

RESEARCH ARTICLE

Attitudes of South Asian Women to Breast Health and Breast Cancer Screening: Findings from a Community Based Sample in the United States

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Abstract

Background: Breast cancer incidence is increasing among South Asian migrants to the United States (US). However, their utilization of cancer screening services is poor. This study characterizes attitudes of South Asians towards breast health and screening in a community sample. **Materials and Methods:** A cross-sectional survey based on the Health Belief Model (HBM) was conducted among South Asians (n=124) in New Jersey and Chicago. The following beliefs and attitudes towards breast cancer screening were assessed—health motivation, breast self-examination confidence, breast cancer susceptibility and fear, and mammogram benefits and barriers. Descriptive statistics and Spearman rank correlation coefficients were computed for HBM subscales. **Findings:** Mean age of participants was 36 years with an average 10 years stay in the US. Most women strived to care for their health (3.82±1.18) and perceived high benefits of screening mammography (3.94±0.95). However, they perceived lower susceptibility to breast cancer in the future (2.30±0.94). **Conclusions:** Increasing awareness of breast cancer risk for South Asian women may have a beneficial effect on cancer incidence because of their positive attitudes towards health and breast cancer screening. This is especially relevant because South Asians now constitute one of the largest minority populations in the US and their incidence of breast cancer is steadily increasing.

Keywords: Breast cancer screening - South Asians - minority groups - attitudes - health belief model

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Introduction

Over the last decade, the United States (US) has undergone a significant increase in racial and ethnic diversity in its population. Of note, in 2010, the Asian population grew faster than any other race, increasing by 43% since 2000. According to the census, South Asians (i.e., Asian Indians, Pakistanis, Sri Lankans, Bangladeshis, Nepalese, Bhutanese and Maldivian) represent the largest Asian group, with a population of 3.44 million (Hoeffel et al., 2012). An increasing migration rate from their home country has made this race a sizeable minority in the country.

With increased migration there has been a corresponding rise in the rates of chronic diseases among South Asians, including cancer. Breast cancer is the most frequently diagnosed cancer in Asian women (Miller et al., 1996; D'Souza et al., 2013). Although South Asian women in their home countries are reported to have a low incidence of breast cancer, changing global patterns indicate growing

trends similar to other developed countries (Bray et al., 2004; Althuis et al., 2005; Ghumare and Cunningham, 2007). Migrant studies have clearly shown that as the number of years lived in developed countries such as the US increases, the risk of breast cancer also increases (Kaur, 2000; National Cancer Institute, 2003). Asian women residing in Asia have the lowest incidence of breast cancer compared to Asians who have migrated to the US or Asians who are born in the US (Ziegler et al., 1993; Stanford et al., 1995). As the rate of breast cancer in South Asian women living in the US is expected to gradually approach the rate in western populations, it becomes important to examine and understand their attitudes and beliefs towards breast cancer screening.

Timely implementation of breast cancer screening services not only averts a loss of significant number of life years, but also reduces a considerable burden on the health care system (Elixhauser, 1991; Maciosek et al., 2010). Yet, utilization of breast cancer screening services is poor in South Asian women living in Asia (Maqsood et al., 2009;

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Bhatt et al., 2011; Grosse Frie et al., 2013), the US (Islam et al., 2006; Glenn et al., 2009; Lee et al., 2010) as well as other western countries (Sutton et al., 2001; Szczepura et al., 2008; Price et al., 2010; Rajan et al., 2011; Peltzer and Phaswana-Mafuya, 2014). Across the various studies among South Asians, the mammography rates range from 30-56%. This is notably low, compared to other Asian sub-groups (e.g., the Japanese) or non-Hispanic whites whose rates are as high as 65-70% (Lee et al., 2010; Tsunematsu et al., 2013). In developing countries, minimal public awareness about breast cancer may be responsible for poor cancer screening behaviors (Khokhar, 2012a); however, studies in the Western world report access and acculturation-related factors to be associated with lower use of breast cancer screening in South Asian women (Islam et al., 2006; Glenn et al., 2009; Rakowski et al., 2010; Menon et al., 2012). Lack of a clear understanding of the attitudes and beliefs of these women towards cancer screening precludes the development of appropriate interventions to overcome these barriers and enhance breast cancer screening uptake among this population. Thus, this paper describes the attitudes of South Asian women towards breast health and breast cancer screening in a community based US sample, using constructs from the Health Belief Model (HBM) (Champion, 1999).

