained that the accidents would be controlled. Remaining five per cent argued that there are no chances of nuclear accidents (Table 3.15). In other words, all of them opined that there would not be major nuclear accidents in India.

Majority of the respondents (52 per cent) maintained that the threat to sabotage nuclear power plants would be lesser; 40 per cent of the respondents expressed that threat to sabotage nuclear power plants would be greater and remaining eight per cent believed that there would not be any threat to nuclear power plants (Table 3.15).

Table 3.15 – Opinion on Security of Nuclear Power Plants

Opinion	%	Opinion	%
Do you think that terrorists could steal fissile materials from a nuclear power plant?		The threat to sabotage nuclear power plants: Greater	40
Yes	55	Lesser	52
No	45	No possibility	8
Chances of nuclear accidents in India:		Are nuclear plants safe? Very safe	9
No chance	5	Safe to some extent	57
Minor	53	Not safe	14
Can happen, but will be controlled	42	Dangerous	20

International Stability

A majority of respondents (80 per cent) felt that international stability would not be possible by creating more nuclear weapons states, whereas remaining 20 per cent said that if we have more nuclear states, less aggression will take place (Table 3.16).

Global Disarmament

Seventy four per cent respondents maintained that there would not be a nuclear war in the future at the global level, whereas remaining 26 per cent felt otherwise (Table 3.16).

On the question of disarmament, respondents were divided into two groups: 34 per cent of the respondents were of the opinion that it is possible to achieve global disarmament, whereas 66 per cent felt that it is not possible(Table 3.16).[20] Probably, those respondents who were optimistic must have felt that there are only few states (P-5, India, Pakistan and Israel) which are capable of using nuclear weapons and it would not be a problem in achieving global disarmament. They hoped that in the era of globalization, the states would act together in the common interest and work for global disarmament. Others who were not hopeful of disarmament felt that the nuclear weapons states did not show sincerity in ending the arms race and did not respond to a time-bound plan proposed by India to end of arms race by 2010 A.D. For them, it is politically not possible and is difficult to conceive a world without any arms. In an anarchical system, where conflicts are inevitable, it would not be possible to achieve disarmament.

Impact of Research Work on Society

Respondents were asked whether their research work had an impact on society. Majority of them (63 per cent) replied in the affirmative whereas a small number of respondents (10 per cent) replied in the negative. The remaining 27 per cent believed that their research work partly had an impact on society (Table 3.16).

Table 3.16 – Opinion on the Nuclear Issue at the Global Level

Opinion	%	Opinion	%	Opinion	%
Will international stability be possible by more nuclear states?		Will there be a nuclear war in future at the global level?		Is there any impact of your research on society?	
Yes	20	Yes	26	Yes	63
No	80	No	74	No	10
				Partly	27
		Is it possible to achieve global disarmament:			
		Yes	34		
		No	66		

Analysis

The following is a more detailed analysis of the survey.

Biographical Characteristics

A majority of respondents from all the fields (biology, physics, chemistry and engineering) justified India conducting further tests (Table 3.17). It should be noted that the respondents with chemistry background supported further tests. Except majority of the respondents with engineering background, all others maintained that India should not sign the NPT and the CTBT (Table 3.17). In a separate question, majority of the respondents with biology, physics and engineering background wanted India to sign the NPT and the CTBT only if Pakistan signs them. Respondents with chemistry background felt that India should sign the treaties unilaterally (Table 3.17). A majority of respondents with biology, physics and engineering background did not advocate using nuclear weapons against Pakistan whereas a majority with a chemistry background were in favor of using nuclear weapons against Pakistan (Table 3.17).

Majority of the respondents of all the fields did not see the decision to go overtly nuclear as a break in India's nuclear policy. However, from among those who agreed that India had changed its policy, respondents with chemistry background figured prominently (Table 3.17). Regarding use of nuclear weapons, majority of the respondents with chemistry (56 per cent) and engineering background (56 per cent) equally felt that India should use its nuclear weapons if Pakistan attacks with nuclear weapons, whereas majority of the respondents with physics background (52 per cent) maintained that India should use its nuclear weapons if China attacks with nuclear weapons. A majority of the respondents with biology background (60 per cent) wanted to use nuclear weapons if US attacks with nuclear weapons.

