"CANCER CERVIX SCREENING AMONG WOMEN AGED 30-60YEARS IN DEVARAYASAMUDRA PRIMARY HEALTH CENTRE AREA IN KOLAR DISTRICT"

By

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DISSERTATION SUBMITTED TO THE SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH, KOLAR, KARNATAKA

In partial fulfillment of the requirements for the degree of

DOCTOR OF MEDICINE

IN

COMMUNITY MEDICINE

Under the Guidance of

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OCTOBER 2014

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ACKNOWLEDGEMENT

I express my sincere gratitude to the **Almighty God** for his Blessings.

I express my deep sense of gratitude and sincere thanks to my guide and mentor **Dr.Ranganath B G**, Professor, Department of Community Medicine, Sri Devaraj Urs Medical College, Kolar for his encouragement and guidance for a successful completion by his constant support and advice.

I owe my profound gratitude to my Professor & HOD **Dr. Muninarayana C** for his encouragement, guidance and support.

I convey my deepest regards to my Co guides **Dr Vidyavathi K, Dr.Aparna Narasimha**, Associate Professors, Department of Pathology, for their support and assistance in reporting Pap smears and **Dr. Munikrishna M,** Professor, Department of Obstetrics and Gynaecology for his support and training me in collecting Pap smears and VIA.

I convey my deepest regards to **Dr. Rajkumar R** Professor of Community Medicine, Meenakshi Medical College, Kancheepuram for his guidance and encouragement throughout the study, his excellence in this field was an inspiration for this study.

I thank **Dr. Prasanna Kamath , Dr.Anil N S, Dr. Deepa L N, Dr. Shilu M, Dr.Anuradha Subramani, Mr. Ravishankar S, Dr. Mahesh V, Dr. Ananta Bhattacharya, Dr. Naresh, Dr. Deepthi Kiran** faculty in Department of Community Medicine for their guidance, encouragement and support.

I thank my Co PG's **Dr Shruthi, Dr Achal Shetty, Dr Ananyalakshmi, Dr.Manjunath, Dr Sunil** for their co operation. I thank the Medico social workers, the non-teaching staff of Department of Community Medicine for their support.

I thank all the Women who participated in this study and I also thank the staff of Devarayasamudra PHC, ASHA's and Interns without whom this would not have happened.

I thank **Indian Council of Medical Research (ICMR)** for the financial assistance. (No.3/2/2012-13/PG- thesis-HRD-9)

I am infinitely obliged to my Parents, family, friends and I am very grateful to my husband **Dr Pramod T &** daughter **Kundana** for their support

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LIST OF ABBREVIATIONS

APL	–	Above Poverty Line
ASCCP	–	American Society for Colposcopy and Cervical Pathology
ASCUS	–	Atypical Squamous Cells of Undermined Significance
ASHA	–	Accredited Social Health Activist
BMI	–	Body Mass Index
BPL	–	Below Poverty Line
CHC	–	Community Health Centre
CIN	–	Cervical Intraepithelial Neoplasia
DALY	–	Disability Adjusted Life Year
DLHS	–	District Level Health Survey
HPV	–	Human Papilloma Virus
HSIL	–	High grade Squamous Intraepithelial Lesion
IARC	–	International Agency for Research on Cancer
ICC	–	Invasive Cervical Cancer
ICMR	–	Indian Council of Medical Research
IEC	–	Information, Education, Communication
IMR	–	Infant Mortality Rate
ISC	–	In Situ Carcinoma
LBW	–	Low Birth Weight
LEEP	–	Loop Electrosurgical Excision Procedure
LSIL	–	Low grade Squamous Intraepithelial Lesion
MMR	–	Maternal Mortality Rate
NCCP	–	National Cancer Control Programme

NCD	–	Non Communicable Disease
NGO	–	Non Government Organization
NPCDCS	–	National Programme for Control of Cancer, Diabetes, Cardiovascular diseases and Stroke
OBC	–	Other Backward Class
OBG	–	Obstetrics and Gynaecology
OCP	–	Oral Contraceptive Pill
PCR	–	Polymerase Chain Reaction
PHC	–	Primary Health Centre
RHTC	–	Rural Health Training Centre
RTI	–	Reproductive Tract Infection
SC	–	Scheduled Caste
SCC	–	Squamous Cell Carcinoma
SCJ	–	Squamo Columnar Junction
SEAR	–	South East Asian Region
SES	–	Socio Economic Status
SHG	–	Self Help Group
ST	–	Scheduled Tribe
STI	-	Sexually Transmitted Infection
TCC	–	Tertiary Cancer Centre
UIP	–	Universal Immunization Programme
VIA	–	Visual Inspection with Acetic acid
VIAM	–	Visual Inspection with Acetic acid under Magnification
VILI	–	Visual Inspection with Lugol's Iodine
WHO	–	World Health Organization

ABSTRACT

Background:

Over 80% of the global cervical cancer cases occur in the developing countries and accounts for 15% of female cancers. Though HPV infection is the cause for cervical cancer many social and reproductive risk factors are associated with the entry of the virus. Organized cervical cancer screening program is carried out in developed countries which has led to decline in the burden of cervical cancer. No such community based screening program is undertaken in the country in spite of existence of National cancer control program. Efforts are made by few workers to plan and implement innovative cancer cervix screening and treatment programs. Opportunities exist to provide cancer cervix screening and treatment services through medical colleges to accessible rural and urban communities in association with community based primary health care workers.

Objectives:

1. To study the prevalence of pre cancerous cervical lesions in women aged 30-60 years in rural Kolar.
2. To study the prevalence of socio-demographic and reproductive health related risk factors of cancer cervix.
3. To study the factors associated with utilization of cancer cervix screening services by the women in rural Kolar.

Material and methods:

This study was undertaken in the six rural communities under Devarayasamudra primary health centre (PHC) area which is administered and managed by Sri Devaraj Urs Medical College, Kolar under a public private partnership model with government of Karnataka. Out of the 475 women aged 30-60 years who were enumerated in these communities, 413 women were interviewed using a structured questionnaire to assess their social and reproductive risk factors of cancer cervix and were then invited to attend cancer cervix screening in the PHC on designated dates. Screening was done by using VIA and Pap smear methods. Screen positive women were advised to attend the medical college hospital for further management. The

socio demographic and reproductive risk factors influencing the utilization of cancer cervix screening services was analyzed. Statistical analysis was performed using open epi software. Univariate and multivariate analysis was performed to identify predictors of women's participation to community based cervical cancer screening clinic. Odds ratio was calculated at 95% confidence interval and 'P' value of <0.05 was considered as statistically significant.

Results

The mean age of the women in the age group of 30-60 yrs surveyed was 39.8±9.2 yrs. It was observed that 83.6% of the women invited for cancer cervix screening clinic were married before 18 yrs of age, 76.6% of them belonged to below poverty line (BPL) category, 27.6% were illiterate, 52.7% of the women belonged to scheduled castes (SC) and scheduled tribes (ST) category and 39.7% belonged to other backward communities (OBC) category. Nearly 47.3% of the surveyed women had more than two live births. Multivariate analysis done to analyse the predictors of women's participation in cancer cervix screening clinics showed that education, caste, socioeconomic status, age at marriage, parity and history of vaginal discharge were independent factors for utilization of cancer cervix screening services and were statistically significant at 95% CI. Among the 300 women screened 30(10%) had cervical pre cancer detected by VIA and Pap smear methods.

Summary and conclusion

This study was conducted on women aged 30-60 years in rural Kolar to find the prevalence of cervical pre cancer and to assess their participation in cervical cancer screening services provided by a rural based medical college in association with community based primary health care workers. This model can be used to provide cancer cervix screening and treatment services to the communities accessible to medical colleges at district level. Since no organized community based cervical cancer screening program is been carried out a participation rate of 72.6% for the screening clinic services by the invited rural women can be considered as satisfactory. This approach of cancer cervix screening and treatment involving medical college, community based primary health care workers and other community stake holders can be carried out in different settings to reduce the burden of cancer cervix among Indian women.

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INTRODUCTION

The estimated global burden for new cases of uterine cervical cancer is 5,28,000 and deaths is 2,66,000 each year accounting to 7.9% of all new cancer cases and 7.5% of all female cancer deaths.[1] Globally cervical cancer is the fourth most common cancer in women after breast, colorectal and lung cancer and in the WHO south east Asian region (SEAR) it is the second most common cancer after breast cancer.[2] The estimated new cases of cancer of cervix in India is 1,22,844 of deaths is 67,477 and accounts for 22.9% of new cancer cases and 23.3% of all cancer deaths in women.[2] Over 80% of cervical cancer cases occur in the developing world, where it accounts for 15% of female cancers compared to 3.6% of cancers in the developed world. The highest incidence rates of cervical cancer are observed in sub Saharan Africa, Latin America and south East Asia. The age standardised incidence rates (ASIRs) for cancer of the cervix in these countries with cancer registries show a very wide range from less than 15 per 1 lakh in Europe and North America to around 30 per 1 lakh in sub Saharan Africa.[3]

Genital human Papilloma virus (HPV) infection which is sexually transmitted has been detected in virtually all cervical cancer tumours tested worldwide. Though most HPV genital infections will not progress to cervical intra epithelial neoplasia (CIN), the highest risks for cancer cervix are associated with HPV types 16 and 18.[4,5] Many risk factors for HPV genital infections have been suggested. The age at first intercourse, number of lifetime sexual partners, age at first child birth, history of previous miscarriage, cigaratte smoking, poor genital hygiene, co infection with other

reproductive tract infections, long term use of oral contraceptive pills and family history of cancer cervix are some of the risk factors.[6-10]

The incidence of cervical cancer varies dramatically among regions of the world and among different socio-demographic groups of women within a given region. Women who have access to screening programs have much lower rates of cervical cancer than women who do not have such access.[3] The incidence of cervical cancer has declined by 70-90% in the developed countries and has been attributed to well established cancer cervix screening programs.[11,12,] Apart from the availability of pap smear as a screening test modality, effective screening strategies, availability of facilities for diagnostic follow up and prompt treatment of detected lesions are attributed to a reduction in cancer cervix burden in these countries.[13] In developing countries the access to screening services for detection of cervical cancer are often not existent or limited and contributes for the higher incidence and mortality due to cancer cervix in women.[14,15]

Cancer cervix screening in developing countries is mainly opportunistic, characterised by an estimated low coverage, over screening of women with access to health care services and an absence of quality control procedures.[16] The use of pap smear as a screening approach in developing countries has been found to be difficult due to lack of trained cytotechnologists, cytology laboratories and inefficient health systems.[11] Hence alternative practicable screening methods for cervical cancer like VIA and VILI have been studied and advocated in low resource settings. A strong relation is observed between initiation of screening program and reduction in mortality from cervical cancer from different approaches.[16,17] Research by alliance for

cervical cancer prevention (ACCP) has shown that in most situations screening women at least once in their lifetime between ages 30-40 results in the greatest health impact and cost effectiveness.[18]

Studies on utilization of cancer cervix screening programs in India are sparse. Various approaches involving personal invitation, appropriate communication strategies, proximity of screening clinics to the community of the target women and screening and treating women in the same session has met with various degree of success.[19,20] Sankaranarayanan and coworkers in a cluster randomized controlled trial conducted in Tamil Nadu on women in high risk group for cervical cancer found that a single round of VIA method followed by treatment reduced the burden of cervical cancer in the study population in a cost-effective manner. They suggested that screening by VIA method which is supported by sustained training should be established in routine health services in India in view of high burden of cancer cervix.[20]

There is no organized screening program for cancer cervix in the country. Hence a large proportion of women with cancer of the cervix present in advanced stages of cancer.[11] In the absence of screening program, nearly 70% of cervical cancer affected women presents in stage 3 and 4.[21] Detection of precancerous lesions (CIN) leads to virtual cure with the use of current methods of treatment.[22] Cervical cancer is unique from a public health and epidemiological perspective. In contrast to most other cancers cervical cancer can be prevented through screening programs designed to identify and treat precancerous lesions. As cervical cancer is one of the most common cancers among women in the developing countries, substantial measures must be

undertaken to address the situation.[23] Most women are unaware of cervical cancer and do not have access to the appropriate screening tests and treatment.[24] It is also well recognized that in developing countries where programs for cancer cervix prevention exists, there is a failure to meet the objectives due to financial, logistical and social problems.[11,25] It is suggested to achieve adequate coverage of cancer cervix screening with socially and culturally appropriate strategies in developing countries.[13,26] There is a need for increasing the attendance of women to cancer cervix screening programs in the existing low resource settings in a cost-effective way. Opportunities for providing cancer cervix screening and treatment services through the medical colleges which usually has diagnostic and treatment facilities can be utilised. Considering the union government plan to start medical colleges in each of the 626 districts of the country.[27] There is a scope to initiate cancer cervix screening and treatment programs in the communities accessible to these medical colleges to increase cancer cervix screening coverage.

Hence this study to find the prevalence of cervical precancer and risk factors which are associated to cancer of the cervix was undertaken in the rural primary health centre area attached to Sri Devaraj Urs Medical College in Kolar. Also the utilisation of a community based cancer cervix screening program by the women from the community, which was organised with the logistics and financial support from the medical college and social support from the community was studied.

OBJECTIVES

1. To study the prevalence of cervical precancer in women aged 30 – 60 years in rural Kolar.

2. To study the prevalence of socio- demographic and reproductive health related risk factors for cancer cervix.

3. To study the factors associated with utilization of cancer cervix screening program/services by the women in rural Kolar.

REVIEW OF LITERATURE

Global Burden of cancer of cervix[1,2]

The occurance of cancers and cancer related deaths is increasing globally. GLOBOCAN 2012, estimated 14.1 million new cancer cases and 8.2 million cancer-related deaths in 2012, compared to 12.7 million and 7.6 million, respectively, in 2008. Globally Cervical cancer is the fourth most common cancer in women after Breast, Colorectal and lung cancer. The worldwide estimates for cancer cervix are 5,28,000(7.9%) new cases, 2,66,000(7.5%) deaths and 5 year prevalence of 15,47,161(9%) accounting for 7.5% of all female cancer deaths. The estimated age standardized incidence rates (ASIRs) are 14/ 1,00,000 and Age standardized mortality rates are 6.8/1,00,000 for cancer of the cervix. Cervical cancer is the second most common cancer among women in WHO South east Asia Region after Breast Cancer, with an estimated incidence of 1,75,229(19.3%), 94,294(17%) deaths and 5 year prevalence of 4,65,485(22.8%) in 2012. The estimated Age standardised incidence rates were 20.5/1,00,000 and Age standardized mortality rates were 11.3/1,00,000. Majority of the deaths (87%) and nearly 70% of the cervical cancer burden globally is reported from the underdeveloped and developing nations. Almost nine out of ten (87%) cervical cancer deaths occur in the less developed regions. The widespread availability of cervical cancer screening services in the industrialized nations has contributed to decline of cancer cervix in these countries. Around 6.6/1,00,000 cervical cancer cases and 2.5/1,00,000 deaths are reported in North America. Disability adjusted life years (DALY) due to cervical cancer among women is 37,19,000.[28] The 5 year survival rate is virtually 100 percent for carcinoma in situ, 79 percent for local invasive disease and 45 percent for regional invasive disease.[29] Cancer cervix is difficult to cure once symptoms develop and is fatal if left untreated.

Prognosis is strongly dependent upon the stage of disease at detection and treatment. Data from the cancer registries indicate that more than 75% of cervical cancers develop in women above the age of 35 years.[30]

Fig 1: Worldwide estimate of cervical cancer mortality in 2012[2]

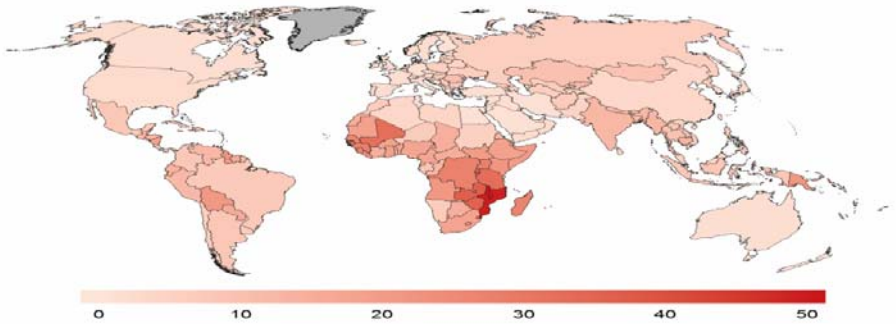
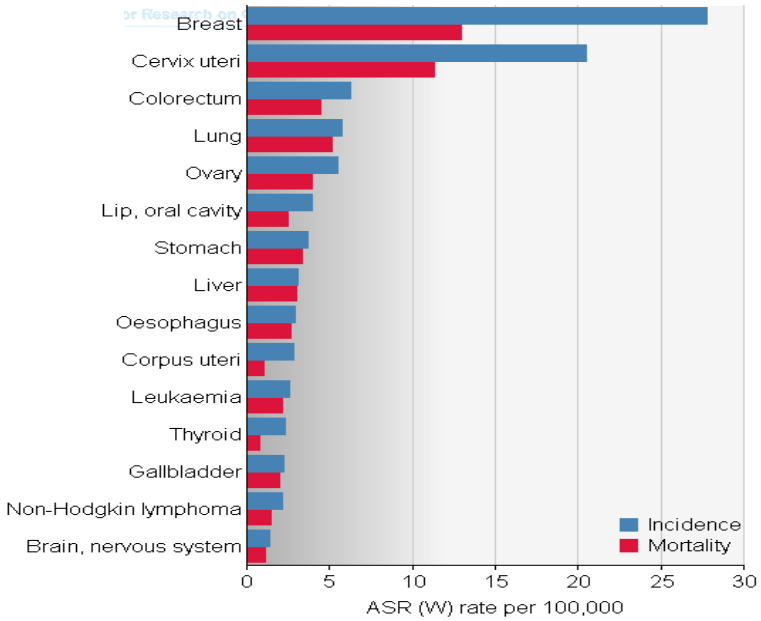


Fig 2: Estimated Age standardised incidence and Mortality rates among women in WHO SEAR region[2]



Burden in India:[1,2]

Cancer of the cervix is the second leading cancer among Indian women followed by cancers of Breast. Globocan 2012 estimates 1,22,844 (22.9%) new cases, 67,477(20.7%) deaths and 5 year prevalence of 3,03,901(27.4%) due to cervical cancer in India which accounts for 23.3 per cent of all cancer deaths in women. The estimated Age standardized incidence rate is 22/100,000 and Age standardized mortality rate is 12.4/1,00,000 women due to cervical cancer . DALY's due to cervical cancer among Indian women is 9,87,000.

Fig 3 : Incidence and mortality among Indian women due to cancer.[2]

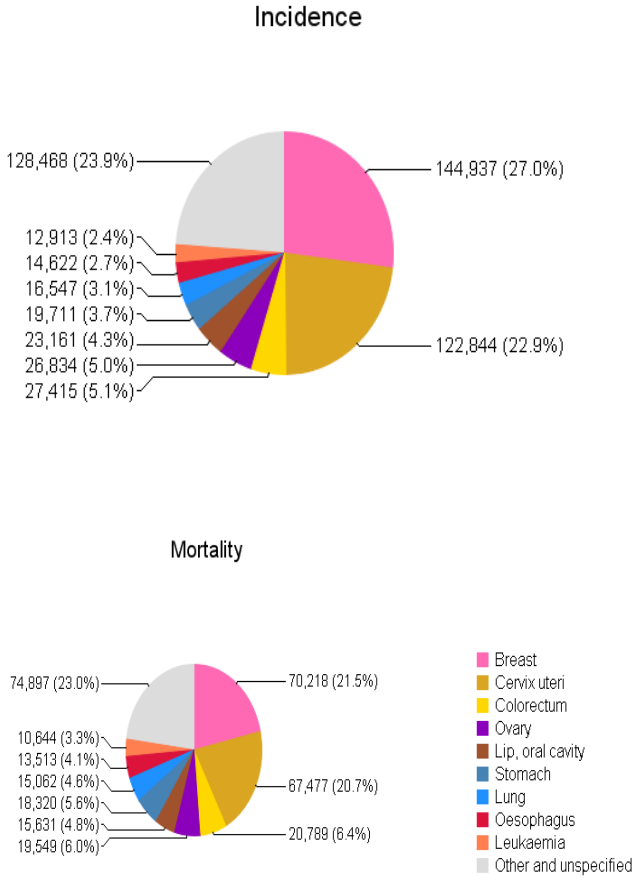


Fig 4 : Estimated age standardized incidence and mortality rates among women in India.[2]

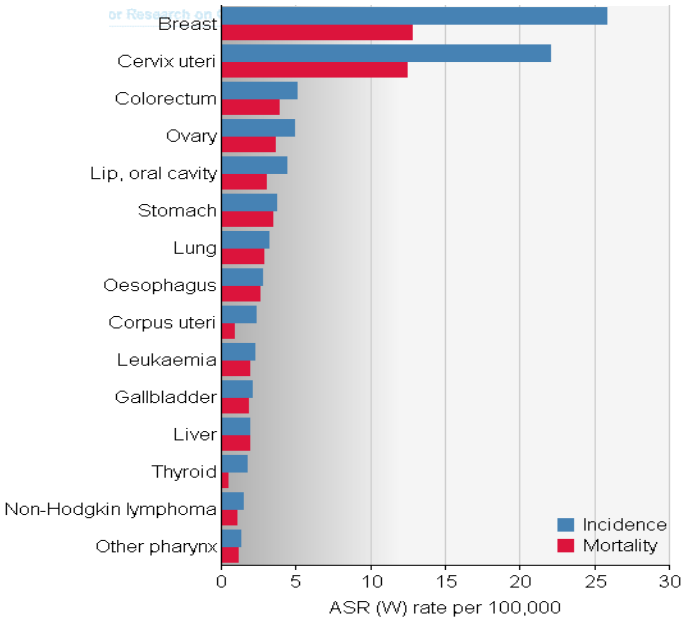
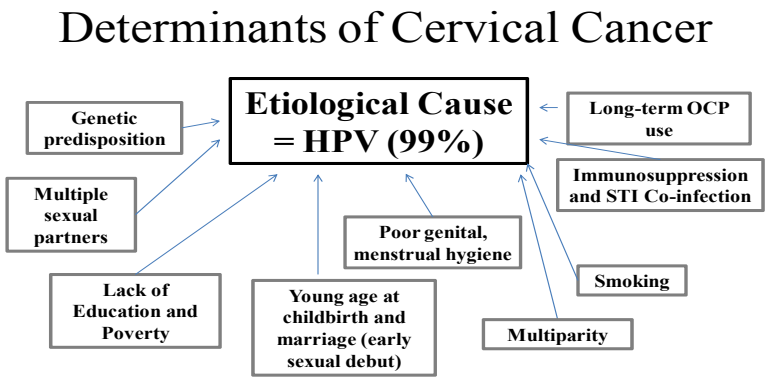


Fig 5 :Risk factors for cancer cervix:



1. HPV infection:

Members of the HPV family have been detected in cervical tumours worldwide with studies showing the presence of HPV in virtually all cervical tumours tested. The highest risks are associated with HPV types 16 and 18. It is known that most HPV infections will not progress to cervical intraepithelial neoplasia (CIN) . However, it is believed that cervical cancer will not develop without the presence of persistent HPV DNA and it has been proposed as the first ever identified "necessary cause" of a human cancer.[4] Genital HPV is generally sexually transmitted through contact with infected cervical, vaginal, vulvar, penile or anal epithelium. It is proposed that genital HPV infection may involve areas that are not easily covered by a condom so correct condom use may not protect against infection. An analysis of studies on the prevalence of HPV infection in population based studies has led to the conclusions that HPV is more common in younger women than older women, that HPV is rarely detected in women with no previous sexual activity and that there are no apparent geographical differences in HPV prevalence. The percentage of the study populations who were HPV positive varied from 0% to 48% depending on the group studied. Results also show that HPV 16 infection is more common than any other classified type of HPV.[31] Risk factors for HPV infection include number of sexual partners, a relatively recent new sexual relationship and a history of previous miscarriage. A study has shown that the main risk factors for CIN 3 among HPV positive women are early age at first intercourse, long duration of the most recent sexual relationship and cigarette smoking.[32] Smoking acts a risk factor among women by causing immunosuppression (increased HPV infection), it is also linked to inactivation of tumor suppressor gene in cervical tumors and in turn increases the risk. Suggested co-factors for cervical cancer include age at first intercourse, number of life-time

partners, co-infection with herpes simplex virus-2 or chlamydia trachomatis, parity, age at first child birth, oral contraceptive use and family history of cancer cervix.[33] Long term usage of Oral contraceptive pills (5 yrs or more) and use of OCP's high in estrogen increases the risk of cervical cancer.[34] Women with a family history of cervical cancer has 2-3 times higher risk of developing cervical cancer. There is a genetic predisposition among some individuals that may decrease ability of individual to resist HPV infection. Cancer cervix affects relatively young women with incidence increasing rapidly from the age of 25 to 45, then leveling off and finally declining.[8,9] Past or present occurance of clinical genital warts has been found to be an important risk factor.[10] Cancer cervix is high among lower socio economic groups and women with lack of education, reflecting probably poor genital hygiene.[10] Poor genital / menstrual hygiene increases the risk of HPV infection, increased risk of other vaginal tract infections also increases risk of HPV infection.

