Epidemiological investigation has become an essential component in the development of pharmaceutical and biological products. Understanding epidemiology data at a granular level has become imperative for specialty pharma and biotech companies, particularly in preparation for introducing targeted products in the selected patient population. Pharmaceutical companies are facing challenges in handling the huge amount of epidemiology data and literature in developed countries and lack of it in developing countries. Although there is significant amount of information available on the burden of cancer mostly through publications and databases in the public domain, it is limited to top level information by tumor, age, and gender.

This white paper focuses on understanding the availability of epidemiology data at a granular level specific to bladder cancer in 10 emerging countries (China, India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, Thailand, and Vietnam) in the Asia–Pacific region.

Cancer is considered for this study as it is among the most complex therapy areas and the second highest cause of death in developed and developing countries. Per year, more than 12 million new cases of cancer occur worldwide. Of these, 5.4 million occur in developed countries and 6.7 million in developing countries. Worldwide incidence of bladder cancer ranks ninth when compared with other cancer types. Approximately 356,000 new bladder cancer cases (274,000 males and 83,000 females) occurred worldwide in 2002. The incidence varies significantly between geographical regions or countries.

From a commercial point of view, most of the global pharmaceutical and biotech companies are heavily focused on the growing oncology market in emerging countries. Hence, there is a need to understand the disease burden and treatment patterns in Asian countries, as each country has a different approach towards managing cancer treatment, guidelines, and market dynamics.

Targeted therapies, which include monoclonal antibodies and small molecule inhibitors, have significantly changed the treatment of cancer over the past 12 years. However targeted therapy has raised new questions about the tailoring of cancer treatment, assessment of drug effectiveness and toxicity, and the economics of cancer care.
With an increase in focus of targeted therapies in the treatment of cancer, characterization of tumor data at a granular level is becoming imperative both from the scientific and commercial perspective. For example, a number of treatable bladder cancer patients by K-RAS status is a key data variable in the cetuximab forecasting model, which will help estimate the more appropriate target patent population and revenue potential for the cetuximab market.

This systematic review aims to critically evaluate the available literature on epidemiology of bladder cancer in Asia-Pacific countries and help global pharmaceutical and biotech companies and medical research professionals understand the availability of epidemiology data at a granular level.

This report will also provide an opportunity to evaluate the further need for investigation or studies that facilitate better planning for drug development and evidence-based decision-making in today’s health care environment.

**Study Methodology**

A comprehensive systematic literature review was carried out between January 2013 and March 2013. The scope of this research was restricted to epidemiology information for bladder cancer specific to 10 Asian countries (India, China, Singapore, Malaysia, Philippines, Taiwan, South Korea, Vietnam, Thailand, and Indonesia). Various sources such as PubMed, registries, and reports from relevant national and international conferences were considered. Search was restricted to articles and reports published in English in the last 12 years (January 2000–February 2013).

Articles, reports, and presentations were obtained from the above mentioned sources using relevant keywords (bladder cancer, epidemiology, incidence, prevalence, survival, treatment, etc.) and this resulted in a total of >15,000 online articles in English. More than 3,000 articles were reviewed including prospective and retrospective studies and review articles on various aspects of bladder cancer epidemiology. Data extraction was conducted from country specific cancer registries and data from major conferences such as ASCO and ESMO. We used tried and tested review mechanisms and tools for screening, shortlisting, and extracting the articles and reports.

The information collected on the epidemiology of bladder cancer included incidence, prevalence, diagnosis, and treatment patterns at a granular level. The depth of the epidemiological information considered is depicted in the chart below.
Study Results

Malaysia:
Overall, the study found limited epidemiology data on bladder cancer in Malaysia.
- Cancer Registry reports provide information on incidence rates at a granular level for the years 2002-2007
- Apart from GLOBOCAN (2008), there are few secondary sources available on prevalence rate
- Published articles and studies on biomarkers are also limited
- There is less information available about the survival rate, diagnostic methods, and treatment options. However, the Malaysian Urological Association has published some information on treatment guidelines
- There are only a few articles on clinicopathological features of bladder tumors
- Hospital based cancer registry started publishing cancer statistics from 2002, their latest publication being 2007