Majority of the respondents from all fields gave different answers for a question related to with whom India had strained relations after it conducted nuclear tests: respondents with biology background (32 per cent) felt that India had strained relations with Pakistan; and respondents of physics background (36 per cent) opined that India had strained

relations with the US; respondents with chemistry background (40 per cent) were of the opinion that India had strained relations with Pakistan, China and the US, whereas respondents with engineering background (32 per cent) said that India had strained relations with all the countries (Table 3.17).

Table 3.17 – Respondents' views on Various Issues

Issue	Fields			
	Biology %	Physics %	Chemistry %	Engineering %
Do you justify further tests?				
Yes	52	64	76	64
No	48	36	24	36
Should India sign NPT & CTBT?				
Yes	32	20	36	36
No	40	60	44	20
Only NPT	28	16	12	28
Only CTBT	–	4	8	16
Under which circumstances India should sign NPT & CTBT?				
Unilateral	24	32	56	28
If Pakistan signs	52	44	40	52
Any other condition	24	24	4	20
Should India use nuclear weapons against Pakistan?				
Yes	16	20	52	32
No	76	68	44	52
Only as a last resort	8	12	4	16
Did India change its nuclear policy?				
Yes	16	16	36	8
No	72	72	56	68
Difficult to sav	12	12	8	24

Contd...

Table 3.17 Contd...

Possible use of nuclear weapons:				
If Pakistan attacks	16	32	56	56
If China attacks	4	52	–	–
If US attacks	4	–	12	4
Under no circumstances	60	16	24	32
Difficult to say	16	–	8	8
Strained relations with:				
Pakistan	32	20	20	20
China	–	20	–	–
U.S	24	36	16	20
All the above	28	20	40	24
All the countries	12	4	20	32
Others	4	–	4	4
Has India lost its pre-eminence?				
Yes	4	4	4	–
No	96	96	96	100
Reasons for India conducting tests:				
US	24	4	8	20
Pakistan	8	4	–	–
China	16	4	8	–
Pakistan & China	16	12	8	
Enhance India's international status	24	76	68	80
Others	12	–	8	–

Respondents from all fields felt that India did not lose its pre-eminence over Pakistan as a result of both countries going nuclear (Table 3.17). The reason for India conducting nuclear tests, according to the majority of them, was to enhance India's international status. For them India's emergence as a great power was important. They felt that conducting nuclear tests was an attempt to challenge the nuclear hegemony of the few and to put an end to nuclear apartheid (Table 3.17). Respondents with biology background also felt that nuclear powers were responsible for India conducting nuclear tests (Table 3.17).

Opinion on Nuclear Power Plants

With reference to a question on contribution of pollution by atomic power plants, majority of the respondents with biology (64 per cent) and chemistry backgrounds (48 per cent) did not agree that they create less pollution of the air and water, whereas respondents with physics background (48 per cent) felt that to some extent these plants are better than other plants with regard to creating pollution. Majority of the respondents with engineering background divided into two groups: Forty per cent felt that nuclear power plants create pollution equally that of other plants and 40 per cent felt that to some extent they create less pollution (Table 3.18).

Majority of the respondents with physics (76 per cent), chemistry (60 per cent) and engineering background (64 per cent) opined that nuclear power plants are operating more efficiently, whereas respondents with biology background (52 per cent) gave negative answer (Table 3.18).

For a majority of the respondents from all the fields, nuclear power plants produce cheaper electricity.

Majority of the respondents with physics (80 per cent) and chemistry background (60 per cent) were of the view that India should build more nuclear power plants, where as majority of the respondents of biology (60 per cent) and engineering background (56 per cent) answered in the negative (Table 3.18). Except respondents with physics background, majority of others opined that terrorists could steal fissile materials from a nuclear power plant (Table 3.18). Regarding the chances of nuclear accidents in India, majority of the respondents of physics (60 per cent) and chemistry background (84 per cent) felt that there would be minor chances of nuclear accidents, whereas respondents of biology (68 per cent) and engineering backgrounds (56 per cent) maintained that nuclear accidents can happen, but they would be controlled (Table 3.18).