Materials and Methods

Study design and participant recruitment

This cross-sectional survey was administered to participants recruited during free cultural, civilian and religious events organized by the South Asian community in New Jersey and Chicago between 2008 and 2010. Recruitment and data collection activities were implemented by student and physician volunteers via personal interaction at the venues.

Data collection

A self-administered questionnaire in English was distributed by the volunteers to South Asians attending these events and participants completed the survey in-person at the events. In order to be eligible to complete the survey, participants had to be 18 years of age or older. This survey was embedded within a larger survey (Mehrotra et al., 2012) assessing general health practices and breast cancer screening related attitudes in women. No incentives were provided for completing the survey.

Measures

Socio-demographics: Participants age, country of origin, length of stay in the US, religion, language spoken at home, household income, education and employment status were assessed. Due to the sparse frequencies in the various employment categories that were measured, participants who were full-time, part-time or self-employed were grouped as 'employed', while participants who were not employed, unable to work due to disability, temporarily laid off or students were grouped under the 'unemployed' category. Similarly, for the education level, participants who reported no schooling, 8th grade or less, some high school or high school graduates, were

categorized as having completed 'at least high school' and participants with a post graduate Master's or Doctorate education were combined to 'post graduates'. Participants reporting other or with missing responses on either employment or education were categorized as 'unknown'.

Health Beliefs and Attitudes: Champion's validated and revised HBM Scale was used to assess the attitudes of participants towards breast health and cancer (Champion, 1999). This HBM scale included 6 sub-scales, focusing on health motivation (seven items), confidence in breast self-examination (two items), mammogram benefits (six items), mammogram barriers (nine items), breast cancer fear (seven items) and breast cancer susceptibility (five items). Responses to all the 36 items were scored on a Likert scale (score 1-5) ranging from 'strongly disagree' to 'strongly agree'. This study was reviewed and approved by the Institutional Review Board of the Robert Wood Johnson Medical School, which has since been transferred to Rutgers, The State University of New Jersey.

Data analysis

Descriptive statistics were used to examine the social and demographic characteristics of the sample. Continuous variables were reported as mean±standard deviation and categorical variables as percentages. Mean scores for each HBM item were calculated and these were summed to generate a mean score for each sub-scale, wherein higher scores imply higher belief on each sub-scale. Correlation between the various HBM scales was assessed using Spearman's rank correlation. Data were also descriptively analyzed to determine extent and pattern of missing data. Participants with missing data on all 36 items of the HBM sub-scales were excluded from data analysis. Post deletion of these participants (n=23) there was still 4-21% of data missing on individual items. Hence data analysis for health beliefs and attitudes were carried out twice, i.e. 1) without any imputation 2) multiple imputation using the PROC MI procedure in SAS (each missing value was replaced with a set of five plausible values to represent the uncertainty about the right value to impute). The multiple imputed dataset was analyzed using standard procedures for a complete data set. Since our analysis found similar results with and without imputation, we present findings from the non-imputed data set. Data were analyzed using STATA version 12.1 and SAS version 9.2.

Results

One hundred and forty seven women participated in the South Asian General Health Survey. Twenty three women did not complete any of the HBM items and were excluded from the analysis. Responders and non-responders were similar in age and other socio-demographic characteristics. This report is based on responses from 124 women.

Socio-demographic characteristics (Table 1)

The mean age of study participants was 36.1 years (SD=8.4), with 19% (24/124) of women above 40 years. While 92% of them originated from India, women from other South Asian countries also participated in the survey. About two-thirds of the sample (83/124) had lived in the

Table 1. Demographic and Socioeconomic Characteristics of the Study Participants (N=124)

