
A Study on Psycho-social Burden of Women after Surgical Removal of Breast

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Abstract: *Breast cancer, the second-leading cause of cancer deaths in women, is the disease women fear most. Breast cancer can also occur in men, but it's far less common. Along with the physical trauma the psychological and social burden of breast cancer is severe and medical treatment must be complimented by psychosocial intervention for better result. This is the study to explore the psycho social and physical burden of women affected by breast cancer.*

The objective of the study is to explore the physical burden of women after surgical removal of the breast, to discover the psychological burden of the women after the removal of the breast and to explore the social burden of women after removal of breast. The methodology is qualitative with case study method.

The study result shows that most of the respondents had physical discomfort, pain, infection and allergic reactions and psychological trauma including depression, anxiety and shyness. They were also withdrawing from social functions and scared of the society. The study has the social work implications in the areas of social work interventions to assess and diagnose the psycho social burden and to provide help in managing them.

Key Words: *Breast Cancer, Physical and Psycho Social Burden, Social Work Intervention.*

Introduction

Breast cancer, the second-leading cause of cancer deaths in women, is the disease women fear most. Breast cancer can also occur in men, but it's far less common. Yet there's more reason for optimism than ever before. One in eight women will be diagnosed with breast cancer in their lifetime. Hundreds of thousands of women each year are affected in countries at all levels of modernization.

Cause of Breast Cancer

Gender, Age, Genetic risk factors, Family history, Personal history of breast cancer, Race/ ethnic background, Dense breast tissue, Certain benign breast problems, menstrual periods, Breast radiation early in life, Not having children or having them later in life, Certain kinds of birth control, Using hormone therapy after menopause, No breastfeeding, Alcohol, and overweight, Tobacco and smoke are some of the causative factors.

Symptoms of Breast Cancer

A lump in a breast, a pain in the breast, redness of the skin of the breast like the skin in the orange, a rash around one of the nipples, swelling in one of the armpits, an area of thicker tissue in a breast, one of the nipples may have a discharge and sometimes it may contain blood, a change in the appearance of nipple and may become sunken, a change in the size or the shape of the breast, the nipple-skin or breast-skin may have started to peel or scale.

The Methods of Breast Cancer Diagnosis

Screening, ultrasound, Magnetic Resonance Imaging (MRI) scan, biopsy, blood tests are often used to determine if the cancer has spread outside the breast and additional tests may be used to determine different stages.

Treatment for Breast Cancer

The Surgery, Radiation therapy, Biological therapy, Hormone therapy and Chemotherapy are the different treatments available for the breast cancer.

Problems after the Removal of breast

After breast surgery many women face some common problems like grief, fear, shock, and anger. But some women have satisfaction because of the removal of the cancer tumor from the breast. People react very differently to surgery. Women need time to overcome from the changes or loss of the breast. Breast cancer surgery can leave them physically, psychologically, and socially drained. After the removal of the breast most of the women face psychosocial burdens. This includes physical problems, body image disruption, sexual problems, economical problems, psychological problems and social problems..

Physical Problems

This includes fear of recurrence, Physical symptoms such as fatigue, trouble sleeping, pain, and allergy or infections. Almost half of the women who have breast cancer surgery still have pain or numbness even after two to three years says a new study. Women younger than 40 who receive lumpectomies are at the greatest risk (Denise Mann, 2009)

Body Image Disruption

Body image disruptions are inferiority, guilt, and shyness.

Sexual Problems

Sexual problems include decreasing sexual interest, partner avoiding to do sexual activities etc. Sexual functioning is particularly vulnerable. Body image concerns and concerns about a partner's reactions represent psychosocial vulnerabilities, especially when there has been disfiguring surgery, as in the case of breast cancer (Spencer 1999). Breast-conserving techniques, such as lumpectomy, lead to moderately better psychological, marital, sexual and social adjustment than the more extensive mastectomy surgery (Moyer, 1997).

Treatment Related Anxieties

After the removal of the breast they should continue further treatment such as Chemotherapy, Radiation and other treatments which increase the patient anxieties.

Familial Problems

After the removal of breast the patient may face many problems from their own family such as partner miscommunication, vulnerability from the family members, children's miscommunication and economical burden are the common problems after the surgery. The breast cancer is impacted on patients and husbands (Northouse,1989).

Psychological Problems

After breast surgery many women have intense feelings including grief, fear, shock, anger and resentment. And emotional imbalance includes extreme mood swings (suddenly tearful, over sensitive), loss of interest in daily activities, depression, and difficulty to concentrate. The social support literature has demonstrated that interpersonal relationships play an important role in adaptation to serious illness, and partner relationship may be damaged due to breast cancer.

Review of Literature

Quality of Life after Breast Cancer Surgery With or Without Reconstruction

There is a wide and multidimensional definition for Quality of life, which relies heavily on patients' sex, age, ethnicity, and religious beliefs. It encompasses personal tastes, hobbies, experiences, perceptions, attitudes, and beliefs, all of which can be divided into 4 primary categories, physical and occupational, psychosocial, social, and somatic (Eplasty. 2009).

Methods to Improve Rehabilitation of Patients Following Breast Cancer Surgery

The current rehabilitation methods tend to focus narrowly on performance components (particularly on physical impairments or dysfunctions). The review found evidence that exercise rehabilitation methods improve physical outcome post operation, although, inconclusive results exist on rehabilitation methods to improve the non-physical sequel such as psychosocial, cognitive, occupational, and broader lifestyle performance factors. Clearly missing are the rehabilitation methods to enable survivors to redesign their lifestyle in tandem with living along with a breast cancer condition that is taking a form of chronic disease. This calls for health prevention and illness prevention lifestyle strategies to i) control cancer recurrence and ii) to promote better QoL during the indefinite period of survivorship. With the overwhelming strong evidence that cancer risk is affected by lifestyle, future studies with higher methodological rigor should be conducted on health promotion strategies to enable healthy lifestyle (Loh et al, 2015).

Breast Surgery and Physical Problems

Pain

In general, women are most likely to have pain or a loss of sensation in the breast region, followed by the armpit, the arm, and their sides. However, 40 percent of women with lingering symptoms have pain in parts of the body not affected by treatment, according to a report in the Journal of the American Medical Association (Mann, 2009).

Breast Cancer and Experiences of Social Support

This paper explores the experience of social support as it evolves in women's relationships with others. Social support contains emotional, practical and

informative dimensions. Here relationships are called interactions. Interaction can be divided into two groups. Interactions with close relatives and others the women know and have contact with or interactions with organizations and institution staff. These interactions consist of social support and lack of social support. Health professionals can assist women and their families in this life-threatening situation, by increasing their awareness of social support issues. (Landmark, R.N et al, (2002),

Methodology

The methodology is qualitative with case study method. The objective of the study is to explore the physical burden of women after surgical removal of the breast, to discover the psychological burden of the women after the removal of the breast and to explore the social burden of women after removal of breast.

The universe of the present study consists of the Breast Cancer women belonging to the age group of 20 to 60 from Karnataka getting treatment in Father Muller hospital, Mangalore.

Two major cases are given to explain the objectives of the study.

Case 1

Rathnavathi (mock name) a 56 years old widowed woman, was born in a poor family. Her husband expired 10 years ago as a result of heart attack. She completed primary education. It was because of poverty she didn't continue the education. She belongs to Gowda caste and is a Hindu. She has two children, daughter is 17 year old, now she has completed PUC and the other one is 15 years old boy who completed his 9th standard.

One day while bathing she found a glade in her right side breast and the very next day as per the advice of her sister she consulted a doctor. They referred her to an oncologist in Father Muller hospital and she was diagnosed with breast cancer 3rd stage. So immediately they told her to remove the breast. In the beginning she had refused to get the breast removed but after the advice by doctor she agreed to undergo the surgery. Her right breast was surgically removed in the year 2015.

At present she is under the radiation treatment. After the surgery she is facing economic and physical burden because of that she is now staying in her cousin's house, along with cousins and their family.

After the surgery she was uncomfortable while wearing dress. In the beginning she had too much pain and discomfort and she found it difficult to do the physical work so she stayed in her cousin's house. She felt very guilty, and discomfort after the surgery. After removing breast she had a feeling of sadness. After the surgery she didn't attend any family or social function because of shyness and a feeling of hesitation. Her family members force her to participate in functions but she avoids the same. Her children and family members are very supportive and they give love and care. They do not allow her to do any work. She is happy with her family members.

Case 2

D.H Gangamma 51 years old married woman. She was economically well off. Her husband was an agriculturist and this couple has no issues. She had completed High school and currently working in Anganavadi as a teacher. She belongs to Gowda caste in Hindu community.

As she had breast cancer 3rd stage, her left side breast was surgically removed in the month of August 2015. Then she was under radiation treatment in Father Muller Hospital Kankanady, Mangalore. Thereafter for a few days she stayed in her sister's home because of physical dependency. After the surgery some part of breast remaining under the arms was irritating her much and because of this she could not sleep properly. After the surgery she had more pain as well as discharge of liquid content from surgical part, was indentified made her feel depressed. And after the surgery she had feelings of discomfort while wearing dress because the odd look of one breast. There is no incident of allergy. According to her, psychologically there is no problem after the removal of breast but surrounding people who ask about her illness makes her psychologically upset.

Socially she was hesitant to participate in social and family functions. Sometimes she feels sad but, by spending time in Anganavadi she managed her sad feelings. Her husband and two sisters were very supportive and they motivated her to participate in social functions. According to her, husband's family members were not giving sufficient care. Even after the surgical removal of the breast she had good sexual relationship with her husband.

Major Findings

Physical Burden

Most of the respondents had uncomfortable feelings in their regular dress code after removal of the breast.

Majority of the respondents had too much pain.

Most of them were physically dependant upon others.

Few of respondents suffered from infections/allergy.

Psychological Burden

After the removal of the breast most of them felt very sad

Most of the respondents had depression, anxiety, loneliness, and hesitations.

Majority of the respondents had sadness after the removal of the breast.

Social Burden

Most of the respondents had hesitation and shyness to participate in the social functions after the removal of the breast.

Most of the respondents' families were supportive, very few respondents' families were not supportive to the respondent.

Very few respondents got criticism like they talk from behind and some ask directly about the breast surgery.

Suggestions for Future Research and Practice Activities

1. To provide counseling for women after the removal of breast and to their family members for the purpose of reducing psychosocial burden of breast cancer patients.
2. The social worker should give psycho-social education to breast cancer patients immediately after the surgical removal of breast.

Social Work Implication

The study on the psycho social burden of women after the surgical removal of breast opens new awareness for social work profession. Being chronic illness, long time care is needed for the breast cancer patients. All the primary and secondary method of social work should be used in various settings in the community to reach out of this special category. More study about the condition of the patients, possible psycho-social intervention including community based rehabilitation is a matter of grave concern. The role of NGO, social worker educator and researcher should focus on this specialized sector. There is also employment opportunity for social workers related to this field.

Conclusion

The researcher concluded from this study that, the women were facing a lot of problems after the surgical removal of breast. There was physical Psychological and Social burden present among the respondents. The role of social worker is very important after the surgical removal of breast. Motivation, psycho-social education and also the role of family and friends are important. They are expected to give sufficient love and care which can help to cope their psycho-social burden. They should treat them as human beings. Education and awareness about breast cancer is definitely helpful to women to recognize the cancer tumor in breast and by this, early treatment is possible. Early treatment means removal of tumor in the breast and not the entire breast.

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Colloidal Processing and Slip Casting of Mullite

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Abstract: *Mullite an aluminosilicate ceramic due to its excellent refractory, mechanical and dielectric properties find wide applications as structural and high temperature ceramics as well as for electric and optical applications. Slip casting is a well established shaping or forming method to fabricate ceramic shapes having simple to reasonably complicated shapes. In the present study commercially available mullite powders were characterized for crystallographic phase purity, particle size distribution and morphology. The optimum dispersion condition of the powder in de-ionised water was studied through measurement of zeta potential as a function of pH. The mullite powder dispersed in deionised water with and without addition of MgO was slip cast in plaster mould. The slip cast samples were sintered at different temperatures to study the effect of MgO addition on the sinterability of mullite. The products were characterized for density, porosity and microstructure.*

Key Words: *Colloidal Processing, Slip Casting, Mullite.*

Introduction

Mullite [$3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$] is an aluminosilicate, generally formed by the high temperature reaction between alumina and silica bearing materials. Mullite show excellent properties such as high melting point (1810°C), high temperature strength and creep resistance, low thermal expansion coefficient ($\sim 3.5 \cdot 10^{-6} / ^\circ\text{C}$), good thermal and chemical stability, good thermal shock resistance, resistance to abrasion, good dielectric properties and also lower density (2.8g/cc). These properties makes mullite and its composites excellent candidate for electric, optical and high temperature structural applications (Aksay et al, 1991). Mullite is used as a matrix material in continuous fibre reinforced ceramic matrix composites (CMC), as a thermal protection systems for combustion chambers in aircraft turbine engines, heat exchanger parts, heat insulating parts, milling media, furnace tubes, refractories in the metallurgical industries, turbine engine components etc (Schneider et al, 2008). In the recent past mullite has been considered as a potential candidate

material for environmental barrier coating (EBC) application on silicon based ceramics like SiC, Si₃N₄ and C_f/SiC and SiC_f/SiC composites in the hot section of gas turbine engines (Zhong Liu et al, 2015). Porous structures of mullite are widely used in several sectors such as filters for high pressure and high temperature gas flow, for fused metal filtering to remove inclusions and impurities, filters for diesel exhaust emissions, substrates for catalytic reactions, thermal insulating materials etc (Roncari et al, 2000).