Majority of them from all the fields maintained that the threat to sabotage nuclear power plants would be lesser (Table 3.18). A majority of the respondents particularly those with a physics background felt that nuclear power plants are safe to some extent. (Table 3.18).

Table 3.18 – Opinion on Nuclear Power Plants

Issue	Fields			
	Biology %	Physics %	Chemistry %	Engineering %
Do nuclear plants create less pollution?				
Yes	20	20	20	20
No	64	32	48	40
To some extent	16	48	32	40
Do you think that nuclear power plants operate more efficiently?				
Yes	48	76	60	64
No	52	24	40	36
Do you think that nuclear power plants produce cheaper electricity?				
Yes	52	52	80	56
No	48	48	20	44
Should India build more nuclear power plants?				
Yes	40	80	60	44
No	60	20	40	56
Do you think that terrorists could steal fissile materials from a nuclear plant?				
Yes	64	28	68	60
No	36	72	32	40

Contd...

Table 3.18 Contd...

Chances of nuclear accidents in India:				
No chance	–	12	–	8
Minor	32	60	84	36
Can happen, but will be controlled	68	28	16	56
The threat to sabotage nuclear plants:				
Greater	44	40	36	40
Lesser	56	48	48	56
No possibility	–	12	16	9

South Asian Security

On South Asian stability, respondents from all the fields opined that India and Pakistan's nuclear weapons programs are not destabilizing South Asia. For them, both countries were not responsible for the present situation in South Asia (Table 3.19). However, for a different question regarding the country responsible for nuclearization of South Asia, majority of them from all the fields were of the opinion that India, Pakistan, China and the US were responsible (Table 3.19).

Table 3.19 – South Asia and the Nuclear Issue

Issue	Fields			
	Biology %	Physics %	Chemistry %	Engineering %
Is India's nuclear weapon program destabilizing South Asia?				
Yes	8	4	12	12
No	80	80	80	80
To a limited extent	12	16	8	8

Contd...

Table 3.19 Contd...

Is Pakistan's nuclear weapon program destabilizing South Asia?				
Yes	20	20	20	28
No	64	52	56	48
To a limited extent	16	28	24	24
Which country is responsible for the nuclearization of South Asia?				
India	8	4	8	8
Pakistan	4	12	8	8
China	16	4	28	4
US	12	16	16	12
All the above	60	64	40	68
Was there any impact of the nuclear tests on regional cooperation in South Asia?				
Yes	20	28	20	28
No	28	20	28	24
Partly	52	52	52	48

Most respondents felt that the nuclear tests conducted by India and Pakistan were a hindrance to regional cooperation in South Asia (Table 3.19).

To a question about the impact of the Kashmir issue on nuclear war, most of them from all the fields felt that they did not see a relationship between the Kashmir issue and nuclear tests (Table 3.20). Similarly, a majority of them from all the fields maintained that nuclear tests conducted by India and Pakistan did not have an impact on Indo-Pakistan relations. Respondents with a background in biology (48 per cent) and engineering (56 per cent) partly supported India and Pakistan conducting nuclear tests in 1998. Out of all the respondents with a physics background: (a) Forty per cent completely supported nuclear tests conducted by India and Pakistan; (b) Forty per cent supported it

partly. A majority of the respondents with chemistry background (44 per cent) supported both countries conducting nuclear tests (Table 3.20).

A majority of the respondents with biology (40 per cent), chemistry (48 per cent) and engineering backgrounds (56 per cent) expressed that India and Pakistan should freeze the arms race, which will reduce the threat of war between them (Table 3.20). However, majority of the respondents from a physics background (52 per cent) opted for reducing weapons procurement (Table 3.20). Majority of the respondents with biology (48 per cent), physics (52 per cent), and chemistry background (68 per cent) opined that war is an outmoded way of settling differences, whereas majority of the respondents with an engineering background (48 per cent) maintained that it is very difficult to say (Table 3.20).

