

Development of an India-Specific Cancer Web Portal: An Educational Tool for Cancer Awareness and Community Engagement

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Abstract- Dissemination of adequate information about cancer is a prerequisite for focused cancer control efforts. This study was aimed at assessing the content validity of the existing web-based cancer awareness resources and using these inputs to create an innovative India-specific website for cancer prevention. A gap analysis of 65 existing websites on various types of cancer was carried out. The websites were graded for their content validity on a scale of 1 (good for minimally educated individual) to 6 (for health professionals only) and for external validity for India on a scale of 1 (not valid) to 3 (good validity). The websites were analysed for their layout, user friendliness, ease of navigation and complexity of the language. None of the 65 websites provided comprehensive information on the prevalent cancers in India. Majority (60%) of the websites had a score of 3 in content validity while external validity scored at 2 for 78.5% websites. In the view of the identified gaps, a comprehensive India-specific cancer website 'India Against Cancer' was developed to provide basic information on cancer to the public with an intent to promote cancer awareness. 'India Against Cancer' is the first comprehensive India-specific website which is user friendly and provides authentic peer-reviewed information on prevalent cancers in India in a simple language. Wider use of this educational tool can potentially assist in improving cancer awareness and provide impetus to the population-based cancer screening program currently in the process of being rolled out in the country.

Keywords— Cancer Awareness, India Against Cancer, Cancer information, Health Promotion

I. INTRODUCTION

Cancer has long been one of the most feared diseases globally and widely regarded to be synonymous with death [1]. In India, the annual burden of new cancer cases is over one million with 0.78 million cancer-related deaths [2]. This high mortality is primarily the result of late diagnosis, largely attributed to a lack of awareness among people about the various risk factors and preventive aspects of the common cancers, like early detection through screening and timely treatment of precancerous lesions. Lack of adequate knowledge also fuels many myths and misconceptions related to cancer, which perpetuate the associated stigma [1,3]. This in turn influences the way people perceive cancer, thereby rendering cancer control a challenging task.

Today, internet provides a unique opportunity for accessing various types of information, including health-related knowledge. As per the Internet and Mobile Association of India's report of 2019 ([https://cms.iamai.in/Content/ResearchPapers/d3654bcc-](https://cms.iamai.in/Content/ResearchPapers/d3654bcc-002f-4fc7-ab39-e1fbeb00005d.pdf)

[002f-4fc7-ab39-e1fbeb00005d.pdf](https://cms.iamai.in/Content/ResearchPapers/d3654bcc-002f-4fc7-ab39-e1fbeb00005d.pdf)), 36% of 12+ year population in India were internet-users, with the proportion being higher in urban areas compared to rural segment. Of these, about two-thirds were less than 30 years of age, especially in the rural areas [4]. Studies have shown that cancer patients as well as general population access cancer-related information on the internet quite often [5]. To cater to these needs, a number of websites, some hosted by health centers, are available that provide information on one or more cancers. Many of these websites do not include authentic peer-reviewed content in an easily comprehensible language and manner for the intended audience. Few earlier studies have performed content analysis of information websites on some specific cancer types such as lung or prostate cancer and found variability in the content as well as the validity of information [6,7]. However, we could not find any robust analysis of the existing websites providing information relevant to the cancers prevalent in India in a way that is suitable for promoting cancer awareness among the general Indian population. Hence, this study was aimed at the conduct of an environmental scan and gap analysis of the existing

cancer informational websites regarding their validity for relevance in the Indian context, especially those with focus on cancer prevention. We intended to use the inputs of this analysis in designing a comprehensive dedicated cancer web-portal to disseminate authentic basic information on prevalent India specific cancers along with their awareness and preventive aspects among the general Indian public.

II. MATERIAL AND METHODS

A systematic literature search of PubMed/Medline and Web of Science core collection databases was performed for studies published until March 2016 using the search terms, 'website' or 'webportal' or 'webpage' or 'online resource' AND 'cancer' or 'cancer awareness' or 'cancer prevention' or 'cancer support' or 'cancer risk' AND 'India'. No relevant articles were identified regarding existing websites on cancer awareness for general population in Indian setting.