Sample Characteristics	n (%)
Age in years	
Mean±Standard Deviation (Range)	36.1 ± 8.4 (25-63)
≤30 years	31 (25.0%)
31-40 years	63 (50.8%)
41-50 years	15 (12.1%)
≥51 years	9 (7.3%)
missing	6 (4.8%)
Country of Origin	
India	114 (91.9%)
Pakistan	4 (3.2%)
Bangladesh	1 (0.8%)
Nepal/Bhutan/Sri Lanka/Maldives	2 (1.6%)
Others	3 (2.4%)
Length of stay in the US in years	
Mean±Standard Deviation (Range)	10.8±10.2 (1-54)
≤5 years	32 (25.8%)
6-10 years	35 (28.2%)
11-15 years	16 (12.9%)
16-20 years	4 (3.2%)
≥21 years	11 (8.9%)
missing	26 (21.0%)
Language at home	
Native	106 (85.5%)
English	17 (13.7%)
missing	1 (0.8%)
Religion	
Hindu	104 (83.9%)
Islam	8 (6.5%)
Catholicism	3 (2.4%)
Others	7 (5.7%)
missing	2 (1.6%)
Annual household income	
< \$25,000	15 (12.1%)
\$25,000-\$49,999	6 (4.8%)
\$50,000-\$74,999	12 (9.7%)
\$75,000-\$100,000	32 (25.8%)
>\$100,000	54 (43.6%)
missing	5 (4.0%)
Current employment	
Employed	64 (51.6%)
Unemployed	11 (8.9%)
Home-maker	45 (36.3%)
Unknown	4 (3.2%)
Education	
At least high school	13 (10.5%)
College graduate/Bachelors	51 (41.1%)
Post graduate	52 (41.9%)
Unknown	8 (6.5%)

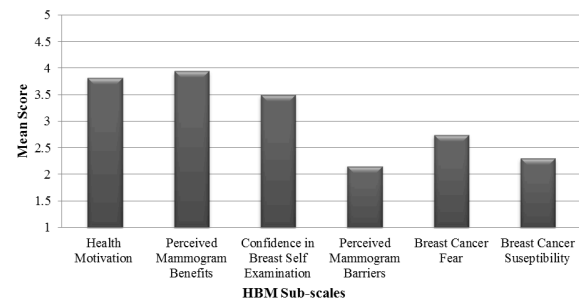
US for less than 15 years. The majority of participants were at least college graduates or more (83%), were either employed (52%) or home-makers (36%), with about 70% having an annual family income of over \$75,000.

Breast health and breast cancer related attitudes (Figure 1)

South Asian women in general reported being motivated to care for their health (3.82±1.18) with the highest mean score for perceived benefits of mammogram (3.94±0.95). They also perceived fewer barriers to obtaining a mammogram (2.15±0.85) and were confident in performing breast self-examination (3.49±1.22). Overall these women reported low perceived fear (2.74±0.86) and low susceptibility towards getting breast cancer (2.30±0.94).

Spearman's Rank Correlation (Table 2)

Among South Asian women, a higher perceived susceptibility towards getting breast cancer was strongly correlated with a higher perceived fear of breast cancer (Spearman's rho $\rho=0.64$, $p<0.0001$). Moderate correlations were observed between mammogram benefits with health motivation, and confidence in breast self-examination. Higher health motivation and confidence in self-breast examination among South Asian women were both correlated with higher perceived benefits of mammogram ($\rho=0.44$, $p<0.0001$ and $\rho=0.47$, $p<0.0001$ respectively). Relatively, weaker correlations were also observed for higher health motivation with higher

**Figure 1. Descriptive Statistics for Sub Scales of the Health Belief Model (N=124)****Table 2. Spearman Correlation Coefficients (rho ρ) between Mean Scores of Health Belief Model Sub-scales**

	Health Motivation	Confidence in Breast Self-Examination	Perceived Mammogram Benefits	Perceived Mammogram Barriers	Breast Cancer Fear	Breast Cancer Susceptibility
Health Motivation		$\rho=0.24$ $p=0.02$ $n=93$	$\rho=0.44$ $p<0.0001$ $n=76$	$\rho=0.05$ $p=0.63$ $n=89$	$\rho=0.23$ $p=0.03$ $n=87$	$\rho=0.08$ $p=0.43$ $n=91$
Confidence in Breast Self-Examination			$\rho=0.47$ $p<0.0001$ $n=81$	$\rho=-0.26$ $p=0.01$ $n=93$	$\rho=0.07$ $p=0.51$ $n=92$	$\rho=0.09$ $p=0.39$ $n=92$
Perceived Mammogram Benefits				$\rho=-0.08$ $p=0.51$ $n=78$	$\rho=0.17$ $p=0.13$ $n=77$	$\rho=0.12$ $p=0.32$ $n=76$
Perceived Mammogram Barriers					$\rho=-0.08$ $p=0.45$ $n=90$	$\rho=-0.06$ $p=0.59$ $n=92$
Breast Cancer Fear						$\rho=0.64$ $p<0.0001$ $n=94$
Breast Cancer Susceptibility						