Most of the respondents from all the fields maintained that India should initiate a dialogue with Pakistan. If a comparison is made, it is clear that majority of the respondents from a chemistry background sought to have a dialogue with Pakistan (Table 3.20).

Table 3. 20 – Opinion on India and Pakistan and the Nuclear Issue

Issue	Fields			
	Biology %	Physics %	Chemistry %	Engineering %
Will the Kashmir dispute impact the nuclear arms race?				
Yes	4	4	28	32
No	96	96	72	68
Was there any impact of nuclear tests on the Indo-Pakistan relations?				
Yes	16	8	24	32
No	84	84	76	56
Not sure	–	8	–	12

Contd...

Table 3.20 Contd...

Do you support nuclear tests conducted by India and Pakistan?				
Yes	20	40	44	28
No	32	20	28	16
Partly	48	40	28	56
Best way to reduce the threat of war between India and Pakistan:				
Freeze arms race	40	24	48	56
Through balance of power	24	24	24	28
Reduce weapons procurement	36	52	28	16
War is an outmoded way of settling differences:				
Yes	48	52	68	40
Necessary	12	20	4	12
Can't say	40	28	28	48
Should India initiate a dialogue with Pakistan?				
Yes	64	60	72	60
No	36	40	28	40

Notes:

[1] The author conducted a survey on youth perceptions of the Kashmir issue. It was found that only 6 per cent of the respondents considered the nuclear issue as the most important. For details see A. Subramanyam Raju, *Third-Generation Indian Perceptions of the Kashmir Issue* (Colombo: Regional Center for Strategic Studies, 2001) & see A. Subramanyam Raju, "Indian Youth Perceptions on Nuclear Issue: Some Observations", in A. Subramanyam Raju (ed), *Nuclear India: Problems and Perspectives* (New Delhi: South Asian Publishers, 2000), pp.147-160. Similarly in a survey carried out by David Cortright and Amitabh Mattoo in 1994 on Indian Public and Nuclear Weapons Policy, it was found that only 6 per cent of the respondents considered the nuclear issue as the most important. The study was conducted among the educated elite belonging to various fields. For details see David Cortright and Amitabh Mattoo (eds), *India and the Bomb: Public Opinion and Nuclear Options* (Indiana: University of Notre Dame Press, 1996), pp.3-22.

[2] It is noteworthy to mention that the author conducted a survey after the Pokhran-II tests to elicit the views of young women. Reasons for India conducting nuclear tests, the respondents gave the following views: a.) nuclear powers (8 per cent); b.) Pakistan (3 per cent); c.) China (1 per cent); d.) Pakistan and China (23 per cent); e.) enhance status (54 per cent) and f.) others (11 per cent). Both in the present and earlier study, majority of the respondents felt that India tested nuclear devices to enhance its international status. However, in the present study more number of respondents felt that China was responsible for India conducting tests than Pakistan, whereas in the earlier study more number of the respondents felt that Pakistan was responsible than China. For details see A. Subramanyam Raju, "Women and the Nuclear Issue", unpublished paper.

[3] Perhaps they agree with Kenneth Waltz's argument that international stability would be possible by nuclear proliferation and more nuclear weapon states would create less international aggression. See James Kurth, "Inside the Cave', The Banality of International Relations Studies", *National Interest*, n. 53, Fall 1996, p.33.

[4] In the earlier survey conducted by the author, it was revealed that majority of the respondents (73 per cent) opposed India going nuclear. For details see Raju, n.2.

[5] In the earlier study, majority of women (47 per cent) felt that Pokhran-II tests did make a departure from the continuation of India's peaceful nuclear policy, see *ibid*.