Fig 6 : Natural history of cervical cancer

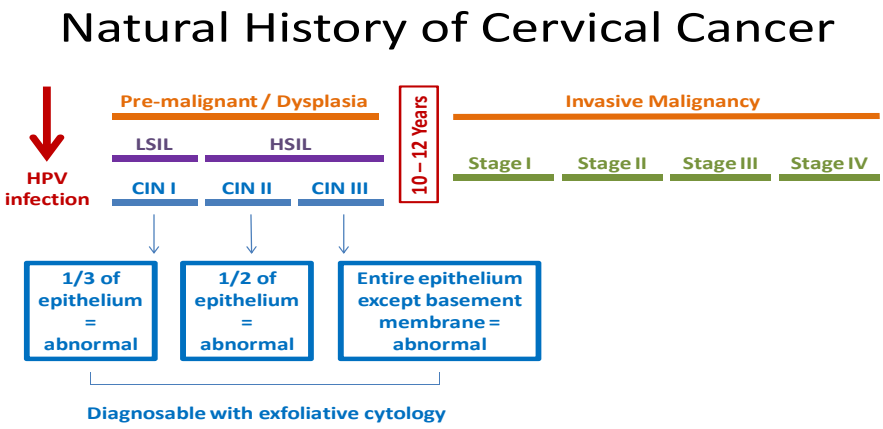
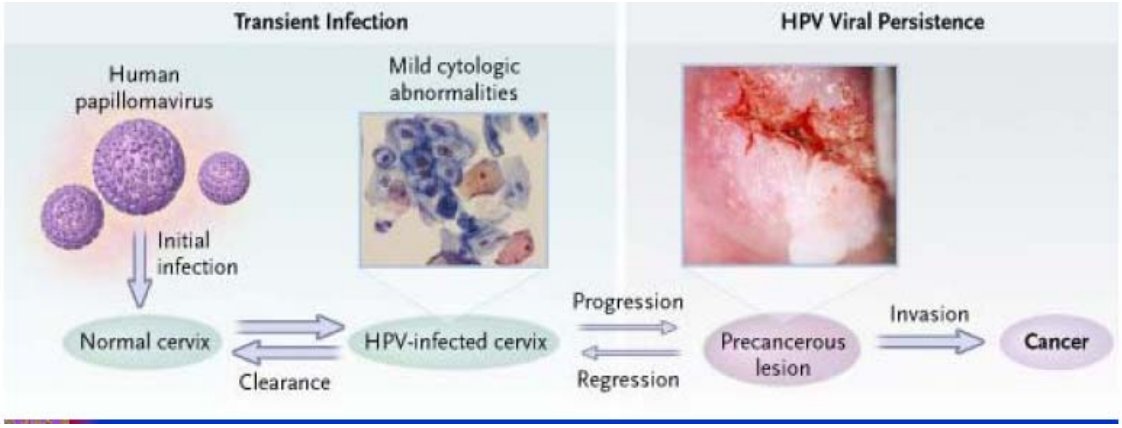


Fig 7: Natural history of HPV infection and cervical cancer



The natural history of Cancer cervix provides an opportunity for a highly effective screening. Multiple studies show that the mean duration of an HPV infection is 4-10 months and longer if the HPV is oncogenic (16, 18, 31, 45). Persistent HPV infection is a requirement for induction of pre-malignant state. Persistent infection allows HPV proteins E6 and E7 to inactivate p53 and pRB genes. Most CIN I, may spontaneously regress: 90% within 2 years. According to American Society for Colposcopy and Cervical Pathology (ASCCP), CIN II and CIN III have a 30% - 50% progression to invasive cancer and are considered to be true pre-malignant lesions. The progression takes years and gives good opportunity to screen women.[35]

Screening guidelines for cancer cervix: Studies in developing countries indicate that average age of women with CIN III was between 35 to 44 years. The age defines a high risk group relevant for the screening activities and providing health care facilities.

Table 1: Cervical cancer incidence by age group[36]

Age	Rate per one lakh
0 – 19	0.1
20 – 29	4.5
30-39	13.9
40-49	16.5
50-64	15.4
65 +	14.6

The new ASCCP (American Society for Colposcopy and Cervical Pathology) guidelines for cervical cancer screening:[37]

Screening should begin at age 21 onwards, done once every 3 yrs upto 30 yrs of age.

Women < 21 yrs should not be screened regardless of age of sexual onset.

Screening of women(30-64 yr) by cytology once in every 3 yrs and by cytology + HPV testing once in every 5 yrs.

Screening can be stopped at age 65 with previous 3 negative Pap smears.

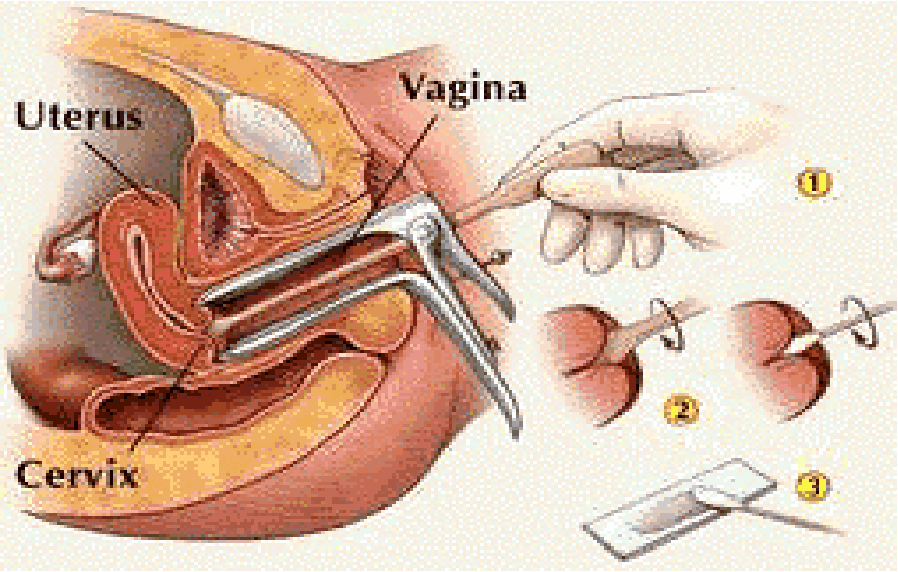
Screening Methods for cancer cervix:

Pap smear as the traditional screening test for cancer cervix and has been most widely used since the middle of the twentieth century in developed countries and in those developing countries where screening was available. The effective use of this screening method among the developed countries is attributed as the major reason in reducing the incidence of cancer cervix. However underdeveloped and developing countries have no organized cervical cytology screening programmes. Control of cervical cancer by early detection and treatment is one of the priorities of the NCCP of India. National consultations on cervical cancer control have concurred that

cytology based screening programmes are not feasible in India for many years to come in view of technical, financial and manpower constraints.[38] In this context approaches based on visual inspection, as potential alternatives to cervical cytology have received great attention. VIA and VILI have been widely demonstrated to be as effective as Pap smear in detecting cervical cancer lesions by minimally trained primary health care providers.[39]

Cervical cytology:[40] Pap smear detects abnormal cells in a sample taken from the cervix. It involves performing a speculum examination to expose the cervix and the os, and collecting cervical cells using a wooden or plastic spatula, or brush and then smearing and fixing on a glass microscope slide.

Fig 8: Collection of Pap smear from the squamocolumnar junction and smearing it onto a glass slide.



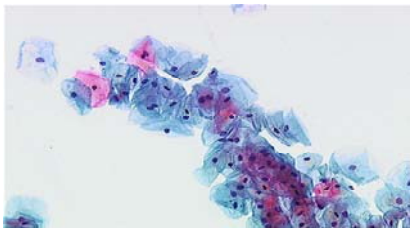
Well-organized and implemented cytology based screening programs that screen women at regular intervals have been associated with measurable reductions in

cervical cancer incidence and mortality when screening coverage and the treatment rate of women with abnormal findings are high. Cytology based programs can be implemented effectively only if infrastructure and laboratory quality assurance requirements are consistently met. Sensitivity of test is 47 – 62% and specificity of test is 60- 95 % consistently which is not high. Cytology has been assessed over the last 50years in a wide range of settings in both developed and developing countries.

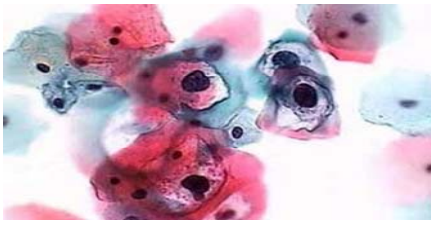
Fig 9: Microscopic findings of normal and abnormal Pap smear.

The characteristics of a positive Pap smear are abnormal cells with

- Increased nuclear:cytoplasm ratio
- Hyperchromic nuclei
- Irregular nuclear membranes



Normal



Abnormal

Table 2: Classification of Dysplasia[41]

Cytological Classification (Used for Screening)		**Histological classification (Used for diagnosis)**	
Papaniculaou classification	**Bethesda system**	**CIN**	**WHO descriptive classification**
Class I- Negative	Normal	Normal	Normal
Class II- Negative	ASCUS, AGUS	Atypia	Atypia
	LSIL	CIN including flat condyloma	Koilocytosis
Class III- Suspicious	HSIL	CIN 2	Moderate dysplasia
	HSIL	CIN 3	Severe dysplasia
Class IV- Positive	HSIL	CIN 3	Carcinoma in situ
Class V- Positive	Invasive carcinoma	Invasive carcinoma	Invasive carcinoma

CIN - Cervical Intraepithelial Neoplasia [42]

The earlier terminology was dysplasia and carcinoma in situ. Richart recommended use of term Cervical intraepithelial neoplasia(CIN) to replace carcinoma in situ. CIN grades 1,2,3 in which the artificial distinction between severe dysplasia and CIN is avoided by including them both in CIN3.

Bethesda terminology system [43]

ASCUS - Atypical Squamous cells of Undermined significance

AGUS - Atypical glandular cells of Undermined significance

LSIL - Low-grade Squamous Intraepithelial Lesion

HSIL - High-grade Squamous Intraepithelial Lesion

Invasive Carcinoma

Staging of cancer cervix: (FIGO staging)

Stage I: Within cervix (microscopically confirmed)

Stage II: Beyond uterus, but not to pelvic wall or lower 1/3 of vagina

Stage III: Extends to pelvic wall and/or lower 1/3 of vagina and/or involves kidney

Stage IV: Beyond true pelvis, involves bladder or rectum mucosa.

Screening using visual inspection methods:

Screening for cancer cervix using Pap smear requires resources of laboratories, equipments and trained personnels. Alternative more cost effective screening methods has been identified. Visual inspection based screening tests such as Downstaging , Visual inspection with 5% acetic acid(VIA), VIA with magnification(VIAM), and Visual inspection post application of Lugol's iodine(VILI) are some of the alternative screening tests, which have been studied . Sensitivity of VIA tends to be similar to cytology based screening and is easy to carry out and easy to train appropriate health workers. These tests are followed by a single visit approach for further investigation and management .[27]

Down staging:

It has been defined as "the detection of the disease in an earlier stage when still curable, by nurses and other non-medical health workers using a speculum for visual inspection of the cervix." Downstaging was advocated for evaluation in areas where cytology screening would not be possible and where the majority of cases of carcinoma of the cervix are diagnosed in advanced stages. A pooled analysis of data from six studies in India indicates a sensitivity of 75.5% and a specificity of 82% to detect invasive cancer.[44] In many low resource countries with a high incidence of

cervical cancer, where a low technology test might be considered for screening, facilities for treating invasive cancer are inadequate. An early detection with a potential to detect high grade cervical cancer precursors is advisable. 'Downstaging' is not considered as a promising or experimental early detection approach in the most recent WHO document on national cancer control programmes.[45]

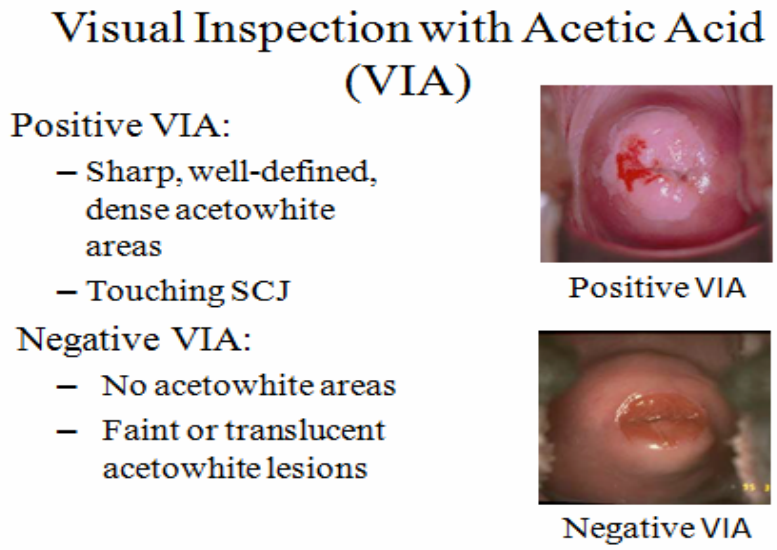
Visual inspection with acetic acid (VIA):[46]

VIA involves gentle application of 5 % acetic acid around the transformation zone of the cervix using a cotton swab. After 1-2 min naked eye evaluation will be performed under 100 watt illumination. **Positive** VIA means a dense acetowhite lesion observed within the transformation zone. **Negative** VIA means if no acetowhite lesions are observed on the cervix, polyps protruding from the cervix , nabothian cysts which appear as button like whitish area and dot like areas present in the endocervix which are due to grape like columnar epithelium staining with acetic acid . VIA ias also negative if lesins are shiny pinkish white, faint patchy or doubtful lesions with ill defined, indefinite margins or irregular, acetowhite lesions resembling geographical lesions away from squamocolumnar junction.

Inconclusive test : No distinct acetowhite lesions or doubtful lesions or when cervix cannot be adequately assessed. Pooled analysis of data from two studies indicated an approximate sensitivity of 93.4% and specificity of 85.1% for VIA to detect CIN 2 or worse lesions, the corresponding figures for cytology were 72.1% and 91.6%. Thus VIA was found to be more sensitive but less specific than cytology.[44]

Principle: Acetic acid interacts with intracellular proteins, causing a reversible coagulation of abnormal cells have higher nuclear protein content and coagulation makes these abnormal cells opaque.

Fig 10: Findings of VIA as a cervical screening method.



Visual inspection under magnification (VIAM):[27]

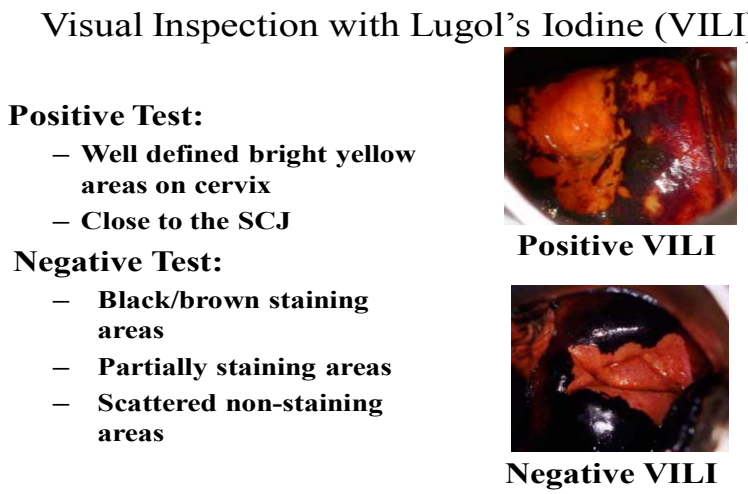
This involves visualisation of cervix after application of acetic acid by using a simple magnifying device (2X- 4X).

Visual inspection with Lugol's iodine (VILI):[44]

Like VIA, VILI involves temporarily staining the cervix with Lugol's iodine. Lugol's iodine solution is prepared by dissolving 5 gm of iodine and 10 gm of potassium iodide in 100 ml distilled water. VILI findings depend on the interaction between iodine and glycogen. Normal cells take up the iodine stain and appear a mahogany-brown color, whereas precancerous cervical lesions appear yellow. Like VIA, results for VILI are immediate, treatment can be provided in the same visit, and it may be implemented in a wide range of settings. Sensitivity of test is 78-98% and specificity of test is 73-91%.

Principle:[41] Normal squamous cells contain glycogen which interacts with the iodine to stain brown/black. Precancerous lesions and invasive cancer do not take up iodine (as they lack glycogen) and appear as well-defined, thick, mustard or saffron yellow areas. Immature metaplastic squamous cells do not contain as much glycogen as mature squamous cells and these may appear as scattered, ill-defined uptake areas.

Fig 11: Findings of VILI as a cervical cancer screening method.



HPV DNA test: [47]

The currently available test, Hybrid Capture 2, determines if one or more of the high risk types of HPV virus associated with cervical cancer are present in the cervical specimen. A sample of cervical cells is obtained using a brush or swab.

Sensitivity of test is 66- 100% and specificity of test is 62- 96%

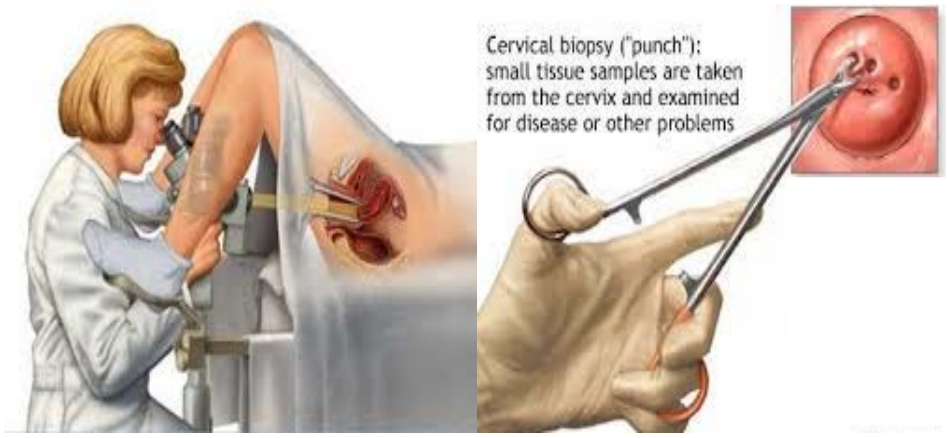
Colposcopy: [48]

Colposcopy involves high-powered illuminated magnification of the cervix using a colposcope. The extent of lesions could be found, biopsy obtained and also helps in providing directed treatment with cryotherapy or loop electrosurgical excision procedure (LEEP). Colposcopy is noninvasive and performed as an outpatient procedure. It does not require anesthesia.

Cervical Biopsy: [49]

Conventionally, cytology based screening is linked to treatment through an intermediary diagnostic step using colposcopy, followed by confirmatory biopsy when indicated. Laboratory assessment of the tissue samples obtained by biopsy (histology) confirms the presence or absence of CIN in precancer stages and in cervical cancer itself it helps in Staging.

Fig 12: Colposcopic examination of positive cases and guided cervical biopsy.



Treatment of pre cancerous lesions of cervix: [50]

The ability to offer women appropriate and effective treatment for precancerous lesions is a critical component of a successful cervical cancer prevention program. Safe and effective outpatient methods are preferred for management of precancerous lesions. In many limited-resource countries, however, clinicians lack training and experience and often the essential equipment and supplies required for simple outpatient treatment procedures. Cryotherapy and LEEP are two safe, effective, and relatively simple and inexpensive outpatient methods used for the treatment of precancer. However in limited resource setting complex inpatient procedures like conization of cervix or hysterectomy are still performed.

Cryotherapy: [50]

Cryotherapy destroys precancerous cells by freezing the cervix, using compressed carbon dioxide (CO2) or nitrous oxide (N2O) gas. To freeze the lesion, the cryoprobe is placed on the cervix, ensuring that the probe covers the entire lesion. The aim of this procedure is to create an ice ball extending 4–5 mm beyond the lateral margin of the cryoprobe.

Cryotherapy is performed using a single-freeze or double-freeze technique. Single freeze involves freezing for three minutes; double freeze involves freezing for three minutes followed by a thaw for five minutes, and then a second freeze for three minutes. This outpatient procedure can be performed in 15 minutes or less without anesthesia. It can be safely and effectively performed by general practitioners and non-physicians. ACCP studies show that cryotherapy is an acceptable treatment option for women, their partners, and providers. Women undergoing cryotherapy need clear information and support to alleviate possible anxieties about side effects. Mild

pain or cramping during or within two to three days after the procedure is common. Profuse, watery vaginal discharge for up to four weeks is very common. It can be safely performed in primary care settings by health worker. So in settings where screening test results are immediately available, women can be treated during the same visit. Other advantages of cryotherapy are that the equipment required is relatively simple, the procedure is easily learned, and it does not require anesthesia or a power supply.

Fig 13: Cryotherapy of precancerous lesion of cervix being performed in rural Primary Health centre.

Fig 14: Visualization of frozen cervix after cryotherapy.

Conization:[50]

Cold knife conisation or laser excision cone biopsy is done as outpatient procedure under local anaesthesia with colposcopic guidance. Blood loss is less. Conization is as effective as hysterectomy provided cone margins are free of disease. Complications such as hemorrhage, infection, cervical stenosis can occur.

LEEP(Loop electro surgical excision Procedure):[51]

LEEP utilizes a thin electric wire in the form of a loop to remove the abnormal area of the cervix. The procedure is usually done using colposcopic guidance under local anesthesia in a secondary or tertiary care setting and requires local anesthesia, as well as a continuous power supply. Severe bleeding is a possible complication both during and after the procedure, occurring in 1% to 4% of patients (Mitchell 1998, Wright et

al. 1992, Sellors and Sankaranarayanan (2002). More sophisticated equipment is required compared with cryotherapy. Two advantages of LEEP are that it is a simple surgical procedure and that the excised tissue can be sent for histopathological confirmation, which allows the exact nature of the lesion to be determined and unsuspected microinvasions to be detected.

Cervical cancer prevention and control:

Cervical cancer can be prevented by screening women systematically through organized population based screening programs. Screening aims to detect the disease at the precancer stage when it is amenable to simple treatment and cure. In many developed countries the annual incidence and mortality from this cancer has reduced by 50-70% with the introduction of population based screening.[27] Resource constraint is a major hurdle in organizing screening programs in developing countries. It has been estimated that in India, even with a major effort to expand cytology services, it will not be possible to screen even one-fourth of the population once in a lifetime in the near future.[52] Hence it is felt that there is a need to look at alternate practicable options which are scientifically correct, ethical and feasible, needs be considered for developing countries. Various studies have demonstrated usefulness of alternative strategies such as VIA for screening women.[53] Hence various approaches for cancer screening including camp based approach, hospital based screening and high risk screening has been used.[54]

International Agency for Research on Cancer (IARC):[55]

The International Agency for Research on Cancer (IARC) is the specialized cancer agency of the World Health Organization. The objective of the IARC is to promote international collaboration in cancer research. The Agency is inter-disciplinary, bringing together skills in epidemiology, laboratory sciences and biostatistics to identify the causes of cancer so that preventive measures may be adopted and the burden of disease and associated suffering reduced. A significant feature of the IARC is its expertise in coordinating research across countries and organizations; its independent role as an international organization facilitates this activity. The agency has a particular interest in conducting research in low and middle-income countries through partnerships and collaborations with researchers in these regions. The IARC has an important role in describing the burden of cancer worldwide, through co-operation with and assistance to cancer registries and in monitoring geographical variations and trends over time. Key publications include the cancer incidence in five continents series and GLOBOCAN. A core part of the agency's mission is education and training of cancer researchers worldwide. This is achieved through fellowships, courses and publications. Priority is given to training researchers from low and middle-income countries in the areas of cancer epidemiology and cancer registration. The close working relationship between IARC and its parent organization, WHO, allows the research findings of the Agency to be translated effectively into timely policies for cancer control. This is manifest, for example, in co-operation in terms of reduction in tobacco use, implementation of vaccination against viruses associated with cancer causation, or in assessing the effectiveness of intervention strategies. IARC is not involved directly in implementation of control measures, nor does it conduct research on treatment or care of cancer patients.