Further, Google search was conducted to identify relevant websites across the world containing information on cancer, cancer prevention, etc. The search was limited to first 10 pages of the search result keeping in mind the relevance of the webpages. These pages yielded 65 websites which met the inclusion criteria, i.e. websites providing information on cancer and published in English or Hindi. Web pages that were blogs, news or magazine articles, videos, books, dictionary definitions or websites providing information limited to a hospital/centre were excluded. Websites that required a membership to view the content were also excluded.

An advisory panel of experts critically reviewed the content of the available websites on cancer-related information. The websites were examined for the type of information available (single or more than one type of cancer) and simplicity of language of the content of the websites. The websites were graded for content validity from level 1 to 6 based on factors like the user interface, design and ease of use. Level one was awarded to the websites which were good enough for minimally educated people and level six was awarded to the websites that were targeted for health professionals. Content validity is qualitative in nature and refers to the degree to which an assessment instrument is relevant to, and representative of, the targeted construct it is designed to measure [8]. The websites were also graded for their external validity with regards to India. Level one was awarded to the websites

with no validity and level 3 was awarded to the websites with good validity. The External validity refers to how well the outcome of a study can be expected to apply to other settings or how generalizable the findings are to the real world. Content validity and external validity were chosen specifically for our study so as to understand the determinants that have an influence on the viewership and relevance of the website content for its targeted the population.

Development of the web portal 'India Against Cancer':

The website was developed on Word Press platform. A special advisory committee with internal and external experts was constituted to provide the evidence-based scientific information related to cancer in a comprehensive but simplified manner for hosting on the website. Through peer-review, it was ensured that the content on the website had a layout which was easy to navigate with a motivational effect on the readers. Fig 1 depicts the process of development of the web portal 'India Against Cancer'.

III. RESULTS

The major findings of the detailed review of the existing 65 websites are displayed in **Table 1**. Special remarks are appended for each website to depict the focus of the content on these websites and the gaps therein. Eight websites focused on the general awareness about cancer and 30 websites included information on one particular type of cancer (e.g. breast cancer or leukemia). There were seven country-specific websites while six websites were found to be focusing on fundraising for cancer patients and research opportunities for different types of cancer. Seven websites provided detailed information about cancer but none of them were India-specific and the content was not written in a simple language.

Content validity: Out of the 65 websites reviewed, majority (39) were graded as level 3 (useful for an individual having biology knowledge of Class XII) while seven websites were in the category of level 2 (useful for high school pass). Only 10 websites had the level of 6 i.e. content that was usable by medical graduates with specialization. Four websites were found to be useful for MBBS doctors (level 5) while five websites had content validity of level 4 (useful for primary level healthcare providers).

Table 1: Various cancer websites examined during the study

S. No.	Name	Website URL	Source	Language	Content Level *	External Validity for India**
1	American cancer society	http://www.cancer.org/	USA	English	Level 2	Level 2
Remarks: Comprehensive, covers various topics. Screening and treatment guidelines follow American Standards						
2	National Breast Cancer Foundation	http://www.nationalbreastcancer.org/	USA	English	Level 2	Level 2
Remarks: Provides very basic and limited information						
3	Mouth Cancer Foundation	http://www.mouthcancer.org/	UK	English	Level 2	Level 2