[6] In the earlier survey, overwhelmingly, respondents (83 per cent) did not want Indian government to conduct nuclear tests without the support of public, see *ibid.*

[7] In the early survey also majority of them (68 per cent) opined that India did not lose its superiority over Pakistan, see *ibid.*

[8] In the earlier survey, majority of the respondents (42 per cent) maintained that India, under no circumstance, should use its nuclear weapons, whereas in the present study majority of them (40 per cent) opined that India should use only if Pakistan attacks it. For details see *ibid.*

[9] For them, consequences of a nuclear war could constitute a global climatic catastrophe. For instance, the Hiroshima bomb killed between 100,000 and 200,000 people. A small nuclear war would be impossible to contain before it escalated. The nuclear war between India and Pakistan would lead to irreversible calamity for the entire South Asia. It is noteworthy to quote Teller and Sakharov here: "It is not even impossible to imagine that the effects of an atomic war fought with greatly perfected weapons and pushed by the utmost determination will endanger the survival of man." See Edward Teller, *Bulletin of the Atomic Scientists*, February 1947 & Andrei Sakharov, "A very large nuclear war would be a calamity of indescribable proportion and absolutely unpredictable consequences, with the uncertainties tending toward the worse… All out nuclear war would mean the destruction of contemporary civilization, throw man back centuries, cause the death of hundreds of millions or billions of people, and, with a certain degree of probability, would cause man to be destroyed as a biological species…" See *Foreign* Affairs, Summer 1983, cited in Carl Sagan, "Nuclear war and Climatic Catastrophe: Some Policy Implications", *Foreign Affairs*, vol.62, no.2, Winter 1983/84, p.257.

[10] For young women: 33 per cent of them maintained that the tests increased tensions between India and Pakistan; 13 per cent opined that the tests ruled out the India and Pakistan war on the Kashmir issue; 17 per cent felt that the tests internationalized

the issue, whereas 24 per cent argued that both the countries adopted an unnecessary course of action and 13 per cent opined that there was no impact on the Kashmir issue, see Raju, n.2.

[11] The NPT was signed on 1 June 1968 and came into force on 3 March 1970. The treaty recognized US, USSR, UK, France and China as Nuclear Weapons States (NWSs) and rest of the countries were branded as Non Nuclear Weapons States (NNWSs). The treaty restricts the NNWSs from developing nuclear weapons. India considered the treaty as discriminatory because it divided the nations into NWSs and NNWSs. It refused to become a member of the NPT and did not sign it.

The CTBT is yet to come into force. It imposes equal obligation on both NWSs and NNWSs by imposing a ban on future testing. However, it does not stop 'laboratory and simulation tests". It also does not stop the NWSs to destroy their existing weapons, nor even to pledge them to do so. India did not sign the treaty because it did not mention about the time bound plan for global disarmament.

[12] India had never encouraged nuclear proliferation anywhere. India discussed supplying to Iran a 5 MWt research reactor but later dropped the offer when suspicions about Iran's intentions became more wide spread. It has exported the sale of small research reactors to NPT member countries in the Persian Gulf, Southeast Asia and it has supplied heavy water to South Korea, where IAEA safeguards are regularly applied to nuclear facilities and materials in any case. India briefly contemplated nuclear cooperation with Libya in the late 1970s, a venture than prompted by the former BJP coalition government's Defence Minister, George Fernandes, but dropped after external and internal criticism materialized. See Rodney W. Jones, Mark G. Mc Donough with Toby F. Dalton and Gregory D. Koblentz (eds), *Tracking Nuclear Proliferation* (Washington, Dc: Carnegie Endowment for International Peace, 1998), p.121.

[13] In the earlier study, 8 and 9 per cent of them felt that India should sign the NPT and CTBT respectively. Whereas in the present study, 21 per cent of them wanted to sign the NPT only, whereas 7 per cent felt that India should sign the CTBT only.

[14] Following factors can be cited as reasons for Pakistan launching a nuclear program: India's nuclear test in 1974 being reckoned as a security threat to Pakistan; to develop a nuclear program as a bargain tool, which would increase Pakistan's bargaining power so that it can compete India to join a mutually binding agreement against the production of nuclear weapons, strengthen its position in any future arms control and disarmament talks involving India; to gain parity with India; reduce India's superiority; to use it as a deterrent against India; 1979 Afghanistan crisis forced Pakistan to have nuclear weapon capabilities; not signing the NPT and linked it up with India; and using the NPT as a diplomatic tool to establish its nuclear non proliferation credentials. Pakistan sought to legitimize its nuclear program. See A. Subramanyam Raju, *Democracies at Loggerheads: Security Aspects of US-India Relations* (Colorado: International Academic Publishers Ltd, & New Delhi: South Asian Publishers, 2001), f.n.82, p.149.