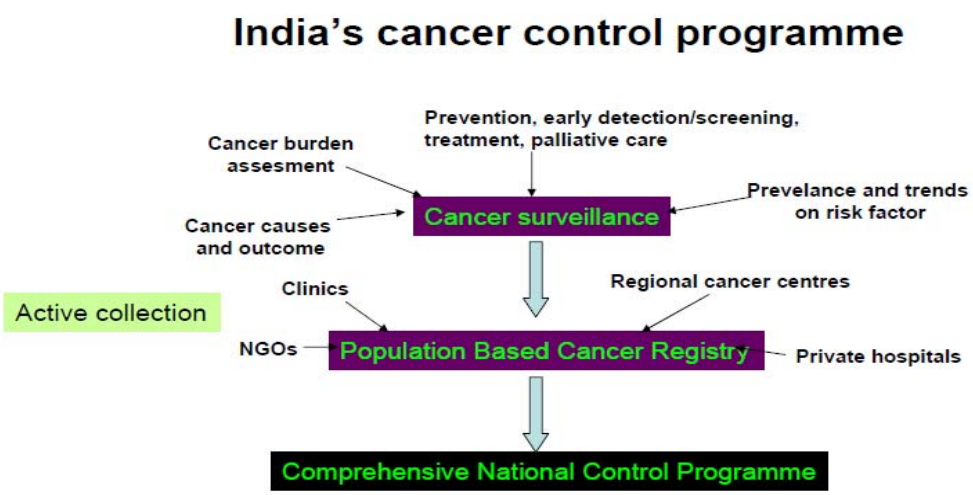
National cancer control program (NCCP)[56]

Cancer is an important public health problem in India, with nearly 10 lakh new cases occurring every year in the country. With the objectives of prevention, early diagnosis and treatment , the National Cancer Control Program was launched in 1975-76. In view of the magnitude of the problem and gaps in the availability of cancer treatment facilities across the country, the program was revised in 1984-85 and subsequently in 2004.

Objectives of NCCP

1. Primary prevention of cancers by health education.
2. Secondary prevention i.e. early detection and diagnosis of common cancers such as cancer of cervix, mouth, breast detected by screening / self examination method.
3. Tertiary prevention i.e. strengthening of the existing institutions providing comprehensive therapy including palliative care.

Fig 15: Cancer control program in India



Schemes under the Program[57]

1. Recognition of new regional cancer centres and strengthening of existing regional cancer centres - there are 27 Regional cancer centres in India. Their main functions are cancer detection and diagnosis, provision of therapy, care and rehabilitation.

2. Oncology wings in medical colleges- The target of the NCCP is to develop oncology wings in all medical colleges in the country. Medical colleges would form an important link between the regional centres and the peripheral health infrastructure (district hospital, taluk hospital, PHC). Financial assistance has been provided under this scheme for all the medical colleges.

3. District cancer control program: This was launched in 1990-91. Under this each state has been advised to prepare their projects on health education, early

detection and pain relief measures. This program will be run by Regional centre or Oncology wing. The district program has five elements.

a. Health education
b. Early detection
c. Training of medical and paramedical personnel
d. Palliative treatment and pain relief
e. Coordination and monitoring.

The district programs are linked with regional centres.

4. Voluntary organization- Assistance has been provided to NGO's for undertaking IEC and early detection activities in cancer. NGO's will implement these activities under the coordination of the nodal agency (Regional centre or Oncology wing).

5. New Initiatives- India has become the member of International Agency for Research on Cancer (IARC). Training of cytopathologists and cytotechnicians in the quality assurance in Pap smear technology. Community based cancer control program carried out with the help of WHO. i.e. training of health care personnel at district level in early detection and awareness of cancer. IEC activities cervical cancer awareness month celebrated in the month of September.

National cancer Registry Program:[58]

It was launched in 1982 by Indian Council of Medical Research (ICMR) to provide information on cancer prevalence and incidence through hospital and population based registries.

Objectives:

1. To generate authentic data on the magnitude of cancer problem in India.
2. To undertake epidemiological investigations and advice control measures.
3. Promote human resource development in cancer epidemiology.

Population based registries:

Of the six population based registries 5 are in urban areas of Delhi, Bhopal, Mumbai, Bangalore, Chennai and one in rural area of Barshi in Maharashtra.

Hospital based registries:

Six hospital based registries are maintained at Chandigarh, Dibrugarh, Thiruvananthapuram, Bangalore, Mumbai and Chennai.

These registries cover a 3.3% of total population of the country. The network of the registries program has expanded by initiation of six population based cancer registries in North east India at Dibrugarh, Kamrup, West Imphal, Mizoram, Sikkim and Silchar and one rural population based cancer registry in Ahmedabad district. In 2010, the National cancer control program was integrated with National Program on Prevention and Control of Diabetes, Cardiovascular disease and Stroke. (NPCDCS)[59]

National program for prevention and control of Cancer, Diabetes, Cardiovascular disease and Stroke: (NPCDCS) [60]

India is experiencing a rapid health transition with large and rising burden of NCD's especially cardiovascular disease, diabetes mellitus, cancer, stroke and chronic lung diseases. It was estimated that in 2005 non communicable diseases (NCD) accounted for 53% of deaths in India. As the burden of NCD's is exceeding to that of communicable diseases and the existing health system mainly focused on communicable diseases, need for National program on Prevention and control of diabetes, cardiovascular disease and stroke was envisaged. Later this program was integrated with NCCP and NPCDCS came into existence.

Cancer services under NPCDCS[60]

1. Common diagnostic services, basic surgery, chemotherapy and palliative care for cancer cases is being made available at 100 district hospitals.
2. Each district is supported with Rs. 1.66 crores per year for the following
    a. Chemotherapy drugs are provided for 100 patients at each district hospital.
    b. Day care chemotherapy facilities is being established at 100 district hospitals
    c. Facility for laboratory investigations including mammography is being provided at 100 district hospitals and if not available, this can be outsourced at government rates.
3. Home based palliative care is being provided for chronic, debilitating and progressive cancer patients at 100 districts.

4. Support is being provided for contractual manpower through 1 Medical oncologist, 1 cytopathologist, 1 cytopathology technician and 2 nurses for day care.

5. 45 centers will be strengthened as tertiary cancer centres(TCC) to provide comprehensive cancer care services at a cost of six crore each.

Efforts in vaccination against cancer cervix in the country:

In developing countries usually, large-scale routine screening is difficult to achieve. The vaccine uses these virus like particles (VLPs) as antigens to induce a strong protective immune response.[61] If an exposure occurs, the vaccinated person's antibodies against the L1 protein will coat the virus and prevent it from releasing its genetic material.[62] Two vaccines licensed globally are available in India; a quadrivalent vaccine (Gardasil™ marketed by Merck) and a bivalent vaccine (Cervarix™ marketed by Glaxo Smith Kline).[63] Both vaccines are manufactured by recombinant DNA technology that produces non-infectious virus like particles (VLPs) comprising of the HPV L1 protein. The Indian parliament's Standing Committee on Health, which, in April, 2010, began probing the use of HPV vaccines in two states after the reported deaths of seven tribal girls, participants in the trial. The trial's purpose was to prepare ground for inclusion of the HPV vaccine in the Universal Immunization Programme (UIP).[64, 65]

Challenges in organising screening programs:

In developing countries, because of the lack of trained cytotechnologists and cytology laboratories, there is often a long interval (1-3 months) between the Pap screening and

when the test result is available. Additionally only a small percentage of women with positive pap smears have diagnostic evaluation and treatment,[66] because of the lack of health centers that are able to treat preinvasive lesions. These problems with pap smears have stimulated research on alternative tests, like VIA and VILI. In most of the cancer screening projects have integrated cervical cancer screening services to existing primary health care services. The tertiary and referral hospitals can adopt certain models provided for Screening in low resource settings. Presently women are being identified as having cervical cancer when they attend gynecology clinics for check up. Very few institutes are carrying out organised screening programs in our country. Screening program recommends various stake holders involved in delivery of health services namely community health centres (CHC) and medical colleges to involve in the cancer cervix prevention and control activities. [57]

Cervical cancer screening methods, risk factors and utilization of screening services.

Screening for cancer cervix by visual inspection method and Pap smear

The results of women who were screened for cancer cervix at NSCB medical college, Jabalpur was analysed by Singh KN and Shefali M. Analysis of the 750 women who had undergone screening for cancer cervix by both Pap smear examination and VIA was performed in the period June 2005 to Sep 2006 by the Department of Obstetrics and Gynaecology. A total of 39 were identified to have precancerous lesions by Pap smear and 122 by VIA. VIA was found to be 93.1% sensitive and was suggested by the authors as a valuable tool to screen for precancerous cervical lesions.[46]

A study was conducted on 500 women aged 18 yrs and above who were attending Gynaecology clinic in a medical college hospital at Bangalore city. VIA were performed and biopsy was done for VIA positive women. In this study conducted in the years 2007 to 2009, the sensitivity of VIA was found to be 94.3% and specificity of 78.3% was estimated.[67]

A study was undertaken by Suman K and Sreenivas N on 70 women aged 20-50 yrs attending Obstetrics and Gynaecology outpatient for presence of precancerous cervical lesion. In this cross sectional study undertaken the year 2010-2012, both VIA and Pap smear were done as screening tests and cervical biopsy was also performed on all the women. Majority of the women had white discharge per vagina. VIA positive in 71.4% of the women and Pap smear was positive in 47.1%. VIA was found to be 88.4% sensitive as a screening test.[68]

Tejaswini BH and Renuka R, performed a comparative study of cervical cytology and VIA for screening premalignant lesions of cervix, in a large referral hospital for industrial workers and their dependents at Bangalore. Five hundred women aged 18-60 yrs who attended the outpatient of Obstetrics and Gynaecology during the year 2013 were screened by VIA and Pap smear. All positive screened cases were subjected to cervical biopsy. Of the 500 women screened for cancer cervix 330 were positive by VIA of which 200 cases was confirmed by biopsy and 100 were positive by Pap smear examination. A high incidence of precancerous lesions was noticed among women aged more than 30 yrs, women with age at marriage ≤16 yr, women with parity ≥3, history of menstrual disturbances and women with history of white

discharge per vagina. In this study it was found that the sensitivity of VIA was high (95%) compared to higher specificity of Pap smear (97%).[69]

A prospective study was conducted by Jeronimo J in 1999-2000 among 1921 women in Peru to assess VIA with Pap smear. Women who were positive were confirmed by colposcopy and biopsy. Around 6.9% women were positive by VIA and 4.2% women were positive by Pap smear examination. Pap smear detected 11 cases of cervical precancerous lesions compared to 5 cases detected by VIA. The authors conclude that VIA is comparable to Pap smear and can be used in low resource settings for early diagnosis and follow up and treatment of cervical precancers.[70]

A study was undertaken by Hegde D among 225 women in age group of 20-50 yrs who attended the Gynaecology OPD at a tertiary medical college hospital from Nov 2008- June 2010. It was carried to assess the role of VIA as an alternative to Pap smear examination in screening for cervical cancer. All the positive women were subjected to colposcopy guided biopsy. Of the 225 women VIA was positive among 27 (12%) and Pap smear in 26 (11.7%) of which 15 were LSIL, 6 HSIL and 5 squamous cell carcinoma. Pap smear had sensitivity of 70.8% and specificity of 95%.[71]

The effectiveness of VIA / VILI in one time and annual follow up screening was studied in rural China among 10,269 women aged 30-59 yrs in the years 2006-2009. All women who were positive underwent colposcopy guided biopsy and women with negative results were rescreened after one year using the same screening procedure.

Only 0.85% of women were diagnosed and confirmed by biopsy. Majority of cases were detected in the first round of screening.[72]

Basu PS conducted a study among 5881 women aged 30-64 yrs to evaluate the performance of VIA, VIAM and cytology to detect high grade cervical precancerous lesions in Kolkata. Positive cases confirmed by either biopsy / colposcopy. Around 18.7% women were positive by VIA and 8.2% were positive by cytology. The sensitivity of VIA was 55.7% and specificity was 60.7%. The sensitivity of Pap smear was 29.5% and specificity was 92.3%.[73]

Studies on utilization of cervical cancer screening services

A study was conducted by Sankaranaranayan R and co workers on determinants of participation of women in a cervical cancer screening trial among women aged 30-59 yrs in Dindugul district. Women, who were young, educated, married, multiparous, from low socio economic status and those who had tubal sterilization had higher compliance with screening. Out of 2,069 women diagnosed with CIN and invasive cancer, 1498 (72.4%) received treatment. Compliance to treatment was more among younger women and those with invasive cancer. This study suggests compliance with screening can be improved by health education, personal invitation, screening clinics in proximity to target women, testing and treating in same session.[74]

Nene B and co workers conducted a study among 1,00,800 women aged 30-59 yrs from Oct 1999 – Nov 2003 to determine the participation of women in cervical cancer screening in Maharashtra. The study group was randomized into three test groups and one control group. The participation was analysed for women of all the three

intervention arms. Women who were younger, better educated, married and had ever used contraception utilized these screening services. Majority of the women (85.6%) who were diagnosed to have cervical lesions received treatment. The authors suggest the use of appropriate strategies like communication methods to encourage women for utilizing screening services.[19]

A cross-sectional study was conducted during February-April 2009 in a rural area of Dadri Tehsil in Uttar Pradesh to evaluate the factors associated to attitudes in rural women toward cervical cancer screening. In a two stage random sampling method a sample of 511 women of age 25-60 years were interviewed from the selected households using a pre-designed and pretested questionnaire containing questions related to attitude of women for responding to screening in the community. Questions on attitudes to screening as adopted from a sample of questions to assess community perspectives The mean age of women interviewed was 37.7 years. Of the women interviewed, 86.9% expressed that their husbands would permit them to go for screening. Factors such as a woman of young age and house wives were significantly associated with the role of husbands in permitting their wives to undergo pelvic examination. Higher proportion (60.0%) of Hindu women expressed that the screening clinic timings would be suitable. Regarding the place of screening center, significant proportion of house wives and literate women were comfortable to go to the Government health facility for cervical screening. More ($P < 0.01$) literate women had the experience of previous speculum examination for reasons other than cervical screening. Women with previous such experience were comfortable during that examination; they also did not feel pain or embarrassment during the procedure. Experience of a pelvic exam earlier was associated with factors like young age,

literacy status of both woman and her husband and occupation of the women. In the opinion of women interviewed on the willingness of other women in the community for undergoing screening, the factors such as religion and occupation are significantly ($P < 0.01$) associated. The present study conducted in Uttar Pradesh observed that women of younger age, literate women and their husband are more likely to avail screening facility. Older and illiterate women are less likely to avail screening facility. Appropriate strategy with additional efforts of focused health education on older and illiterate women population would yield more screening acceptance.[75]

A multistage cluster sampling study carried out to describe how demographic characteristics and knowledge of cervical cancer influences screening acceptance among women aged 25-59 yrs in Tanzania. Eight hundred and four women accepted whereas 314 women rejected the screening invitation. Information was collected using a structured questionnaire. Women in age group of 35- 44 yrs and 45-49 yrs had 3.52 and 7.09 times higher acceptance than among 25-34 yrs. Increased attendance was observed that was 1.94 times high among women with secondary schooling than illiterates and 3.21 times high among women with 0-2 children than among women with > 5 children. The authors suggest that knowledge and awareness raising campaigns are essential for increasing the uptake of screening services for cancer of the cervix.[76]

This study conducted by Denny L and co workers described that organised and quality assured cytology-based screening programs have substantially reduced cervical cancer incidence in many developed countries. However, there are considerable barriers to setting up cytology-based screening programs, particularly in

developing countries and this has stimulated the search for alternative approaches to cytology for cervical cancer prevention. These approaches generally perform as well as cytology, and sometimes better, although many of them have a lower specificity, resulting in higher false-positive rates. The possibility of linking screening to treatment in a one- or two-visit strategy appears to be safe, feasible and effective. Barriers to establishing screening programs and the pitfalls encountered differ from one country to the other. Country-specific solutions need to be found, while being cognisant of the criteria that have enabled successful screening programs. The barriers to screening in developing countries which were mentioned in this study are Competing health needs, limited human and financial resources, poorly developed healthcare services, women are uninformed and disempowered, war and civil strife, the nature of the screening test and widespread poverty.[77]

Studies on risk factors for cervical cancer

A cross sectional study was conducted in Beed district at a tertiary hospital to study the association of risk factors with cervical cancer. Four hundred and sixty two women were interviewed and Pap smear collected. 86.4% of the women were married before 17 yrs of age and dysplasia among them was 19.04%. This study showed significant association between risk factors and cancer of the cervix.[78]

A study was conducted to assess the role of risk factors in cervical carcinogenesis among 36,484 women screened by Pap smear from April 1971 to June 2005 at Queen Mary's hospital. This study suggested higher age and parity were the predominant risk factors in cervical carcinogenesis.[79]

A descriptive cross sectional study among 968 women in the age group of 15-60 yrs for cervical cancer screening was conducted in a Primary health centre at East Sikkim from Sep to Nov 2006. The information related to socio demographic and reproductive variables was collected using a questionnaire. Majority (95.15%) of the women did not have precancerous cervical lesions. Nearly 34.1% of women aged 21-30 yrs and were illiterate had highest evidence of cervical inflammation. Around 42.6% who were married as early as 12-17 yrs had increased cervical inflammation. This study showed no significant difference among women with or without precancerous lesions.[80]

A study was conducted to quantify the influence of screening on risk factors for cervical cancer by Thulaseedharan JV. This study was conducted among women aged 30-59 years with an intact uterus and no past history of cancer in the years 2000-03 in 113 local administrative units called panchayaths. The panchayaths were randomised into two groups 57 in the intervention arm and 56 in the control arm. The effect of screening on the incidence of cervix cancer was estimated with reference to socio-demographic and reproductive risk factors of cervical cancer. We compared these risks with the incidence of cancer in the randomised control population by the same determinants of risk. The results in the screening arm compared to the control arm showed that the women of low SES and young age were benefitting more than those of high SES and old age. The results in controls were consistent with the general evidence, but results in attenders and nonattenders of the screening arm showed that screening itself and self-selection in attendance and effectiveness can influence the effect estimates of risk factors. The effect of cervical cancer screening

programs on the estimates of incidence of cervical cancer causes bias in the studies on etiology and therefore, they should be interpreted with caution.[81]

A study was conducted to assess the role of reproductive factors in the progression from HPV infection to cancer, the pooled data from eight case-control studies on invasive cervical carcinoma (ICC) and two on in-situ carcinoma (ISC) from four continents. 1465 patients with squamous-cell ICCs, 211 with ISCs, 124 with adenocarcinomas or adenosquamous ICCs, and 255 control women, all positive for HPV DNA by PCR-based assays, were analysed. The pooled odds ratios was calculated by means of unconditional multiple logistic regression models, and adjusted them for sexual and non-sexual confounding factors. A direct association between the number of full-term pregnancies and squamous-cell cancer risk: the odds ratio for seven full-term pregnancies or more was 3·8 (95% CI 2·7–5·5) compared with nulliparous women, and 2·3 (1·6–3·2) compared with women who had one or two full-term pregnancies. There was no significant association between risk of adenocarcinoma or adenosquamous carcinoma and number of full-term pregnancies. The authors concluded high parity increases the risk of squamous cell carcinoma of the cervix among HPV-positive women. A general decline in parity might therefore partly explain the reduction in cervical cancer recently seen in most countries.[82]

SUMMARY TABLES

Table 3: Studies on screening methods (VIA and Pap smear) for cervical cancer.

Authors, Title	Objectives	Study design, Sample size & Study period	Results	Sensitivity	Specificity	Conclusion
Singh KN & co investigators[46] Visual inspection of cervix with acetic acid(VIA) in early diagnosis of cervical intraepithelial neoplasia (CIN) and early cancer cervix	Efficacy of VIA and cytology	Cross sectional study 750 Jun 2005- Sep 2006	VIA- 16.26% positive. Pap 5.2% positive	VIA- 93.1%		Sensitivity of VIA is high and is valuable in detection of precancerous lesions of cervix
Neha B, Renuka R[67] Visual inspection with acetic acid as a predictor of precancerous lesions of cervix. Dissertation (RGUHS)	Evaluate VIA	Cross sectional study 500 Sep 2007- Aug 2009	Early marriage- 1.78 times, Parity > 4- 2.1 times & >30 yr age – 2.3 times higher risk of precancer.	VIA- 94.3%	VIA- 78.3%	VIA has the potential for greater [population coverage than other available screening approaches.

Suman K, Sreenivas N[68] Evaluation of Pap smear & acetic acid test as cervical cancer screening tools with histopathological correlation. Dissertation (RGUHS)	Evaluate pap smear & VIA using histopathology as gold std	Cross sectional study 70 Dec 2010- May 2012	Pap smear positive- 47.14%, VIA positive- 71.42%	Pap- 69.77% VIA- 88.37%	Pap- 88.89% VIA-55.6%	This study showed age at first pregnancy as an independent risk factor.
Tejaswini, Renuka R[69] Comparative study of cervical cytology & VIA as screening method of Premalignant and malignant lesions of cervix.Dissertation (RGUHS)	Evaluate VIA & Pap smear	Prospective study 500 2013	VIA positive- 330, Confirmed with biopsy- 200, Pap positive- 100	VIA- 95% Pap- 43%	VIA-55% Pap- 97%	Overall accuracy of VIA 72% and cytology 74%
Jeronimo J & co investigators[70] Visual inspection with acetic acid for cervical cancer screening outside of low-resource settings.	To evaluate VIA as an alternative to Pap smear & to determine role of VIA in settings other than low resource ones.	Prospective study 1921 1999-2000	More women were tested positive by VIA (6.9%) than cytology (4.2%). 35 women had CIN I and 13 women had CIN 2 or 3. 2.3% positive women were lost to follow up with positive VIA & 26.3% were lost to follow up with Pap smear.			In non low resource settings, VIA has a PPV comparable to conventional Pap smear, but is more likely to achieve earlier diagnosis, follow up & treatment than cytology.

Divya H & co investigators[71] Diagnostic value of acetic acid comparing with conventional Pap smear in the detection of colposcopic biopsy- proved CIN.	Evaluate VIA & Pap smear	Prospective study 225 2011	VIA positive 12% and Pap smear 11.7%.	Pap smear 83% VIA 70.8%	Pap smear 98% VIA 95%	Dignostic values of VIA is comparable to Pap smear, hence VIA can be used as screening test for low resource settings.
Qureshi S **& co investigators**[83] Evaluation of visual inspection with acetic acid & lugol's iodine as cervical cancer screening tools in a low resource setting.	Evaluate VIA,VILI compared to Pap smear	Cross sectional study 328		Pap test 20.83% VIA 55.5% VILI 86.84%	Pap test 98.38% VIA 71.39% VILI 48.93%	VIA & VILI are more sensitive in detecting precancerous lesions & can be used in low resource settings.
Basu PS & co investigators[73] Visual inspection with acetic acid & cytology in the early detection of cervical neoplasia in Kolkata, India.	Evaluate the performance of VIA, VIAM, cytology	Cross sectional study 5881	18.7%, 17.7% and 8.2% were tested positive for VIA, VIAM & cytology.	VIA 55.7% VIAM 60.7% Pap 29.5%	VIA 82.1% VIAM 83.2% Pap 92.3%	VIA & VIAM have higher sensitivity than cytology, specificity of cytology is higher.

Table 4: Studies on cancer cervix screening programs and its determinants among women.