Remark: Provides information on oral cancer only						
4	Oral cancer facts	http://www.oralcancerfacts.com.au/	Australia	English	Level 3	Level 3
Remarks: Detailed information about general facts of oral cancer						
5	Breast Cancer Care	http://www.breastcancercare.org.uk/	London	English	Level 3	Level 2
Remarks: Provides very basic and limited information						
6	National cancer registry programme (ICMR)	http://www.ncrpindia.org/	India	English	Level 6	Level 3
Remarks: Provides only epidemiological data.						
7	Indian Cancer Society	http://www.indiancancersociety.org/	India	English	Level 3	Level 3
Remarks: Very limited information. Focuses more on charity part.						
8	Caring for Carcinoid Foundation	http://www.caringforcarcinoid.org/	USA	English	Level 6	Level 2
Remarks: Limited information of only neuroendocrine cancer						
9	National cancer institute	http://www.cancer.gov/	USA	English	Level 3	Level 3
Remarks: Comprehensive, covers various topics. Follows American guidelines						
10	New Zealand Breast Cancer Foundation	http://www.nzbcf.org.nz/	New Zealand	English	Level 3	Level 3
Remarks: Provides good information about breast cancer awareness but mostly New Zealand specific						
11	Coalition Against Childhood Cancer	http://cac2.org/	USA	English	Level 3	Level 2
Remarks: Limited information on childhood cancer						
12	Lung cancer alliance	http://www.lungcanceralliance.org/	USA	English	Level 6	Level 2
Remarks: Detailed information about screening, staging and treatment of lung cancer. Follow American guidelines						
13	American Lung Association	http://www.mylungcancersupport.org/	USA	English	Level 3	Level 2
Remark: Provides information on Lung cancer only						
14	Cancer Research UK	http://www.cancerresearchuk.org/	London	English	Level 3	Level 2
Remarks: Comprehensive information on different types of cancers found in United Kingdom						
15	Global Lung Cancer Coalition	http://www.lungcancercoalition.org/	Multiple countries	English	Level 6	Level 2
Remarks: Act as voice of lung cancer patients of European country						
16	Lung Cancer Canada	http://www.lungcancercanada.ca/	Canada	English	Level 3	Level 2
Remark: Only Lung cancer specific information is available						
17	Foundation for Women's Cancer	http://www.foundationforwomenscancer.org/	USA	English	Level 5	Level 2
Remark: Information on women specific cancer eg. Breast and cervical cancer is provided.						
18	BreastCancerIndia.net	http://www.breastcancerindia.net/	India	English	Level 2	Level 3
Remarks: Information about breast cancer early detection and a forum of breast cancer survivors						
19	Cancer Aid Society	http://canceraidssocietyindia.org/	India	English	Level 2	Level 3
Remarks: Limited information on different cancers. Focuses more on charity part.						
20	Cancer Patients Aid Association	http://www.cpaaindia.org/	India	English	Level 3	Level 3
Remarks: Very limited information on different cancers. Focuses more on charity part.						
21	Skin cancer Foundation	http://www.skincancer.org/	USA	English	Level 4	Level 2
Remarks: Very limited information about skin cancer						
22	Delete Blood Cancer	http://www.deletebloodcancer.org/en	USA	English	Level 2	Level 1
Remarks: Focuses more on charity part.						
23	Inside Cancer	http://www.insidecancer.org/	New York, USA	English	Level 6	Level 2
Remark: Focuses on the molecular aspect of cancer only						
24	Breastcancer.org	http://www.breastcancer.org/	USA	English	Level 3	Level 3
Remarks: Information mostly on symptoms, diagnosis and treatment of breast cancer						
25	Cancernet-UK	http://www.cancernet.co.uk/	UK	English	Level 6	Level 2
Remark: Provides detailed information about cancer and lifestyle						
26	Cancer.Net	http://www.cancer.net/	USA	English	Level 6	Level 2
Remarks: Comprehensive information on different cancers from American Society of Clinical Oncology						