Slip casting is a well established shaping or forming method to fabricate dense and porous bodies having simple to reasonably complicated shapes. The method has been applied to variety of advanced ceramics like Al₂O₃, ZrO₂, SiC, Si₃N₄, hydroxyl apatite and also to ceramic composite systems (Ramachandra Rao and Kannan, 2001 and Ramachandra Rao et al, 2001). Slip casting involves mixing of fine ceramic powders in aqueous (deionised or distilled water) or non aqueous media (eg. Isopropyl alcohol) and pouring the so formed slip or slurry into a porous mould (generally made from plaster of paris) to get the required shape. The liquid medium gets absorbed through fine pores present in the mould by capillary action, while the fine particles get assembled at the wall to form the body. The so formed green body will be removed from the mould, dried and then sintered at high temperature to result in dense product.

During the process of slip preparation the fine particles show a tendency to agglomerate because of Van der Waal's physical force of attraction which results in inhomogeneous microstructure leading to inferior properties for the sintered product. The agglomeration of fine particles can be avoided and dispersion be achieved by control or manipulation of inter particle forces. By adjusting the pH of the medium or by adding electrolytes or polyelectrolytes as dispersants, the fine particle surface will be positively or negatively charged resulting in repulsive forces overcoming the attractive Van der Waal's forces. This leads to good dispersion of the particles resulting in improved properties to the green and sintered material (Ramachandra Rao and Kannan, 2001; Ramachandra Rao et al, 1999 and 2001; Lewis, 2000). Colloidal processing and slip casting has been employed to make mullite products starting from alumina powder and colloidal silica (Burgos-Montes et al, 2007), alumina powder and kaolinite clay (Moreno and Scian, 2015) and using mullite powder (Goren et al, 2012 and Tkalcec et al, 1998) as well as alumina mullite composites (Askel, 2002) and mullite Zirconia composite ceramics (Temoche et al, 2005).

The present study deals with the slip casting of commercially available mullite powder using the optimum dispersion condition. The slip cast samples were sintered at different temperatures to study the effect of MgO addition on the sinterability of mullite. The products were characterized for density, porosity and microstructure.

2. Experimental Procedures

Two grades of commercial mullite powders, M72 and M672 (M/s Nabaltec AG, Schwan) were used for slip casting experiments. The two powders were subjected to X-ray diffraction analysis (D8 Advance, M/s Bruker, Germany) for identification of crystalline phases present and particle size analysis (Master sizer, M/s Malvern Aimil) to find out the particle size distribution of the particles. The size and morphology of the powders were evaluated through scanning electron microscopy (SEM, Leo 440, M/s Leo, England). The powders were dispersed in deionised water and the zeta potential was measured as a function of pH using zeta potential analyser (3000HSA, M/s Malvern Instruments, UK).

The mullite powders were dispersed in deionised water and the pH was adjusted to an optimum value of 10 – 10.5 and milled in polythene bottle using alumina milling media for about 16 hrs. The homogenized slip was cast in plaster moulds to give simple shapes like discs and small crucibles. The green density of slip cast samples was obtained by weight and dimensional measurements.

Slip casting was carried out using as received mullite powders and also by adding 1 and 2 wt.% of MgO as sintering additive. The slip cast samples were sintered in the temperature range 1500 to 1600°C for 1hr in a super kanthal furnace (M/s Therelek Engineers, Bangalore). The sintered samples were characterized for density by weight and volume method, apparent density and porosity by Archimedes principle, microstructure by scanning electron microscopy.

3. Results and Discussion

The X-ray diffraction patterns of the two powders are presented in Fig.1. By comparing the diffraction peak positions (2θ) and intensity with the Joint Committee on Powder Diffraction Standards (JCPDS), it is found that both the powders represent mullite with all the major peaks corresponding to orthorhombic phase (card No. 15-0776) with a small quantity of α – alumina (Card No. 46-1212) as the secondary phase.

The particle size distribution graphs of the two commercial mullite powders are presented in Fig.2. The particle size analysis results show that M72 powder is coarser with $d_{10} = 2.29\mu\text{m}$, $d_{50} = 6.66\mu\text{m}$ and $d_{90} = 20.16\mu\text{m}$, while M672 powder is fine with $d_{10} = 0.62\mu\text{m}$, $d_{50} = 2.00\mu\text{m}$ and $d_{90} = 10.26\mu\text{m}$. Also M672 show wider and bimodal size distribution as compared to M72 powder. These results are well supported by SEM photographs of these powders shown in Fig 3(a-b). The SEM photograph of M-72 powder in Fig. 3(a) show higher proportion of larger particles than those found in SEM of M-672 powder shown in Fig. 3(b).

Fig. 1 XRD Graphs of Mullite Powders; M-72 and M-672; ● = Alumina

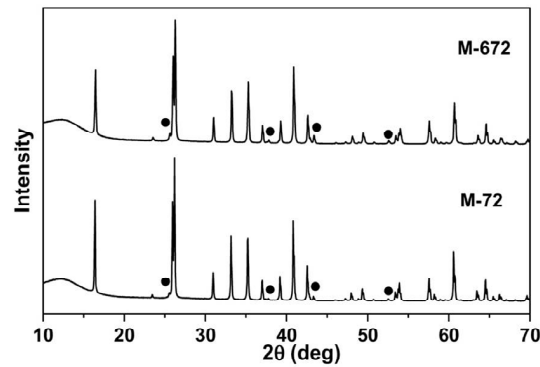


Fig.2 Particle Size Distribution of Mullite Powder (▲) M72 (○) M672

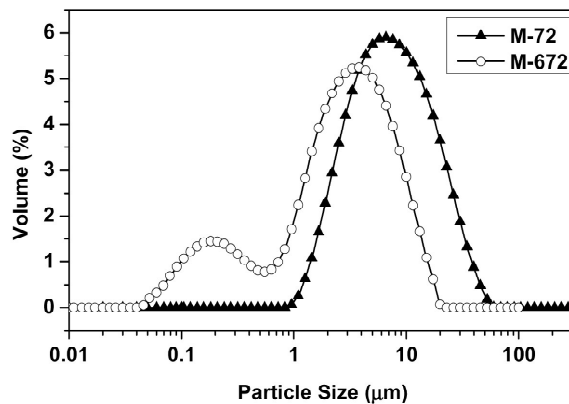
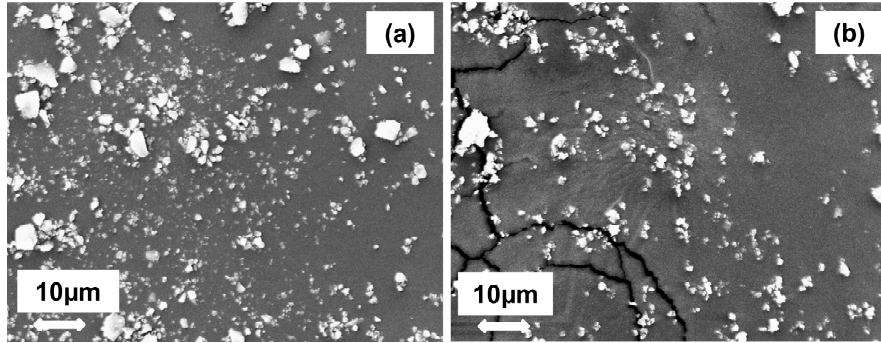
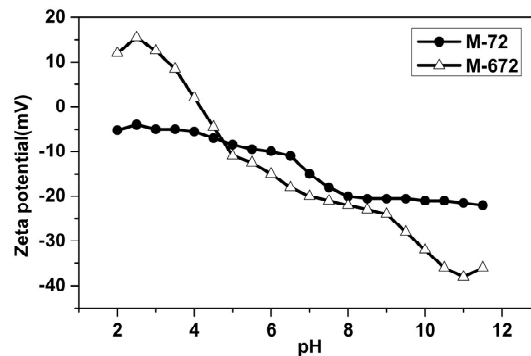


Fig.3 Scanning Electron Micrograph of Mullite Powder (a) M72 ((b) M672



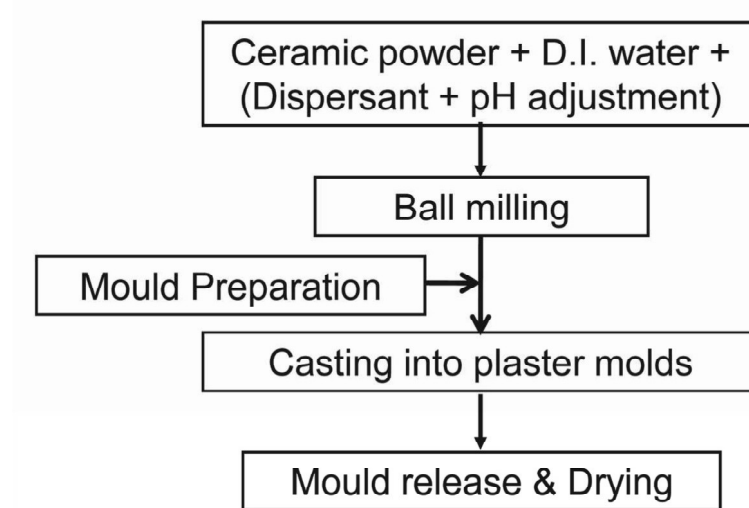
The dispersion of mullite powders in deionised water studied as a function of pH is presented in Fig 4 in terms of zeta potential. The zeta potential curve of M72 powder shows that the powder surface is negatively charged in the entire pH range while it is more negative in the alkaline pH as compared to acidic pH. This behavior is similar to that of silica and hence indicates that the powder surface behaves mostly as silica. On the other hand the Zeta potential of M672 powder is positive in the pH range 2 to 4 and negative above the isoelectric point 4.2. The high zeta potential of about 36mV at pH of 10 to 11 indicates high surface charge resulting in repulsion between the particles and hence good dispersion. Hence the pH of the mullite slurry was adjusted to pH 10 to 10.5 for slip casting experiments.

Fig.4. Zeta Potential of Mullite as a Function of pH



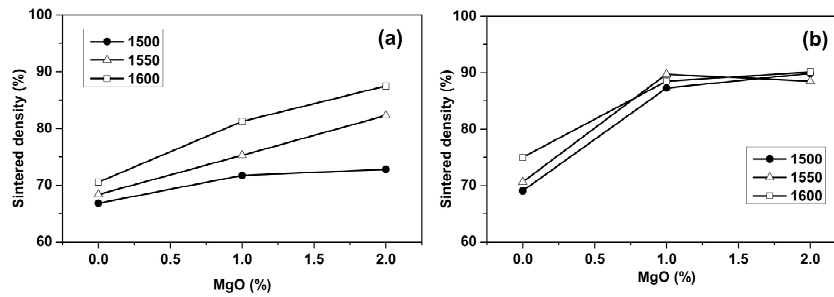
The slip casting of two commercial mullite powders were carried out in deionised water with controlled pH condition to give optimum dispersion and high solid loading of about 80 Wt.% (55 Vol.%). The flow chart of the slip casting process is given in Fig. 5. The green density of slip cast samples of M72 and M672 with and without MgO additions was $62 \pm 2\%$. This high green density indicates that the dispersion of the particles in the liquid medium is optimum leading to good packing of fine particles.

Fig.5. Flow Chart of the Slip Casting Process



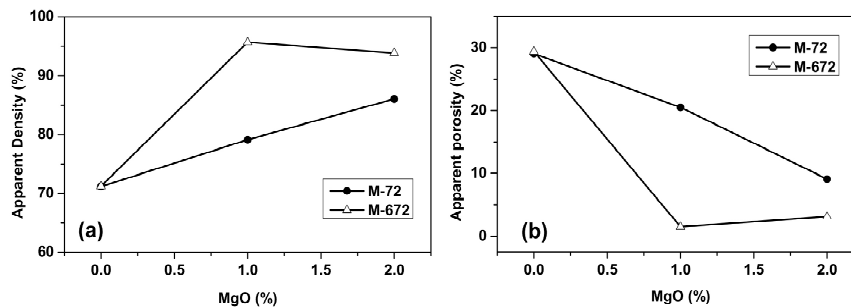
The slip cast samples are sintered in the temperature range of 1500°C to 1600°C for 1 hr. The densities measured through mass by volume method for samples sintered at different temperatures are plotted in Fig. 6 as a function of sintering additive. The apparent density and apparent porosity of M-72 and M-672 samples sintered at 1550°C measured by Archimedes principle are presented in Fig. 7 as a function of percentage of sintering additive added.