Authors **Article**	**Objectives**	**Study design & Sample size**	**Study period & place**	**Results**	**Conclusion**
Nene B & co investigators[19] Determinants of women's participation in cervical cancer screening trial, Maharashtra, India.	To determine factors associated with participation in cervical cancer screening & follow up treatment	Randomised control trial 1,00,800	Oct 1999-Nov 2003 Osmana badMaha rashtra	There was 79% level of participation. Screened women were younger(30-39yr), better educated,married & had ever used contraception	Good participation levels can be achieved in rural areas of developing countries by using appropriate strategies to deliver services.
Kahesa C & co investigators[76] Determinants of acceptance of cervical cancer screening in Dar es Salaam, Tanzania.	To describe how demographic characteristics & knowledge of cancer cervix influence screening acceptance among women.	Cross sectional study 1117	2012 Dar es Salaam, Tanzania	There was 72% level of participation. Women(35-60yr) age group had better participation than 25-34age group. Married women, literate & parity <2 had better participation.	Special attention to be given to illiterate, women with high parity. Awareness campaigns & culturally acceptable screening services likely to increase uptake of cancer cervix screening services.
Sankaranarayanan R & co investigators[84] Dterminants of participation of women in	To know determinants of participation of women in a cancer cervix visual screening trial.	Randomised control trial 1,08,969	Dindugal district, South India	Younger, educated, married, multiparous, low income had a higher compliance with	Appropriate service delivery systems including health education activities, personal invitations,

a cervical cancer visual screening trial in rural south India.				screening. There was 72.4% compliance with treatment among those diagnosed to have CIN & invasive cancer	clinics in proximity, testing & treatment in same session will improve the acceptance of screening.
Smitha Asthana & co investigators[85] Factors associated with attitudes of rural women toward cervical cancer screening.	To evaluate factors associated to attitudes in rural women towards cancer cervix screening	Cross sectional study 511	Feb- Apr 2009, Dadri, UP	86.9% expressed role of husbands in permitting them to attend screening clinic. Younger, literate women having literate husbands were more likely to avail screening services.	Appropriate strategy with additional efforts of focused health education of on older, illiterate women would yield better screening acceptance.
Denny L & co investigators[86] Screening for cervical cancer in developing countries.	To identify barriers to setting up of cervical cancer screening programmes in developing countries.			Barriers included competing health needs, limited financial resources, poor quality of health care services, poverty & nature of screening tests.	Linking of screening to treatment in a one or two visit strategy is found to be safe, feasible & effective.
Aswathy S & co investigators[87] Cervical cancer screening: Current knowledge & practice among women in a rural population of Kerala, India.	To determine screening practices & determinants to identify factors for non screening	Cross sectional study 809	Jan –Aug 2009 Vypin block Cochin	Only 6.9% had undergone screening out of 809 women surveyed. Factors for getting screened includes no symptoms & not necessary(51.4%) Resource factors(15.1%)- no time, no money and 10.2% no interest	Specific knowledge is critical in determining a women to undergo screening for cancer cervix.

Table 5: Studies on assessment of risk factors for cervical cancer.

Authors **Article**	**Objectives**	**Study design & Sample size**	**Study period & place**	**Results**	**Conclusion**
Mhaske M & co investigators[88] Study of association of some risk factors & cervical dysplasia/cancer among rural women.	To study association of risk factors and cervical dysplasia.	Cross sectional study 462	One yr Beed district	86.4% were married before 17 yrs of age. Prevalence of dysplasia is 19.04% among women married before 17yrs, 91.3% had first child before 20yrs of age. 26.31% had more than 4 children.	There was a significant association between risk factors and cervical dysplasia and there is a need to reduce these risk factors.
Misra JS & co investigators[89] Risk-factors & strategies for control of carcinoma cervix in India: Hospital based	To study role of risk factors in cervical carcinogenesis and strategies for control of the disease.	Hospital based screening study 36,484	Apr 1971-June 2005 Queen Mary's hospital, Lucknow	Frequency of squamous intraepithelial lesion & carcinoma found to be 7.2% & o.6% respectively. High age, parity, STI's like HPV,	Single lifetime screening which is most feasible and affordable made for control of cancer cervix in developing

cytological screening experience of 35 years.				Herpes were associated with squamous intraepithelial lesions.	countries should be carried in all women with high parity and women above 40 yrs of age.
Thulaseedharan JV & co investigators[90] Effect of screening on the risk estimates of sociodemographic factors on cervical cancer – A large cohort study from rural India.	To quantify the influence of screening on risk factors for cervical cancer.	Randomised control trial 80,000	2000-2003 Rural India	Women of low SES (socioeconomic status) & young age were more benefitted than high SES & old age. The relative risk by age was 0.33 in control arm & 0.24 in screening arm	The results in controls were consistent and non attenders of screening arm showed that screening itself and self selection in attendance can influence the effect estimates of risk factors.

MATERIAL AND METHODS

Study setting :

This study was undertaken in the rural communities that receive primary health care services from Devarayasamudra primary health centre(PHC) in Kolar. The PHC is administered and managed by the Department of Community Medicine of Sri Devaraj Urs Medical College at Kolar under a Public Private Partnership model (Arogyabandhu) with the Ministry of Health and Family Welfare Government of Karnataka. Devarayasamudra PHC at Mulbagal taluk in Kolar district is at a distance of 18 km from the medical college. The PHC covers a population of 11,164 in 20 villages through the 3 sub centres of Devarayasamudra, Keeluholali and Kothamangala. Kolar district in Karnataka state is a semiarid and a drought prone area and less than 14% of the land is under forest cover. More than 90% of the drinking water requirements of the district are met by ground water resources. Also, around 16% of the villages in Kolar district are affected by excess fluoride concentration in groundwater ranging from 1.5 to 4.05 mg/L, leading to endemic fluorosis. The main occupations in these communities are related to agricultural activities and there is intense cultivation of mulberry for sericulture, floriculture and horticulture farming. Quarrying, stone crushing and bricks and roof tiles manufacturing are major unorganized occupation sectors in Kolar.[91] The population size in Kolar is 1,38,553, 2,98,374 families included under BPL and 387052 people holding lands according to the government of Karnataka statistics.[92,93] As per 2011 census effective literacy is 84.02%, male literacy is 87.28% and female literacy is 80.69%.[94] Though Kannada is the major language a significant population speaks Telugu. Tamil is also spoken in Kolar gold field (KGF). Health care institutions in Kolar district include 61 PHC's, 2 CHC, 5 taluk hospitals, 4 urban health centres, 1

district hospital (SNR Hospital) and one medical college hospital (R.L.Jalappa hospital and Research centre).[95] Around 83.9% of the population follow Hindu religion and 12.2% are muslims.[91]

Table 6 : Distance of the study villages from the PHC Head Quarters.

Sl.No	Study Village	Distance from the PHC HQ
1	V.Guttahalli	9.9 Km
2	Kothamangala	7.3 Km
3	Kamadatti	4.8 Km
4	Kamanur	5 Km
5	Ramasandra	9.4 Km
6	Devarayasamudra	PHC HQ

Fig 16: Map of Karnataka showing Kolar district

Fig 17: Map of Kolar district showing Mulbagal Taluk

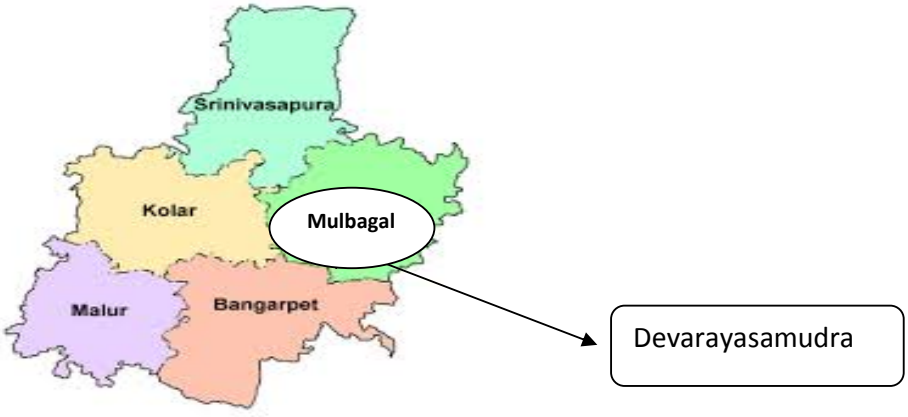
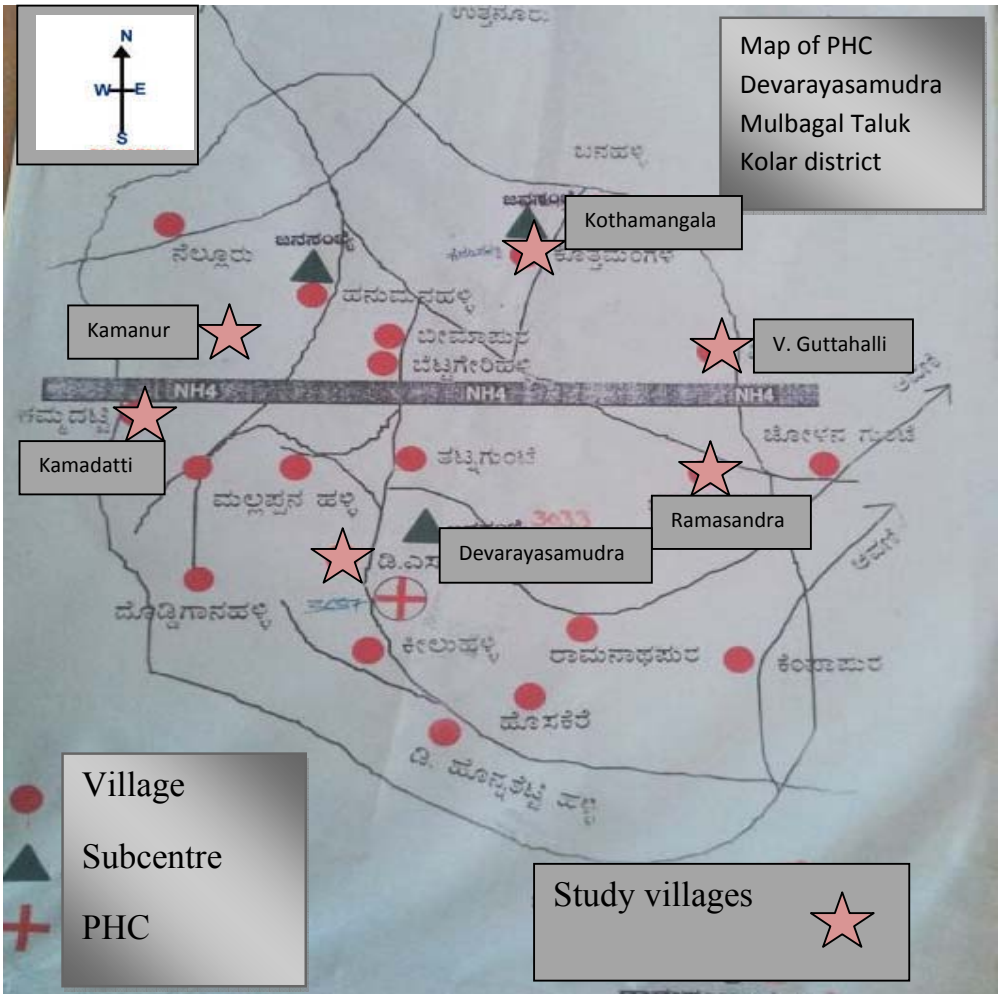


Fig 18: Map of Devarayasamudra Primary Health Centre area

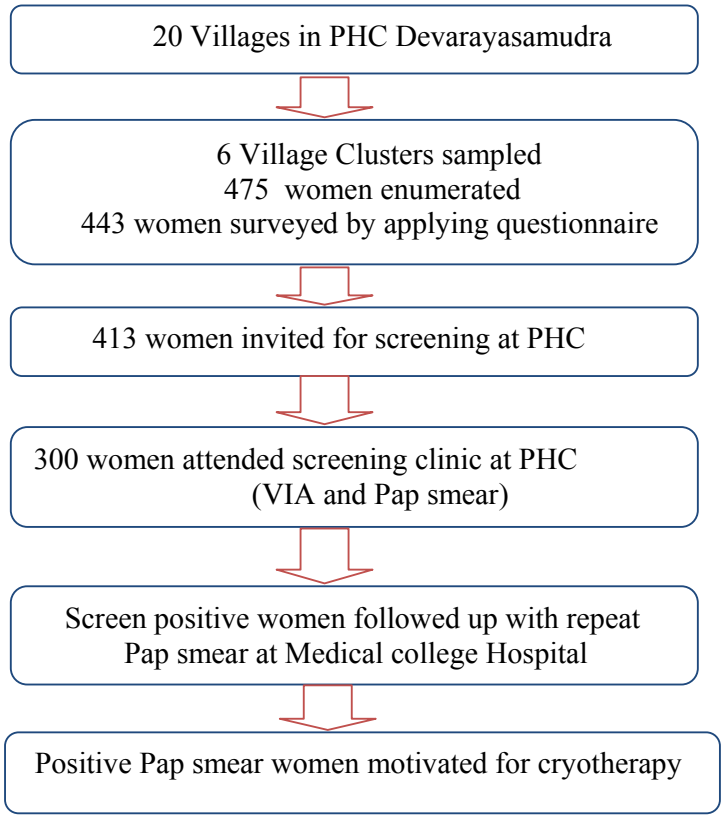


Study population: Six out of twenty villages in the Devarayasamudra PHC area were randomly selected for the study. Women aged 30-60yr in these selected study villages were enumerated and formed the study population. A total of 475 women aged 30-60 yr were enumerated in the study villages of Devarayasamudra, V.Guttahalli, Kothamangala, Kamadatti, Kamanur and Ramasandra. Of the 475 enumerated women, 445 could be contacted after three household visits and were administered a questionnaire to assess their risk for cancer cervix. Since 30 of these women had already undergone hysterectomy they were excluded for screening of cancer cervix. Thus a total of 413 women were invited for screening for cancer cervix at

Devarayasamudra PHC. An attempt was made to invite atleast 2 more times to those women who did not attend the screening clinic.

Study design: This Cross sectional study was conducted in the rural communities of Devarayasamudra PHC area, from November 2011- November 2012 on Women aged 30-60 yrs. Four hundred and seventy five women were enumerated and 413 women were invited for the Cancer cervix screening clinic during this study period. Three screening clinics were conducted for each community and women were motivated to attend the clinic by the investigator and the community based health workers.

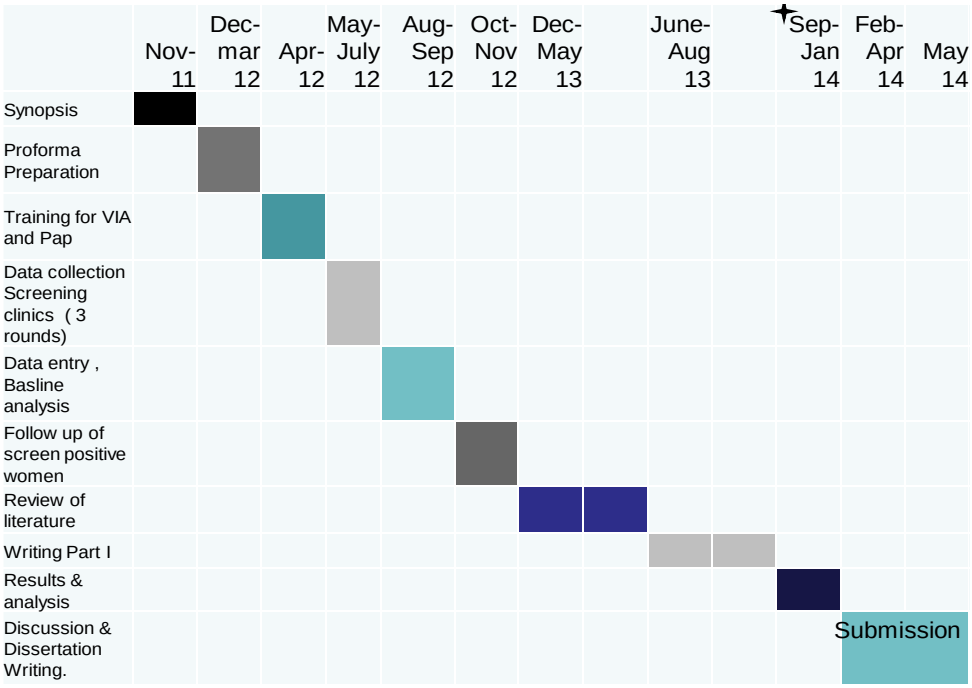
Cross Sectional Study Design



Sample size :

Sample size was estimated by considering the prevalence of precancerous cervical lesions at 10%.[2] Using Z^2PQ/l^2, considering an error of 5%, a design effect of 2 and a non response of 10% the estimated sample size is 304 women.

Fig 19: Gantt Chart



DATA COLLECTION

Step 1: Cancer Cervix Risk factor Survey.

A household survey was conducted to enumerate all the women aged 30-60yrs in the sampled six communities under Devarayasamudra PHC. A structured and closed ended questionnaire(annexure 1,2) which was validated and pretested was administered to these women to assess the various sociodemographic characteristics

namely education, socio economic status, caste, age, etc and reproductive health related factors namely age at marriage, age at first child, parity, abortions, history of sexually transmitted infections (STI/RTI), menstrual disturbances etc. The questionnaire was validated by four members who are experts in identification and management of cancer cervix and conducting cancer cervix screening programs. The questionnaire was pretested on 20 women in the same communities. The investigator administered the questionnaire to the household members in the locally spoken languages of Kannada and Telugu. The investigator took the assistance of the female Health worker (ANM) and ASHA serving the selected community to undertake the survey. The ASHA and ANM introduced the investigator to the household members and assisted in identifying all the households in the community. In case where the women could not be contacted during the survey, the households were revisited again for two more times. After a total of three visits if the women could not be contacted they were considered as non responders.

Step 2: Cancer cervix education:

All the enumerated women aged 30-60yrs who could be contacted and administered the questionnaire were informed about cancer of the cervix and the importance of early cancer cervix screening. One to one communication of health information and distribution of the printed leaflet containing information in Kannada on cancer cervix screening and its benefits, its risk factors and date and place of the screening clinic was carried out. The women were told that a screening clinic would be held in the PHC on a specified date. One to two days before the cancer cervix screening activity the identified women were revisited and the dates and place of the

screening clinic was reminded. The assistance of the ANM and ASHA of the community was taken to carry out cancer cervix education.

Step 3: Cancer cervix screening

A plan was prepared to undertake the screening for cervical precancer among 30-60 yrs old women of the 6 rural communities under Devarayasamudra PHC area in Mulbagal taluk.(Table 7)

Table 7: Planned schedule of cancer cervix screening clinic at Devarayasamudra PHC.

Communities to be Screened	**Screening clinic dates**		
	First	**Second**	**Third**
Devarayasamudra	8-05-2012	18-06-2012	16-07-2012
Ramasandra	8-05-2012	18-06-2012	16-07-2012
Kamadatti	15-05-2012	11-06-2012	09-07-2012
Kamanur	15-05-2012	11-06-2012	09-07-2012
V. Guttahalli	22-05-2012	04-06-2012	23-07-2012
Kothamangala	22-05-2012	04-06-2012	23-07-2012

On the day of the cancer cervix screening clinic at Devarayasamudra PHC the women attending the clinic were informed about the screening procedure and an informed consent (annexure 4) was obtained. Anthropometry was performed and history of any symptoms related to reproductive tract was obtained. Height was

measured using a flexible wall mounted tape taken upto an accuracy of 0.5 cm. Women were asked to stand straight and barefoot against the wall. Weight was measured using a Salter brand electronic bathroom scale upto an accuracy of 500g. Women were asked to stand straight and barefoot. The details of the observations in the screening clinic were entered in the proforma (annexure3). Additional information about any symptoms like postcoital pain, intermenstrual bleeding, white discharge, any history of STI were collected by the ANM and trained interns and it was entered into the same proforma. The assistance of medical interns posted to the rural health training centre (RHTC) and ANM of the community from where the women had come from were utilized.

Training :

1. The investigator underwent training for Pap smear collection and performing VIA test for 15 days under the Professor of Obstetrics and Gynaecology at Sri Devaraj Urs Medical College and teaching hospital in Kolar. The procedure was standardized with the trainer to perform speculum examination, to collect Pap smear, perform VIA of the cervix uteri and to interpret the results.

2. The investigator attended a three day workshop conducted by RUHSA, CMC, Vellore on "Low tech screen and treat methods of cervical cancer".

3. The investigator also participated in the workshop on cryotherapy jointly held by the departments of community medicine, and OBG,SDUMC, Kolar and conducted by Dr. R. Rajkumar, Professor, department of community Medicine, Meenakshi Medical college, Kancheepuram. He is the WHO consultant for cervical cancer screening activities in South India. His speciality being rural population based cancer registry and cervical cancer

screening in rural areas of India. Women identified with cervical precancer were treated by cryotherapy in this workshop.

Resources

1. **Manpower:** Female health worker (ANM), ASHA, staff nurse, medico social worker (MSW), interns, group D worker.

2. **Material:** A check list of materials required to conduct the cancer cervix screening clinic was prepared and arranged accordingly (annexure 5).

Three ANM's and six ASHA's who were providing care to these rural communities were approached and told about the cancer cervix screening activity that was planned in the community . Their participation was requested through the medical officer of the PHC. Interns posted in the department of Community Medicine in the RHTC attached to the PHC during the study period were approached through the head of community medicine department. A contact program was conducted for ANM, ASHA and interns for three hours three days before the date of screening clinic. The plan for the screening clinic was discussed with them. The role to be played by the participant as assistants in the study was explained to them. (Table 8)

Table 8: Role of various resource persons in Cancer screening clinic

Resource person	Number	Activity planned
ASHA	6	To bring the identified / invited women from the village to the PHC/ cancer cervix screening clinic. Assisting in household survey Education activity - distribution of handouts
ANM	3	Household survey Educating women- Distributing handouts Explaining the screening procedure to the women in the screening clinic. Filling the consent form and explaining it. Assistance in collecting Pap smear and VIA.
Staff Nurse	1	Assistance in screening clinic
Medical Interns	10	Performing Anthropometry (measuring height, weight, BP) Assistance in screening clinic
Group D	1	Assistance in screening, washing and disinfecting the equipments used for screening

Cancer cervix screening methodology:[46,70]

The arrangements for the screening clinic on the designated date at the PHC were made as per the prepared check list (annexure 5). A freshly prepared dilute acetic acid (5%) was obtained from the biochemistry laboratory of Sri Devaraj Urs Medical College. After obtaining the written informed consent from the women, clinical examination and screening for cancer cervix was performed.

Using an un-lubricated bivalve Cusco's speculum the cervix was exposed, excess mucus was cleaned when present and the direct visual evaluation of the cervix was made to identify the external os with pinkish squamous epithelium and reddish columnar epithelium and transformation zone. A Pap smear was collected from the transformation zone (SCJ) of the cervix using a sterile plastic Ayre's spatula by a 360^0 rotatory motion. It was smeared onto the glass slide and was fixed immediately using Biofix spray (90% ethyl alcohol) fixative. The slides were labeled and the Pap smear number was entered into the screening clinic proforma.

Following this, 5% acetic acid was applied on the cervix by using a sterile broom stick fixed with a small piece of sterile cotton. After one minute a naked eye evaluation was performed under 100 watt illumination. VIA was considered positive when an acetowhite lesion was observed within the transformation zone. If there were no acetowhite areas after one minute the result was considered negative. The findings were entered into the screening clinic proforma simultaneously by the interns as observed and dictated by the investigator. The instruments used were washed thoroughly in running water and soap and was disinfected by dipping in savlon solution for 10 minutes.

Women with VIA positive result were informed about the result and were asked to collect Pap smear report after one week. They were advised to come for cervical biopsy if Pap smear was positive. If the Pap smears were negative in a VIA positive woman they were administered a course of oral antibiotics for 15 days and instructed to come for follow up visit to collect the repeat Pap smear report. If the smear was positive the patient was advised cryotherapy/biopsy. If the repeat Pap smear was negative no treatment was advised and follow up screening for cancer

cervix was advised after one year. The Pap smears were fixed, labelled and stored in the slide box and were deposited at the cytology laboratory of department of Pathology the next day along with the requisition form (annexure 9) with Pap smear number and other examination findings of the woman. The slides were stained using Papaniculaou stain by the cytotechnologist and were covered with a cover slip. The slides were collected the next day after staining and were submitted to the pathologist along with requisition forms for reporting. Pap smear was reported according to Bethesda System.[96] The reports were collected after one week. The reports were handed over to the screened women at their doorsteps by the ASHA and ANM. The women whose reports were positive were personally approached by the investigator and were explained about the problem and the treatment to be undertaken. They were asked to come for follow up on a designated date to the department of OBG at Sri Devaraj Urs Medical College, Kolar. The reports which showed LSIL, HSIL and Invasive cancer were considered as positive and reports with ASCUS, AGUS and inadequate were considered as negative. Women with LSIL were advised repeat Pap test following 15 days of oral antibiotics (Tab doxycycline 100 mg twice daily) treatment.[97] If repeat test was positive they were advised cryotherapy. Women with HSIL underwent cryotherapy and were advised to come for follow up once in six months. All the women who attended screening clinic were advised to undergo Pap test once in every three years. The women found to have vaginal tract infections were provided treatment as per the syndromic approach.[98]

Table 9: Detection and management plan for vaginal tract infections[98]

Vaginal tract infection	Operational definition	Treatment plan
Candidiasis	Patient complains of vaginal discharge. curdy white discharge on speculum examination.	Clotrimazole vaginal Pessary for 6 days. Tab. Metronidazole 2g plus Tab.Fluconazole 150 mg stat.
Bacterial Vaginosis and Trichomoniasis	Patient complains of vaginal discharge. Greenish foul smelling discharge on speculum examination.	Tab. Metronidazole 2g stat plus Tab Fluconazole 150 mg stat
Herpes genitalis	Patient complains of genital sore. Vesicles found and history of recurrences.	Tab. Acyclovir 400mg orally three times daily for 7 days

Both Pap smear collection and VIA were performed by the single trained investigator. All the Pap smears were reported by two pathologists in the department of Pathology of medical college. Women who did not attend the screening clinic on the designated days were contacted again. They were informed to attend the screening clinic on the designated date and time. A total of three screening clinics were conducted to facilitate the women to utilize the services.