* ρ =Spearman correlation coefficient; p =significance level; n =number of observations

confidence to perform self-breast exam ($\rho=0.24$, $p=0.02$) and perceived fear of breast cancer ($\rho=0.23$, $p=0.03$). Finally, a greater confidence in performing self-breast examination was correlated with a lower perceived barrier to obtaining a mammogram ($\rho=-0.26$, $p=0.01$).

Discussion

Breast cancer screening rates are very low among South Asian women (Glenn et al., 2009); yet there is a lack of understanding about the attitudes and beliefs of this socioeconomically advantaged ethnic group services towards screening. The objective of this report is to describe perceptions of South Asian women towards breast cancer screening using a validated instrument. Study findings indicate that South Asian women perceive themselves to be less susceptible to getting breast cancer but are highly motivated to care for their health. According to the HBM, women will be more likely to utilize screening services if they perceive the screening service to be beneficial (perceived benefit), if they consider themselves at risk from breast cancer (perceived susceptibility), if they consider breast cancer to be a severe disease (perceived severity/fear) and if they have fewer obstacles in obtaining the service (perceived barriers).

Lower rates of cancer in their home countries (Rastogi et al., 2008) may contribute to their reduced perception of breast cancer risk. This perspective coupled with their lower breast cancer screening rates (34% to 65%) (Glenn et al., 2009; Menon et al., 2012) and increasing breast cancer incidence in their host countries can contribute to a significant burden from breast cancer among South Asians living in the US. Earlier studies report that barriers related to demographic (e.g., age, marital status, education), social (e.g., access, transportation), economic (e.g., health insurance, income) and cultural (e.g., language, religious beliefs) factors might account for some of the poor screening behavior in South Asian women (Bottorff et al., 1998; Islam et al., 2006; Glenn et al., 2009; Sokal, 2010; Grosse Frie et al., 2013). However, few women in our study sample perceived barriers to obtaining a mammogram which might be related to the higher socioeconomic status of the women in this sample.

Several migration studies have shown that rates of breast cancer and other cancers are lowest among people in their country of origin, higher among migrants to western countries, and even higher among subsequent generations of migrants (Ziegler et al., 1993; John et al., 2005). With recent increases in migration of South Asians to the US, a similar pattern in incidence of several cancers has been observed. In spite of increased risks, cancer screening and preventive health services have not improved among South Asians in the US (Bharmal and Chaudhry, 2012). Our study showed a disturbing pattern of reduced perception among South Asians to their susceptibility to breast cancer in spite of increased risks associated with changing lifestyles and environmental exposures. Studies from other Asian populations (e.g., Japanese) that have much higher screening rates (64%) show that awareness of cancer screening benefits along with lower barriers to obtaining screening are crucial to motivating

participation in breast cancer screening (Tsunematsu et al., 2013). A systematic review of the literature shows that interventions on breast cancer screening that were adapted from the HBM, obtained positive changes in screening behavior when nurses employed components of the HBM to promote awareness of early screening (Ersin and Bahar, 2011). Similarly, there is some evidence that awareness generated through physician recommendations, group education or training programs may facilitate positive changes and improve knowledge of screening importance and intention to seek screening services (Guvenc et al., 2012; Khokhar, 2012b; Wang et al., 2012). In this socioeconomically advantaged population with relatively lower barriers, lack of awareness of their risk of getting breast cancer appears as a key determinant to screening uptake, which must be targeted in future intervention studies. Thus, there is an urgent need to improve awareness of increased risk of breast cancer among South Asians. Especially since these women perceive high benefits from mammography, providing them with adequate education might positively influence utilization of preventive cancer screening services.