Fig.6. Sintered Density at Different Temperatures for (a) M-72 and (b) M-672 Powders as Function of Percentage of Sintering Additive



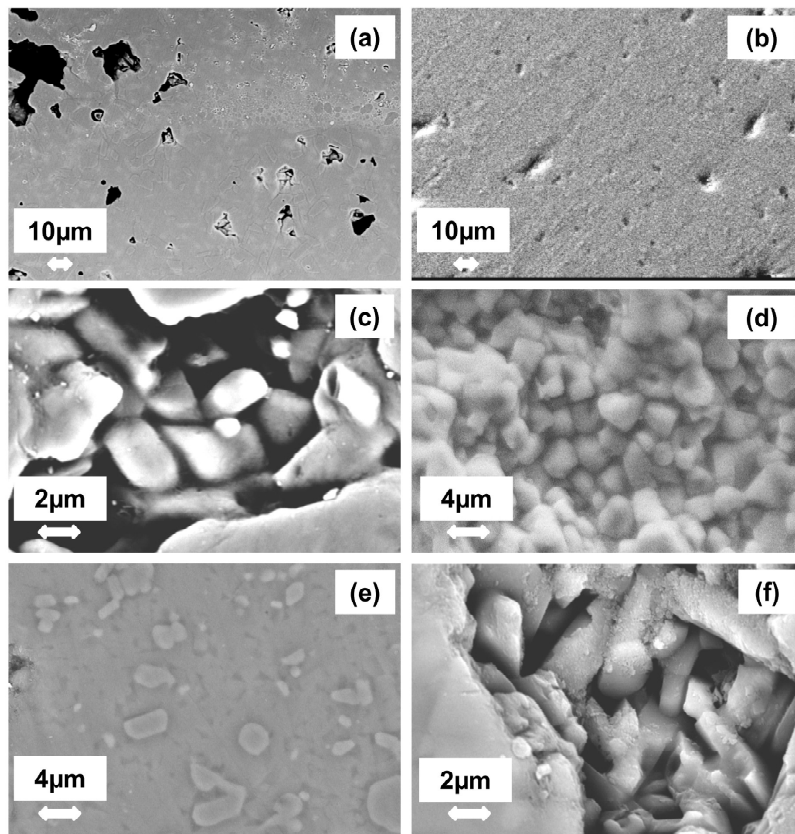
From the Fig. 6 it can be found that the density of slip cast mullite samples without the sintering aid increases marginally with the increase in sintering temperature from 1500 to 1600°C (67 to 71% for M-72 and 69 to 75% for M-672). On the contrary, the samples with doping of MgO show increased density of 72 to 88% for M-72 and 87 to 90% for M-672 powders in the temperature range of 1500 to 1600°C. The enhanced density is attributed to the influence of sintering additive on densification. The higher densification in case of M-672 as compared to M-72 at the entire temperature range studied could be attributed to the finer particle size of the powder.

Fig.7. (a) Apparent Density and (b) Apparent Porosity of M-72 and M-672 Samples Sintered at 1550°C as a Function of Percentage of Sintering Additive



The apparent porosity of M-72 and M-672 samples sintered at 1550°C presented in Fig.7(b) decreases with increase in sintering additive in correlation with the increase in sintered density [Fig 7(a)]. Among the two powders M-672 show highest density of $95.5 \pm 0.5\%$ and lowest porosity of $1.5 \pm 0.2\%$ on sintering at 1550°C, while M-72 powder reaches highest density of $94 \pm 0.5\%$ and porosity of $3 \pm 0.3\%$ at 1600°C . These results indicate that M-672 powder is superior to M-72 powder with respect to sinterability.

Fig.8. SEM Micrographs of Polished and Acid Etched Sintered Slip Cast Mullite Samples. (a) M-672 (b) M-672-1Mg (c) M-672 (d) M-672-1Mg (e) M-672-2Mg (f) M-72-2Mg



The representative SEM micrographs of polished and acid etched (Dilute acetic acid) samples of slip cast mullite with and without sintering aids sintered at 1550°C are presented in Fig. 8. The SEM micrograph of M-672 sample presented in Fig. 8(a) show considerable open porosity in correlation with the 29% porosity presented in Fig 7. The dense surface feature shown in Fig 8(b) for M-672 with 1% addition of MgO (M-672-1Mg) represents the highest density achieved at 1550°C. The SEM in Fig 8(c) reveals the porosity and grain structure of the M-672 sample at higher magnification, where as the dense microstructure is observed for M-672 doped with 1% MgO (M-672-1Mg) in Fig 8(d). The SEM in Fig 8(e) and (d) reveals the dense microstructures of 2% MgO doped M-672 and M-72 respectively.

4. Conclusion

Two commercial mullite powders M-72 and M-672 used in the present study were found to show X-ray pure mullite phase and their particle size distributions were in the range of 2.3µm to 20.0µm and 0.6µm to 10.3µm respectively. Both the powders show higher zeta potential values in the alkaline pH range of 10 to 11 indicating high surface charge leading to good dispersion. The slurry prepared from these powders in aqueous media at pH = 10.0 to 10.5 could be slip cast to give green body having density of $62 \pm 1\%$. On sintering in the temperature range of 1500 to 1600°C, M-672 powder having finer particle size resulted in higher density as compared to M-72 powder. The addition of MgO as sintering aid has resulted in increased density and decreased porosity for both M-72 and M-672 powders as compared to non doped samples. M-672 powder having 1% MgO as sintering aid resulted in highest density of $95.5 \pm 0.5\%$ and lowest porosity of $1.5 \pm 0.2\%$ on sintering at 1550°C for 1 hr. The microstructural observations correlate well with the density and porosity results.

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Occupational Stress among Long Route Truck Drivers: A Study

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Abstract: *Long route truck drivers are the people who travel from one place to another to deliver goods by truck or trolleys. Researchers have identified a number of health concerns and other health related issues, which include obesity, heart problems, high blood pressure, diabetes and more. These conditions are very prevalent in the trucking industry, and impact not only the driver's health, but also their ability to stay on the road (Thorpe, 2017). Long working hours, night work, or spending extended periods on the road away from friends and family can isolate drivers and leave them too exhausted to nourish their relationships. This descriptive study was undertaken among 200 long route truck drivers to find out the occupational stress experienced by the long route truck drivers. Purposive sampling technique was followed. The study indicates that these drivers experience tremendous stress in several areas. The study suggests that these drivers should have a periodical medical check-up and counseling services to find out the problems related to their ailments and take steps to reduce the same.*

Key Words: *Long Route Truck Drivers, Obesity, Occupational Stress, Ergonomic Factors, Environment.*

Introduction

Drivers are responsible for the movement of people and goods from one place to another through a transport system of trucking. A truck driver is commonly referred to as a trucker or driver, but in India is known as a lorry driver. Truck driving is a profession that is vital to the economy of every country, yet it is a career about which most people know very little. Larsen (2004) reported that surveys of the general public indicate that most people are ambivalent about truck driving and have a poor view of trucking as a whole. Truck drivers provide an essential service to industrialized societies by transporting finished goods and raw materials over land, typically to and from manufacturing plants, retail and distribution centers. Truck drivers are also responsible for inspecting their vehicles for mechanical items or issues relating to safe operation.

Meaning and Understanding of Long Route Truck Drivers

Long route truck drivers are the people who travel from one place to another to deliver goods by truck or trolleys. If they start their journey they will be away for 15 to 20 to 25 days from their families. It is their task to deliver the goods in order to earn their livelihood. During this travel they face multiple problems. These drivers carry mostly heavy and sometimes dangerous goods. They are not sure of their destination but they are clear about their task.

Long route truck drivers mostly come from poor family background in order to support and sustain their families. Therefore, they take up this job as a driver to support economically and bring change in the economic status. They are mostly on constant move from one place to other, one city to the other. These drivers have minimal social life, lot of health issues, which come their way. They are susceptible to adverse behavioural patterns and develop aggression arising from their workload. They also have the problem of unavailability of mechanics and technical issues. Therefore, long route truck driver's life style is more or less not a sought of job due to their long absences from home and the kind of work that they are carrying on.

Problems and Challenges

Economic growth accelerated by market liberalization and global market integration, has created many significant opportunities for men in particular in the urban areas. But rural poverty has led many men to leave their families and villages in search of work, changing traditional patterns of sexual unions (Upadhyay, 2000).

India has one of the largest road networks in the world. The trucking industry is booming in India due to heightened consumerism facilitated by economic growth and a huge demand in transportation of goods. It is said that HIV travels along trucking routes and highways with numerous rest areas providing food, alcoholic drink and the services of commercial sex workers for lonely truckers (Bryan et. al, 2000; Singhal and Rogers, 2004). Perhaps, we can trace the extent of transmission of this virus if we compare truck routes connecting major cities with the rates of infection of people who are living close to these highways. Undoubtedly, one would find an increase in HIV prevalence rate.

Research has linked sitting for very long periods of time to a number of health concerns and other health related issues, which include obesity, heart problems, high blood pressure, diabetes and more. These conditions are very prevalent in the trucking industry, and impact not only the driver's health, but also their ability to stay on the road (Thorpe, 2017).

Backache is another problem faced by the long route truck drivers. Lower back pain is a growing pandemic in the Indian drivers with prevalence 40 percentage to 69 percentages (Vink & Kantola, 2010). Back pain in truck drivers is of multi-factorial such as vibrations, strained postures for long hours, etc. Different states of India are interconnected through the National highways. Throughout the year, the truck drivers are encountering the rough hilly terrain, hair pin bend, narrow roads, adverse climatic conditions and natural calamities.

Occupational Stress among the Truck Drivers

Truck drivers experience stress from many sources. Long working hours, night work, or spending extended periods on the road away from friends and family can isolate drivers and leave them too exhausted to nourish their relationships. Pressure to stay on schedule even when road conditions are bad or they are fatigued can strain driver's nerves. Delivering or picking up loads can be taxing—drivers are often required to wait in their trucks for long and unpredictable periods of time; they may be denied opportunities for food, water, and restroom facilities; and they may be treated disrespectfully by shipping and receiving personnel to make the required loan or lease payments on their truck due to low compensation rates.

Bureau of Labor Statistics (2006) data on injury and illness show that the drivers of heavy trucks and tractor-trailers in the US are associated with second highest number of occupational illnesses and injuries for the past three years.

Dhere A.M. (2010) carried out a study on Impact of Pollution on Psychological Setting among Indian Truck Drivers. Trucking worker have wide variety of problems like decrease immune system, increases stress on body parts. It is an in-depth pilot tested structured interview schedule used to investigate 240 truck drivers on micro level things of physical and psychological health of truck drivers. It was found that 59.5 percent of truck drivers were affected by long distance hearing loss while 15.4 percent of the respondents faced regular fatigue. These illnesses were occurred because of irregular work

schedule, less sleep and high work related stress. The study found that 66 percent of the truckers were married and many of them were spent more than one month away from their home. During group discussion many truck drivers agreed to sexual exposure with many women during journey. But it is a common opinion that they had selected safe sexual contact with adequate measures. The truck drivers reported that they were abused and treated badly by the traffic police in different states. This physical and verbal abuse closely linked with decline in the social status of the truck drivers.

A review by Costa et.al (2000) noted the impact of non-standard work schedules on Social relationship. 141 people engaged in shift and night works are frequently out of phase with society, and can face greater difficulties in their social lives because most family and social actives are arranged according to the day oriented rhythms of the general population.

The truck drivers are constantly exposed to environmental overstimulation (e.g., noise, smog, variable light conditions) (Biggs, H.; Dingsdag, D.; Stenson, N. 2009), and difficult ergonomic conditions (Tse, J. L.M.; Flin, R.; Mearns, K. 2006).

Since a large group of Indian working population is involved in truck driving and hence an attempt is made through this study to understand the level of occupational stress experienced by the long route Truck Drivers.

Materials and Method

This descriptive study was carried out among 200 long route truck drivers in Mangaluru Region, Karnataka State. The respondents were selected for the study through purposive sampling technique. The work stress among the respondents under this study is measured using a 24 item scale developed and validated by the researcher taking various aspects of work stress in to consideration. The respondents were explained the purpose of the study and ensured confidentiality. The data gathered was coded, tabulated and analyzed using SPSS Version 20 and statistically tested.

Results and Discussion

The Socio-demographic data reveals that a majority (42.5%) of the respondents were in the age group of 21-30 years, while 29.5 percent of them were in the age group of 31-40 years. A majority (67.5%) of the respondents were married, while 31.5 percent of them were unmarried.

A majority (65%) of the respondents were from the rural areas, while 27 percent of them were from urban areas. A relative majority (37%) of the respondents had educational qualification up to High School, while (34%) of them stated that they were educated up to primary and higher primary. A majority (65.5%) of the respondents had their own residential house. A vast majority (90.5%) of the respondents stated that they were full time truck drivers. More than half (53%) of the truck drivers stated that they get monthly income of less than Rs. 10,000, while 40 percent of them get monthly income of Rs. 10,000 - Rs. 20,000.

A majority (60%) of the respondent stated that they were not getting the benefits of Employee State Insurance (ESI), while 40 percent of them stated that they received ESI Benefits. A majority (61%) of the respondent stated that they have Provident Fund and a majority (58.5%) of the respondent stated that they will be getting Gratuity benefits.

Occupational Stress

The item analysis of the occupational stress scale revealed that a majority (46.5%) of the respondents said that they felt their body is tense all over some time. Another (42.5%) of the respondents stated that they have experienced severe or chronic lower back pain most of the time. A relative majority (38.5%) of the respondents stated that they had problems with their bowels some time. A majority (40%) of the respondents stated that they lacked physical energy some time. A Relative majority 27 percent of them stated that sometimes they take pills to get sleep.

A relative majority (38.5%) of the respondents stated that sometimes they feel tired no matter how much they sleep. A relative majority (34%) of the respondents stated that they consumed alcohol or drugs to relax most of the time.