[15] Aurangzeb Khan opines: "As bilateral trade and both economies progressively integrate and as the benefits become larger and more evident, policy makers will become aware of the importance of sustaining and further consolidating bilateral economic and political ties. As political ties improve, the level of bilateral tension and mutual suspicion may subside…it may prompt both governments to start

channeling resources away from their bloated defence establishments to their acutely neglected social. Infrastructures and other developmental spheres." See Aurangzeb ZA. Khan, "Confidence Building Through Free Trade and Joint Ventures" in Sony Devabhaktuni (ed), *Regional Cooperation in South Asia: Prospects and Problems*, Occasional Paper (Washington, Dc: The Henry L. Stimson Center, February 1997, p.47. Unofficial trade between India and Pakistan through cross-border smuggling and routing through third countries like Dubai and Singapore amounts more than official trade annum.

[16] A Pakistani journalist noted that the biggest hurdles in the way of a tension-free relationship between India and Pakistan are the distorted perceptions, which have been fostered by vested interests on both sides. They are the result mostly of lack of contact and communication at the people-to-people level, which would dissipate if formal and informal exchanges of visits by non-officials were allowed to continue. Some such process has been discernible in recent years. See M.H.Askari, "Obstacles to Normalization", *The Dawn*, 21 May 1997, cited in Moonis Ahmar, *The Road to Peace in South Asia: Lessons for India and Pakistan from the Arab-Israel Peace Process*, ACDIS Paper (Urbana: University of Illinois, August 1996), p.9.

[17] In the earlier study, 7 per cent of the respondents argued that India and Pakistan were responsible for the nuclear proliferation of South Asia, see Raju, n.2.

[18] Women thinking on peace can be seen in the words of Ruddick: "There is a real basis for the conventional association of women with peace. Women are daughters who learn from their mothers the activity of preservative love and the maternal thinking that arises from it. These 'lessons from her mother's house' can shape a daughter's intellectual and emotional life even if she rejects the activity, its thinking, or, for that matter, the mother herself. Preservative love is opposed in its fundamental values to military strategy…. A daughter, one might say, has been trained to be unsoldierly". Cited in Sara Ruddick, "Pacifying the Forces: Drafting Women in the Interests of Peace", *Signs: Journal of Women in Society and Culture*, vol.8, no.3, Spring 1983, p.479 Unlike men "women are more peace loving, more nurturing and more connected with life, it is they who may be our only hope of salvation in the nuclear age". See Sandra Whitworth, *Feminism and International Relations* (New York: St. Martin's Press, 1994), p.17.

[19] T.S. Subramanian, "The Kalpakkam 'Incident' ", *Frontline*, vol.20, No.17, August 16-29, 2003, see *http://www.frontlineonnet.com/fl2017/stories/20030829002404400.htm*

[20] In the earlier study, respondents were divided into three groups: a.) 39 per cent of them opined that it is possible to achieve global disarmament, whereas 43 per cent maintained that it is not possible and remaining 18 per cent of the respondents said that they were not in a position to say anything, see Raju, n.2.

Chapter-IV
Conclusion

The survey reveals a diffused pattern of response by the respondents on some issues on the basis of occupation. Whether the results of the survey of three cities in India tally with the views of women scientists in other parts of India is a matter of conjuncture. The study is more of an exploratory attempt to study how women scientists understand and analyze the nuclear issue.

The study has revealed that for a majority of the respondents, poverty and terrorism have a higher salience than the nuclear issue. According to them, the nuclear tests conducted by India in 1998 are a matter of national pride. However, they think that Pakistan tried to divert people's attention by conducting nuclear tests. They support India conducting further tests (Table 3.3). They oppose the use of nuclear weapons against Pakistan. However, a majority of them said that India should use nuclear weapons only if Pakistan attacks it with nuclear weapons. They are not in favor of India signing the NPT and the CTBT, probably because they feel that if India signs the treaties, preventing proliferation at a global level is not possible. Most of them are of the opinion that expenditure on the nuclear weapons program certainly has an impact on economic development.