27	Ovarian Cancer Australia	https://ovariancancer.net.au/	Australia	English	Level 6	Level 2
Remarks: Information on symptoms and risk factors of ovarian cancer in Australia						
28	American Brain Tumor Association	http://www.abta.org/	USA	English	Level 3	Level 2
Remarks: Information about brain tumors in adults and children						
29	Brain Tumour Foundation of Canada	http://www.braintumour.ca/	Canada	English	Level 4	Level 2
Remark: Provides brain cancer specific information						
30	The Childhood Brain Tumor Foundation	http://www.childhoodbraintumor.org/	USA	English	Level 3	Level 2
Remark: Provides childhood cancer specific information						
31	Oncolink	http://www.oncolink.org/	USA	English	Level 5	Level 2
Remarks: Information about different cancers, risk factors, treatments from American society						
32	Living Beyond Breast Cancer	http://www.lbbc.org/#	USA	English	Level 3	Level 2
Remarks: Breast cancer details along with survivor stories						
33	Susan G. Komen	http://www.komen.org/	USA	English	Level 3	Level 2
Remark: Provides only breast cancer information						
34	Hirshberg Foundation for Pancreatic Cancer Research	http://www.pancreatic.org/site/c.htJY8MPiWf/b.640099/k.D524/Hirshberg_Home_Page.htm	USA	English	Level 3	Level 2
Remarks: Very little information about pancreatic cancer						
35	American Institute for Cancer Research	http://www.aicr.org/	USA	English	Level 3	Level 1
Remarks: More focus on cancer research.						
36	ThyCa: Thyroid Cancer Survivors' Association, Inc.	http://www.thyca.org/	USA	English	Level 6	Level 2
Remarks: Comprehensive information on different thyroid related cancers.						
37	Cancer Treatment Centers of America Global, Inc.	http://www.cancercenter.com/	USA	English	Level 5	Level 1
Remark: Provides general information about cancer and treatment centres						
38	Cancer Council Australia	http://www.cancer.org.au/	Australia	English	Level 3	Level 2
Remarks: Provide variety of information regarding cancers to health professionals and patients in Australia						
39	Irish Cancer Society	http://www.cancer.ie/#sthash.ZVkogete.dpbs	Ireland	English	Level 3	Level 2
Remarks: Detailed information about common cancers in Ireland						
40	The Cancer Association of South Africa (CANSA)	http://www.cansa.org.za/	South Africa	English	Level 2	Level 2
Remarks: Detailed information about common cancers in South Africa						
41	Cancer Australia	http://canceraustralia.gov.au/	Australia	English	Level 5	Level 2
Remarks: Detailed information about cancers in Australia						
42	The Leukemia & Lymphoma Society (LLS)	http://www.lls.org/	USA	English	Level 4	Level 2
Remarks: Information about Leukemia & Lymphoma in USA						
43	Prostate Cancer Foundation	http://www.pcf.org/site/c.leJRIROrEpH/b.5699537/k.BEF4/Home.htm	California	English/Español	Level 3	Level 2
Remark: Provides detailed information on Prostate cancer.						
44	Cancer Council Victoria	http://www.cancervic.org.au/#	Australia	Several including English/Hindi	Level 3	Level 2
Remark: Provides detailed information regarding different types of cancers and their signs and symptoms.						
45	Facing Our Risk of Cancer Empowered, Inc.	http://www.facingourrisk.org/index.php	USA	English	Level 3	Level 2
Remark: Provides information and support for breast cancer, ovarian and related cancers, pancreatic and prostate cancer.						