Statistical analysis :

Data collected was coded and entered into Microsoft Excel 97-2000 software. Analysis of data was done using Open epi 2.3 version software. The summarized data is presented as frequencies, proportions, mean and standard deviation. The association between cervical cancer cancer and its risk factors is analysed using Chi square test. Univariate and multivariate analysis was performed to identify predictors of women's participation in cervical cancer screening clinic. Odds ratio was

calculated at 95% Confidence interval and 'P' value<0.05 was considered statistically significant.

Operational definitions of variables under the study:

Age : The completed age of the participant was taken as told by the women.

Education: was measured by completed years of formal schooling.

Occupation:[99] Engagement in a particular income earning activity for the major part of the day was categorized as main occupation.

Table 10: Classification of individuals according to their occupation.

Professional	Doctor, Engineer, Principal, Lawyer, Military officer, Senior executive, Business Proprietor, Writer, Scientist, Large employer, Director, University Professor, Police officer, Others (Horse rider)
Semi Professional	Teacher, Pharmacist, Social worker, Owner of small business and manager, Farmer, others (Computer programmer, constructor, Govt employee, Nurse)
Skilled worker	Artisans, clerk, Supervisor, Carpenter, Tailor, Mechanic, Electrician, Railway guard, Painter, Modelor, Smiths, Baker, Driver, Shop assistant, Petty trader, constable,soldier, potter, barber, linesman, others (tinkering, welder, gardner, cook, mason, postman, plumber)
Semi skilled	Factory operator, Agricultural labour, shoemaker, security guard, shop helper
Unskilled	Labourer, Domestic servants, peon, sweeper, washerman, others.

Socio economic status classification:

Using modified B.G Prasad Classification[100]

Using Percapita income (Total income/ No. of members in households)

All India Consumer price index (AICPI) for rural labourers for the month of July 2012 is 658(1986-87=100) base[101]

Multiplying factor = Current index value (658)/ Base index value in 1986 (100) = 6.58

New income value = 6.58x 4.63x4.93x old value

Table 11: Socio economic status classification

Class	Old value	New value
Upper class	≥100	≤15,019
Upper middle	50-99	7509-15,018
Middle	35-49	5,256-7,508
Lower middle	15-34	2,252-5,254
Poor	5-15	750-2,251

Below Poverty Line (BPL): Those who were issued BPL card by the government.

Caste:[102] Caste was considered based on the categorization made by the respondent. Caste under general category were brahmin, lingayat, vaishya etc. OBC included yadava, madivala, agasa etc, schedule caste includes bhovi, holiya etc, schedule tribe included banjara, kammara, kuruba, nayaka.

Reproductive health related factors :[103,104]

Parity: Denotes a state of previous pregnancy beyond the period of viability of 28 weeks of gestation.

Multiparity: Defined as one who has completed two or more pregnancies to the stage of viability or more.

Abortion: Defined as expulsion or extraction from its mother of an embryo or fetus weighing 500g or less when it is not capable of independent survival. It can be taken approximately upto 22 weeks of gestation.

Menstrual cycle

Regular- Menstrual cycles ranging from 21-35 days .

Irregular- Menstrual cycles ranging less than 21 days or more than 35 days.

Menopause: It is the point of time when last and final menstruation occurs. This date is fixed retrospectively, once 12 months have gone by with no menstrual flow at all.

Vaginal tract infection:[98] Presence of any abnormal vaginal discharge on per vaginal examination.

BMI(Body Mass Index): It is calculated as weight in kg divided by the square of height in metre(Kg/m^2)

Table 12: WHO Classification of BMI[105]

Grade	**BMI (Kg/m^2)**
Underweight	<18.5
Normal	18.5 – 24.99
Pre Obese	25 – 29.99
Obese	>30

RESULTS

The demographic profile of the selected villages for the study on cancer cervix screening and the sequence of events in the screening are presented in table 13 and fig 20 respectively. Six villages were randomly selected out of 20 villages in Devarayasamudra PHC area of Mulbagal Taluk in Kolar. A total of 948 households were visited in these six villages covering a population of 4354 persons. A total of 475 women in the age group of 30-60 yr were enumerated for the study. About 445 women could be contacted for administering the survey questionnaire and 300 out of them attended the cancer cervix screening clinic. The location of the villages are represented in the map of the PHC area (Fig 18). Atleast three attempts were made to contact the women in their homes for the survey. The women answered questions on social, demographic and reproductive profile.

Table 13: Demographic profile of the villages for study for study in Devarayasamudra PHC area in Kolar.

	Villages	No. of Households	Total Population	Women aged 30-60 yr n (%)	Women aged 30-60 yr surveyed for risk factors n (%)	Women aged 30-60 yr screened for cancer cervix n (%)
1	Devarayasamudra	186	707	110(23.2)	105 (23.6)	91(30.4)
2	V.Guttahalli	313	1340	144(30.3)	134 (30.1)	65(21.6)
3	Kothamangala	186	777	89(18.7)	81(18.2)	61(20.4)
4	Ramasandra	85	415	34 (7.2)	34 (7.6)	23(7.6)
5	Kamanur	53	270	38 (8.0)	35 (7.9)	19 (6.4)
6	Kamadatti	125	845	60 (12.6)	56 (12.6)	41(13.6)
	Total	**948**	**4354**	**475(100)**	**445 (100)**	**300 (100)**

Fig 20: Sequence of events in cancer cervix screening at Devarayasamudra PHC area among women aged 30-60 yrs.

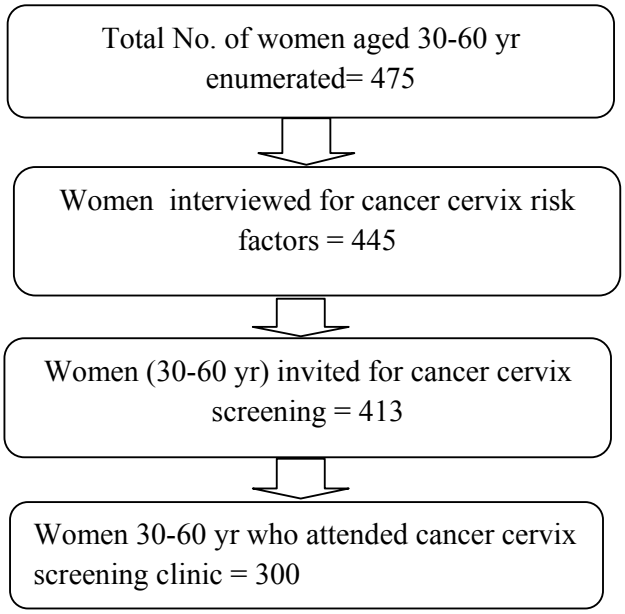


Table 14: Sociodemographic profile of women aged 30-60yrs surveyed for prevalence of risk factors for cancer cervix at Devarayasamudra PHC area, Kolar.

Characteristics (n=445)	n (%)
Age distribution in yrs	
30-39	235 (52.8)
40-49	117 (26.3)
50-60	93 (20.9)
Education status	
Illiterate	130 (29.2)
Primary/ secondary level	138 (31)
High school level	139 (31.3)
College level and above	38 (8.5)
Occupation	
Housewife	207 (46.6)
Unskilled labour	128 (28.7)
Skilled labour	105 (23.5)
Professional+ Semi Professional	05 (1.2)
Marital status	
Married	426 (95.8)
Widow	17 (3.8)
Unmarried	02 (0.4)
Education status of husbands (n= 443) *	
Illiterate	197 (44.6)
Primary/ secondary level	154 (34.6)
High school level	50 (11.2)
College level and above	42 (9.6)
Occupation status of husbands (n= 443)*	
Unskilled labour	303 (68.4)
Skilled labour	127 (28.7)
Professional + Semi Professional	13 (2.9)

Religion	
Hindu	440 (98.9)
Muslim	05 (1.1)
Caste distribution**	
SC, ST	233 (52.3)
OBC	177 (39.8)
General	35 (7.9)
Socioeconomic status	
BPL***	292 (65.6)
Lower class	135 (30.4)
Middle class	18 (4)

* 2 among the surveyed women were unmarried.

* * SC- Schedule caste, ST- Schedule tribe, OBC- Other backward caste

*** BPL – Below poverty line

Table 14 describes the social and demographic characteristics of the women aged 30-60yrs in Devarayasamudra PHC area on whom the study of prevalence of risk factors for cancer cervix was undertaken. About 53% of the sociodemographic profile of the surveyed women were in the age group of 30-39 yrs and 62.3% of the women had undergone upto primary, middle or high school education. Around 29.2% of the interviewed women were illiterate whereas around 45% of the husbands of the women were also illiterate. Around half of the women were housewives (46.6%) and the remaining worked as labourers in the agricultural fields. Majority of their husbands (68.4%) were unskilled labourers. Women under the general caste category constituted to only 7.9% and 52% could be categorized under SC and ST community. Around 65.6% of the surveyed household were identified as below poverty line (BPL) by the government.

Table 15: Reproductive health profile of women aged 30-60 yrs surveyed for prevalence of risk factors for cancer cervix at Devarayasamudra PHC area, Kolar.

Characteristics (n= 445)	**n (%)**
Mean age at marriage (yrs) 18.7 ± 1.9	
Age at marriage (n=443)*	
≤18 yrs	190 (43.0)
>18 yrs	253 (57.0)
Mean age at first pregnancy (yrs) 20.2 ± 1.9	
Age at first pregnancy (n=443)*	
≤18 yrs	100 (22.6)
>18 yrs	343 (77.4)
Parity status (n=443)*	
≤2 child birth	225 (50.8)
>2 child birth	218 (49.2)
Abortions (≥ 1)	22 (5.4)
Use of Oral contraceptive pill (OCP)	14 (3.2)
Attained Menopause	114 (25.6)
Irregular menstrual cycles	33 (7.4)
Vaginal discharge in the past one year (n=413)**	114 (27.6)

* Among the women surveyed 2 were unmarried.

** Among 413 women invited for cancer cervix screening clinic

Table 15 describes the reproductive health profile of the interviewed women. Around 43 % of the surveyed women in Devarayasamudra PHC area in Kolar who were aged 30-60 yrs had married before they had attained 18 yrs of age and 22.6 % had also become pregnant before attaining 18yrs. About 49.2% had given birth to more than two children. Only 3.2% of the women mentioned that they had ever used an oral contraceptive pill (OCP) for family planning. Around 5.4% them could recollect that they had an abortion in the past and 25.6% of the women had attained menopause.

Table 16: Comparison of sociodemographic profile of women aged 30-60 yrs utilizing cancer cervix screening services at Devarayasamudra PHC area in Kolar.

	Women attending cancer cervix screening clinic (n= 300)	Women who did not attend cancer cervix screening clinic (n=113)	Women surveyed and invited to attend cancer cervix screening clinic (n= 413)	
Mean Age (yrs)	39.7 ± 9.0	37.7 ± 8.5	39.8 ± 9.2	
Mean age at marriage (yrs)	18.4 ± 1.9	19.4 ± 1.7	18.7 ± 1.9	
Mean age at first pregnancy (yrs)	20.0 ± 2.0	20.8 ± 1.7	20.2 ± 1.9	
Characteristics	**n (%)**	**n (%)**	**n (%)**	**P value**
Age group (yrs)				
30-39	160 (53.3)	71 (62.8)	231 (55.9)	χ^2 = 3.015
40-49	82 (27.3)	25 (22.1)	107 (25.9)	df-2
50-60	58 (19.4)	17 (15.1)	75 (18.2)	P= 0.2214
Education status				
Illiterate	76 (25.4)	38 (33.6)	114 (27.6)	χ^2= 2.826
Literate	224 (74.6)	75 (66.4)	299 (72.4)	df- 1
				P= 0.0927
Occupation status*	(n = 300)	(n = 108)	(n = 408)	χ^2 = 5.31
Housewife	128 (42.6)	60 (55.5)	188 (46.1)	df-1
Working	172 (57.4)	48 (44.5)	220 (53.9)	P=0.0212
Caste				
SC,ST	163 (54.3)	55 (48.8)	218 (52.7)	χ^2= 15.93
OBC	124 (41.3)	40 (35.3)	164 (39.7)	df-2
General	13 (4.4)	18 (15.9)	31 (7.6)	P= <0.001
Socioeconomic status				
BPL	230 (76.6)	44 (38.9)	274 (66.3)	χ^2 = 54.54
Lower class	64 (21.4)	58 (51.4)	122 (29.5)	df-2
Middle class	6 (2)	11 (9.7)	17 (4.2)	P=<0.001
Marital status**	n =300	n =111	n = 411	
Married	285 (95)	109 (96.6)	394 (95.8)	Fischer exact test
Widow	15 (5)	02 (1.7)	17 (4.2)	0.2352

*Among 5 (1.2%) Professional & Semi Professional none attended screening clinic and they were excluded in this analysis. (SC, ST, OBC, BPL)

** 2 (1.7%) women who were unmarried did not attend screening.

Three hundred women out of 413 invited women attended the cancer cervix screening clinic conducted at Devarayasamudra PHC . Three screening clinics were held for each of the six selected village community so as to facilitate the utilization of cancer cervix screening services. Around 69.2% of the women in the age group of 30-39 yrs attended the screening clinic whereas more than 76% of the women above the age group of 40yrs attended the screening clinic. Nearly 75% of women who were literate attended the cancer cervix screening clinics whereas 66.6% of women who were illiterate attended the screening clinic. Working women were more likely to utilize the cancer cervix screening facilities (78.2%) compared to 68% of the women who were housewives who utilized the services.

Around 75% of the women who belong to SC, ST and OBC category in the society utilized the cancer cervix screening facilities in their community. Whereas only 42% of the women who belonged to general category in the society came forward to utilize cancer cervix screening facilities in the community. Among the women who did not attend the screening clinics, nearly 16% belonged to the general caste category whereas only 4.4% of the women who used the screening clinic services belong to this section of the society. This caste difference in the utilization of cancer cervix screening services was found to be highly statistically significant ($P<0.001$).

Nearly 84% of the women from the BPL strata of the society came forward and utilized the cancer cervix screening facilities whereas only 52.4% of the women from the lower socio economic strata who were above the poverty line and 35.2% of the women from the middle socio economic strata of communities under Devarayasamudra PHC area utilized cancer cervix screening facilities. Majority of the women (76.6%) utilizing the screening clinic services belonged to the BPL category

whereas around 61% of the women who did not attend the screening clinic facilities belong to above poverty line poverty line category. This difference in the utilization of community based cancer cervix screening services according to socioeconomic status was found to be highly statistically significant (P<0.001). Out of the 17 widows invited for cancer cervix screening, majority (88.2%) of them utilized the screening facilities. Nearly 57.4% of the women who attended the screening clinic were labourers whereas 55.5% of the women who did not attend the screening clinics were housewives. This difference in the occupational status was statistically significant (P<0.05).

Table 17: Comparison of reproductive profile of women aged 30-60 yrs utilizing cancer cervix screening services at Devarayasamudra PHC area in Kolar.

	Women attending screening clinic (n= 300)	Women who did not attend screening clinic (n=113)	Women surveyed and invited for screening clinic (n= 413)	P value
Age at marriage		n=111	n= 411*	χ^2 = 15.51
≤18 yrs	238 (79.4)	106 (95.4)	344 (83.6)	df-1
>18 yrs	62 (20.6)	05 (4.6)	67 (16.4)	P= <0.001
Age at first pregnancy		n=111	n=411*	χ^2 = 12.95
≤18 yrs	83 (27.6)	12 (10.8)	95 (23.2)	df- 1
>18 yrs	217 (72.4)	99 (89.2)	316 (76.8)	P= <0.001
Parity status		n=111	n=411*	χ^2= 24.84
≤2	136 (45.4)	81 (72.9)	217 (52.7)	df-1
>2	164 (54.6)	30 (27.1)	194 (47.3)	P<0.001
Abortion		n=111	n=411*	χ^2 = 0.9774
No abortions	288 (96)	104 (93.6)	392 (95.3)	df-1
≥ 1 abortion	12 (4)	07 (6.4)	19 (4.7)	P= 0.3228
History of vaginal discharge			n=413	χ^2= 51.95
Yes	112 (37.4)	02 (1.8)	114 (27.6)	df-1
No	188 (62.6)	111 (98.2)	299 (72.4)	P<0.001

* 2 women were unmarried

Table 17 shows the comparative reproductive profile of women utilizing the screening clinic services and of those who could not use the services. It is observed in the survey that as high as 86.6% of the women invited for cancer cervix screening were married before the age of 18yrs. Of the 111 married women who did not attend the cancer cervix screening clinic nearly 95.4% were married off before the age of 18yrs compared to 79.4% among the women attending the screening clinic. This difference in the age at marriage among women utilizing the screening clinic services was found to be highly statistically significant ($P<0.001$).

Of the 413 women invited for cancer cervix screening nearly 23.2% had borne a child before they had attained 18yrs of age. About 27.6% of the women who attended the screening clinic had delivered a child before the age of 18yrs compared to 10.8% among the women who did not attend the screening clinic. This difference in the age at first pregnancy and attendance to screening clinic services in the community was found to be highly statistically significant ($P<0.001$). Nearly 47% of the women surveyed and invited for cancer cervix screening had more than two children. More than 72% of the women who did not attend the screening clinic had two or less than two children whereas 45.4% of the women who attended the screening clinic had less than two children. This difference in the parity status and attendance to cancer cervix screening services was found to be highly statistically significant ($P<0.001$).

Around 27% of the women surveyed and invited for cancer cervix screening at Devarayasamudra PHC area gave a history of vaginal discharge currently or in the past one year. An astonishing 37.4% of the women who came for screening gave an history of vaginal discharge whereas only less than 2% of women with such symptoms did not participate in the screening clinic. This difference in the history of vaginal discharge among women participating in cancer cervix screening was found to be highly statistically significant ($P<0.001$).

Table 18: Univariate and multivariate analysis of predictors of women's participation in cancer cervix screening clinics conducted at Devarayasamudra PHC area, Kolar.

Characteristics	No. of women surveyed & invited for screening clinic			Analysis			
				Univariate		Multivariate	
	Screened (n = 300)	Not screened (n = 113) (n =111)*	Total n =413	OR (95% CI)	P value	OR (95% CI)	P value
Age group							
46 - 60 (yrs)	61 (78.2)	17 (21.8)	78	1.441 (0.8011-2.593)	0.2213	0.937 (0.406-2.162)	0.879
30 - 45 (yrs)	239 (71.3)	96 (28.7)	335				
Education							
Literate	224 (74.9)	75 (25.1)	299	1.493 (0.9343-2.387)	0.0927	3.423 (1.673-7.005)	0.001
Illiterate	76 (66.6)	38 (33.4)	114				
Occupation							
Working	172 (76.4)	53 (23.6)	225	1.521 (0.9851-2.349)	0.0577	1.188 (0.656-2.154)	0.570
Housewife	128 (68)	60 (32)	188				
Caste							
SC, ST, OBC	287 (75.1)	95 (24.9)	382	4.183 (1.976-8.856)	0.0000	3.027 (1.133-8.086)	0.027
General	13 (41.9)	18 (58.1)	31				
Socioeconomic status							
BPL	230 (83.9)	44 (16.1)	274	5.153 (3.242-8.188)	0.0001	4.205 (2.341-7.554)	0.000
APL	70 (50.4)	69 (49.6)	139				
Age at marriage *							
>18 (yrs)	62 (92.5)	05 (7.5)	67	5.523 (2.159-14.13)	0.0008	2.435 (1.178-5.033)	0.016
≤18 (yrs)	238 (69.2)	106 (30.8)	344				
Age at first pregnancy *							
≤18 (yrs)	83 (87.4)	12 (12.6)	95	3.156 (1.647-6.046)	0.0003	1.177 (0.685-4.592)	0.238
>18 (yrs)	217 (68.6)	99 (31.4)	316				
Parity *							
>2	164 (84.5)	30 (15.5)	217	3.256 (2.022-5.244)	0.0000	2.080 (1.110-3.895)	0.022
<2	136 (62.7)	81 (37.3)	194				
Vaginal discharge							
Yes	112 (98.2)	02 (1.8)	114	33.66 (8.011-136.5)	0.0000	28.392 (6.696-120.3)	0.000
No	188 (62.9)	111 (37.1)	299				

Among the women who were invited to attend cancer cervix screening clinics at Devarayasamudra PHC majority (78.2%) of the women who attended belonged to the age group of 46-60 yrs age and they had 1.4 times better utilization of the screening compared to 30-45 yrs age group (P=0.2213). Women who were literate had 1.49 times (P=0.0927) better utilization compared to illiterate women and working women had 1.52 times (P=0.0577) better utilization compared to housewives. Women who belonged to SC, ST and OBC category had 4.18 times (P=0.000) better utilization compared to general category and women belonging to BPL category had 5.15 times (P=0.0001) better utilization compared to APL category and the difference is statistically significant. Women who were married after 18 yrs of age had 5.5 times (P=0.0008) better utilization and women who had delivered before 18 yrs of age had 3.15 times (P=0.0003) better utilization and the difference is statistically significant. Women who had more than two live births had 3.25 times (P=0.000) better utilization and women with history of vaginal discharge had 33.6 times (P=0.000) better utilization and the difference is statistically significant.

Multivariate analysis showed that education, caste, socioeconomic status, age at marriage, parity and history of vaginal discharge were independent factors for utilization of cancer cervix screening services and were statistically significant at 95% CI. Utilisation of screening services is 3.42 times better among literate, 3.02 times better among SC,ST & OBC category, 4.2 times better among BPL category, 2.43 times better among women married after 18 yrs of age, 2.08 times better among women having more than 2 live births and 28.39 times better among women with a history of vaginal discharge in the past one year and was statistically significant.

Table 19: Utilisation of cancer cervix screening clinic services by women aged 30-60 yrs at Devarayasamudra PHC area in Kolar.

Invitation	n (%)
Once	68 (22.6)
Twice	144 (48)
Thrice	88 (29.4)
Total	**300 (100)**

Four hundred and thirteen women aged 30-60 yrs were invited to attend the screening clinic at Devarayasamudra PHC. Out of them 300 (72.6%) attended the screening clinic services. For those women who did not attend the screening clinic on the designated days atleast 2 more visits were made to their house and were invited again. About 22.6% of the women used the screening clinic services with once inviting only and with twice inviting atleast 70.6% had visited the screening clinic.

Table 20: Clinical profile of women who attended cancer cervix screening clinic at Devarayasamudra PHC.

Characteristics	Value (n= 300)
Weight in Kg (Mean ± SD)	48.6 ± 8.6
Height in m (Mean ± SD)	1.53 ± 0.06
BMI (Kg/m^2)	**n (%)**
Underweight (<18.5)	71 (23.6)
Normal (18.5- 24.99)	204 (68)
Overweight (25- 29.99)	18 (6)
Obese (>30)	07 (2.4)

All the 300 women who attended the cancer cervix screening clinic at Devarayasamudra PHC were measured for their weight and height . The mean (SD) weight of these 300 women was 48.6 ± 8.6 Kg and ranged from 31 to 113 Kg. Nearly 23.6% of them were underweight based on their BMI (<18.5Kg/m^2).

Table 21: Vaginal tract infections among women aged 30-60 yrs attending cancer cervix screening clinic at Devarayasamudra PHC, Kolar.

Vaginal tract infection	Clinical examination n=300 n (%)	Pap smear n=300 n (%)
Bacterial vaginosis	20 (48.7)	15 (44.1)
Candidiasis	13 (31.7)	15 (44.1)
Trichomoniasis	07 (17.2)	05 (14.7)
Herpes genitalis	01 (2.4)	01 (2.9)
Total	**41 (13.6)**	**36 (12)**

Table 9 describes the clinical findings of vaginal inspection for evidence of infections with the use of speculum and good lighting. It was found that 41 (13.6%) of the women out of 300 had evidence of vaginal tract infections clinically. Nearly 20 (48.7%) of them had evidence of bacterial vaginosis followed by 13 (39.2%) of them having candidiasis clinically based on an operational definition. Of the 300 Pap smears collected and examined by the pathologist microscopically, 36 (12%) had evidence of vaginal tract infections. All these women identified to have vaginal tract infections either clinically by vaginal tract inspection or based on Pap smear findings were treated as per syndromic approach for RTI/STI management.

Table 22: Results of cervical cancer screening by VIA and Pap smear examination in women aged 30-60 yrs at Devarayasamudra PHC area, Kolar.