Instruments based on the HBM are commonly used to help understand utilization of breast cancer screening services in various populations. Its validity and reliability has been replicated among several racial and Asian ethnic minority populations across the world (Champion et al., 2008; Parsa et al., 2008; Anagnostopoulos et al., 2012; Tsangari and Petro-Nustas, 2012; Fouladi et al., 2013; Subramanian et al., 2013; Tsunematsu et al., 2013). While much of the prior work done to examine attitudes and beliefs towards cancer and screening among South Asians has been limited to small qualitative studies (Kishore et al., 2008; Karbani et al., 2011), this is the first community sample from two large metropolitan cities in the US that used constructs from the HBM to examine breast cancer screening attitudes. Its utility in the South Asian population in the US is however limited to only one prior small sample study ($n=37$) in eastern Michigan, with results comparable to this study (Wu et al., 2006). Over a decade ago, Meana et al (2001) have also showed lower perceived susceptibility and seriousness to breast cancer among Canadian immigrated South Asian Tamil population. Clearly, attitudes to breast cancer screening among immigrant South Asian women have not changed dramatically over time.

This study is limited by its convenience sample of participants recruited from women attending cultural or religious events in New Jersey and Chicago, limiting its generalizability. We used robust imputation techniques to account for missing data. Since single imputation methods have received considerable criticism for introducing bias and underestimating standard errors, we performed a multiple imputation technique for HBM items with more than 10% missing data (Rubin, 1987; Schafer, 1999). After imputation, our findings from the non-imputed data-set were not substantially different from the multiple imputed dataset (results not shown); thus ensuring that scores on HBM scales reported are valid.

Previous research shows that rates of breast cancer among South Asian women living in western countries is

higher than among women living in their native countries; yet screening rates are low. This research shows that although South Asian women living in the US are aware of the benefits of mammography and are motivated to care for their health, they consider themselves less susceptible to getting breast cancer. This may contribute to the low rates of screening in this ethnic group.

In conclusion, despite an increasing burden of breast cancer in South Asian women, the perceived susceptibility to this disease is relatively low; indicating that awareness of cancer screening and breast cancer risks is needed in this ethnic group. Given that these women are highly motivated to maintain good health and also perceive mammograms to be beneficial, increasing awareness has the potential to enhance the uptake of screening practices rapidly. Future studies should focus on devising culturally appropriate intervention strategies that address attitudes, perceptions and barriers to early breast cancer screening. Simultaneously, collaboration with South Asian community organizations and community leaders may improve the breast cancer screening rates in this population.