46	Brain Tumour Research	http://www.braintumourresearch.org/	UK	English	Level 3	Level 2
Remark: Focuses more on the research aspect of Brain tumour.						

47	HeadSmart	http://www.headsmart.org.uk/	UK	English	Level 3	Level 2
	Remark: Provides detailed information for the early diagnosis of the brain tumour in children.					
48	CancerConsultants.com	CancerConsultants.com	USA	English	Level 3	Level 2
	Remark: Focuses more on the research aspect of cancer and its treatment.					
49	CancerTutor	http://www.cancertutor.com/	USA	English	Level 4	Level 2
	Remark: Provides information on all types of cancers and clinical trials.					
50	MD Anderson Cancer Center	http://www.mdanderson.org/	Texas	English	Level 3	Level 2
	Remark: Provides information on types of cancers, fundraising and research aspects.					
51	World Cancer Research Fund International	http://wcrf.org/	London	English	Level 3	Level 2
	Remark: Focuses on cancer statistics and research aspects.					
52	Target Ovarian Cancer	http://www.targetovariancancer.org.uk/	London	English	Level 6	Level 1
	Remark: Provides information on ovarian cancer					
53	Ovarian Cancer National Alliance	http://www.ovariancancer.org/	USA	English	Level 3	Level 2
	Remark: Focuses on research and fundraising for ovarian cancer patients					
54	Ovacom	http://www.ovacom.org.uk/	London	English	Level 3	Level 2
	Remark: Focuses on providing support to people affected by ovarian cancer					
55	Betty Allen Ovarian Cancer Foundation	http://www.ovariancancerfl.org/	USA	English	Level 3	Level 2
	Remark: Describes ovarian cancer with focus on awareness drive.					
56	Nirog: health information in hindi	http://nirog.info/index.php?n=Cancer.Cancer	India	Hindi	Level 3	Level 3
	Remark: Cancer website in Hindi with focus on overall wellbeing.					
57	Cancer Guide	http://cancerguide.org/	Puerto Rico	English	Level 3	Level 2
	Remark: Detailed information on how to deal with cancer.					
58	colon cancer alliance	http://www.ccalliance.org/	USA	English	Level 3	Level 2
	Remark: Focuses more on fundraising and screening for colon cancer.					
59	Susan Cohan Colon Cancer Foundation	http://www.coloncancerfoundation.org/	USA	English	Level 3	Level 2
	Remark: Focuses on colon cancer and awareness activities and donations to help cancer patients.					
60	Fight Colorectal Cancer	http://fightcolorectalcaner.org/	USA	English	Level 3	Level 2
	Remark: Focuses mainly on colorectal cancer and the impact of their organization.					
61	Colorectal Cancer Association of Canada	http://www.colorectal-cancer.ca/	Canada	English	Level 4	Level 2
	Remark: Focuses only on colorectal cancer					
62	Centers for Disease Control and Prevention	http://www.cdc.gov/cancer/	USA	English	Level 3	Level 2
	Remark: Provides detailed information on cancer, its prevention and statistics (USA Specific)					
63	Stop Colon Cancer now	http://www.stopcoloncancer.com/	USA	English	Level 3	Level 2
	Remark: Focuses on the screening and referrals for Colon Cancer.					
64	National Cervical Cancer Coalition	http://www.nccconline.org/	USA	English	Level 3	Level 2
	Remark: Focuses on cervical cancer, its diagnosis and treatment along with HPV.					
65	Head & Neck Cancer Guide	http://www.headandneckcancerguide.org/	USA	English	Level 3	Level 2
	Remark: Focuses on Head and Neck Cancer, its diagnosis and treatment.					