Cancer cervix screening	n=300 n (%)
VIA Positive	23 (7.6)
Pap smear Positive *	09 (3)
LSIL	04 (1.3)
HSIL	05 (1.7)

* Bethesda classification for grading pap smear

LSIL- Low grade squamous intraepithelial lesion, HSIL- High grade squamous intraepithelial lesion. Negative Pap smear includes ASCUS (1.7%) and inadequate smears (6.1%). ASCUS- Atypical squamous cells of undetermined significance, Inadequate- Pap smear is not adequate for interpretation.

Table 22 describes the findings of cancer cervix screening among 300 women at Devarayasamudra PHC area. All the women attending the cancer cervix screening clinic were first subjected to per speculum examination to collect Pap smears using a disposable plastic Ayres spatula. After obtaining the smear and ensuring that there is no bleeding VIA was performed. A total of 30 (10%) women were identified to have cervical precancerous lesions by VIA and Pap smear examination in the community based cancer cervix screening program at Devarayasamudra PHC area. It was found that 23 women (77.6%) developed acetowhite areas around the transformation zone of the cervix suggestive of precancerous cervical lesions. The cervical smears were stained with Papaniculaou stain at cytology laboratory in the department of Pathology. There were 9 (3%) Pap smear positive out of which 5 were HSIL and 4 were LSIL. There were no invasive cervical cancer detected in these Pap smears. Out of 291 negative Pap smears 6% were due to inadequate smears. Two (0.6%) women were found to have both VIA and Pap smear positive for precancerous cervical lesions.

Table 23: Social and Reproductive risk factors among women aged 30-60yrs at Devarayasamudra PHC area detected to have cervical precancer.

Risk factors	Screening outcome		Total (n=300)	OR (95% CI)	P value
	Positive (n=30)	Negative (n= 270)			
Age distribution (30-60 yrs)					
30-45	25 (10.5)	214 (89.5)	239	1.308	0.5989
46-60	05 (8.1)	56 (91.9)	61	(0.4793-3.572)	
Education status					
Literate	23 (10.2)	201 (89.8)	224	1.128	0.790
Illiterate	7 (9.2)	69 (90.8)	76	(0.4636-2.744)	
Socioeconomic status					
BPL	26 (11.3)	204 (88.7)	230	2.103	0.1724
APL	4 (5.7)	66 (94.8)	70	(0.708-6.246)	
Age at marriage					
≤ 18 yrs	15 (10)	136 (90)	151	0.9853	0.9693
>18 yrs	15 (10)	134 (90)	149	(0.4634-2.095)	
Age at first Pregnancy					
≤ 18 yrs	10 (12)	73 (88)	83	1.349	0.4646
>18 yrs	20 (9.2)	197 (90.8)	217	(0.6032-3.018)	
Parity					
> 2	19 (11.6)	145 (88.4)	164	1.489	0.3170
≤ 2	11 (8)	125 (92)	136	(0.6825-3.249)	
Vaginal tract infections (clinical findings)					
Present	7 (17)	34 (83)	41	2.113	0.1042
Absent	23 (8.8)	236 (91.2)	259	(0.8925-5.297)	

Table 23 shows profile of various socio demographic and reproductive health factors in women detected to have cervical precancer in the cervical cancer screening program conducted at Devarayasamudra PHC area. Thirty of the 300 (10%) women screened were identified to have cervical precancerous lesions by both VIA and Pap

smear. The profile of age, educational status, socioeconomic status, age at marriage, age at first pregnancy, parity and history of vaginal tract infection were compared among the women with (n=30) and without (n=270) precancerous lesions. The majority of the cases 25 out of 30 (10.5%) were in the 30-45 yrs age group and the cases are 1.3 times higher among younger (30-45 yrs) women (P = 0.5989). The cases were 1.1 times (P = 0.7906) higher among literate compared to illiterate and 2.1 times (P = 0.1724) higher among BPL category compared to APL. Age at marriage has no association with precancerous cervical lesions in this study. The age at first pregnancy before 18 yrs has 1.3 times (P = 0.4646) higher risk compared to women married after 18 yrs of age. There is 1.5 times (P = 0.3170) higher risk of precancerous lesions among women with more than two live births although the difference not statistically significant. Nearly 17% of the cases were among women with history of vaginal tract infections and there is 2.1 times (P = 0.1042) higher risk among those who had vaginal tract infections.

DISCUSSION

This study attempts to find the prevalence of some of the social and reproductive risk factors for cancer of the uterine cervix and the prevalence of cervical precancer among women aged 30-60 yrs in the rural Devarayasamudra Primary health centre (PHC) area in Kolar district. Also, the utilization of community based cervical cancer screening services by these women were studied, which was provided under a partnership between medical college at Kolar and the community. This study finds that a significant proportion of the rural women aged 30-60 yrs in Devarayasamudra PHC area, Kolar are at risk for cancer of the uterine cervix and 10% have cervical precancer. Utilization of cancer cervix screening services by the women was 72.6%. The study also found that being a housewife, belonging to the general caste category, belonging to above poverty line (APL), having reproductive tract problems and having two or less than two children were some of the factors significantly influencing the utilization of cancer cervix screening facilities in the community.

This study at rural Kolar in Karnataka shows that the level of participation in the community based cancer cervix screening program by women aged 30-60 years is 72.6%. This level of participation could be considered as satisfactory considering that no such attempt to organize cancer cervix screening program has been made in Kolar in the past. Nene B and co workers in a cancer cervix screening study conducted in Maharashtra showed a 79% general level of participation of women.[19] In a study conducted in Tanzania to find the acceptance of cancer cervix screening among women, it was observed that 71.9% of them accepted the screening invitation and participated in the screening.[76] This study was designed to include a representative sample of women aged 30-60 years from rural communities of Kolar who are utilizing the services provided by the medical college in a Public Private Partnership (PPP)

with the department of Health and family welfare, Government of Karnataka. Six village clusters were sampled from the 20 villages in Devarayasamudra PHC area. Enumeration of the women aged 30-60 yrs was undertaken by the investigator with the assistance of the female health worker (ANM) and the ASHA of the primary health centre. The perceived advantage of the community based health workers accompanying the investigator to all the households in the selected communities were to expect better co-operation from the household members, to facilitate identification of the houses and hence reducing the chances of missing households as the investigator will not be fully familiar with the community.

Significant percent of the houses were found to be locked and many of the women aged 30-60 years were not available during the day time household visits. Hence atleast 3 visits were made to such houses. Thirty of the 475 enumerated women in these six villages could not be contacted and invited for screening inspite of the 3 mandatory visits to such households. Around 93.6% of the enumerated women could be contacted during the household survey. Similarly in a major cancer of the uterine cervix screening and follow up trial in Maharashtra by Nene B and co workers between 1999 to 2003 on women aged 30-59 years, 92.4% of the enumerated women could be contacted and invited for cancer cervix screening.[19] The important reasons for the non availability of women in the day time which might affect the utilization of cancer cervix screening programs are women would have gone to work, they may have lack of knowledge and understanding on cancer and health and they may have social stigma which are associated with the reproductive health problems.[19,106-108]

Around 32(6.7%) of women had undergone hysterectomy in the past and were hence excluded for screening of the cancer of cervix but were included in the risk factor survey. Thus 445 women were individually contacted and administered an

interview questionnaire pertaining to social and demographic aspects and reproductive health related information. Then these women were given a hand bill containing information on cancer cervix, the risk factors associated with cancer of uterine cervix and modes of its prevention including screening and the dates and venue for screening clinic.

Both the investigator and the accompanying community health worker provided oral information on the importance of screening for cancer of uterine cervix, the method of its screening and the facilities available for follow up and treatment in the primary health centre at Devarayasamudra and in the medical college hospital at Kolar. This approach in the planning phase was perceived to be important as it involved stakeholders involvement and their consensus. Such attempt to provide information on the benefits of screening for cancer cervix, the venue and the date of the screening service was made available to the women again 1-2 days prior to the date of screening. The reason for such a repeated effort to inform the beneficiary was to reinforce the information so as to ensure better utilization of the screening service.[19,76]

Policy, planning and implementation phase

In the planning phase of the cancer cervix screening activity at Devarayasamudra PHC area there was a need to train the investigator for performing VIA and Pap smear collection. The investigator attended a three day workshop on screen and treat methods of cancer cervix at Christian medical college in Vellore, a training for two weeks at the department of OBG in the medical college hospital at Kolar and workshop on cryotherapy at the medical college hospital in Kolar conducted by an expert who had the experience of conducting community based cancer cervix

screening programs. This activity was planned so as to be conducted in the beginning of the implementation phase of the screening program(fig 19).

An effective cervical cancer screening program requires developing awareness and acceptance of screening both among the health care providers and the community. One of the first steps in the policy phase is to determine the burden of pre cancer and cancer of cervix in the community by means of a rapid survey.[3] Key steps in the design and implementation of successful cancer cervix screening programs includes determining goals and policy, planning and implementing the program. Usually health care personnel mainly focus on training of the providers and developing the treatment services for women. Aspects like organization and management of the services are not carefully considered leading to failure of screening programs. This study on organizing and conducting the cancer cervix screening program in rural communities carefully considered the importance of organizing the program with support from the medical college at Kolar, the primary health centre at Devarayasamudra and district health administration of Kolar.[3]

The policy phase of this study involved collecting data on women in the risk group 30-60 years. This included studying the prevalence of socio demographic and reproductive health related risk factors, determining whom to screen and when to screen, making a protocol of screening, assessing the diagnostic and treatment options based on the existing resources in the primary health centre and the medical college hospital and soliciting the resources for the program.[109]

In the planning phase the stake holder's involvement and their consensus for the program was obtained. The various logistics, finance, training aspects and modes of tracking the women in the implementation phase was decided. The investigator was

trained, the information and education (IEC) material was prepared and distributed to the beneficiaries. The screening services in the community was launched.[3]

Social and Reproductive risk factors for cancer cervix in women of 30-60 yrs surveyed at Devarayasamudra PHC area, Kolar.

The interview survey on 445 women aged 30-60 years in Devarayasamudra PHC area found that 70.8% of the women were literate. The female literacy in Kolar according to 2001 and 2011 census is 55.46 and 66.84 respectively. However, regarding the educational status of the women husband's only 55.5% were found to be literate. The male literacy in Kolar according to 2001 and 2011 census is 75.99 and 81.81 percent respectively.[110]

In the surveyed households in Devarayasamudra PHC area of Mulbagal taluk in Kolar district about 65.6% of the respondent women belonged to below poverty line (BPL) category as identified by the government. Around 53.4% of these surveyed women were mainly engaged in unskilled or skilled labour activities. The DLHS 3 data of Kolar district shows that 66.4% of the households have a BPL card in 2008.[112] To substantiate the credibility of the observation of 65.6% of the respondents belonging to below poverty line, the caste distribution of surveyed community was analysed. The observation in the study of a very high proportion of BPL families can be substantiated, as nearly 52.3% of the surveyed women belonged to SC, ST category and another 39.8% belonged to OBC category only 7.9% belong to general category. Similarly Aswathy and co workers in their study on Cervical cancer screening: Current knowledge and practice among women in a rural population of Kerala, India conducted at Cochin during 2009 found that majority of women (59.6%) belong to low socioceconomic status.[87]

Most of the (95.8%) interviewed women were currently married and remaining were unmarried/widows. According to the 2001 Census, more than 3.6 crore or 7.4 per cent women in India are single.[113] Forty three percent of the studied women in Devarayasamudra PHC area were married before they had attained 18 years of age, the mean age at marriage being 18.7±1.9 years. Also 32.6% of these women were pregnant before the age of 18yrs, the mean age at first pregnancy being 20.2±1.9yrs. As per Indian marriage act the minimum age for marriage of women is 18 yrs.[114] According to DLHS survey data 17.5% of the girls get married before attaining 18 yrs in rural Kolar.[112] It is alarming to observe that 43% of the women in Kolar region are married before 18 yrs and a significant percent of them are also bearing children before attaining18 yrs. The well known consequences of such social practices are high maternal mortality rate (MMR), high infant mortality rate (IMR), higher proportion of low birth weight (LBW), premature births and abortions.[112]

Almost 98.9% of the surveyed women were hindus. The percentage of hind us in Kolar is 86.2%.[111] Only 5 women of 445 belong to the muslim community. Around 2.5 lakh population of Kolar are muslims and constitutes to 11.78% of the total population.[115] It is well known that there is no uniform distribution of muslim population in the district and the proportion of muslim population in Devarayasamudra PHC area and panchayat is very less.

Nearly 50% of the interviewed women at Devarayasamudra had more than 2 child births. The women with more than 3 child births in the sample is 24.8 and in rural Kolar is 23.6.[112] Important causes for the high child births could be social preference for male child, poor family planning services provided by the health care sector and ignorance of the women and the community. Also only 3.2% of the 445 interviewed women gave a history of ever using an oral contraceptive pill. According

to DLHS reports only 0.2% of the rural women utilize oral contraceptive pill as a method of family planning.[112] This observation strongly argues that family planning services delivery and utilization in the study area is extremely poor and may be considered as an important factor contributing to 49.2% women in this study having more than 2 child births.

Characteristics of women who utilized cancer cervix screening facilities

Age of the 300 women who decided to attend the cancer cervix screening clinics organized in the primary health centre closer to their community, 53.3% were distributed in the age group of 30-39yrs. Such observations has similarly been made by Nene B and co workers in cervical cancer screening trial at Maharashtra.[19] Also it is observed in the present study that 62.8% of the 113 women who did not come to the screening clinic belonged to the age group 30-39yrs. The incidence of cervical cancer among women in the age group of 30-39 yrs is 13.9 per lakh and the average age of women with CIN III is between 35-44 yrs.[116] Hence there is still a high possibility of women in the high risk age group of 30-39 yrs not utilizing cancer cervix screening facilities inspite of repeated household visits made in co- ordination with community health care providers to invite for cancer cervix screening clinics. Similarly Nene B and co workers found that 47.3% of the women who did not attend the community based cervical cancer screening programs belonged to the age group of 30-39 yrs. [85] Hence women in the younger age groups are more likely not to use community based cancer cervix screening program facilities, but this observation was not statistically significant.

Significant percent of women (55.9%) in the age range of 30-60 yrs belonged to 30-39 yr group. Hence there should be a priority in concentration of cancer cervix

screening in this age group. Some of the likely reasons of young women who are not likely to use cancer cervix screening services are they are likely to be working as labourers, likely to be preoccupied in taking care of young children, might perceive cancer as a problem of the elderly, may have lack of knowledge on cancer, due to financial reasons, lack of interest and fear of procedure and embarrassment to undergo examination.[87,117] It is desirable that to ensure better participation in the cancer cervix screening programs by young women there is a need to consider options of flexible timings in conducting the screening clinic, a need to reassure young women that screening will be conducted in the presence of community health care providers and preferably by women physicians and by ensuring adequate privacy in the screening clinics. The findings of this study that younger age group women are not participating in the screening services in comparison to women above the 40 yrs is contradictory to several studies on cancer cervix screening services carried out in different settings.[84,118,119,120]

Educational status

Women who are less educated were less likely to participate in the community based cancer cervix screening programs.[19] Among the women who did not attend the cancer cervix screening clinic 33.6% of them were illiterate. In comparison 25.4% of the women attending the screening clinic were illiterate. Even though this observation of educational status influencing utilization of screening service was not statistically significant, the point being made here is that illiterate women are more likely not to utilize the cancer screening which are being organised in their own communities and is consistent with the previous study reports.[19,84,119,121] The knowledge on cancer and prevention of cancer is likely to be poor or limited in women with no formal

education or in women who do not have the ability to read. Also the earning potential of illiterate women is likely to be poor which may influence their ability to utilize health care services.[19,85,122] However in this study the screening procedure was free of cost and the transportation of the women from their communities to the screening clinic at PHC was also freely arranged. Hence economic constraints which are associated with low levels of education may not be the true barrier for utilization of cancer cervix prevention services organised in Devarayasamudra PHC area. It is likely that women who are not educated were not able to understand what was told to them during the interview survey and they did not understand the contents of the distributed hand bills.[19,117,123] Probably, they were not able to understand the benefits of a preventive health program such as cancer cervix screening which is done on apparently healthy women.[117] Hence it may be argued that poor educational status of women influences negative participation in cancer cervix screening programs and has to be considered adequately in the planning of cancer cervix screening programs. In terms of considering appropriate strategies it may mean that the process of providing information and education on cancer cervix screening and its benefits to illiterate women should be case specific, culture sensitive and based on the education principle of from known to unknown rather than providing uniform information to all the beneficiaries.[19,121]

It is well observed and studied that women are less empowered than men in the aspects of education, health care and productive ability. As per cencus 45% of females are illiterate as against 25% among men. Ninety percent of rural female workers are not skilled. The enrolment of females is only 31% of the aggregate at the university level and drops to 16% for the professional courses. The National policy on

education envisages that free and compulsory education of satisfactory quality should be provided to all children up to the age of 14 yrs.[125]

Caste

This study clearly shows that women belonging to SC, ST and OBC communities in Devarayasamudra PHC area increasingly participated in the cancer cervix screening program in contrast to women belonging to general caste category who participated poorly in the community based cancer cervix screening program. This difference is statistically significant. The society in the country is mainly divided on caste basis. This is more obvious and practiced in the rural parts of the country. In the selected villages for the study almost 92.4% of the women belong to SC, ST and OBC category. The women belonging to the general caste category in this study namely Brahmin, Lingayat and Vaishyas are generally considered as superior to other castes. Hence the women belonging to general caste may have hesitated or considered as below their status or dignity in participating in a free community based health program where majority of the participants will be from SC, ST and OBC category. Since they would be physically examined in the health centre along with women belonging to the lower caste, the women from the upper caste may have perceived that it is below their status to attend the cancer cervix screening program at the PHC. Based on these caste observations it is appropriate that the community based cancer cervix screening services provided should be case specific, socially and culturally sensitive and need not be generalized.[76,84] The women belonging to general caste should be reassured that their concerns will be considered and aspects such as flexibility of time and the respect for their privacy will be maintained so as to ensure better participation in screening program by all the categories of the community.

The Indian constitution prescribes safeguards and provides protection for OBC's, ST's and SC's to remove social disabilities through removal of restrictions of all types of services and institutions. The society of our country has been characterized by the caste system over the period of time. It is well known that the caste system has influenced the developmental activity including service and divided the society. Some salient features of our caste society includes restriction on marriage, social separation, restrictions on social interactions and feelings, segmental division, etc. There is no doubt that new legal drives, political movements, Indian constitution, city culture etc has influenced and greatly undermined the edifice of casteism. But the practice of identifying people by caste and the prejudice toward various castes especially SC's, ST's and OBC's continues.[126]

The poor utilization of cancer cervix screening services by most of the upper caste women and also by significant number of SC's, ST's & OBC category of women signifies the existence of gaps in cancer cervix screening program delivery at Devarayasamudra PHC area. If we consider the gap in under utilization of cancer cervix screening as partly contributed due to caste feelings, then the condition merits a collective approach. The problem of poor utilization of cancer cervix screening services then can be considered as social problem with linkage to other problems.[127] SC's and ST's may be poorly educated and hence have difficulty in understanding the importance of utilizing cancer cervix screening program. Also their earning capacity may be very low and hence may not be able to afford to visit health care facility because of the inevitable loss of wages on that day. Because majority of the households in Devarayasamudra PHC area belongs to SC, ST and OBC, the upper caste may hesitate to utilize the cancer cervix screening services along with them which was organized as a camp based approach.

Below Poverty line (BPL)

It is observed in this study that majority of the women attending the cancer cervix screening clinic at Devarayasamudra PHC belonged to BPL category. More than 50% of the women who did not attend the cancer cervix screening program were from the lower strata of the above poverty line (APL) category. Also a significant 9.7% of the women belonged to middle class category. It is obvious from these observation that women belonging to better socioeconomic status when compared to the BPL category did not utilize the cancer cervix screening facility at Devarayasamudra PHC and this difference was statistically significant (P=0.0001). Similar observations were made in other studies where women belonging to poor socioeconomic strata of the society have utilized the free community based cancer cervix screening facilities in larger number compared to women from better socioeconomic strata[19,84,90] One reason could be the social differences in terms of the perceived better status of the women and her family from above poverty line category inhibits them to utilize such free health care services along with the women from the BPL category. Also, there may be a perception in the women that such free preventive health services for apparently healthy individuals may be a service for very poor and unaffordable strata of the society. [19,84,90] Hence the communication methods to educate and motivate the women from strata other than BPL category should be specific to their needs and reassuring rather than common information and education given to women from all strata. There should be an inbuilt effort in the planning stage itself to incorporate social and culture specific methods to provide information and education on cancer cervix screening to women based on their strata in society. Efforts must be made to use appropriate methods of inviting the women belonging to above poverty line

(APL) category, in reassuring that their privacy would be maintained in the cancer cervix screening clinic and stressing the importance of their participation in the program to prevent cancer cervix.

It is well understood that poverty is one of the common symptom of the underdeveloped world. Poverty line is the level of income at which a person or a family may barely subsist. The planning commission of India has estimated that 32.7% of rural population are living below the poverty line and the urban and rural combined is 29.2%. The economic development in the rural agrarian sector of the country is worrisome. There is great level of inequality due to an intense division of various strata among the agrarian society. The social security measures does not exist for the 86% of India's working population in the unorganized sector and adding to this is a decline in the agricultural growth. All these factors are making the landless agricultural and semiskilled and unskilled workers to migrate in distressing conditions from rural area to inhospitable towns and cities in search of livelihood. The priority for the many living below poverty line, the poor and the labourers who all work for livelihood in the agrarian society is day to day sustainance. Health may not be a priority to them. Routine efforts by the health sector to promote health and to prevent diseases may not be understood by them in the prevailing socioeconomic situation.[128-130]

Reproductive factors

Women who have married before the age of 18 yrs are less likely to participate in the cancer cervix screening services. Among the women who did not participate in the cancer cervix screening program majority that is 106 (93.8%) out of 113 were those who were married off before they had attained 18 yrs. In contrast, most of the women

who were married after 18 yrs of age attended the cancer cervix screening clinic organized close to their community. The possible reasons for such women participate in low number in the cancer cervix screening program could be because they are likely to be less educated, they are yet to complete their family, they have poor knowledge on health, cancers and their prevention and are not able to understand the information provided by the health care providers.[19,84,87,117]

Parity

This study found that women with 2 or lesser children are less likely to attend the cancer cervix screening program services organized in their community. The rates of women participating in the program is higher if the women had more than 2 children.[19,84] Many studies have looked at parity and usage of cancer cervix screening services and found that having 5 or more children reduces the rates of using such services.

Unlike in this study the observation is on parity status of women having two or less children and more than two children. One reason why women with two or less children are poorly using cancer cervix screening facilities can be because they are in the younger age group and may have not yet planned in completing their families.[19,76,84] As already observed, women in the younger age group are less likely to use screening facility in the study. Women who have more than two children are more likely to have completed their family and are likely to be in the older age group. The reproductive tract illness are more likely, higher in women who have borne more children and who are in the older age group.[139] Hence such women may utilize the cancer cervix screening facilities more frequently.

This behavior among women with two or less children should be recognized as a predictor of poor utilization of cancer cervix screening program. Lack of such women's participation in this study might reflect their lack of understanding of the benefits of cancer cervix screening. The process of providing information and education should be appropriately planned for their better understanding. Since these women with few children are less likely to be ill, they are also less likely to utilize any screening program. Hence more efforts using appropriate education and information methods needs to be tested in such situations and used appropriately.

Vaginal discharge

It is observed in the study that almost all the women (98%) who had abnormal vaginal discharge currently or in the past one yr attended the community based cancer cervix screening clinics at Devarayasamudra PHC. It is well known that women with illness use health care facilities more frequently for curative services than women who are apparently healthy for preventive services.[140,141] Since women without any reproductive symptoms are less likely to use preventive screening services better communication and education approaches should be tested and used among them.

Constraints in women's participation in community based organized cancer cervix screening program.