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References

- Althuis MD, Dozier JM, Anderson WF, Devesa SS, Brinton LA (2005). Global trends in breast cancer incidence and mortality 1973-1997. *Int J Epidemiol*, **34**, 405-12.
- Anagnostopoulos F, Dimitrakaki C, Niakas D, Tountas Y (2012). Validity and reliability assessment of health belief scales for mammography screening in Greek asymptomatic women. *Psychooncology*, **22**, 1912-7.
- Bharmal N, Chaudhry S (2012). Preventive health services delivery to South Asians in the United States. *J Immigr Minor Health*, **14**, 797-802.
- Bhatt VR, Wetz RV, Shrestha R, et al (2011). Breast cancer knowledge, attitudes and practices among Nepalese women. *Eur J Cancer Care*, **20**, 810-7.
- Bottorff JL, Johnson JL, Bhagat R, et al (1998). Beliefs related to breast health practices: the perceptions of South Asian women living in Canada. *Soc Sci Med*, **47**, 2075-85.
- Bray F, McCarron P, Parkin DM (2004). The changing global patterns of female breast cancer incidence and mortality. *Breast Cancer Res*, **6**, 229-39.
- Champion VL (1999). Revised susceptibility, benefits, and barriers scale for mammography screening. *Res Nurs Health*, **22**, 341-8.
- Champion VL, Monahan PO, Springston JK, et al (2008). Measuring mammography and breast cancer beliefs in African American women. *J Health Psychol*, **13**, 827-37.
- D'Souza ND, Murthy NS, Aras RY (2013). Projection of burden of cancer mortality for India, 2011-2026. *Asian Pac J Cancer Prev*, **14**, 4387-92.
- Elixhauser A (1991). Costs of breast cancer and the cost-effectiveness of breast cancer screening. *Int J Technol Assess Health Care*, **7**, 604-15.
- Ersin F, Bahar Z (2011). Effect of health belief model and health promotion model on breast cancer early diagnosis behavior: a systematic review. *Asian Pac J Cancer Prev*, **12**, 2555-62.
- Fouladi N, Pourfarzi F, Mazaheri E, et al (2013). Beliefs and behaviors of breast cancer screening in women referring to health care centers in northwest Iran according to the champion health belief model scale. *Asian Pac J Cancer Prev*, **14**, 6857-62.
- Ghumare SS, Cunningham JE (2007). Breast cancer trends in Indian residents and emigrants portend an emerging epidemic for India. *Asian Pac J Cancer Prev*, **8**, 507-12.
- Glenn BA, Chawla N, Surani Z, Bastani R (2009). Rates and sociodemographic correlates of cancer screening among South Asians. *J Community Health*, **34**, 113-21.
- Grosse Frie K, Ramadas K, Anju GA, et al (2013). Determinants of participation in a breast cancer screening trial in Trivandrum district, India. *Asian Pac J Cancer Prev*, **14**, 7301-7.
- Guvenc I, Guvenc G, Tastan S, Akyuz A (2012). Identifying women's knowledge about risk factors of breast cancer and reasons for having mammography. *Asian Pac J Cancer Prev*, **13**, 4191-7.
- Hoeffel EM, Rastogi S, Kim MO, Shahid H (2012). The Asian population: 2010. United States census bureau. (Accessed on May 13, 2013). Available at: <http://www.census.gov/prod/cen2010/briefs/c2010br-11.pdf>.
- Islam N, Kwon SC, Senie R, Kathuria N (2006). Breast and cervical cancer screening among South Asian women in New York City. *J Immigr Minor Health*, **8**, 211-21.
- John EM, Phipps AI, Davis A, Koo J (2005). Migration history, acculturation, and breast cancer risk in Hispanic women. *Cancer Epidemiol Biomarkers Prev*, **14**, 2905-13.
- Karbani G, Lim JN, Hewison J, et al (2011). Culture, attitude and knowledge about breast cancer and preventive measures: a qualitative study of South Asian breast cancer patients in the UK. *Asian Pac J Cancer Prev*, **12**, 1619-26.
- Kaur JS (2000). Migration patterns and breast carcinoma. *Cancer*, **88**, 1203-6.
- Khokhar A (2012a). Breast cancer in India: Where do we stand and where do we go? *Asian Pac J Cancer Prev*, **13**, 4861-6.
- Khokhar A (2012b). Effect of a training programme on knowledge of nurses from a missionary hospital in India regarding breast cancer and its screening. *Asian Pac J Cancer Prev*, **13**, 5985-7.
- Kishore J, Ahmad I, Kaur R, P K M (2008). Beliefs and perceptions about cancers among patients attending radiotherapy OPD in Delhi, India. *Asian Pac J Cancer Prev*, **9**, 155-8.
- Lee HY, Ju E, Vang PD, Lundquist M (2010). Breast and cervical cancer screening disparity among Asian American women: does race/ethnicity matter [corrected]? *J Womens Health (Larchmt)*, **19**, 1877-84.
- Maciosek MV, Coffield AB, Flottesmesch TJ, Edwards NM, Solberg LI (2010). Greater use of preventive services in U.S. health care could save lives at little or no cost. *Health Aff (Milwood)*, **29**, 1656-60.
- Maqsood B, Zeeshan MM, Rehman F, et al (2009). Breast cancer screening practices and awareness in women admitted to a tertiary care hospital of Lahore, Pakistan. *J Pak Med Assoc*, **59**, 418-21.
- Meana M, Bunston T, George U, Wells L, Rosser W (2001). Influences on breast cancer screening behaviors in Tamil immigrant women 50 years old and over. *Ethn Health*, **6**,