A relative majority (33.5%) of the respondents stated that they consumed a lot of junk food most of the time. A relative majority (33.5%) of them stated that most of the times had no structured time for meals and sleep respectively. A majority (42.5%) of the respondents stated that in a given week they take one prescription drug without the consultation of the physician some time while 24 percent of them stated that they most of the time take one prescription drug without the consultation of the physician.

A relative majority (41.5%) of the respondents stated that they had some times problem with their sex life. A relative majority (43.5%) of the respondents stated that sometimes they deal with hassles and problems by consciously avoid thinking or talking about it, while 35 percent of them most of the time dealt with hassles and problems by consciously avoid thinking or talking about it.

Further (42%) of the respondents stated that sometimes they felt that they should not show their emotions to their family, while 35 percent of them stated that most of the times they feel that they should not show their emotions to their family.

Another (45%) of the respondents stated that sometimes they felt that they are not doing justice to their family. A relative majority (42.5%) of the respondents stated that sometimes they had temper outburst which can't be controlled.

A majority (40.5%) of the respondents stated that sometimes they felt extremely sensitive and irritable, while one-fourth (25.5%) of them stated that most of the times they felt extremely sensitive and irritable.

A relative majority (34%) of them stated that most of the times they felt like they can't trust anyone. A relative majority (34%) of the respondents stated that sometimes they felt bad and thought of hurting themselves.

A majority (43%) of them stated that it is difficult to plan time and activities to constructively release their stress, while 36.5 percent of them stated that sometimes it is difficult to plan time and activities to constructively release their stress.

A majority (59.5%) of the respondents stated that sometimes spend less than 30 minutes a week talking casually with neighbors and others.

A relative majority (32%) of the respondents stated that sometime they don't feel to pray and get strengthened, while 29 percent stated that they feel to pray and get strengthened.

A relative majority (42%) of the respondents stated that sometime they have various other interests which remain neglected due to lack of time.

A relative majority (40%) of the respondents stated that sometime their family complains that they don't spend time due to their erratic time of work;

while 34 percent of them stated that most of the time their families complain that they don't spend time due to their erratic time of work.

A majority (35.5%) of them stated that most of the time they wished to have more financial resource for work assigned to them.

Table 1 : Results of One Way ANOVA for Age and Stress

Indicator	Age										Statistical Inference df= 199
	Below 20 N=5		21-30 N=85		31-40 N=59		41-50 N=44		51 & above N=7		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Stress	75.20	9.63	75.05	9.69	74.17	8.10	78.18	7.98	77.57	7.41	F=1.507 p>.0.05 (NS)

The above table shows the results of one-way ANOVA for age on the Stress.

There is no significance with regard to the Stress and the age (F= 1.507, p>0.05) of the respondents. It indicates that age and work stress are independent of each other. Long route truck drivers of all age groups experience occupational stress.

Table 2 : Results of One Way ANOVA for Marital Status on Stress

Indicator	Marital Status								Statistical Inference df= 199
	Unmarried N=63		Married N=135		Separated N=1		Divorced N=1		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Stress	72.70	9.46	76.70	8.16	86.00	.	94.00	.	F=5.145 P<.0.05 (Sig)

The above table shows the results of one-way ANOVA for Marital Status on the Stress.

It shows that there is significance with regard to the marital status and stress (F=5.145, p<0.05). It shows that married respondents had more stress than the others. It may be because they may be thinking about their families and commitments as they are away for work.

Table 3: Results of One Way ANOVA for Monthly Income on the Stress

Indicator	Monthly Income								Statistical Inference df= 199
	Less than Rs. 10,000 N=106		Rs. 10,000- Rs. 20,000 N=80		Rs. 20,000- Rs. 30,000 N=13		Above Rs. 40,000 N=1		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Stress	75.71	9.03	74.91	8.42	79.31	9.63	65.00	.	F=1.411 (p>0.05) (NS)

The above table shows the results of one-way ANOVA for monthly income on the Stress.

It shows that there is no significance with regard to the monthly income and the stress (F=1.411, p<0.05) among the respondents. It only indicates that long route truck drivers from all income groups experience occupational stress.

Recommendations

1. The truck drivers get a minimum salary which is not enough to meet the expenses on the road. Therefore, the company or the owner for whom they are working should fix a minimum salary so as to meet the daily expenses with regard to tolls to reach the destination.
2. The truck drivers are considered to be in an unorganized sector due to which most of the drivers are not covered under the Social Security Scheme, the owners should make it a point to include all the permanent employees under the social security scheme and give them benefits of Employees’ State Insurance (ESI), Provident Fund (PF) and Gratuity. This would help them to lead a better quality of life in future. If they are brought to the main stream they could get more benefits.

3. The drivers should form truck driver's clubs, to where they can meet up and exchange their views of trucking. The clubs should work as a stress releaser and aim for a better quality of life.
4. The truck drivers consume alcohol and drugs to reduce their fatigue. The clubs they form should try to create awareness programmes and help them get rid of these vices.
5. The clubs formed can conduct activities that can help them to have a better standard of living. It will also help them to have social gatherings or celebrate the festivals together.
6. Most of the truck drivers are ailing from occupation related pains, like back pain, shoulder pain, headache and other ailments. The drivers should have a periodical medical check-up and counseling services to find out the problems related to their ailments and take steps to reduce their ailments.
7. The truck drivers have junk food in dhabas which is unhealthy. There should be pit stops or petrol bunks where these drivers get a clean and healthy option for their food on the road.
8. Commercial Truck Manufacturers should adopt truck drivers through driver training institutes and give them jobs with substantial salaries. This is one of the best strategies which Ashok Leyland limited had started in the past and it is doing well. The objective is to train the drivers and attach these drivers to the respective owners who buy the trucks from Ashok Leyland Ltd. The Job security is ensured to the truck driver and the respective person can be shuffled from Logistics Company to other Logistics Company like a job rotation as prevailing in high profile corporate employees.

Conclusion

The trucking industry plays a crucial role in driving the growth of India, the stressful and demanding nature of the work undertaken by the truck drivers impact their physical and mental well-being. Unusually prolonged working hours, long periods away from home and family, difficult road and driving conditions, all emerged as issues impacting their health and well-being. The ergonomic risk factors faced by Truck Drivers as a result of awkward and fixed postures, repetitive twisting of back and neck and working and sleeping

in tight spaces result in chronic back, neck and joint pain. There should be training on exercises to be conducted for the truck drivers so that they can relax themselves and keep their mind and body healthy. It is very important that they are fit and healthy so that they can perform the given task of reaching the destination in the intended time. In this context, the owners' and the government should introduce and implement programmes which benefit the drivers to keep them fit.

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Repositioning India's Cotton Lint Export Direction

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Abstract: *Following the recent non-impressive performance in the export volume of its cotton lint which in turn affected its foreign exchange earnings from the sector due to bear raid by USA and China price subsidies which caused imperfection in the global trade market, the researchers conceptualized the need to identify the magnitude and effects of the key drivers of India's cotton lint exports using Engel-Granger two-step procedure. The study used dated data spanning from 1981 to 2013 which were sourced from FAO and UNCTAD databases. The results of the long-run and short-run models showed that India's cotton lint export is stimulated mostly by the internal economic forces. However, export growth of the product was hindered by both the domestic and external forces. In this regard, in as much as the negative impact on India's cotton lint due to distortion induced downward pressure on world prices caused by price subsidies offered by China and USA, inefficiencies and constraints in the domestic environment would preclude India from appropriately exploiting opportunities and adjusting to unexpected market developments in the short-run. Therefore, to revitaliz the gloomy export trade of India's cotton lint, policy makers and various stakeholders in the industry should put in place measures to address domestic inefficiencies over which the country has some control compared to inefficiencies on the global market, thus placing the country in a better position to exploit market opportunities and adjust to unexpected developments in the shortest possible time.*

Key Words: *Reposition; Export; Cotton Lint; India.*

Introduction

Determinants of agricultural export in developing countries after trade liberalization are still a controversial issue in economics (Kinghu, 2014). Literature review showed that some studies in developing countries found internal determinants to be the driving force behind export while other studies found external forces to be the significant determinant of agricultural export. Therefore, the studies on the determinants of agricultural export in developing countries are marred with mixed results.

Baffes (2004) as cited by Anwar *et al.* (2010b) reported that the demand for cotton is increasing with population growth over the globe. This silver fiber has involved millions of India's rural households in its production. Currently, India is the second largest producer, consumer and exporter of cotton with world share production, consumption and exportation been 22 percent, 19 percent and 20.62 percent respectively (ITC, 2013). These respective periodical contributions reflect a strong reliance of India's economy on cotton lint exports, which consequently makes the country vulnerable to unexpected developments on the global cotton lint market.

The cotton sector, both in production and export dimensions has been subjected to various developments and instruments in internal and external policy environments over the past decades. In as much as internal efforts are aimed towards strengthening the sector, external influences in the form of distortions (production and export subsidies levied by major players - USA and China) have primarily induced downward pressure on world cotton prices and consequently prices faced by exporters, traders and producers in India. Changes in these policy environments, alongside pulls from other biophysical, structural, financial constraints have affected the export performance of India's cotton economy. These conditions place not only the current national production and export position at risk, but could as well trigger major food insecurity and poverty implications due to heavy reliance of majority of the India's rural populace on the cotton sector.

Research Methodology

The present research used dated data spanning from 1981 to 2013 sourced from the databases of FAO and UNCTAD. The data collected covered the internal and external macroeconomic indicators. The data analysis was

performed using the Augmented Dickey-Fuller unit root test (ADF), Engel-Granger two-step procedure model and the Granger causality test. Presented below are the empirical models:

Augmented Dickey-Fuller Test

Following Blay *et al.* (2015); Singh, *et al.* (2016); and, Sadiq *et al.* (2016) the Augmented Dickey-Fuller test (ADF) used is given below:

$$\Delta P_t = \alpha + P_{t-1} + \sum_{j=2}^{it} \beta_j \Delta P_{it-j+t} + \varepsilon \dots\dots\dots (1)$$

Where, P_{it} is the i^{th} variable at the tin t , ΔP_{it} ($P_{it} - P_{t-1}$) and α is the intercept or trend term.

Engel-Granger Two-step Procedure Model

Long-run Dynamic Model

$$\begin{aligned} CEXQ_t = & \beta_0 + \beta_1 FDIF_t + \beta_2 FDIS_t + \beta_3 DI_t + \beta_4 TOT_t + \\ & \beta_5 CPQ_{t-1} + \beta_6 CI_t + \beta_7 WEV_t + \beta_8 MD_t + \beta_9 TOP_t + \\ & \beta_{10} WPR_t + \beta_{11} CGDP_t + \beta_{12} BGD P_t + \beta_{13} AI_t + \beta_{14} IND_t + \\ & \beta_{15} RWPP_t + \beta_{17} PRP_t + \beta_{18} IRP_t + \beta_{19} INF_t + \beta_{20} RER_t + \\ & \beta_{21} CMI_t + \beta_{22} CEXQ_{t-1} + \varepsilon_t \dots\dots\dots (2) \end{aligned}$$

Short-run Dynamic Model

$$\begin{aligned} \Delta CEXQ_t = & \beta_0 + \beta_1 \Delta FDIF_t + \beta_2 \Delta FDIS_t + \beta_3 \Delta DI_t + \\ & \beta_4 \Delta TOT_t + \beta_5 \Delta CPQ_{t-1} + \beta_6 \Delta CI_t + \beta_7 \Delta WEV_t + \beta_8 \Delta MD_t \\ & + \beta_9 \Delta TOP_t + \beta_{10} \Delta WPR_t + \beta_{11} \Delta CGDP_t + \beta_{12} \Delta BGD P_t + \\ & \beta_{13} \Delta AP_t + \beta_{14} \Delta IND_t + \beta_{15} \Delta RWPP_t + \beta_{17} \Delta PPR_t + \\ & \beta_{18} \Delta IRP_t + \beta_{19} \Delta INF_t + \beta_{20} \Delta RER_t + \beta_{21} \Delta CMI_t + \\ & \beta_{22} \Delta CEXQ_{t-1} + ECT_{t-1} \dots\dots\dots (3) \end{aligned}$$

Where, CEXQ is the Export quantity of cotton; FDIF is Foreign direct investment (flow); FDIS is Foreign direct investment (stock); DI is Diversification index; TOT is Term of trade; CPQ is the cotton production quantity; CI is Concentration index; WEV is World export cotton volume; MD is Market potential of domestic cotton lint or world market demand of cotton lint; TOP is the Trade Openness; WPR is World price; CGDP is

China GDP, BGDP is Bangladesh GDP; AP is Agricultural productivity; IND is Industrialization; RWPP is ratio of real world to real domestic price of cotton lint; PPR is Pakistan's real producer price (neighbouring country); IRP is India's real producer price; INF is Inflation; RER is Real exchange rate; CMI is Competitiveness index; ε_i is the error term; t is the current time; $t-1$ is one year lagged period; β_0 is the intercept; β_{1-n} are the parameter estimates; and, Δ is the first difference operator.