Considering the social, economic and educational characteristics of the rural women in Kolar who were studied to assess the prevalence of risk factors of cancer cervix and to observe their participation in the organized community based cancer cervix screening program, it is obvious that utilization of services and women empowerment go hand in hand. The status of women empowerment in Indian women will be briefly reviewed. The political constraint of women is reflected in the voting

proportions of females in the 2014 Loksabha elections. The proportion of women voters in this election was 73.8% compared to 77.17% among men in Kolar district.[131] Their record of women as holders of political office is dismal. The central council of ministers formulated after 2014 Loksabha election has only 6 out of 23 (26%) female ministers.[132]

Women's participation in economic activity especially in the rural areas is not recognized. In this study it is found that 53.9 % of women apart from being a house keeper and a mother also have to participate in a gainful economic activity. The prevalent illiteracy and low level of education among them explains their seeking employment in agriculture sector as casual labourers where there will be work differentiation and also wage differentiation compared to men for the same type of work done. Also being a female in rural area they may not aspire to seek jobs outside their place. Further for the educated village women, very few employment opportunity exist. Less than 10% of the female work force is in the agrarian sector. The deep rooted caste system is connected and linked with the occupation and profession. Ex: high castes get more lucrative profession and the low castes are condemned to the low paid professions.[133]

Largest number of weaker sections in the Indian society is constituted by SC's and ST's and are mainly agricultural labourers, unorganized urban labourers and slum dwellers. They are considered as victims of cumulative inequalities and usually are marginalized politically, economically, culturally, educationally and socially.[134] Also since the weaker sections of SC's, ST's and OBC's constitute to the major category in the Devarayasamudra PHC area their requirements in terms of time, social concerns and understanding of health should be considered while planning for the cancer cervix screening program. Involvement of the organizations formed by the weaker sections,

voluntary organization who are working for the welfare of the weaker sections and the government departments concerned for the welfare of the weaker sections must be considered in the planning stage itself.

Socio-cultural barriers in cervical cancer screening

The socio cultural barriers faced by the women in utilizing health care services has to be considered in the planning and implementation of community based cancer cervix screening program. The traditional notion of females being assigned to the home and hearth has resulted in their being deprived of seeking adequate health care facility. Neglect of women's status, importance to male sex at birth, the female predominance in the under five mortality is explanatory to this phenomenon. A working women also has to perform her family duties. Having accepted a subsidiary status at home, neither the women nor the family members appears to have confidence in her ability of decision making. Hence the information on cancer cervix screening program has to be provided to decision makers in family also. This may improve the attendance of women to community based cancer cervix screening programs and their further participation in follow up under the program.[135]

A better women's health status is a basic necessity to their advance in all fields of endeavour. Any serious attempt made to improve the health of the women must also include dealing with biased social customs and cultural traditions that have an impact on their health status. The health problems of Indian women have been identified for priority attention and efforts are being made for Maternal and child health services since the beginning of planned development in the country. But, much remains to be done to improve the health care of the women both in quantitative and qualitative terms.[136]

Equality:

The root causes of prevailing social inequality is well known but not talked in the right manner. Citizens have been identified on the basis of the status of their birth. Public policies are formulated around religion and caste which further reinforce the identification of people based on their caste and religion. Ex: the policy of reservation of seat in educational institutions is on the basis of an identity determined by birth, caste or religion and not 'education for all' or 'education for every deprived child'. People continue to be identified more so in the rural areas based on their caste, subcaste, religion and with a prejudice on SC and ST community.[137] Such prevailing social inequalities will prevent all sections of the society in utilizing a common preventive health service of cancer cervix screening at a common facility like a primary health centre.

Thinking and Reasoning:

Participation of the women in the cancer cervix screening program may have also been influenced by their thinking and reasoning capabilities. The thinking and reasoning about cancer cervix screening and its possible benefit to the women may be dependent on the type and quality of information and education on cancer cervix prevention given to the women.[138]

Screening for cancer cervix

Worldwide all these years it has been accepted that Pap smear examination is the gold standard for cancer cervix screening among women. Very few developed countries for example, North America, Canada, UK, Australia etc, have succeeded in effectively utilizing this test to screen for cervical precancer. However, rather than the method of

screening it is the organizational ability of the health care systems in these countries that has successfully prevented and controlled cancer cervix through cancer cervix screening programmes.[10,11]

The deficiencies in the organizational, managerial capabilities and availability of adequate logistics and trained manpower in most of the developing countries is well known. India is implementing National cancer control program (NCCP) from the year 1975. Prevention of cancer cervix through screening is advocated in this program, but no organized efforts were made all these years because of financial and infrastructure limitations and lack of trained manpower and limited logistics. Sankaranarayanan and co workers have demonstrated the effectiveness of alternative methods for screening of cancer cervix in South Indian rural women.[11,19,20, 39] VIA and VILI as screening methods is found to be as effective as Pap smear examination in detection of precancerous lesions of the cervix. Also, training of community based basic health care workers was undertaken by this group in these studies. This research group has successfully demonstrated that the community based screening of women in the high risk age group is possible in reducing incidence of cancer cervix and deaths due to it among 30-60 years in a single session which involves "screen and treat" approach.[19,48,142] Screening by visual inspection of cervix with acetic acid application and treatment of precancerous lesions with cryotherapy in a single session by community based health workers demonstrated by Sankaranarayanan and co-workers has been replicated in various parts of the globe.[3,19,73,76,142]

Table 24: Comparison of VIA and cervical cytology by Pap smear as screening methods for cervical cancer.

	VIA		Cervical Cytology	
Authors	**Sensitivity**	**Specificity**	**Sensitivity**	**Specificity**
Megavand & co-workers.[143]	0.64	0.98	0.62	0.89
Sankaranarayanan and co-workers.[144,145]	0.90	0.92	0.92	0.90
Sankaranarayanan and co-workers .[146]	0.96	1.00	1.00	0.63
Zimbabwe Project[147]	0.77	0.65	NA	NA
Denny and co-workers .[148]	0.67	0.83	0.75	0.90
Bellinson and co-workers .[149]	0.71	0.74	0.94	0.78

In this study the strategy to provide services for community based cancer cervix screening was to utilize the logistics and organizational capacity of a rural based medical college. The existing facilities of the PHC was utilized in consultation with the stake holders namely the medical officer of PHC, community health workers, the health administration at district level and other trained manpower in the medical college. The focus of the study was mainly to observe how women will utilize cancer cervix screening services provided by trained manpower of medical college hospital in association with community based primary health care workers. The medical college personnel along with PHC personnel were involved in planning, organizing and delivering a cancer cervix screening program in those rural communities which were regularly visited by the medical teachers, medical students and medical trainees for teaching, training, learning and service providing purposes. Hence an already

tested methodology for screening of cancer cervix in rural Indian women was adopted.[46,70] Here no attempt was made to test the effectiveness of VIA as a screening test in comparison with Pap smear. The treatment of the women identified with cervical precancer through VIA and Pap smear screening was planned at the medical college hospital as facilities for transportation of the women and treatment of the women is available in the medical college. Also no attempt was made to train the community based health workers in treating the women identified to have cervical cancer as in the model of Sankaranarayanan and co workers.

In this study 300 rural women aged 30-60 yrs of Kolar district were screened for cancer cervix using both Pap smear and VIA method. Thirty (10%) were identified to have cervical precancer through these cancer cervix screening methods in this community based screening approach carried out by medical college staff in association with the community based health workers. Women identified to have cervical precancer were informed about the report at their doorsteps by the investigator and community based health workers and were advised and invited to the medical college hospital for further management. Twenty one (70%) women identified to have cervical precancer agreed to visit the medical college hospital for further management. These women were accompanied by the investigator and the community based health worker to the department of gynaecology in the medical college hospital where they were further investigated for the confirmation of the positive screening test. The remaining 9 (30%) women gave various reasons for not being able to come to the medical college hospital for further management which included that they will come after sometime or they would like to consult their personal physicians.

Limitations of the study

This study on prevalence of risk factors for cancer cervix among rural women in Kolar and their utilization of community based screening clinics, considers the facilities and manpower in a medical college as a strength for providing cancer cervix screening services in the communities accessible to it. Hence the results of this study pertaining to the utilization of cancer cervix screening services cannot be extrapolated to the communities which do not have access to medical college facilities.

Some of the risk factors for cancer cervix were not measured in this study namely details of menstrual hygiene practices, history of consumption of tobacco and its products and history of exposure to multiple sexual partners. The working hours and weekly day off, was not enquired from the women during the survey. Such information is necessary for planning the appropriate time schedule of cancer cervix screening clinic in their community.

This study considered the medical college, PHC, community based health workers and district health administrators as the main stake holders. The major limitation in such an approach for cancer cervix screening initiative obviously is poor community involvement in policy, planning and implementation. This study made no attempt to seek involvement of village panchayat, women's group mainly the popular self help groups (SHG's), local community based non government organisations (NGO's), women and child welfare department and husbands and other household members of the invited women. There could have been better acceptance of the program by the community and hence better participation not only in the cancer cervix screening activity but also in the further follow up in the medical college hospital if more stake holders were involved actively in this program.

SUMMARY AND CONCLUSION

This study on prevalence of cervical precancer, its social and reproductive risk factors and utilization of community based services for detection and treatment was conducted on rural women aged 30-60 years in Kolar district. The approach to identify women with cervical precancer was based on the proposed intent of government of India to commission atleast one medical college and hospital in each of the 626 districts of the country. Generally the medical colleges have fairly developed logistics support, financial support and manpower support for providing cancer detection, its treatment and prevention services. Medical colleges are associated with the primary health care system in providing medical services for a few rural based and urban based communities. An approach to screen for cervical precancer in rural women aged 30-60 yrs was made considering these aspects.

A rapid interview survey of 445 women identified some of the social and reproductive risk factors for cervical cancer in women aged 30 – 60 years in six villages of Kolar district. These women were invited for screening for cervical precancer in the PHC situated nearer to their community and 72.6% (300) of them participated and utilized the screening services. Ten percent of the screened women were found to have cervical precancer by VIA and Pap smear screening method.

Some important factors influencing their participation in the community based cancer cervix screening program were identified. Factors identified to positively influence the women's participation in community based cancer cervix screening provided by medical college and community based health workers are women aged 45 years and above, women with formal education, women belonging to SC, ST and

OBC category, women working as labourers, women having reproductive tract symptoms and women belonging to BPL category. Social factors which were not favourable for women to utilize the community based cancer cervix screening facilities was being illiterate, belonging to upper caste category, being a regular employee and being a housewife.

The cultural norms that specifically affect women's health are age at marriage, values attached to sex of the child and the ideal role demanded of women by social conventions. All these determine her place within the family, the degree of her access to education, nutrition, health care and accessories of health namely water, sanitation, female education and food. Education, oppurtunities for skill-building, income generation and decision making ability and availability of basic support services are required for women to carry out her multiple roles.

Hence it is essential to address the causes of women's ill-health. Cancer cervix is an important cause of ill-health in women and which is amenable to preventive measures and reduction in its morbidity and mortality. Hence improving the health and social situation of women would have to form an integral part of a multi-sectoral package operationalised simultaneously. Medical colleges, health department, Panchayat raj institutions (PRI), self help groups (SHGs), non government organizations (NGO's) and women and child welfare department can come together for the planning and implementation of cancer cervix screening programs.

This study on organizing community based cancer cervix screening services and study of finding the prevalence of cervical precancer, utilization of the screening

services by women aged 30 – 60 years in rural Kolar was conducted by a rural based medical college in association with community based primary health care workers. The participation of women in the community based cancer cervix screening program was found to be satisfactory. Since no organized community based cervical cancer screening program is been carried out a participation rate of 72.6% to the screening clinic by the invited rural women can be considered as satisfactory. Further involvement of other stake holder's mainly local community based non government organizations (NGOs), self help groups (SHGs) and village panchayats may improve the utilization rates of cancer cervix screening and treatment facility by the women. Also, the involvement of these various stakeholders in the cancer screening services provided by the medical colleges in collaboration with community based health workers may bolster the participation rate of women belonging to the upper caste group, those who are regularly employed, the illiterate and housewives, whose participation rates were limited in this study. This study has demonstrated that there is a need to use appropriate methods of education and motivation based on the various social considerations of caste and social status of the women. This approach in education and information may improve the participation rates of women in the cancer cervix screening services.

This approach of cancer cervix screening and treatment involving medical college, community based primary health care workers and other appropriately choosen community stake holders can be carried out in different districts to reduce the burden of cancer cervix among Indian women.

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ANNEXURES

ANNEXURE1: PROFORMA FOR HOUSEHOLD SURVEY

Study of Risk factors for Cancer of Cervix among women aged 30 – 60 yrs in Devarayasamudra

Village:_____ Date: _____

ASHA: _____

Sl. No.	Household No.	Name of Head of HH	Total members in HH	No. of women in 30-60 yrs age group	Names of women in 30-60 yr age group
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					

ANNEXURE2: PERFORMA FOR CANCER CERVIX RISK FACTOR ASSESSMENT

Study of Risk factors for Cancer of Cervix among women aged 30 – 60 yrs in Devarayasamudra

Village:_____ Date: _____

ASHA: _____

1	**Household No.**				
1a	**Name of Head of HH**				
	Occupation of Head of HH				
	Education of HH				
	No of HH members				
	Religion				
	Caste				
2	No. of women between 30-60yrs				
2a	**Name of women between 30-60yrs**				
	Age				
	Education				
	Occupation				
	Income				
	Mobile No				
	BPL card – Yes/ No				
2b	**Husbands Name**				
	Husbands occupation				
	Husbands education				
	Husbands income				
2c	Total HH income				
2d	Age at menarche				
	Age at marriage				
	Age at first pregnancy				
	Total no. of pregnancies				
	Mode of Delivery:Normal/ LSCS				
	No of abortions				
	No of live births				
	No of living children				
3a	Ever used OCP:Yes/ NO				
	If used OCP - for how many months/yrs				
3b	Ever used Cu-T :Yes / No				
	If used Cu-T - for how many months/yrs				
4a	Menstrual cycles: Regular/ Irregular				
4b	H/O WDPV: In Present: Yes/No In past : Yes/No				
4c	Menopause attained: Yes/ No				
	If Yes, Age at Menopause				
5	Tubectomy: Yes / No				
6	Hysterectomy: Yes/ No				

ANNEXURE 3: PROFORMA USED IN CANCER CERVIX SCREENING CLINIC

Study of Risk factors for Cancer of Cervix among women aged 30 – 60 yrs in Devarayasamudra

Village:_____ Date: _____

ASHA: _____

1	Name	
2	Husbands Name	
3	Age	
4	H/o Diabetes H/o Hypertension Other Chronic Disease History	
5	Anthropometry: Height Weight BMI	
6	GPE: Pulse: BP:	
7	Cervx Uteri: On Inspection Healthy Leucorrhoea Cervicitis Polyps	
8	Cervix Uteri: On speculum examination Bleeds on touch Friable Loss of motility of cervix Induration	
9	Pap Smear Number	
10	Pap Smear Report Result LSIL HSIL SCC ASCUS/AGUS	
11	VIA White lesions: Present / Absent	
12	VIA White lesions Grade: Colour density Surface Margins Vascular pattern	
13	Referral to OBG for Colposcopy guided Biopsy	
14	CRYOTHERAPY Yes /No	
15	Treatment after Cryotherapy	
16	Follow up advice 1 mo, 6 mo, 1 yr	
17	Reason for Cryotherapy refusal	
18	Biopsy report	

ANNEXURE 4: INFORMED CONSENT FORM

Department of Community Medicine: Sri Devaraj Urs Medical College, Kolar

Cancer Cervix Screening Clinic – Devarayasamudra PHC

To be obtained before Screening

Name:

Address:

The doctor/nurse explained to me in detail about the services on early detection and prevention of cervical cancer.

It was explained that I will be interviewed to collect information as part of medical investigation and services.

I agree/ do not agree to be interviewed and to participate.

I understand the following tests will be performed to detect or to exclude precancer/cancer in my uterine cervix (lip of the womb).

- Looking at the surface of the cervix after application of dilute acetic acid
- Taking cells from transformation zone of cervix by using ayre's spatula and examine under microscope in cytology laboratory to exclude or confirm precancerous lesions or cancer.

The information thus obtained from the interview and tests will be kept confidential.
I understand that this procedure is generally harmless, but may occasionally cause some mild complications like bleeding or infection, which can be satisfactorily treated. I also understand that I will be advised appropriate treatment (medication/cryotherapy/surgery/radiotherapy), in the event of any abnormality (infection/precancer/cancer/complications) being detected.
I hereby express my willingness / I am not willing.

Name: Signature:

Place: Date:

ANNEXURE 5: CHECK LIST FOR ORGANISING SCREENING CLINIC

Cancer Cervix Screening among Women aged 30-60 yrs in Devarayasamudra

I. Items required for Performing VIA & Pap Smear Collection:

1. Glass slides
2. Ayres Spatula
3. Biofix Spray Fixative
4. Hand Gloves
5. Slide Tray
5. Cusco's Speculum
6. Torch
7. Fluorescent Bulb
8. Savlon Solution
9. 5% Acetic acid
10. Normal Saline
11. Cotton Swabs, Gauze
12. Sterile Broom Sticks for performing VIA
13. Bowl- 4
14. Betadine Solution
15. Emergency Drug Kit
16. Proformas
17. Consent Forms
18. Hand bills
19. Weighing Scale
20. Measuring tape
21. Sphygmomanometer
22. Banner

ANNEXURE 6: CANCER CERVIX-HAND BILL KANNADA

ಸ್ತ್ರೀ ಆರೋಗ್ಯ ಶಿಬಿರ

ಸ್ಥಳ : ಪ್ರಾಥಮಿಕ ಆರೋಗ್ಯ ಕೇಂದ್ರ,
ದೇವರಾಯಸಮುದ್ರ

ದಿನಾಂಕ : ...../03 / 2014

ಪ್ರತಿಯೊಬ್ಬ ಮಹಿಳೆಯು ಅವಳ ಸಂಸಾರದ ಮುಖ್ಯ ಆಧಾರ ಸ್ತಂಭ. ಅವಳು ತನ್ನ ಸಂಸಾರದ ಒಡನಾಟದ ನಡುವೆ ತನ್ನ ಆರೋಗ್ಯವನ್ನು ನಿರ್ಲಕ್ಷಿಸುತ್ತಾಳೆ. ಎಲ್ಲಾ ಮಹಿಳೆಯರು ಗರ್ಭಕೋಶದ ತೊಂದರೆಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟಂತೆ ಪ್ರತಿ 3 ವರ್ಷಕ್ಕೊಮ್ಮೆ ಪರೀಕ್ಷೆಮಾಡಿಸಿಕೊಳ್ಳಬೇಕು. ಗರ್ಭಕೋಶದ ಕ್ಯಾನ್ಸರ್ ಭಾರತೀಯ ಮಹಿಳೆಯರಲ್ಲಿ ಅತಿ ಸಾಮಾನ್ಯವಾದ ಕ್ಯಾನ್ಸರ್. ಸಾಮಾನ್ಯವಾಗಿ ಇದು ಕೊನೆಯ ಹಂತದಲ್ಲಿ ಪತ್ತೆಯಾಗುವುದು ಹಾಗೂ ಚಿಕಿತ್ಸೆಯು ವಿಫಲವಾಗುವುದು.

ಗರ್ಭಕೋಶದ ಕ್ಯಾನ್ಸರ್‌ಗೆ ಸಾಮಾನ್ಯವಾಗಿ ಯಾರು ಗುರಿಯಾಗುತ್ತಾರೆ.

1. 30-60 ವರ್ಷದೊಳಗಿರುವ ಮಹಿಳೆಯರು.
2. ಮೂರಕ್ಕಿಂತ ಹೆಚ್ಚು ಮಕ್ಕಳು / ಹೆರಿಗೆಯಾದ ಮಹಿಳೆಯರು.
3. ಜನನಾಂಗದ ಸೋಂಕು ಹೊಂದಿರುವ ಮಹಿಳೆಯರು.
4. ಜನನಾಂಗದ ಸ್ವಚ್ಛತೆ ಇಲ್ಲದಿರುವುದು.

ಗರ್ಭಕೋಶದ ಬಾಯಿಯ ಕ್ಯಾನ್ಸರ್‌ನ ತಪಾಸಣೆ

1. ಜನನಾಂಗದ ಪರೀಕ್ಷೆಯನ್ನು ನುರಿತ ವೈದ್ಯರಿಂದ ಮಾಡಲಾಗುವುದು.
2. ಪ್ಯಾಪ್ ಪರೀಕ್ಷೆ ಮಾಡಲಾಗುವುದು ಮತ್ತು ಅದನ್ನು ಶ್ರೀ ದೇವರಾಜ ಅರಸ್ ಮೆಡಿಕಲ್ ಕಾಲೇಜಿನ ರೋಗ ಲಕ್ಷಣ ವಿಭಾಗದ ಪ್ರಯೋಗಶಾಲೆಯಲ್ಲಿ ಪರೀಕ್ಷಿಸಲಾಗುವುದು.
3. ಪರೀಕ್ಷೆಯಿಂದ ಕ್ಯಾನ್ಸರ್ ಇರುವುದು ದೃಢಪಟ್ಟಲ್ಲಿ ಅದರ ಚಿಕಿತ್ಸೆಯ ಬಗ್ಗೆ ಸಲಹೆ ನೀಡಲಾಗುವುದು.
4. 30-60 ವರ್ಷದ ಎಲ್ಲಾ ಮಹಿಳೆಯರು ಸ್ತ್ರೀ ಆರೋಗ್ಯ ಶಿಬಿರದಲ್ಲಿ ಭಾಗವಹಿಸಲು ತಮ್ಮೂರಿನ ಆಶಾ, ಅಂಗನವಾಡಿ ಶಿಕ್ಷಕಿಯರ ಬಳಿ ನೊಂದಾಯಿಸಿ ಮತ್ತು ಶಿಬಿರದಲ್ಲಿ ಭಾಗವಹಿಸಬೇಕೆಂದು ವಿನಂತಿ.

ANNEXURE 7: CANCER CERVIX -HAND BILL ENGLISH

WELL WOMEN CLINIC

Place : PRIMARY HEALTH CENTRE

Devarayasamudra

Date : ...../03/2014

Women plays key role as a care taker in every family & in this process she neglects her health. Every women must undergo examination of her womb once in every 3 years to detect cancer of the cervix in the early stage. Cancer of the uterine Cervix is one of the common preventable cancer in Indian women. It is usually identified in late stage where treatment is not useful.

WHO IS AT RISK FOR CANCER OF CERVIX

1. Women aged 30-60 yrs.
2. Women with 3 or more children.
3. Women with reproductive tract infections.
4. Poor genital hygiene.

Screening for cancer of Uterine cervix

1. Reproductive tract of the women will be examined by a trained medical person.
2. PAP smear will be collected & sent to the pathology laboratory at Sri Devaraj Urs Medical College, Kolar.
3. If the result is positive for cancer cervix early treatment will be advised.
4. All women between 30-60 yes are requested to register their names & attend the screening clinic.

ANNEXURE 8: DISPLAY BANNER

ANNEXURE 9: PAP SMEAR REPORTING FORMAT

	R.L.JALAPPA HOSPITAL & REASEARCH CENTER **(Attached to Sri Devaraj Urs Medical College)** **Tamaka, Kolar-563101** **CYTOLOGY REPORT**	FORMAT NO	PATH - 03
		ISSUE NO	01
		REV NO	00
		DATE	1.9.05

DEPARTMENT OF PATHOLOGY

Report #		Received on			
Name		Age		Sex	
OP/IP #		Ward	OPD	Hospital	RLJH
Reported by		Date of reporting			

Nature of specimen: PAP SMEAR

Clinical diagnosis:

Microscopy:

Result :

Others:

Organisms:

Advice :

ANNEXURE 10: MOU

ಕರ್ನಾಟಕ ಸರ್ಕಾರ

ಜಿಲ್ಲಾ ಆರೋಗ್ಯ ಮತ್ತು ಕುಟು0ಬ ಕಲ್ಯಾಣ ಅಧಿಕಾರಿಗಳ ಕಾರ್ಯಾಲಯ ಕೋಲಾರ.

ಸ0ಖ್ಯೆ:ಡಿಇವಿ/42/2010–11

ದಿನಾ0ಕ 20/4/2010

ರವರಿಗೆ:

ಪ್ರಾ0ಶುಪಾಲರು
ಶ್ರೀ ದೇವರಾಜ ಅರಸ್ ವೈದ್ಯಕೀಯ ಮಹಾವಿದ್ಯಾಲಯ,
ಟಮಕ
ಕೋಲಾರ.

ಮಾನ್ಯರೇ,

ವಿಷಯ: ಪ್ರಾಥಮಿಕ ಆರೋಗ್ಯ ಕೇ0ದ್ರ ದೇವರಾಯಸಮುದ್ರ, ಮುಳುಬಾಗಿಲು ತಾಲ್ಲೂಕು ಇದನ್ನು ಎರಡು ವರ್ಷಗಳ ಅವಧಿ ತೆಗೆದುಕೊಳ್ಳುವ ಬಗ್ಗೆ.

ಉಲ್ಲೇಖ:ತಮ್ಮ ಪತ್ರದ ಸ0ಖ್ಯೆ ಡಿಯುಎ0ಸಿ/ಕೆಎಲ್ಆರ್/ಎಡಿಎ0ಎನ್/19/2009–10 ದಿನಾ0ಕ 1/4/2010.