Overwhelmingly, respondents said that people should be educated on the effect of nuclear tests. They felt that both India and Pakistan should freeze the arms race to reduce the threat of war between them (Table 3.11). Most of them wanted to solve the problems peacefully and amicably. For confidence building measures, they suggested the following steps to be taken: greater people-to-people contact; more discussions between intelligentsia of India and Pakistan; more open official talks between both the governments; and improving trade relations (Table 3.11). They felt that war is an outmoded way of settling differences and suggested that India should initiate a dialogue with Pakistan (Table 3.11). For the respondents, the nuclear weapons programs of India and Pakistan are not destabilizing South Asia

(Table 3.12). Respondents opined that women should be involved in decision-making processes related to the nuclear weapon program because they are a part of society.

Majority of the respondents did not agree that nuclear power plants create less pollution. However, most of them believed that nuclear power plants operate more efficiently and produce cheap electricity. The respondents expressed the need to build more plants in India (Table 3.14) and felt that there was not much chance of nuclear accidents in India (Table 3.15). They did not agree with Kenneth Waltz's argument i.e. international stability would be possible by creating more nuclear states. The respondents did not see a nuclear war in future at a global level, and for them, achieving global disarmament is far from reality. They believed that their research certainly has an impact on society, and India, Pakistan, China and the US were responsible for exposing South Asia to the arms race. According to them, the US and China were mainly at fault.

The scientific community is far from homogenous. For instance, majority of the respondents with a background in physics, chemistry and engineering felt that nuclear power plants are operating more efficiently, whereas majority of the respondents with a biology background did not feel so. Majority of the respondents with a chemistry background were more supportive of India conducting further nuclear tests and they supported India using nuclear weapons against Pakistan than others. Majority of the respondents with physics and chemistry backgrounds suggested that India should build more nuclear power plants, whereas majority of the respondents with biology and engineering backgrounds opposed the idea. It is very interesting to note that majority of the respondents with chemistry and engineering backgrounds opined that India should use nuclear weapons if Pakistan attacks it with nuclear weapons, whereas majority of the respondents with physics background wanted to use nuclear weapons if China attacks India with nuclear weapons and majority of the respondents with biology background maintained that India should use weapons only if the US attacks with nuclear weapons.

Majority of the respondents with biology, chemistry and engineering backgrounds wanted to freeze the arms race between India and Pakistan,

whereas majority of the respondents with physics background wanted to reduce nuclear weapons procurement by both the countries.

Inconsistency: Of all the respondents, only two per cent considered the nuclear issue as an important one, whereas 56 per cent of them felt the issue to be somewhat important (Table 3.1). Only 23 per cent of them felt that the nuclear tests conducted by India strained relations with Pakistan (Table-3.3), whereas in a separate question (Table-3.6), they argued that the tests increased tensions between them on the Kashmir issue. Here, one comes across inconsistency among them in understanding the issue. When a question was asked on the order of preference in Indo-Pakistan relations, eight per cent of them suggested economic cooperation between India and Pakistan. However, only three per cent of them wanted to improve trade relations to improve confidence-building measures between them (Table 3.11). Instead of spending on nuclear/military capability, majority of the respondents suggested that resources should be devoted to economic development (Table 3.9). However, for a different question, majority of them wanted India to test further nuclear devices (Table 3.3). Only nine per cent of them felt that nuclear power plants are very safe (Table-3.15) and 46 per cent opined that atomic power plants in no way create less air and water pollution as compared to other plants using coal, hydel etc., and 56 per cent respondents suggested building more nuclear power plants (Table 3.14). It is to be noted that there is some inconsistency in the perceptions of the respondents.

The research elicited a variety of responses from people belonging to different backgrounds. From the above analysis, one may notice that a majority of the respondents with a chemistry background were more critical of Pakistan than others, whereas most of them with a biology background seemed to be more concerned about environmental issues than others. Respondents from all the fields were more or less positive towards development of a nuclear weapons program. From this study, one can see that women scientists' perceptions of nuclear issues are determined by their position and their area of study, rather than by virtue of being women.

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