Trade Openness: The Trade openness index is calculated as follow:

$$TOP = (EX_{AG} + IM_{AG}) / GDP_{AG} \times 100 \dots\dots\dots (4)$$

Where, TOP is trade openness; EX is export; IM is import; AG is agricultural goods; and GDP is the nominal Gross domestic product of the chosen country

Market Potential for Domestic Cotton Lint (MD): Following Anwar *et al.* (2010a and b) as adopted by Bashir (2003), the world demand or export market potential for domestic cotton measured in terms of weighted-average index of world export price for cotton lint is specified below:

$$MD_{CX} = \alpha WP_{CX} \dots\dots\dots (5)$$

Where, MD is market potential for domestic cotton lint; α is share of cotton lint in country's total agricultural export; WP is constant price index for world export of cotton lint; and, CX is cotton lint export.

Competitiveness: Following Anwar *et al.* (2010a and b) the index of competitiveness as developed by Balassa (1965) which was measured through the ratio of country's export of cotton lint in its relevant sector at national level and then at world level is shown below:

$$CMI_{CX} = \frac{X_{ij} / \sum X_{ij}}{X_{iw} / \sum X_{iw}} \dots\dots\dots (6)$$

Where, CMI_{CX} is competitiveness index of India's cotton lint; X_{ij} is export of India's cotton lint; $\sum X_{ij}$ is total export of India's cotton sector; X_{iw} is export of world cotton lint; $\sum X_{iw}$ is total export of world cotton sector. The numerator represents the commodity structure of the exports from India and the denominator represents the product structure of the global market.

Concentration Index: The index was constructed to depict the extent of expansion in marketing of cotton lint in the total India's exports and specified below is the formula:

$$CI = \sqrt{\sum \left[\frac{X_{ij}}{\sum X_{ij}} \right]^2} \dots\dots\dots (7)$$

Where, CI is concentration index; X_{ij} is export of India's cotton lint; and, is $\sum X_{ij}$ total export of India's cotton sector.

Diversification Index: Literature has shown various methods used to measure level of diversification but for the present empirical examination, Berry's index was used and the model is given below:

$$BID = 1 - \sum_{i=1}^n P_{it}^2 \dots\dots\dots (8)$$

$$P_{it} = \frac{A_{it}}{\sum_{i=1}^n A_{it}} \dots\dots\dots (9)$$

Where, BID is Berry's Index of Diversification; P_{it} is share contribution of i^{th} sub-sector to the main sector at time t ; A_{it} is i^{th} export value of i^{th} sub-sector at time t ; and, $\sum_{i=1}^n A_{it}$ export value of cotton sector at time t .

Inflation: Using the following formula the consumer price index (CPI) was used to calculate inflation:

$$INF = \frac{(CPI_t - CPI_{t-1})}{CPI_{t-1}} \times 100 \dots\dots\dots (10)$$

Where, INF is inflation; CPI is consumer price index; t is current period; and, $t-1$ is lagged period.

Real Prices: Real prices are prices that have been adjusted for inflation in order to hold the value of currency constant, and allow comparison of the exchange value of a good or service at different time periods. Unlike nominal prices, real prices are not observed in the market, and they are calculated. Below is the formula used to calculate real price:

$$RP_t = (CPI_{t-1} / CPI_t) \times NP_t \dots\dots\dots (11)$$

Where, RP is real price and NP is nominal price.

Real exchange rate: Following Yousif (2015) as adopted by Kingu (2014), the real exchange rate is calculated as follow:

$$RER_t = (CPI_{India} / CPI_{USA}) \times NER_t \dots\dots\dots (12)$$

Where, RER is real exchange rate; CPI is the consumer price index at time t ; and, NER is nominal exchange rate in the local currency.

Granger Causality Test

Following Granger (1969) the model used to check whether market P_1 Granger causes market P_2 or vice-versa is given below:

$$P_t = \alpha + \sum_{i=1}^n (\phi P_{1t-i} + \delta_i P_{2t-i}) + \varepsilon_i \dots\dots\dots (13)$$

A simple test of the joint significance of δ_i was used to check the Granger causality i.e.

$$H_0 : = \delta_1 = \delta_2 = \dots\dots\dots \delta_n = 0.$$

Results and Discussion

Unit Root Test

The results of ADF unit test applied at level showed all the variable series to be non-stationary as indicated by the tau-statistics which were not different from zero at 5% degree of freedom. Further, application of the ADF unit root test at first difference showed all the variable series to be stationary as

evident from their respective tau-statistics which were different from zero at 5% risk level. Furthermore, the linear combination of these variables or macroeconomic indicators was integrated of an order one less the original order of the variables [I(0)]. In other words, the application of ADF unit root test at level to the co-integrating regression residual showed the variable series to be stationary as indicated by the tau-statistic which is lower than the Engel-Granger critical value at 5% probability level (Table 1). Thus, it can be inferred that the macroeconomic indicators move together in the long-run as they shared the same or one stochastic trend, and the results of the linear combination is reliable for long-run prediction as the regression results of long-run model is not spurious. Also, there is absence of spurious correlation as evident from the coefficient of multiple determination which is not too close to unity i.e. not too large or over inflated.

The Engel-Granger co-integration approach was followed in examining the existence of long-run equilibrium relationship among the macroeconomic predictors. For the Engel-Granger two-step procedure, the required two conditions were met. The variables were integrated of order one [I(1)], and the residual from the co-integrating relationship was integrated of order zero [I(0)].

Table 1: Stationarity Test

Items	Stage	ADF		Decision
		tau-stat	t-critical at 5%	
CEXQ	Level	-1.57522	0.4833	Non-stationary I(0)
	1 st	-5.68659**	6.54E-07	Stationary I(1)
FDIF	Level	-0.82450	0.7984	Non-stationary I(0)
	1 st	-7.14717**	1.31E-010	Stationary I(1)
FDIS	Level	-0.21676	0.934	Non-stationary I(0)
	1 st	-3.08436**	0.03825	Stationary I(1)
DI	Level	-1.03784	0.2634	Non-stationary I(0)
	1 st	-6.04127**	9.52E-08	Stationary I(1)
TOT	Level	-2.09823	0.2455	Non-stationary I(0)
	1 st	-7.77297**	2.98E-07	Stationary I(1)
CPQ	Level	-0.20353	0.9282	Non-stationary I(0)
	1 st	-5.38351**	3.14E-06	Stationary I(1)
CI	Level	-3.43684	0.0642	Non-stationary I(0)
	1 st	-5.44663**	2.18E-05	Stationary I(1)
WEV	Level	-1.03226	0.7295	Non-stationary I(0)
	1 st	-6.90437**	2.12E-06	Stationary I(1)
MD	Level	-2.39192	0.1518	Non-stationary I(0)
	1 st	-5.54606**	7.13E-05	Stationary I(1)
TOP	Level	-3.12959	0.1168	Non-stationary I(0)
	1 st	-5.86309**	0.0001971	Stationary I(1)
WPR	Level	-2.83229	0.06503	Non-stationary I(0)
	1 st	-5.72727**	5.27E-07	Stationary I(1)
CGDP	Level	-1.58586	0.7762	Non-stationary I(0)
	1 st	-5.60418**	9.80E-06	Stationary I(1)
BGDP	Level	-0.72244	0.9626	Non-stationary I(0)
	1 st	-4.95195**	0.0019	Stationary I(1)
AI	Level	-0.40216	0.9066	Non-stationary I(0)
	1 st	-7.14849**	1.18E-06	Stationary I(1)
IND	Level	-0.99111	0.7586	Non-stationary I(0)
	1 st	-2.90234**	0.04506	Stationary I(1)
RWPP	Level	-3.58492	0.09281	Non-stationary I(0)
	1 st	-5.46787**	0.00211	Stationary I(1)
PRP	Level	-2.78590	0.07154	Non-stationary I(0)
	1 st	-5.36476**	3.45E-06	Stationary I(1)
IRP	Level	-2.84220	0.06371	Non-stationary I(0)
	1 st	-4.83118**	0.00049	Stationary I(1)
INF	Level	-3.19726	0.1029	Non-stationary I(0)
	1 st	-5.71502**	5.49E-06	Stationary I(1)
RER	Level	-1.27465	0.6436	Non-stationary I(0)
	1 st	-3.47884**	0.01552	Stationary I(1)
CMI	Level	-3.79289	0.0801	Non-stationary I(0)
	1 st	-5.40914**	0.00017	Stationary I(1)
ECT	Level	-5.65898**	-3.34	Stationary I(0)

Note: ** indicate that unit root at level or 1st difference was rejected at 5% significant level

Impact and Effect of Macroeconomic Indicators on India's Cotton Lint Export

A cursory review of the results showed almost all the macroeconomic indicators to have impacts and effects on India's cotton lint export during the studied period. Macroeconomic variables *viz.* foreign direct stock investment (FDSI), terms of trade (TOT), world export cotton volume (WEV), China GDP (CGDP), Agricultural productivity (AP), Industrialization (IND), ratio of real world price to real producer's price (RWPP), India's producer price (IPR) and inflation (INF) had positive impacts and effects on the current India's cotton export while foreign direct flow investment (FDFI), diversification (DI), market potential of domestic cotton lint (MD), real exchange rate (RER) and lagged export quantity of cotton lint ($CEXQ_{t-1}$) had negative impacts and effects on the export performance of India's cotton lint in the global market. In addition, it was observed that China GDP (CGDP) and Bangladesh GDP (BGDP) had positive impact and effect respectively on export volume, while trade openness (TOP) exerted negative effect on the export growth of India's cotton lint (Table 2a).

The negative coefficient of the intercept coefficient for the cotton lint export in both the long-run and short-run model indicated that inspite of the gloomy nature of cotton lint export in the global market, India does not strongly rely on export of cotton lint. This is so, because the value of cotton lint is however expected to plummet significantly since all other things been equal. Besides the distortions in the world export trade of cotton lint due to subsidies offered by USA and China, the negative coefficients of the intercept for both the long and short-run models implied that India's cotton lint traders and exporters faced other domestic constraints that hinder them from appropriately responding to sudden developments in the export trade of cotton lint. By this, it is perceived that growth of the cotton lint export sub-sector of the country is hindered by both internal constraints and external forces.

The significant positive coefficient observed for FDSI in both the long-run and short-run implied that foreign direct investment of stock capital supplemented the limited resources of the cotton farmers in expanding their farms and boosting or increasing annual cotton lint output for export. In addition, the FDSI aided in enhancing industrialization of the cotton sector of the country as there is large demand for India processed textile in the global market. This investment may not contribute to the export growth of cotton

lint as the investment motive is to capture the domestic market. Therefore, the semi-elasticity implication of a percent increase in FDSI in the long-run and short-run will increase India's cotton lint export by 3.4% and 3.72% respectively. However, the FDSI effect is higher than its impact on India's cotton lint export

The significance of direct elasticity of TOT for both the models implied that favourable or positive terms of trade for India enhanced its performance in the exportation of cotton lint to the global market. In other words, India is observed to have quite an elastic response to improvements in the country's terms of trade index for exports in the long-run. In the long-run were India stands adjusting to short-run constraints, a percent increase in the TOT index in both the long-run and short-run would lead to 5.15% and 5.28% increase in the India's cotton lint export at times. Increase in trade openness would present the country with diverse and greater market opportunities and at the same time promotes efficiency in operations by exposing India to competition.

India's cotton lint volume was observed to rise with increased WEV, AP and IND in both the long-run and short-run. World trade in this contest reflects increased export volume triggered by increased demand as against over-production and subsidy induced increases. Increasing world demand for cotton lint triggers a competition among exporters from all parts of the globe, and such competition aids in restructuring and shaping economies that depend on the commodity for sustenance. Countries with a competitive edge-advantage would be able to respond and benefit from such demands. Therefore, it can be inferred that India has a competitive edge-advantage in cotton lint exports, and current domestic and international market inefficiencies should be addressed, the country stands a good chance in benefiting from increasing global demand for cotton lint. The semi-elasticity implication of a percent increase in WEV would increase its impact and effect on cotton lint export by 6.16% and 4.8% respectively.

Reflecting on Agricultural productivity index, it can be inferred that agricultural productivity stimulated growth in the exportation of India's cotton lint as it showed success of agricultural sector of the country. The marginal implication of a percent increase in the AP index would increase cotton lint export in the long-run and short-run by 4.47% and 4.06%. Reflecting on Industrialization (IND), it implies effective and efficient intra-industry trade, and export manufactured goods of India's cotton lint (*ceteris paribus*) move intensively to more industrialized countries. Therefore, a percent increase in IND index will increase its impact and effect on cotton lint export by 2.34% and 1.99% respectively.

The significant positive coefficients observed for India's real producer price (IRP) for both the long-run and short-run models implied that favourable producer price encouraged Indian's cotton producers to sell most of their products to the domestic licensed buyers or agents as against smuggling them into neighboring countries with higher prices in the black market. In addition, increases in real producer price of cotton helps the Indian's cotton farmers to invest appropriately in their farms hoping for better and sustainable outputs in the coming years. Therefore, an increase in the real producer price of cotton affects cropping decisions, as well as farmers' decisions to sell domestically or to smuggle. This shows that real producer price is a crucial factor in the supply decision of Indian's cotton farmers, and setting it too low may have negative effect on export of India's cotton lint. The semi-elasticity implication of a unit increase in the IRP will increase export volume of India's cotton lint in the long and short-runs by 6.1% and 4.3% respectively.

More interestingly, it was observed that the inverse coefficient of producer price of cotton lint in neighbouring Pakistan is not significant, indicating non-effectiveness of price disparity which will create incentive for smuggling of India's cotton lint. Thus, price of cotton lint in neighboring Pakistan did not affect export volume of India's cotton lint during the studied period.