** ** **

ವಿಷಯಕ್ಕೆ ಸ0ಬ0ದಿಸಿದ0ತೆ ಉಲ್ಲೇಖ ಪತ್ರದನ್ವಯ, ಶ್ರೀ ದೇವರಾಜ ಅರಸ್ ವೈದ್ಯಕೀಯ ಮಹಾವಿದ್ಯಾಲಯದಿ0ದ ಗ್ರಾಮೀಣ ಪ್ರದೇಶದಲ್ಲಿರುವ ಪ್ರಾಥಮಿಕ ಆರೋಗ್ಯ ಕೇ0ದ್ರ ದೇವರಾಯಸಮುದ್ರ, ಮುಳುಬಾಗಿಲು ತಾಲ್ಲೂಕು ಇದನ್ನು ಎರಡು ವರ್ಷಗಳ ಅವಧಿ ದತ್ತು ತೆಗೆದುಕೊ0ಡು ಕಾರ್ಯನಿರ್ವಹಿಸಲು ಈ ಮೂಲಕ ಒಪ್ಪಿರುವುದರಿ0ದ ಪ್ರಾಆಕೇ0ದ್ರದ ಸಿಬ್ಬ0ದಿ ವರ್ಗದವರ ವೇತನ ಶ್ರೇಣಿ ಮತ್ತು ವಿದ್ಯಾರ್ಹತೆಯ ಬಗ್ಗೆ ಮಾಹಿತಿಯನ್ನು ಈ ಪತ್ರಕ್ಕೆ ಆಡಕವಿರಿಸಿ ತಮ್ಮ ಮು0ದಿನಕ್ರಮಕ್ಕಾಗಿ ಕಳುಹಿಸಿದೆ.

ತಮ್ಮ ನ0ಬುಗೆಯ,

ಜಿಲ್ಲಾ ಆರೋಗ್ಯ ಮತ್ತು ಕುಟು0ಬ
ಕಲ್ಯಾಣ ಅಧಿಕಾರಿಗಳು, ಕೋಲಾರ.

ಪ್ರತಿಯನ್ನು:–

1. ಆಡಳಿತ ವೈದ್ಯಾಧಿಕಾರಿಗಳು, ಪ್ರಾಆಕೇ0ದ್ರ ದೇವರಾಯಸಮುದ್ರ, ಮುಳುಬಾಗಿಲು ತಾಲ್ಲೂಕು ರವರ ಮಾಹಿತಿಗಾಗಿ ರವಾನಿಸಿದೆ.
2. ತಾಲ್ಲೂಕು ಆರೋಗ್ಯಾಧಿಕಾರಿಗಳು, ಮುಳುಬಾಗಿಲು ರವರ ಮಾಹಿತಿಗಾಗಿ ರವಾನಿಸಿದೆ.
3. ಕಛೇರಿಪ್ರತಿ.

ಜಿಲ್ಲಾ ಆರೋಗ್ಯ ಮತ್ತು ಕುಟು0ಬ
ಕಲ್ಯಾಣ ಅಧಿಕಾರಿಗಳು, ಕೋಲಾರ.

MASTER CHART

Grouping	village	Name	Education	Occupation	Age	Wt	Ht	Husband name	Occupation	Marital status	H education	Parity	Abortions	Religion	caste	age at marriage	age at first pregnancy	contraceptive use	menstrual cycle	menopause	No of members	income		vaginal discharge	VIA	pap	outcome	BMI	BMI coded	hysterectomy	SES
1	V.Guttahalli	Aruna	1	housewife	35	113	1.61	Satish	Manual labourer	married	0	2	0	1	OBC	21	22	no	regular	no	4	3000	White d	1	Negativ	Negativ	0	43.59	4	no	5
1	Ramasandra	roopa	1	housewife	30	58	1.58	Manjunath	Manual labourer	married	2	2	0	1	OBC	19	21	no	regular	no	4	2000	none	0	Negativ	Negativ	0	23.23	2	no	6
1	V.Guttahalli	Papamma	0	manual labour	60	31	1.46	Munivenkatappa	Manual labourer	married	1	4	0	1	OBC	16	18	no	regular	attaine	6	4000	none	0	Negativ	Negativ	0	14.54	1	no	6
1	Devarayasamudra	Rukmini	1	housewife	32	33	1.5	Lokesh	Manual labourer	married	0	2	2	1	st	19	20	no	regular	no	4	3000	none	0	Negativ	Negativ	0	14.67	1	no	5
1	Devarayasamudra	Vasanthamma	1	housewife	32	33	1.5	Lokesh	agriculture	married	0	2	2	1	sc	19	20	no	regular	no	4	3000	none	0	Negativ	Negativ	0	14.67	1	no	5
1	V.Guttahalli	Gayathri	1	agriculture	30	35	1.5	Yellappa	Manual labourer	married	0	3	0	1	OBC	19	20	no	regular	no	5	2000	White d	1	Negativ	Negativ	0	15.56	1	no	6
1	V.Guttahalli	Nellamma	1	housewife	30	35	1.5	Rameshappa	Manual labourer	married	1	2	0	1	sc	20	21	no	regular	no	4	2000	White d	1	Negativ	Negativ	0	15.56	1	no	6
1	Kothamangala	Lakshmi	1	agriculture	35	35	1.48	Srinivasa	agriculture	married	0	2	0	1	st	19	22	no	regular	no	4	2000	White d	1	positive	Negativ	1	15.98	1	no	6
1	Kothamangala	Lakshmi	1	agriculture	35	35	1.48	Nagraj	Manual labourer	married	1	2	0	1	OBC	19	22	no	regular	no	4	2000	White d	1	positive	Negativ	1	15.98	1	no	6
1	V.Guttahalli	Venkataratna	0	agriculture	40	35	1.5	Ramappa	Manual labourer	married	0	2	0	1	sc	20	21	no	irregular	no	4	2000	none	0	Negativ	Positive	1	15.56	1	no	6
1	V.Guttahalli	Bidamma	0	agriculture	60	35	1.44	Sandappa	Manual labourer	married	0	4	0	1	OBC	17	18	no	regular	attaine	6	4000	none	0	Negativ	Negativ	0	16.88	1	no	6
1	Devarayasamudra	Renuka	1	housewife	30	36	1.48	Narayanaswamy	Manual labourer	married	1	3	0	1	OBC	19	21	no	regular	no	5	3000	White d	1	Negativ	Negativ	0	16.44	1	no	6
1	Ramasandra	Renuka	1	housewife	30	36	1.47	Narayanaswamy	Manual labourer	married	0	2	0	1	OBC	21	22	no	regular	no	4	2000	none	0	Negativ	Negativ	0	16.66	1	no	6
1	Ramasandra	Saraswathamma	1	manual labour	35	36	1.52	Nagarajappa	Manual labourer	married	0	2	0	1	sc	19	21	no	regular	no	4	2000	White d	1	Negativ	Negativ	0	15.58	1	no	6
1	V.Guttahalli	Gowramma	1	agriculture	30	37	1.55	Varalu murthy	Manual labourer	married	0	2	0	1	sc	20	23	no	regular	no	4	3000	White d	1	Negativ	Negativ	0	15.4	1	no	5
1	Devarayasamudra	Vineela	1	housewife	32	37	1.55	Gangadev	Manual labourer	married	0	3	0	1	sc	21	22	no	irregular	no	5	3000	none	0	Negativ	Negativ	0	15.4	1	no	6
1	V.Guttahalli	Radhamma	0	agriculture	30	38	1.3	Thimappa	Manual labourer	married	0	2	0	1	sc	20	22	no	regular	no	4	2000	none	0	Negativ	Negativ	0				
1	Devarayasamudra	Aarti	2	housewife	32	38	1.56	K. R. Govindappa	Manual labourer	married	0	5	4	1	OBC	20	21	no	regular	no	6	4000	white d	1	Negativ	Negativ	0	15.61	1	no	6
1	Kamadatti	Lakshmidevamma	1	agriculture	40	38	1.5	Venkateshappa	shop owner	married	1	3	0	1	OBC	17	18	no	regular	no	5	5000	none	0							
1	Ramasandra	Lakshmidevi	1	manual labour	30	39	1.47	Manjunatha	Manual labourer	married	0	1	0	1	OBC	18	20	no	regular	no	4	2000	White d	1	Negativ	Negativ	0	18.05	1	no	6
1	Devarayasamudra	Hanumakka	1	manual labour	38	39	1.52	Late Venkataramappa	Manual labourer	widow	1	3	0	1	sc	17	18	no	regular	no	4	2000	White d	1	Negativ	Negativ	0	16.88	1	no	6
1	V.Guttahalli	Ratnamma	1	housewife	45	39	1.44	Ramappa	agriculture	married	1	2	0	1	sc	20	22	no	regular	no	4	2000	White d	1	Negativ	Negativ	0	18.81	2	no	6
1	Devarayasamudra	Meenamma	0	manual labour	30	40	1.48	Bhaskarappa	agriculture	married	0	3	0	1	sc	15	16	no	regular	no	5	4000	none	0	Negativ	Negativ	0	18.26	1	no	5
1	Kamanur	Kamalamma	1	manual labour	30	40	1.44	seenappa	Manual labourer	married	1	1	0	1	sc	18	21	no	regular	no	6	4000	none	0	Negativ	Negativ	0	19.29	2	no	6
1	Kothamangala	Mamata	1	housewife	30	40	1.48	Late Venkateshappa	Manual labourer	widow	0	2	0	1	sc	19	22	no	regular	no	4	2000	none	0	Negativ	Negativ	0	18.26	1	no	6
1	V.Guttahalli	Anitha	1	housewife	30	40	1.55	Chalapathi	Manual labourer	married	0	2	0	1	sc	20	21	no	regular	no	4	2000	White d	1	Negativ	Negativ	0	16.65	1	no	6
1	V.Guttahalli	Bharathi	1	housewife	30	40	1.57	Harisha	Manual labourer	married	0	1	0	1	sc	20	21	no	regular	no	4	2000	White d	1	Negativ	Negativ	0	16.23	1	no	6
1	Ramasandra	Yellamma	1	agriculture	30	40	1.54	Rajappa	Manual labourer	married	0	0	0	1	gen	20	20	no	regular	no	3	2000	none	0	Negativ	Negativ	0	16.87	1	no	6
1	Devarayasamudra	Narayamma	1	manual labour	35	40	1.51	Ujanappa	agriculture	married	0	3	0	1	OBC	19	21	no	regular	no	5	3000	none	0	Negativ	Negativ	0	17.54	1	no	6
1	V.Guttahalli	Shylaja	1	agriculture	35	40	1.62	Venkatesh	Manual labourer	married	0	1	0	1	OBC	20	22	no	regular	no	4	2000	none	0	Negativ	Negativ	0	15.24	1	no	6
1	V.Guttahalli	Pramilamma	1	housewife	35	40	1.55	Rajappa	agriculture	married	1	3	0	1	OBC	20	21	no	regular	no	5	4000	none	0	Negativ	Negativ	0	16.65	1	no	5
1	V.Guttahalli	Ispramma	0	manual labour	36	40	1.63	Shankarappa	Manual labourer	married	1	2	0	1	OBC	20	22	no	regular	no	4	2000	none	0	Negativ	Negativ	0	15.06	1	no	6
1	Devarayasamudra	Dhanalakshmi	1	housewife	38	40	1.48	Venkataswami	Manual labourer	married	0	4	0	1	OBC	21	22	no	regular	no	6	3000	none	0	Negativ	Negativ	0	18.26	1	no	6
1	Devarayasamudra	Prabavati	2	housewife	38	40	1.49	Venkataramappa	Manual labourer	married	0	3	0	1	OBC	22	25	no	regular	no	5	5000	none	0	Negativ	Negativ	0	18.02	1	no	5
1	Kamanur	Sheela	0	manual labour	40	40	1.41	Krishnappa	Manual labourer	married	0	3	0	1	sc	16	17	no	regular	no	5	3000	none	0	Negativ	Negativ	0	20.12	2	no	6
1	Kamadatti	Muniyamma	0	manual labour	40	40	1.41	Krishnappa	agriculture	married	1	3	0	1	gen	16	17	no	regular	no	5	3000	none	0	Negativ	Negativ	0	20.12	2	no	6
1	Kamanur	Savitramma	0	manual labour	40	40	1.51	Shivanna	Manual labourer	married	0	3	0	1	OBC	18	20	no	regular	no	5	2000	none	0	Negativ	Negativ	0	17.54	1	no	6
1	Kamadatti	Ishwaramma	0	manual labour	40	40	1.51	R. N. Yenkappa	agriculture	married	1	3	0	1	OBC	18	20	no	regular	no	5	2000	none	0	Negativ	Negativ	0	17.54	1	no	6
1	Devarayasamudra	Sushilamma	1	housewife	40	40	1.5	Govindappa	Manual labourer	married	0	2	0	1	sc	20	23	no	regular	no	3	3000	none	0	positive	Negativ	1	17.78	1	no	5
1	Kamanur	Radha	0	manual labour	45	40	1.57	Govindappa	Manual labourer	married	0	5	0	1	sc	16	18	no	irregular	no	7	2000	none	0	Negativ	Negativ	0	16.23	1	no	6
1	Devarayasamudra	Venkatamma	0	manual labour	45	40	1.57	Gurappa	agriculture	married	1	5	0	1	OBC	16	18	no	irregular	no	7	2000	none	0	Negativ	Negativ	0	16.23	1	no	6
1	Ramasandra	Shanthamma	0	agriculture	45	40	1.46	Narayanaswamy	Manual labourer	married	1	3	0	1	OBC	17	18	no	regular	attaine	5	3000	none	0	Negativ	Negativ	0	18.77	2	no	6

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1	V.Guttahalli	Jayamma	0	manual labour	45	40	1.49	M. Venkataramappa	Manual labourer	married	1	0	0	1	OBC	20	21	no	regular	attaine	4	2000	none	0	Negativ	Negativ	0	18.02	1	no	6
1	Devarayasamudra	Anjamma	1	housewife	48	40	1.4	Venkatesha	Manual labourer	married	0	2	0	1	sc	19	20	no	regular	attaine	4	2000	none	0	Negativ	Negativ	0	20.41	2	no	6
1	Devarayasamudra	Gangamma	1	manual labour	50	40	1.52	Muniyappa	Manual labourer	married	0	3	0	1	sc	16	17	no	regular	attaine	5	3000	none	0	Negativ	Negativ	0	17.31	1	no	6
1	Devarayasamudra	Thimakka	1	manual labour	50	40	1.5	Late Salapurappa	Manual labourer	widow	0	3	0	1	OBC	16	17	no	regular	attaine	6	5000	none	0	Negativ	Negativ	0	17.78	1	no	5
1	Kamadatti	Tholasamma	0	manual labour	50	40	1.5	Anjappa	Manual labourer	married	0	3	0	1	OBC	18	19	no	regular	attaine	5	2000	none	0	Negativ	Negativ	0	17.78	1	no	6
1	Devarayasamudra	Salamma	1	agriculture	55	40	1.52	Narayanappa	Manual labourer	married	1	4	0	1	sc	15	17	no	regular	attaine	6	4000	none	0	Negativ	Negativ	0	17.31	1	no	6
1	Kamadatti	Chinamma	0	manual labour	55	40	1.52	Narayanappa	Manual labourer	married	0	4	0	1	sc	16	18	no	regular	attaine	6	2000	none	0							
1	V.Guttahalli	Venkatamma	0	manual labour	60	41	1.54	Subanna	agriculture	married	0	6	0	1	OBC	15	17	no	irregular	attaine	9	6000	none	0	Negativ	Positive	1	17.29	1	no	6
1	Kothamangala	Lakshmidevamma	1	manual labour	30	42	1.48	Muniyappa	Manual labourer	married	1	5	0	1	sc	16	19	no	regular	no	8	4000	white d	1	Negativ	Negativ	0	19.17	2	no	6
1	V.Guttahalli	Eshwaramma	1	housewife	30	42	1.65	Shankarappa	Manual labourer	married	1	1	0	1	sc	17	21	no	irregular	no	3	2000	Menno	1	Negativ	Negativ	0	15.43	1	no	6
1	V.Guttahalli	Nagamma	1	manual labour	30	42	1.48	Narayanaswamy	Manual labourer	married	1	3	0	1	st	18	19	no	regular	no	5	2000	White c	1	Negativ	Negativ	0	19.17	2	no	6
1	Kothamangala	Ratna	1	manual labour	37	42	1.58	Muniraju	Manual labourer	married	0	2	0	1	sc	17	19	no	regular	no	5	2000	White c	1	Negativ	Negativ	0	16.82	1	no	6
1	V.Guttahalli	Kamalamma	1	manual labour	37	42	1.58	Muniraju	Manual labourer	married	1	2	0	1	OBC	17	19	no	regular	no	5	2000	White c	1	Negativ	Negativ	0	16.82	1	no	6
1	Ramasandra	Lakshmamma	1	housewife	37	42	1.53	Hanumanthappa	Manual labourer	married	0	4	0	1	OBC	18	19	no	regular	no	6	3000	White c	1	Negativ	Negativ	0	17.94	1	no	6
1	Kamadatti	Venkatamma	1	agriculture	40	42	1.46	Munivenkatappa	Manual labourer	married	0	4	0	1	st	19	20	no	regular	no	6	2000	White c	1	Negativ	Positive	1	19.7	2	no	6
1	Devarayasamudra	Tara	1	agriculture	45	42	1.42	Ranganath	shop owner	married	2	2	0	1	sc	21	23	no	regular	no	4	10000	none	0	Negativ	Negativ	0	20.83	2	no	4
1	Kamanur	Muniyamma	1	manual labour	50	42	1.46	Lakshmanna	agriculture	married	1	2	0	1	sc	20	21	no	regular	attaine	4	2000	White c	1	positive	Negativ	1	19.7	2	no	6
1	Ramasandra	Vanaja	1	housewife	30	43	1.52	Nagaraj	Manual labourer	married	1	2	0	1	sc	20	21	no	regular	no	4	2000	none	0	Negativ	Negativ	0	18.61	2	no	6
1	Devarayasamudra	Drakshayini	2	housewife	30	43	1.55	Nagesh	Electrician	married	2	1	0	1	OBC	22	24	yes	regular	no	5	8000	none	0	Negativ	Negativ	0	17.9	1	no	5
1	Devarayasamudra	Suma	2	housewife	32	43	1.48	Chandrashekar	clerk	married	2	2	0	1	sc	21	22	no	regular	no	4	7000	none	0	Negativ	Negativ	0	19.63	2	no	5
1	Ramasandra	Radhamma	1	manual labour	35	43	1.48	Anjappa	agriculture	married	1	3	0	1	OBC	17	18	no	regular	no	6	3000	none	0	Negativ	Positive	1	19.63	2	no	6
1	Kamadatti	Rajamma	1	agriculture	35	43	1.66	Muniyappa	Manual labourer	married	0	3	0	1	gen	18	19	no	regular	no	5	3000	none	0	Negativ	Negativ	0	15.6	1	no	6
1	Devarayasamudra	Kalavathi	2	housewife	35	43	1.52	Venkatesh	Driver	married	1	2	0	1	OBC	23	24	no	regular	no	5	3000	White c	1	positive	Negativ	1	18.61	2	no	6
1	Ramasandra	Rajamma	0	manual labour	40	43	1.48	seenappa	Manual labourer	married	1	4	0	1	sc	16	18	no	regular	no	6	3000	none	0	Negativ	Negativ	0	19.63	2	no	6
1	Kothamangala	Munilakshmamm	0	manual labour	40	43	1.48	Krishnappa	Manual labourer	married	1	4	0	1	st	16	18	no	regular	no	6	3000	none	0	Negativ	Negativ	0	19.63	2	no	6
1	Ramasandra	Narayanamma	1	agriculture	40	43	1.5	Hanumappa	Manual labourer	married	1	1	0	1	gen	21	23	no	regular	no	4	2000	White c	1	Negativ	Negativ	0	19.11	2	no	6
1	Kothamangala	Lakshmakka	1	manual labour	45	43	1.48	Subbanna	Manual labourer	married	1	6	0	1	sc	15	18	no	regular	attaine	10	5000	White c	1	Negativ	Negativ	0	19.63	2	no	6
1	V.Guttahalli	Krishnamma	1	manual labour	45	43	1.48	srinivasappa	Manual labourer	married	1	6	0	1	OBC	15	18	no	regular	attaine	10	5000	White c	1	Negativ	Negativ	0	19.63	2	no	6
1	Devarayasamudra	Lakshamma	0	manual labour	50	43	1.53	Narayanappa	Manual labourer	married	0	3	0	1	OBC	14	15	no	regular	attaine	6	4000	none	0	Negativ	Negativ	0	18.37	1	no	6
1	Kothamangala	venkatamma	0	manual labour	50	43	1.52	Thimmappa	agriculture	married	0	2	0	1	OBC	16	18	no	regular	attaine	4	2000	none	0	Negativ	Negativ	0	18.61	2	no	6
1	Kothamangala	Gayamma	0	manual labour	50	43	1.52	Nagappa	Manual labourer	married	1	2	0	1	sc	16	18	no	regular	attaine	4	2000	none	0	Negativ	Negativ	0	18.61	2	no	6
1	Ramasandra	Shobha	1	housewife	30	44	1.64	Venkataramappa	Manual labourer	married	1	0	0	1	gen	22	22	no	regular	no	3	2000	White c	1	positive	Negativ	1	16.36	1	no	6
1	V.Guttahalli	Manjula	1	housewife	35	44	1.5	Swamappa	agriculture	married	0	3	0	1	sc	17	19	no	irregular	no	6	4000	post-co	1	positive	Negativ	1	19.56	2	no	6
1	Kothamangala	Venkatamma	1	housewife	35	44	1.55	Chalpati	Manual labourer	married	1	2	0	1	OBC	20	22	no	regular	no	4	2000	none	0	Negativ	Negativ	0	18.31	1	no	6
1	Kamadatti	Venkatamma	1	housewife	35	44	1.55	Chalpati	carpenter	married	2	2	0	1	OBC	20	22	no	regular	no	4	7000	none	0	Negativ	Negativ	0	18.31	1	no	5
1	Devarayasamudra	Aarti	1	housewife	38	44	1.5	Srirama	Manual labourer	married	0	2	0	1	OBC	21	22	no	regular	no	4	2000	White c	1	Negativ	Negativ	0	19.56	2	no	6
1	Devarayasamudra	Leelavathi	1	agriculture	42	44	1.44	Shivlingappa	Manual labourer	married	1	1	0	1	OBC	21	23	no	regular	no	4	2000	none	0	Negativ	Negativ	0	21.22	2	no	6
1	Kothamangala	Nagamma	1	manual labour	45	44	1.58	Anjappa	Manual labourer	married	1	6	0	1	st	16	18	no	regular	no	6	4000	none	0	Negativ	Negativ	0	17.63	1	no	6
1	Devarayasamudra	Munilakshmamm	1	housewife	45	44	1.44	Prasannakumar	agriculture	married	2	2	0	1	OBC	18	20	no	regular	no	4	3000	none	0	Negativ	Negativ	0	21.22	2	no	5
1	Kothamangala	Venkatalakshman	1	housewife	45	44	1.48	Venkataramappa	Manual labourer	married	0	3	0	1	sc	19	21	no	regular	no	5	3000	White c	1	Negativ	Negativ	0	20.09	2	no	6
1	Kamanur	Padmamma	0	agriculture	50	44	1.48	Late Bathappa	Manual labourer	widow	1	2	0	1	sc	21	22	no	regular	attaine	4	2000	none	0	Negativ	Negativ	0	20.09	2	no	6
1	Kamadatti	Sarasamma	0	manual labour	30	45	1.54	Srinivas	Manual labourer	married	0	4	0	1	sc	17	19	no	regular	no	6	2000	none	0	Negativ	Negativ	0	18.97	2	no	6
1	V.Guttahalli	Renuka	1	housewife	30	45	1.6	Srinivas	Manual labourer	married	0	2	0	1	sc	18	20	no	regular	no	4	3000	White c	1	Negativ	Negativ	0	17.58	1	no	5
1	Devarayasamudra	Sujatha	1	agriculture	30	45	1.48	Venkatesh	agriculture	married	1	3	0	1	OBC	18	20	no	regular	no	5	4000	none	0	Negativ	Negativ	0	20.54	2	no	5
1	Kothamangala	Shantha	2	housewife	30	45	1.54	Subramanya	Manual labourer	married	2	2	0	1	sc	18	21	no	regular	no	6	4000	White c	1	Negativ	Negativ	0	18.97	2	no	6
1	Kothamangala	Venkataratnamm	1	housewife	30	45	1.5	Subbanna	agriculture	married	0	2	0	1	OBC	19	20	no	regular	no	4	5000	White c	1	Negativ	Negativ	0	20	2	no	5
1	Devarayasamudra	Venkataratnamm	1	housewife	30	45	1.5	Nagraj	attender	married	1	2	0	1	sc	19	20	no	regular	no	4	5000	White c	1	Negativ	Negativ	0	20	2	no	5