***Content validity score:**

Level 1 – good enough for uneducated,

Level 2 – good enough for high school pass,

Level 3 – good enough for one having biology knowledge of Class XII,

Level 4 – good enough for healthcare providers,

Level 5 – good enough for MBBS doctors,

Level 6 – good enough for MS/MCH doctors

****External validity score:** Not at all valid – 1, somewhat valid – 2, good validity – 3

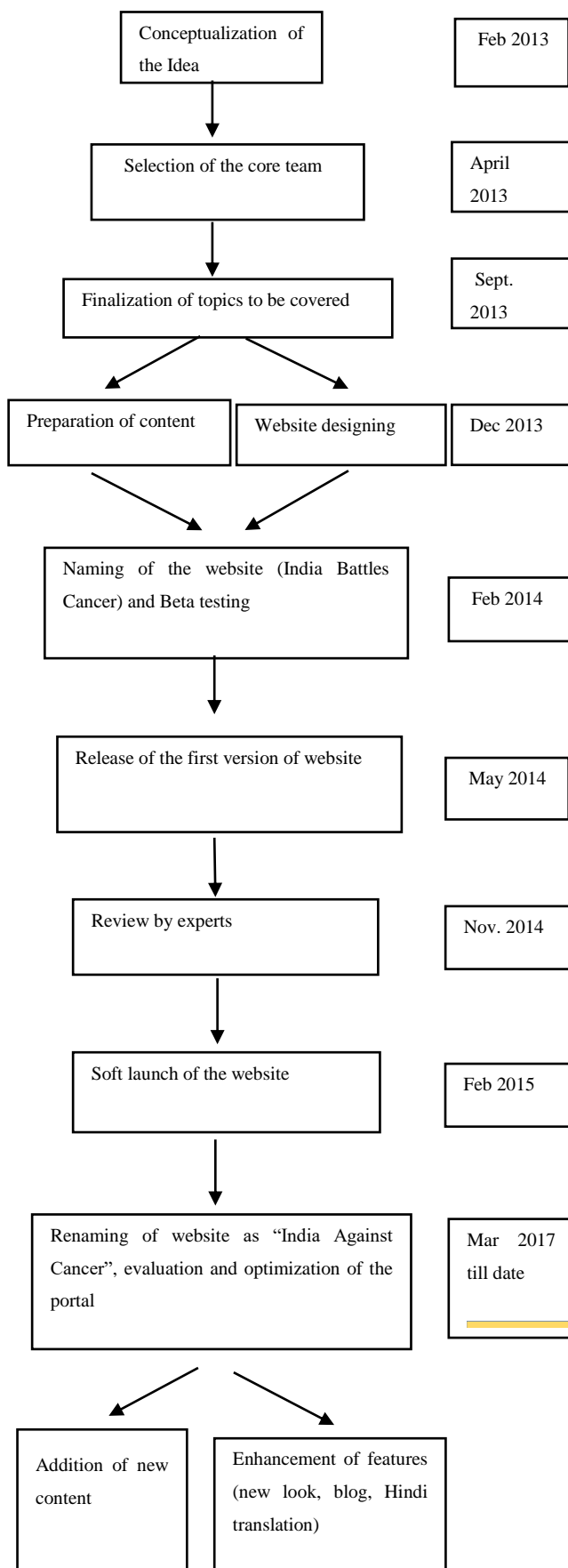


Fig 1: Timeline of website development

External Validity: Only 10 websites had the external validity level of 3 (good validity) while four websites had level 1 external validity (not at all valid). Majority of the websites' content was in English while only two websites were found to have the content in Hindi language. Of these two, one focussed on the overall well-being of the cancer patients and the other one provided detailed signs and symptoms of different types of cancers.

None of the evaluated websites offered comprehensive information about different types of cancers and tips to promote a healthy lifestyle. The 360-degree approach required to prevent and effectively manage cancer from detection to treatment was found to be missing in the available websites. Additionally, the available Indian websites on cancer provided information suitable only for literate people and that too was presented in a disorganized fashion. The websites, international as well as Indian, had variable user engagement strategies with limited focus on cancer prevention communication.

Due to these lacunae identified in the existing websites, it was deemed necessary to develop a cancer-related website which focuses on the cancers prevalent in India with comprehensive information on awareness and other aspects of cancer for the public.

Salient features of web portal 'India Against Cancer'

Layout of the information provided on the website: 'India Against Cancer' has been designed in a user-friendly manner with informative videos for general awareness on cancer. Each of the nine cancer sites viz. breast, oral, cervical, lung, prostate, stomach, colorectal, esophageal and gall bladder have been described under the uniform headings of disease burden, risk factors, warning signs and symptoms, tests used in screening, diagnosis and treatment protocols. It has a section to address the commonly encountered myths on cancers. Apart from this information, a special section has been included on the importance of healthy lifestyle with linkages of 'diet and cancer' to focus on the general well being of the people visiting the website. This web portal also provides information regarding various government institutes offering cancer treatment facilities as well as the governmental initiatives for free cancer screening and treatment for the economically weaker sections of the society. Besides, there is an interactive quiz section to engage and educate the visitors. The media corner covers information of the recent developments in the field of cancer research and news articles on cancer awareness. The website has a section dedicated to palliative care as well. A separate section has been added that caters to the needs of healthcare providers of different cadres. The national guidelines of screening and management of cancer cases have also been uploaded for reference by the healthcare providers engaged in screening of cancers. The website also provides the India-specific current cancer statistics which is useful to the researchers and the academicians alike.

The content on the web portal has also been translated into easy-to-understand Hindi language to increase the viewership and outreach of the website, considering Hindi is the national language of our country. The site map of the website has been depicted in Fig 2.