The positive elastic coefficients observed for Inflation in both the long-run and short-run showed that demand-push inflation encouraged producers to increase production of cotton lint which in turn expand or boost export output to the global market. The marginal implication of a percent increase in the inflation rate will lead to an increase in the export volume of India's cotton lint by 3.70% and 2.22% in the long and short-runs respectively.

The significant positive long-run elasticity of China GDP proxy as foreign income which is relatively high and elastic revealed that growth and improvements in the economic condition of China boost cotton lint export of India. This conforms to *a priori* reasoning, which suggests that demand and income have a positive relationship. In addition, high income elasticity is evidence of adaptation of the export to local preference for cotton lint in China. Therefore, the marginal implication of a percent increase in CGDP will induce an increase in India's cotton lint by 2.39%. In other words, demand for India's cotton lint increase as China GDP increases. This outcome is not surprising as China which is the world number one largest producer

of cotton lint need more quantum of cotton lint to satisfy its industrial demand due to inability of its local supply to bridge the gap. China is by far the largest importer of cotton lint as a result of its production been lower than its consumption and also because it had started a stockpiling or inventory holding campaign aimed at shoring up domestic prices, combined with an increase of import quotas.

Also, the observed positive significant coefficient for Bangladesh GDP in the short-run proxy by income elasticity implied that economic growth in the economy of Bangladesh induced increase in the volume of India's cotton lint. The high value and elastic state of the coefficient of Bangladesh income elasticity is evidence of adaptation of the export to the local preference for India's cotton lint by domestic industries in Bangladesh. However, the cotton sub-sector of India witnessed an impact and effect with respect to China income elasticity and Bangladesh income elasticity respectively. The magnitudes of both income elasticities in the long-run and short-run were greater than 1.0, potentially revealing that the volume of the cotton lint traded is sensitive to the exporting country (India) production capacity or individual productivity of labour. This sensitivity of India's cotton lint export may be attributed to their efficient production capacity or less interference of government support in the domestic industry.

The significant positive impact and effect observed for the real world price to real domestic price showed that in as much as exporters would export more in times of increases in this ratio due to rising profit in export trade, any negative reaction on the part of the producers in times of an increase in the ratio will be insignificant due to high dependence of most of the producers on the crop for sustenance, and in-kind benefit farmers receive through government assistance and bonuses from buyers. The semi-elasticity implication of a percent increase in the RWPP in the long-run and short-run would increase export volume of India's cotton lint by 6.40% and 4.57% respectively.

The significant positive coefficient reflected by lagged production volume of India's cotton lint implied that increased production and stock for the previous year helped in bridging deficit in the current year's output to ensure sufficient quantities of cotton lint in the domestic market for both export in raw form and for domestic processing. Lagged instead of current production was used because of the strategy adopted by most exporters in the pursuit of maximizing

their profits. Increase in output in times of declining world price prompts most exporters to adopt inventory holding of some portion of cotton lint to take advantage of potential price increases later in the season or in the subsequent year. Exports therefore, respond more appropriately to lag outputs than they do to current outputs. Higher levels of production in time t at a favorable world price in time t would still lead to increase in stock in the domestic market to help minimize the adverse effects of adding-up in the global market which results in world price decline. In contrast to a close economy where production incremental is deemed bad due to the price-plummeting implications thereof, in an open economy, production incremental is regarded as an opportunity for export boost. The semi-elasticity implication of a percent increase in the CPQ_{t-1} would increase India's cotton lint export volume by 2.03% in the short-run. The insignificant of the CPQ_{t-1} in the long-run may be attributed to the exporters' anticipation of market imperfection correction in the global cotton market caused by the subsidies offered by the major exporting economies (China and USA).

Both long-run and short-run export volume of India's cotton lint were observed to respond negatively to an increase in direct foreign investment flow (DFIF), Diversification (DI), market potential of domestic cotton lint (MD), real exchange rate (RER) and lagged export volume of India's cotton lint ($CEXQ_{t-1}$). A reflection of the DFIF indicated that the investment was made with an export-oriented motive due to the comparative advantage of the recipient country and not with the motive of capturing the domestic market, thus, contributing to the export growth of India's cotton lint. The semi-elasticity implication of a percent increase in the DFIF in the long-run and short-run would decrease the export volume of India's cotton lint by 0.444% and 0.435% respectively. The reflection of DI in the long-run and short-run showed that India's cotton sector is receding towards specialization in the exportation of cotton lint as it accounted for the major share of foreign exchange earned from the sector. This outcome is expected as India has been a front-runner in the textile sector globally, been one of the largest industries in terms of its contribution in India's worldwide export. Also, the textile industry which is a sub of cotton lint sector is a key area where India has an opportunity for success on a global scale, given its abundant cheap labour since it is a labour intensive industry. Without doubt, the textile industry's predominant presence in the Indian's economy manifested in its significant contribution to industrial production, employment creation and foreign exchange earnings. The marginal implication of a percent increase

in DI for the long and short-runs will affect domestic production which in turn would decrease export volume of India's cotton lint by 0.36% and 0.47% respectively. However, its negative effect on export would be more than the impact as observed from a cursory review of the results.

The reflection of the world demand for cotton lint (MD) in the long-run and short-run indicated that increased demand for domestic cotton lint in the global market decreased export of cotton lint due to supply constraint. Increase in demand for domestic cotton in the global market, can decrease export of cotton lint if the supply side factors negatively responded. Thus, supply constraint to meet the world demand lead to decline in cotton lint export of India. Therefore, it can be inferred that the real constraint to export growth of India's cotton lint is not the export demand but rather the supply side of export. This finding is contrary to the findings of Anwar *et al.* (2010) who reported that export demand is not a constraint to export performance of Pakistan's cotton lint. Therefore, the semi-elasticity of a percent increase in MD in both the long-run and short-run would decrease export performance of India's cotton lint by 6.17% and 4.51% respectively.

The reflection of the lagged export volume (CEQ_{t-1}) both in the long-run and short-run models showed how glut due to price subsidy offered by China and USA caused market imperfection in the global cotton lint market thereby affecting export performance of India's cotton lint as the exporters adopt inventory holding strategy to take advantage of any slight potential price rise or arbitrage that may occurred in the future date to maximize profit. The elasticity implication of a percent increase in the CEQ_{t-1} in the long-run and short-run would decrease export volume of India's cotton lint by 4.22% and 4.06% respectively.

Contrary to *a priori* expectation, real exchange rate (RER) both in the long-run and short-run negatively affected export supply of India's cotton lint. The inverse relationship of real exchange rate with the export volume of India's cotton lint showed that currency devaluation which is expected to make export cheap and boost India export share in the global market plummet export performance and growth of India's cotton lint. This scenario can be attributed to the fact that India's cotton lint price is higher than that of USA and China which benefit from price subsidy thereby affecting export performance and world share export of India's cotton lint. Therefore, it can be inferred that devaluation of India rupee against US dollar did not favour growth of India's cotton lint due to market imperfection, thus, affecting the domestic economy of India as the country did not maximize foreign exchange

earning benefits from its cotton lint trade in the global market. In lieu of this, the anticipation is that exporters should take necessary actions to reduce or eliminate the negative effect of exchange rate movements on their output which is the profit determinant in most cases. Actions such as price, non-price or a combination of both can be employed depending on the competitive strength or market power of India. The marginal implication of a percent increase in the RER both in the long-run and short-run would decrease export volume of India's cotton lint by 4.22% and 4.06% respectively.

The negative elasticity of the trade openness (TOP) in the short-run implied that India's cotton is not integrated into the global market despite been the second largest producer and exporter of the product in the world. This outcome is not surprising as the price of cotton lint in the international cotton trade market is permeated by bear raid caused by subsidy offered by China and USA who accounted for the bulk of the world production and exportation. In addendum, China is the largest importer of cotton lint in the world as its domestic supply cannot satisfied there industrial demand. Since the export performance is affected by TOP, there is need for India to devise a protective measure to protect its domestic cotton subsector in order not to affect its home grown economy and not to expose it to external factors which will be detrimental to the vibrant industrial sector of the country. Therefore, the marginal implication of a percent increase in the TOP would decrease export volume of India's cotton lint by 5.28%.

The non-significant of the concentration index (CI) means that high domestic consumption of cotton lint did not have any effect on export volume of India's cotton lint. Also, the non-significant positive response of the export volume of India's cotton lint to the competitiveness index (CMI) revealed poor comparative advantage of India's cotton lint in the global market due mainly to market imperfection caused by price subsidy offered by the major cotton lint cartels (China and USA) in the world.

The insignificant of the world cotton price showed how international merchants take advantage of the asymmetric information on both sides, such when they buy cotton lint from the Indian ginners and when they resell it to the Asian importing spinners. This is because they have more information than the sellers (ginners) on the market, and have also more information than the buyers (spinners) on India's cotton production. By contrast, independent ginners have little knowledge of the world cotton market, and usually receive very little market information through merchants. As lint is sold free on truck

or free on board to international merchants, ginners are ignorant about the actual selling price of their lint as well as intermediary costs. Therefore, the cotton marketing system may send biased signals to ginners and producers. Moreover, as India's cotton is marketed almost exclusively through intermediaries, there is no direct feedback loop on buyer requirements from spinning mills and back to ginning companies and producers. Therefore, Indian producers and ginners receive feedback that has been "filtered" by merchants according to their own interests; complaints about the poor quality of shipments and positive feedback are most of the time concealed.

The result showed that the export volume of India's cotton lint established an efficient degree of integration with the external and internal factors as indicated by the attractor coefficient which is different from zero at 10% probability level, and had the *a priori* expectation sign which showed the convergence of the system towards the equilibrium. This implied that the export volume of India's cotton lint established a long-run equilibrium with the macroeconomic parameters and tends to correct the economy previous disequilibrium from the equilibrium at the speed of 135% over a year after the disturbance or shock. In other words, a shock that induce deviation of export from the equilibrium level would induce the exporters to respond to the shock in a way that export volume would converge toward its equilibrium value. The approximate time period required to adjust the shocks and changes needed to bring back the economy or for the economy to re-establish equilibrium is 4 years. The relatively low rate of adjustment of export volume indicates that India has good control over the export volume of its cotton lint.

Appropriate diagnostic tests performed confirmed that the short-run model is valid, as the residual is devoid of auto-correlation, auto-covariance, no covariance among the predictor variables, normality in the distribution of the residuals and the estimated coefficients are stable as indicated by their respective test statistics which were not different from zero at 10% degree of freedom (Table 2b). The estimated F-statistics in both the long-run and short-run models were different from zero at 10% degree of freedom, implying that the estimated parameters captured in the models were different from zero and are reliable for prediction. The estimated coefficient of multiple determinations in both the models showed that 94.56% and 93.45% of the variation in the export volume of India's cotton lint in the long-run and short-run respectively were determined by the internal and external economic forces captured in the models.

Table 2a: Long-run and Short-run Predictions for Cotton EXPQ

Variable	Long-run dynamic model (LNEXQ)			Short-run dynamic model (LNEXQ)			
	Coefficient	SE	t-ratio	Coefficient	SE	t-ratio	VIF
Constant	511.30	157.130	3.254***	0.03244	0.22914	0.142 ^{NS}	-
lnCEXQ _{t-1}	0.36731	0.151765	2.420**	0.23377	0.08116	2.880**	4.465
lnFDIF _t	0.44421	0.150710	2.947**	0.43523	0.11925	3.650***	3.542
lnFDIS _t	3.40988	0.889673	3.833***	3.72795	0.47096	7.916***	1.909
lnDI _t	0.35804	0.158441	2.260**	0.46513	0.10673	4.358***	3.735
lnTOT _t	5.14961	2.56909	2.004*	5.28257	1.18629	4.453***	3.121
lnCPQ _{t-1}	1.24026	1.46879	0.844 ^{NS}	2.02487	0.60883	3.326***	5.055
lnCI _t	2.29608	2.02112	1.136 ^{NS}	2.23700	1.40405	1.593 ^{NS}	1.615
lnWEV _t	6.16088	2.71966	2.265**	4.81144	1.29673	3.710***	6.386
lnMD _t	6.17295	1.94556	3.173***	4.50651	1.61377	2.793**	6.063
lnTOP _t	3.81585	3.20968	1.189 ^{NS}	3.83436	1.92115	1.996*	3.397
lnWPR _t	2.11471	2.34157	0.903 ^{NS}	0.81401	1.41412	0.576 ^{NS}	3.636
lnCGDP _t	2.39592	0.96497	2.483**	0.46025	1.11374	0.413 ^{NS}	4.691
lnBGDP _t	1.27498	3.73676	0.341 ^{NS}	3.56633	1.33287	2.676**	3.274
lnAI _t	4.46528	1.95212	2.287**	4.06108	7.17983	5.656***	2.765
lnIND _t	2.34421	7.28098	3.220***	1.99957	3.37241	5.929***	2.067
lnRWPP _t	6.40055	1.98211	3.229***	4.56673	1.63190	2.798**	3.042
lnPRP _t	1.85509	2.49874	0.742 ^{NS}	0.19937	1.24896	0.159 ^{NS}	3.948
lnIRP _t	6.04948	1.86089	3.251***	4.26160	1.58633	2.686**	3.296
lnINF _t	3.70003	1.10543	3.347***	2.22194	1.11793	1.988*	4.737
lnRER _t	4.22077	1.54539	2.731**	4.05832	1.20565	3.366***	3.095
lnCMI _t	1.66601	2.67131	0.624 ^{NS}	0.386303	1.79079	0.022 ^{NS}	7.333
ECT _{t-1}	-			1.35101	0.09144	14.77***	1.559
R ²	0.9457			0.93447			
R ² adjusted	0.8316			0.75426			
D-Watson	0.9137						
F-statistic	283.8(3.2E-11)***			519.3(2.4E-10)***			

Note: *** ** * NS means significant at 1%, 5%, 10% probability levels and non-significant respectively

(): The value in parenthesis is probability level; VIF means variance inflation factors and values > 10.0 may indicate a collinearity (multicollinearity) problem.