- Mehrotra N, Gaur S, Petrova A (2012). Health care practices of the foreign born Asian Indians in the U.S. A community based survey. *J Community Health*, **37**, 328-34.
- Menon U, Szalacha LA, Prabhughate A (2012). Breast and cervical cancer screening among South Asian immigrants in the United States. *Cancer Nurs*, **35**, 278-87.
- Miller BA, Kolonel LN, Bernstein L, et al (1996). Racial/ethnic patterns of cancer in the U.S. 1988-1992. national cancer institute. NIH pub. no. 96-4104. Bethesda, MD. (Accessed on May 10, 2013). Available at: <http://seer.cancer.gov/publications/ethnicity>.
- National cancer institute, Surveillance epidemiology and end results program (2003). Cancer incidence in U.S. immigrant populations-Landmark studies. (Accessed on July 15, 2013). Available at: <http://seer.cancer.gov/archive/studies/surveillance/study5.html>.
- Parsa P, Kandiah M, Mohd Nasir MT, Hejar AR, Nor Afiah MZ (2008). Reliability and validity of champion's health belief model scale for breast cancer screening among Malaysian women. *Singapore Med J*, **49**, 897-903.
- Peltzer K, Phaswana-Mafuya N (2014). Breast and cervical cancer screening and associated factors among older adult women in South Africa. *Asian Pac J Cancer Prev*, **15**, 2473-6.
- Price CL, Szczepura AK, Gumber AK, Patnick J (2010). Comparison of breast and bowel cancer screening uptake patterns in a common cohort of South Asian women in England. *BMC Health Serv Res*, **10**, 103.
- Rajan SS, Lim JN, Haq A (2011). Late presentation and management of South Asian breast cancer patients in West Yorkshire, U.K. *Asian Pac J Cancer Prev*, **12**, 1615-8.
- Rakowski W, Wyn R, Breen N, Meissner H, Clark MA (2010). Prevalence and correlates of recent and repeat mammography among California women ages 55-79. *Cancer Epidemiol*, **34**, 168-77.
- Rastogi T, Devesa S, Mangtani P, et al (2008). Cancer incidence rates among South Asians in four geographic regions: India, Singapore, UK and US. *Int J Epidemiol*, **37**, 147-60.
- Rubin DB (1987). Multiple Imputation for nonresponse in surveys. John Wiley & Sons, Inc., Hoboken, NJ, USA.
- Schafer JL (1999). Multiple imputation: a primer. *Stat Methods Med Res*, **8**, 3-15.
- Sokal R (2010). A critical review of the literature on the uptake of cervical and breast screening in British South Asian women. *Qual Prim Care*, **18**, 251-61.
- Stanford JL, Herrinton LJ, Schwartz SM, Weiss NS (1995). Breast cancer incidence in Asian migrants to the U.S. and their descendants. *Epidemiology*, **6**, 181-3.
- Subramanian P, Oranye NO, Masri AM, Taib NA, Ahmad N (2013). Breast cancer knowledge and screening behaviour among women with a positive family history: a cross sectional study. *Asian Pac J Cancer Prev*, **14**, 6783-90.
- Sutton GC, Storer A, Rowe K (2001). Cancer screening coverage of south Asian women in Wakefield. *J Med Screen*, **8**, 183-6.
- Szczepura A, Price C, Gumber A (2008). Breast and bowel cancer screening uptake patterns over 15 years for UK south Asian ethnic minority populations, corrected for differences in socio-demographic characteristics. *BMC Public Health*, **8**, 346.
- Tsangari H, Petro-Nustas W (2012). The psychometric properties of the greek version of champion's health belief model scale. *J Nurs Meas*, **20**, 244-57.
- Tsunematsu M, Kawasaki H, Masuoka Y, Kakehashi M (2013). Factors affecting breast cancer screening behavior in Japan--assessment using the health belief model and conjoint analysis. *Asian Pac J Cancer Prev*, **14**, 6041-8.
- Wang HH, Chung YC, Sun JL (2012). The effects of education program on knowledge and intention of breast cancer screening in Taiwan. *Asian Pac J Cancer Prev*, **13**, 5545-9.
- Wu TY, West B, Chen YW, Hergert C (2006). Health beliefs and practices related to breast cancer screening in Filipino, Chinese and Asian-Indian women. *Cancer Detect Prev*, **30**, 58-66.
- Ziegler RG, Hoover RN, Pike MC, et al (1993). Migration patterns and breast cancer risk in Asian-American women. *J Natl Cancer Inst*, **85**, 1819-27.