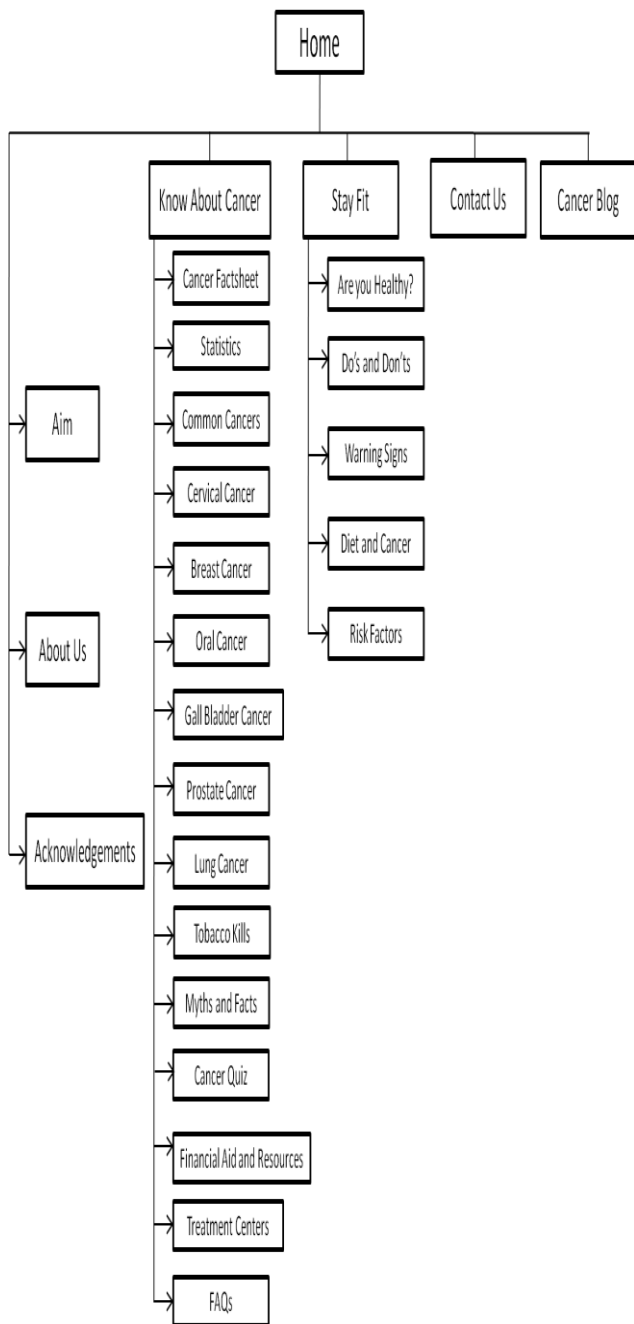


Fig. 2: Layout of the web portal

Appearance of the website: All efforts have been made to design the website using an attractive, aesthetically appealing and user-friendly format. The logo has been designed in such a way that it signifies hope. The website has evidence-based authentic information on prevalent cancers in our country and provides an overall good learning experience to the website visitor in a language that is easy to understand. The informative sliders on the

website intend to create awareness regarding different types of cancers through pictorial representation that even the layman can understand. A special section of videos has been created to cater to the people who can't read. Peer-review and interaction with stakeholders from various strata of the society have helped us in ensuring that the language used on the website is simple with avoidance of scientific jargons to be best possible extent. Social media platforms, like Facebook, Twitter and LinkedIn accounts have also been created and are updated regularly for the website to enhance its outreach. The website has a dynamic mode and offers an opportunity for the visitors to interact and test their knowledge through the quiz section which is regularly updated as well as share their queries on any aspect of cancer. These queries are responded to by the scientific experts in a timely manner.

IV. DISCUSSION

Internet has become a part of everyday life of a large proportion of individuals across the globe. In conjunction with this phenomenon, a huge number of websites disseminating health information can be found on the web [9]. Since a significant part of information available on such websites may not be accurate, the individuals accessing them may become vulnerable [10]. This potential harm assumes greater significance when the disease in question is cancer. A recent cross-sectional survey of internet use among patients visiting a hospital revealed that 63.2% individuals searched health information on the internet. However, only a quarter of these enquired from their doctor about the knowledge acquired from the internet [11]. These results underscore the importance of websites providing accurate peer-reviewed scientific information related to any disease, including cancer.

Cancer as a disease is among the most feared by the general population. Due to the lack of adequate time with physicians to provide detailed information to their patients, resort to internet and online communities is frequent. For instance, a study of interactions in an online breast cancer community revealed that patients filled their information gaps through these interactions to build confidence in optimizing the management protocols [12]. There are a number of cancer-related informational websites, some of which are country-specific while a few focus on cancer of a specific body site such as breast, uterine cervix and so on. Since breast, uterine cervix and oral cavity constitute the three most common cancers affecting the Indian population, there is a felt need of a website providing accurate information regarding these cancers for the Indian population. Hence, we undertook an environmental scan of the existing cancer websites to assess their relevance for use in the Indian context.