Table 2b: Diagnostic Test for Short-run Model

Diagnostic item	Test	t-statistic
Heteroskedasticity	Breusch-Pagan test (LM)	16.082(0.811) ^{NS}
Normality	Chi-square	3.047(0.217) ^{NS}
Autocorelation	LMF	0.836(0.384) ^{NS}
	Ljung-Box Q	1.040(0.308) ^{NS}
ARCH effect	LM	1.659(0.197) ^{NS}
CUSUM (Stability test)	Harvey-Collier t	-0.523(0.613) ^{NS}

Causal Linkage between India's Cotton Lint Export with Macroeconomic Indicators

Examining the long-run relationship of the lagged India's cotton lint export volume with the macroeconomic indicators, a perusal of the Table showed the existence of bidirectional causalities between the pairs of CEXQ-RWPP and CEXQ-IRP; unidirectional causalities between the pairs of CEXQ-TOP, CEXQ-PRP and CEXQ-CMI; and non-causalities between the pairs of CEXQ-DFIF, CEXQ-DFIS, CEXQ-DI, CEXQ-TOT, CEXQ-CPQ_{t-1}, CEXQ-CI, CEXQ-WEV, CEXQ-MD, CEXQ-WP, CEXQ-CGDP, CEXQ-BGDP, CEXQ-AP, CEXQ-IND, CEXQ-INF and CEXQ-RER (Table 3). For the bidirectional causality it implies that the former granger cause the latter and the latter granger cause the former. The implication of the unidirectional causality means that only lagged information of the former contain reliable information to predict the future direction of the latter. However, for the non-causality it implies that neither the former nor the latter contains useful information to predict the future direction of each other. Therefore, it can be inferred that strong endogeneity, weak exogeneity and strong exogeneity existed in the case of bidirectional, unidirectional and none causalities respectively. The Wald test signified the weak role of export volume of India's cotton lint in the global cotton market. This result is not surprising as the India's cotton lint price is on the high side when compared to that of China and USA which are low due to administrative price offer.

Table 3: Granger Causality Test Results

Null hypothesis	F-stat	P < 0.05	Granger cause	Direction
<i>CEXQ</i> ↔ <i>FDIF</i>	0.3587	0.5563	No	None
	0.9171	0.3503	No	
<i>CEXQ</i> ↔ <i>FDIS</i>	0.0684	0.7964	No	None
	0.3121	0.5829	No	
<i>CEXQ</i> ↔ <i>DI</i>	1.3495	0.2598	No	None
	0.1547	0.6984	No	
<i>CEXQ</i> ↔ <i>TOT</i>	2.7490	0.1137	No	None
	3.4442	0.0791	No	
<i>CEXQ</i> ↔ <i>CPQ</i>	1.0605	0.3160	No	None
	0.0593	0.8102	No	
<i>CEXQ</i> ↔ <i>CI</i>	0.2286	0.6380	No	None
	1.3804	0.2545	No	
<i>CEXQ</i> ↔ <i>WEV</i>	0.4967	0.4895	No	None
	0.4354	0.5173	No	
<i>CEXQ</i> ↔ <i>MD</i>	0.7237	0.4055	No	None
	2.1635	0.1577	No	
<i>CEXQ</i> ↔ <i>TOP</i>	9.3550**	0.0065	Yes	Unidirectional
	0.3813	0.5442	No	
<i>CEXQ</i> ↔ <i>WPR</i>	1.8982	0.1843	No	None
	0.0670	0.7985	No	
<i>CEXQ</i> ↔ <i>CGDP</i>	1.2934	0.2703	No	None
	0.9243	0.3491	No	
<i>CEXQ</i> ↔ <i>BGDP</i>	2.4855	0.1323	No	None
	1.0094	0.3284	No	
<i>CEXQ</i> ↔ <i>AI</i>	0.0167	0.8985	No	None
	0.7731	0.3908	No	
<i>CEXQ</i> ↔ <i>IND</i>	2.1694	0.1581	No	None
	0.9035	0.3544	No	
<i>CEXQ</i> ↔ <i>RWPP</i>	10.140**	0.0051	Yes	Bidirectional
	16.651**	0.0007	Yes	
<i>CEXQ</i> ↔ <i>PRP</i>	22.282	0.0002	Yes	Unidirectional
	2.0025	0.1741	No	
<i>CEXQ</i> ↔ <i>IRP</i>	4.6819**	0.0442	Yes	Bidirectional
	5.0622**	0.0372	Yes	
<i>CEXQ</i> ↔ <i>INF</i>	3.0333	0.0986	No	None
	0.5677	0.4609	No	
<i>CEXQ</i> ↔ <i>RER</i>	0.1549	0.6985	No	None
	0.3142	0.5820	No	
<i>CEXQ</i> ↔ <i>CMI</i>	7.9577**	0.0113	Yes	Unidirectional
	2.6712	0.1195	No	

Note: ** denotes rejection of the H_0 at 5% level of significance
 → ← means forward and backward directions respectively

Conclusion and Recommendations

Findings showed that the cotton sector of India is not integrated into global market due to subsidized cotton lint price offered by two major exporting economies (China and USA), thereby affecting the export share of India in the global cotton market. In addition, the effect of the cotton price subsidy affected the growth of India's cotton lint export as devaluation of the local currency did not make export cheaper nor increase its share export in the international market. Furthermore, the cotton market system conveyed biased world price signals filtered by the international merchants who capitalized on the asymmetric information on both the supply (ginners) and demand (spinners) sides in the market, thus affecting the export performance of India's cotton lint. Therefore, the study recommended adoption of prompt actions such as price, non-price or a combination of both depending on the competitive strength or market power of the exporting economies to enhance the growth and performance of India's cotton lint export in the international market. In addition, India should continue with its protective measures to protect the agricultural and industrial sectors from external shocks created by the major cotton exporting economies. Advisably, India should devise measures of production cost-cut in order to make the cotton economy competitive in the global market as the country have abundant and cheap human resource which can be used to harness this potential capital intensive sector.

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The Problem of Plenty Versus Quality of Life

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Abstract: *The quality of life of people largely depends upon meaningful development of an economy. A healthy, educated and an empowered population contributes to improved productivity which in turn sustain economic growth. In view of the emerging multi-faceted trends in population in India, population stabilization is the chief issue which the country has to accord top priority in its march towards socio-economic development. The programme of family planning and infant health care programmes are of vital importance to improve the ' quality of life'. In this paper an attempt is made to present a model of small family norm in improving quality of life through social marketing principles.*

Key Words: *Population, Unemployment, Family Planning, Health and Mal-nutrition.*

Introduction

The Decennial Census Report 2011 released by the Home Secretary GK Pillai and Registrar General and Commissioner of Census Dr. C Chandramouli unveils an increase of population of the country at the rate of 17.6 percent, from 1.03 billion to 1.21 billion between 2001 and 2011. It means an addition of 181 million to the country's population. The percentage of population added is lower by 3.90% when compared to the previous census (2001). The population of 1.21 billion is almost equal to the combined population of the US, Indonesia, Brazil, Pakistan, Bangladesh and Japan. On the one hand, in a finite earth, infinite growth is not a logical possibility and on the other, quality of the population poses a real challenge. Half a million young women die from causes related to pregnancy and child birth and more than 14 million children die before reaching the age of five. Around 1.87 lakh children below the age of one died in the country in 2013, with Maharastra and West Bengal topping the list. The figures based on the registration of deaths with

authorities, showed Maharashtra had at least 22,159 deaths of children below the age of one, followed by West Bengal, which had 18992. Uttar Pradesh had 18760 deaths while Karnataka had 15221 followed by Odisha, with 15076. The share of infant deaths in rural area is 33.1 per cent, against 66.9 per cent in Urban areas. Madhyapradesh and Karnataka also top the list of deaths of children aged 1-4 years. While Madhyapradesh had 10714 such deaths, Karnataka had 7357 followed by West Bengal 7191 (Annual Report on Vital Statistics of India based on Civil Registration System 2013).

The most disturbing aspect of 2011 census data by far is the growing imbalance between the sexes in the youngest age group (0-6) which is indicative of female foeticide. In short, the girl child is not wanted and therefore not allowed to be born. The Child Sex Ratio has continuously declined from 976 in 1961 to 914 in 2011. It should certainly be a cause for concern.

A lot has been achieved in economic front since the opening up of economy in 1991. There has been remarkable progress in Manufacturing, Agriculture, Service sector. However, in social sphere much remains to be tackled including poverty, health, malnutrition, unemployment, regulatory inefficiencies, corruption, and bureaucratic red tape etc. The performance of India in the social sector is far from satisfactory and could have been much better. Particularly in rural areas, the levels of education and health are much lower than that of urban areas (Dreze and Sen, 2005). The quality of life of people, particularly, the health of people is not much to be satisfied. The meaningful development of an economy should lead to improvement in quality of human life leading to economic welfare of its people. Ultimately, a healthy, educated and an empowered population contributes to improved productivity which, in turn sustains economic growth. As far as literacy rate is concerned, it has gone up from 64.83 percent in 2001 to 74.04 percent in 2011 showing an increase of 9.21 percentage.

As per the projection, India is going to be the most populated country of the world by the year 2050. It exhibits the rate of growth at 1.6 percent. The world population was 2.52 billion in the year 1950 which increased to 6.06 billion in 2000 and is likely to reach 9.42 billion by the year 2050 if the present rate of increase continues unchecked.

Objectives of the Study

The specific objective of the present paper is to describe and analyse the effect of population growth on social indicator of life and the policies and measures undertaken to contain it. For the conceptual and theoretical framework of the subject under study, various books, refereed journals, periodicals, census reports, NFHS Reports, Economic Survey Reports, WHO reports, UNDP reports on population and development indicators etc. were consulted. Many documents and records have been reviewed during the preparation of this work.

Unemployment Rate

Employment statistics is a key input in understanding quality of life. Burgeoning unemployment is considered as a menace. In a country like India, which adds a million people to its workforce every month and urgently needs to create jobs for them, reliable and timely evidence on jobs can help decision-making in a big way. The country's overall unemployment rate was estimated to be 4.9 percent in 2013-14 and Youth Unemployment Rate in India was 12.90 percent in 2013 according to Labour Bureau of Government of India.

There are various reasons for the increase in unemployment rate. Modern economy is technology driven and not labour-intensive. High volume of high quality goods and services are produced with fewer labour hands. In short, the modern economy is not generating much employment and sometimes it displaces and replaces labour with machines and tools.

Several employment generation programmes have taken root in the country such a Mahatma Gandhi National Rural Employment Guarantee Act, Swarnajayanthi Gram swarojgar Yojana, Swarnajayanthi Shahari Swarojgar Yojana. These are the programmes of poverty alleviation and employment generation. In spite of the introduction of policy measures to contain unemployment, it has not given fruit mainly due to burgeoning population and its uneven reach.

Poverty Figures

The Declaration by International Labour Organisation (ILO) on Poverty specifies that 'Poverty anywhere is a threat to prosperity everywhere'. Poverty is defined in terms of income, expenditure and nutritional value (calorie intake). Social dimension of poverty is a neglected area of study.

Poverty is more of social marginalization of an individual, household or group in the community/society rather than inadequacy of income to fulfill the basic needs (Yesudian, 2007). Indeed, inadequate income is therefore one of the factors of marginalization but not the sole factor. Franklin D. Roosevelt said “the test of our progress is not whether we add more to the abundance of those who have much; it is whether we provide enough for those who have too little”

As per the findings of Tendulkar Committee on poverty, India’s poverty rate is estimated at 37.2 per cent of the total population. It means that 80 million households are below the poverty line. Again, India ranks 67 on the Global Hunger Rate Index 2010, Conducted by the International Food Policy Research Institute among 88 countries. A nation cannot become great when the lives of millions of its citizens are afflicted by poor nutrition, limited by poor learning opportunities and swiveled by gender discrimination.

Many poverty alleviation programmes have been introduced from time to time to empower the poor such as (i) Self-employment programmes (ii) Wage employment programmes (iii) Food security programmes; (iv) Social security programmes (v) Urban poverty alleviation programmes (vi) financial inclusion plans and (vii) Empowerment through micro finance and Promotion Medium and Small Enterprises. However, the fruits of economic growth have not benefited everyone uniformly. Some are left behind and some others are not touched by the benefits of economic growth.

Poverty linked malnutrition lies at the base of diseases like diarrhoea, which claims the lives of 1.5 million babies each year in the country. It also takes its toll in terms of deficiency- thousands of Indian babies go blind annually owing to Vitamin A deficiency. Early child malnutrition is also the single greatest cause of mental and physical retardation. The link between poverty and ill health and poverty are well-established. There are diseases of poverty such as malaria, tuberculosis, diarrhoea and malnutrition. Having fallen ill due to poverty, the poor do not have the resources to seek quality health care, for which he/she has to borrow money for treatment. Indebtedness due to hospitalization leading to poverty has been well documented. Poverty, therefore, is a complex phenomenon of many dimensions not merely the economic dimension. Poverty alleviation programmes should address the issue of poverty from broader social and economic perspectives (Yesudian, 2007).

Health and Malnutrition

The health status of a population is a reflection of the socio-economic development of the country and is shaped by a variety of factors—the level of income and standard of living, housing, sanitation, water supply, education, employment, health consciousness, personal hygiene and by the coverage, availability, accessibility and affordability of health care delivery services. The poor health status is the product of inadequate nutrition, lack of protected water supply and overcrowded and insanitary housing conditions. These conditions lead to deficiency diseases, air borne diseases, and waterborne diseases. The health status of Indians is a cause of grave concern. India accounts for a fifth of the global disease burden, with a 17 per cent of share of the world's population. India lives with many appalling statistics. Both communicable and non-communicable diseases impose an enormous social and economic burden on the people. It affects all age groups but has its greatest impact on productive adults. For instance one single TB case in a family leads to the loss of 2–3 months of income.

Communicable diseases include HIV, TB, malaria, diarrhoea, acute respiratory infections, maternal and perinatal conditions. These accounted for nearly half of India's disease burden. A conservative set of projections suggests that an estimated 3 per cent of people in the age group of 15–49 years, i.e. about 5 crore people, are likely to be HIV-positive by the year 2025; and around 1.5–1.8 crore by 2015. Nearly 40 percent of the Indian population of all ages has *Mycobacterium tuberculosis* infection; and there are about 85 lakh people with TB at any given time. Non communicable Disease accounts for the second largest share, after communicable health conditions, and includes cancers, Cardio Vascular Disease, diabetes, respiratory conditions such as asthma and mental health disorders. Available data suggest that these conditions will account for a fairly sharp increase in India's disease burden in future.

This is one side of the scene. On the flip side about 2.3 crore children upto 6 years of age are suffering from malnourishment and are underweight. As per 2011 census, India has 158.7 million children in the age group of 0–6 years, comprising about 16 percent of the total Indian population. In the period 2008–2013, 43 percent of India's children under five were underweight and 48 percent had stunted growth. Less than half the women in the country are provided any form of support during their pregnancies, deliveries and

lactation, which has a significant impact on child's health and growth during early part of its life. Malnutrition impairs the future of children and in turn, the country. Malnutrition is a drag on the economy, and the root cause is poverty. It costs it dearly in terms of lost productivity, illness and death.

The Ministry of Health, GOI, Central Health Council launched programmes in controlling and eradicating diseases resulting in morbidity and mortality. NRHM (2005) looks into mother and child health, National programmes related to communicable diseases, National programmes related nutrition deficiency, National programmes related to non-communicable diseases etc have been launched and programmes to strengthen women welfare have been launched.

Due to low share of government in total health care expenditure and introduction of user fees in public sector, households have to bear most of the expenses in the event of health shock, which may lead to a fall in consumption expenditure below subsistence level, i.e., to catastrophic OOP health expenditure (Joglekar, 2008). Timely governmental intervention and higher health spending are pre-conditions when the BPL population reports higher morbidity rates than the general population. Moreover, both the real and pecuniary burden would be higher in the case of chronic and long-standing diseases (Ashokan, 2008). India spend just 1% of its GDP on Health which is lesser than many of the counties like Pakistan, Banladesh, the allocations, low as they are, are not well spent, with wrong priorities and corruption taking away much from their utility. Similarly, India trails in health outcomes behind its South Asian neighbours like Srilanka and Bangladesh. Reducing child and maternal mortality, prevention of communicable disease, access to basic and affordable health facilities for even the poorest and availability of specialized attention whenever needed are important requirements of a sound health policy. But the country's record on them is not creditable. Will the specified goals of 12th plan be achieved on health outcomes?

Environment and Economy

With 7.4 percent GDP growth rate, India is considered to be the fastest growing economy in the world. This growing population and a consequent increase in the demand for goods and services puts more strain on the environment. Nature is the sole provider of resources essential for fueling economic activities. The escalating pressure on nature affects on environment

resulting in Air, water, noise pollution. Deforestation due to reckless cutting of forests for industries/ homes have given vent to global warming, decreased biodiversity, soil erosion, reduce rainfall, desertification, flooding, removal of habitats for animal, removal of topsoil etc. This environmental degradation ultimately reduces agricultural yields and food availability, causes famines and diseases and health problems and long term livelihood impact on people. Pollution thus is a major challenge for India.

EP Act authorises Central Govt. "To take all such measures as it deems necessary for the purpose of protecting and improving the quality of environment and preventing, controlling and abating environmental pollution"

Slum and Housing

A Slum, for the purpose of Census, has been defined as residential areas where dwellings are unfit for human habitation by reasons of dilapidation, overcrowding, faulty arrangements and design of such buildings, narrowness or faulty arrangement of street, lack of ventilation, light, or sanitation facilities or any combination of these factors which are detrimental to the safety and health.

There are three kinds of Slums: Notified, Recognised and Identified slums. Accordingly, there are 49.65 lakh Notified Households, 37.96 lakh households in recognized category and 49.88 lakh household in identified category. In all 137.49 lakh households are slums in India according to 2011 Census data. About 17.4 percent urban households live in slums. Out of that 19 percent do not have bathing facility and 34 percent had no latrine within their premise. As a result 18.9 per cent do open defaecation. As per the report of Pranab Sen Committee constituted to look into slum population, the country's slum population had grown by 17.8 million people in the last decade. The committee projected the slum population in 2011 at 93.06 million, up from 75.26 million in 2001 as per new definition. In addition to shortage in housing, slum is faced with the problem of inadequate civic services. They are deprived of basic facilities such as water, sanitation, health, electricity etc. Disease morbidity and mortality is high due to poverty, poor nutrition and poor education. These children are more exposed to drug abuse, child labour and sexual exploitation.

Almost all Central and State government schemes, including Kanshi Ram Shahari Garib Awasiya Yojana (KRSGAY) and Basic Services for Urban Poor (BSUY), launched for the welfare of slum-dwellers have come to a

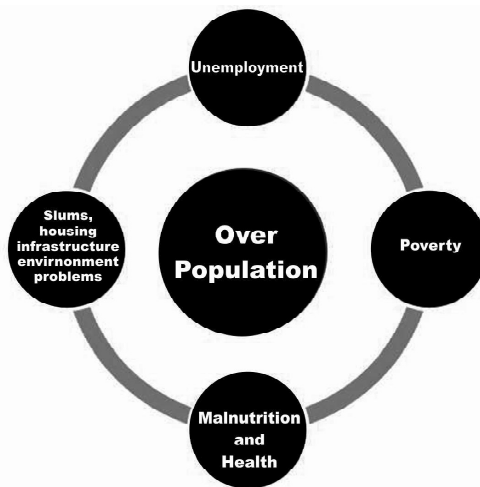
naught due to lack of unambiguous eligibility criteria. Indira Awas Yojana (IAY) intends to assist certain vulnerable target groups in housing activities. It is necessary to create low cost houses to slum dwellers and to undertake slum sanitization programme, slum adoption programme for solid waste management and roads and infrastructure and health and education facilities to be provided.

Infrastructure Development

Infrastructure is the engine for sustainable economic development. Infrastructure refers to the fundamental facilities and systems serving a country, city, or area including the services and facilities necessary for its economy to function. It typically characterises technical structures such as roads, bridges, tunnels, water supply, sewer, electrical grids telecommunications, schools and so forth, and can be defined as “the physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance societal living conditions.

For any country, its infrastructure is a matter of pride. The 12th Five Year Plan (2012-17) proposes to spend huge sums for infrastructure development. As a result there is phenomenal change in this respect.

Fig.1: Vicious Cycle of the Problem of Plenty



Over population is linked with unemployment, causing poverty, malnutrition, health problems, more slums and housing problems, poor infrastructure development, reckless use of nature causing ecological imbalance and so on. This list is not conclusive; only an indicator of few of the larger gamut of problems resulting in deterioration in quality of life of people. The only way out is to stabilise population and bring about economic development. Family Planning and Family Welfare Programmes as the Principal Instrument of Stabilisation of Number Magic.

Population and socio-economic development are inter-related. Changes in population size and structure affect various economic and social factors relating to income, health, education and employment. United Nations Economic, Social and Cultural organisation (UNESCO) has included the population policy “measures and programmes designed to contribute to the achievement of economic, social, political and other collective goals affecting critical demographic variables, namely, the size and growth of the population, its geographic distribution (national and international) and its collective characteristics”. The population policy is not a matter of birth control alone. The focus is on promoting human development and all-round progressive social change. A population policy is a deliberate attempt to spell out the basic objectives and the means to achieve an optimum rate of growth of population by controlling the size and composition of human resources so as to contribute positively to economic development.

‘Family planning’ is a constituent of population policy. Family planning is planning of the family, by the family and for the family. By family planning or Planned Parenthood is meant conscious family limitation or spacing of children. It means children by choice and not by chance, by design, not by default. It requires the adoption of certain suitable methods of birth control (Ghosh, 1993). Family planning can promote women’s health through the prevention of unwanted pregnancies, limiting number of births, proper spacing, timing of births and foetal health. Family planning also promotes the health of the child through the reduction of child mortality and promotion of child development.

In view of the emerging multi-faceted trends in population in India, population stabilisation should be the chief issue which the country has to accord top priority in its march towards socio-economic development. The programme

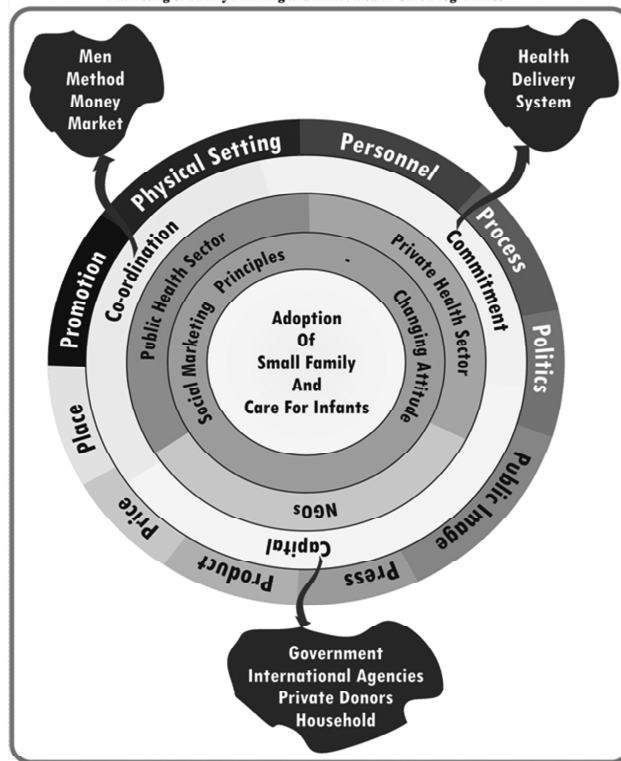
of family planning and infant health care programmes are of vital importance for the country to improve the 'quality of life' of individuals and community as a whole. "Uncontrolled fertility directly threatens the health of mothers and infants and may undermine the health of other family members. Today, no health programme can be considered complete unless it offers ready access to the appropriate family planning measures for all potential parents" (Fullam, 1984).

Citing example of Kerala, Nobel laureate Amartya Sen proposes in favour of Condorcetian approach implying primarily promotion of female education and primary health care for population control. He outrightly rejects any disincentive or coercion as "the first worst solution". However, Ramakrishna Hegde, ex-Chief Minister of Karnataka, clearly warned that the issue of population explosion is extremely grave, urgent and complicated and what is needed is combination of co-operation, incentives and disincentives to check India's population growth (Sahay, 1996). Stringent penalty imposed on China for having more than one child policy is giving results now with the increase in grey population and lesser number of productive youths. Some parents, with their traditional preference for male heirs, have used abortion and infanticide to ensure they have a son, and the ratio is 117 boys born for every 100 girls. By 2020, China will have an estimated 30 million bachelors- a situation so dire that one economist has proposed that a wife has multiple husbands. The one child policy had a greater impact on social development in China. In spite of lifting the One child policy in china it is not giving results. So for a democratic country like India, Social marketing principles are relevant. Family planning and family welfare through modification is the mind set is the only way out. Marketing Family Planning and Welfare programmes in India is need of the hour.

A model for bringing small family norm in improving the quality of life is envisaged through social marketing principles in this study. As clearly depicted in figure 1, successful social marketing efforts is governed by the inseparable and interlinked circles. In the outer most circle of the diagram, 10 Ps are represented for the implementation of successful social marketing efforts- product, price, place, promotion, physical setting, personnel, process, politics, public image, and press. In the next inner circle, the requirement of 3 Cs-co-ordination, commitment, and capital contents are presented as a support for the above marketing efforts. In the next inner circle the implementing

agencies are depicted. Family planning and infant health care programmes are not the programme of public health delivery system alone. In the next inner circle social marketing efforts to change the attitude, behavior and adoption of a practice with or without a tangible product base is highlighted. Finally the inner most circle depicts the ultimate goal of small family and healthy family. A healthy family can be productive and contribute for development.

Fig.2: Model Advocated for a Small Family and Healthy Family



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