Our review of the 65 websites yielded six web portals that had India-specific cancer content, however none of these provided comprehensive information on prevalent cancers in India. Majority of the 65 websites reviewed had content

suitable for at least high-school educated individuals. Only 10 websites were found to have good validity for the Indian context. However, none of the websites provided a comprehensive 360-degree approach for prevention of prevalent cancers in India. An extensive literature search failed to yield any previously conducted review of the available cancer websites for their utility in the Indian setting. A recent content analysis of lung cancer screening program websites among the academic or community medical centers in the United States revealed that the information lacked balance regarding the portrayal of benefits vs harms of screening [6]. Similar analysis has been undertaken for cervical cancer screening information in UK websites [13] or prostate cancer information [7]. These studies have emphasized the need of assessment of reliability and accuracy of cancer-related information on various websites so as to enable the health care professionals guide the patients towards reliable online resources.

In view of the gaps identified during the environmental scan, an India-specific comprehensive web portal was developed to disseminate the information about the prevalent cancers in the country. This is the first-of-its-kind effort from our country which intends to create cancer awareness in general public and focuses on preventive aspects of prevalent cancers. Involvement of scientific experts along with other stakeholders like community representatives have helped in ensuring the user-friendliness and the easily comprehensible language of the content on our website. This is in consonance with the earlier reports that inputs from patients and caregivers allows for a cancer website provide usable treatment information [14]. The content on our web portal is useful for the general population in adopting a healthy lifestyle and becoming aware of the risk factors and warning signs when an individual should seek timely medical attention. Also, the web portal caters to primary health care providers like the Accredited Social Health Activists (ASHAs) with information useful in promoting cancer awareness and motivating individuals for cancer screening. The section on 'myths and facts' also comes in handy for the health care workers to bust the common myths they are likely to encounter while motivating the individuals in the community. For individuals diagnosed with cancer or having an acquaintance with this diagnosis, the information on nearest cancer treatment centers as well as methods to avail the government-provided assistance for treatment can be life-saving. The content analysis of our website places it in category level 2 while external validity is level 3. A comparison of the existing six cancer websites of Indian organizations shows that one of them is dedicated to epidemiology of cancers across the country. Three websites being hosted by non-governmental organizations focus more on charity for cancer-related activities and provide limited information about the prevalent cancers in the country. In addition, these websites do not include an interactive component. One web portal (<http://www.breastcancerindia.net/>) is a dedicated forum

for breast cancer survivors and includes information about early detection of breast cancer. The only Indian website in Hindi provides information to maintain general well-being. In comparison to these websites, the web portal 'India Against Cancer' provides peer-reviewed content on the prevalent cancers in easily comprehensible English and Hindi languages. The uniform layout of information of the cancers makes it easy for the visitors to navigate through the various tabs in the website. The sections on 'healthy lifestyle', 'busting the myths', 'risk factors', 'warning signs', and 'diet and cancer' offer the visitors practical tips to prevent cancer as well as recognizable signs when medical attention should be sought. The content on the web portal has been designed with intent to promote awareness about cancer among the general population and assist in cancer screening activities. The ease of navigation is likely to help in penetration of cancer related information among the internet users, especially given the interactive design. Web analytics of the website over two-and-a-half-year period have shown that the web portal had the potential to serve its intended purpose of promoting cancer awareness among the general population [15].

Strengths and Limitation of the study: The strengths of our analysis of the existing websites include the unrestricted search criteria for cancer websites, well-defined criteria for content and external validity with intention of relevance to Indian context. In view of the average literacy rates in the country, websites with content in category up to level 2 were considered appropriate for our setting.

The main limitation was the focus on cancer prevention information while analyzing the existing websites. Since organized cancer screening had been lacking in the country at the inception of this study, our main aim was to promote cancer awareness and augment cancer prevention through screening and early detection rather than focus on treatment and palliative care.

V. CONCLUSION

A scan of the existing cancer websites revealed the lack of a comprehensive India-specific website providing credible information on the prevalent cancers in an easy-to-comprehend language. Hence, 'India Against cancer' has been developed as a first-of-its-kind India-specific interactive and user friendly web portal for promotion of cancer awareness among general public through authentic peer-reviewed content on prevalent cancers in India. The content analysis and external validity of our website confirms the suitability of this web portal for the purpose of improving cancer awareness among the general population in India. Through increasing community penetration and engagement, especially the internet-savvy youth, the website has a potential to assist in the national cancer control program and also serve as an educational tool to improve the skills and practice of the primary health care workers involved in cancer screening programs.

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