China:
There is sufficient amount of epidemiological data at a granular level for parameters like incidence, and survival, and partially available for prevalence, diagnosis, treatment, and biomarkers.
- Incidence of bladder cancer is available by gender from 2003 to 2007 from the 32 cancer registries.
- Since 2007, Chinese cancer registries (48 centers) have started capturing epidemiology data from both urban and rural areas. Overall, incidence data at a granular level by age, gender, and stage is available from individual registries and articles in China for the period 2001-10.
- There is not much data available on prevalence either from registries or publications at both regional and country level. Limited data is available on treatment and diagnosis from studies that were conducted for overall and stage level treatments from 2002-2008.
- Studies dealing with survival rate by stage from the period 1990 to 2007 are available where disease free survival and overall survival of patients has been studied.
- Most of the studies on biomarkers are based on their use as a diagnostic agent but only a few deal in biomarkers as a treatment agent.

India:
Overall, there is sufficient epidemiology data (however less as compared to top 10 cancers in India) at a granular level for parameters like incidence, diagnosis, and treatment and partially available for prevalence, survival, and biomarker.
There are 19 cancer registries in India, mostly at the regional level, which cover a vast majority of the country. Incidence level data is available from population based cancer registries by age and gender covering both urban and rural population for the period 2001–2008.

Research articles estimate incidence for the years 2010, 2015, and 2020 based on the incidence data available through Indian Cancer Registries for the time period 2001-2005.

There is not much data on prevalence either from registries or publications at both regional and country level.

Treatment and diagnosis level data is available by gender for the period 2004-2006 from Hospital Based Cancer Registry.


Survival rate is available by stage from articles for the period 1992-2006 and 2001-2004.

Articles on biomarker studies are few; one study published in PubMed studied the sensitivity of biomarkers for treating bladder cancer patients. Studies on biomarkers are based on identifying the suitable diagnostic marker for early detection of cancer.

Indonesia:

Epidemiological study of bladder cancer in Indonesia shows that the available data is limited and very much scattered.

- An article gives information on incidence by stage and grade and also provides data on diagnostic methods and extensive information on survival data.
- Apart from GLOBOCAN (2008), there are limited sources available for incidence and prevalence by age and gender.
- There are a few articles focused on biomarkers that could play an important role in the decision making process during treatment.
- Countries Cancer Registry, a hospital based cancer registry, has been collecting data on cancer since 1993 but it is again at a superficial level. Few articles are authored on incidence, prevalence, and treatment options for bladder cancer.

Philippines:

Availability of epidemiological data for Philippines is relatively less as compared to other countries.

- Most of the epidemiological data available is found with the local cancer registry and the Department of Health. Very limited epidemiological data is available in publications.
- Granular level of epidemiological data for incidence is available as estimates for the year 2010 only.
- Data on prevalence, survival, and treatment level information is hardly available.
- Incidence estimates for 2010 and relevant information therein has been taken from GLOBOCAN 2008. Estimates are given as gender split but there is no split available for bladder cancer in rural and urban areas of Philippines.
- Information on treatment guidelines of bladder cancer is available in the online library of the Department of Health.
- There is limited data on studies carried out on biomarkers.

Singapore:

Epidemiological data availability on bladder cancer for Singapore is moderate.

- Granular epidemiological data for incidence and survival is readily available.
- Data on prevalence and treatment level information is not available.
- Singapore has only one cancer registry that provides most of the data at a granular level for incidence and 5 years survival by age and gender for the period 1973 to 2007.
- Specifically from 2007-2011, incidence data is available as a split of ethnic groups; as bladder cancer is among the top 10 cancer indications in Singapore males, data is available only for males and not for females.
- Relative and observed survival by age group is mentioned for the 1st, 3rd, 5th, and 10th year survival periods.
- No specific treatment guidelines for the treatment of bladder cancer are available.
- Studies have been carried out on the use of biomarkers in bladder cancer prognosis and treatment.

South Korea:

In South Korea, granular epidemiology data on incidence and prevalence is adequately available till 2010 whereas data on survival and diagnosis for the same period is available with limited data points.

- Majority of incidence data points are available with the granularity level of overall, age standardized, gender, and stage specific incidence.
- Data points for 1, 2, 3, 5, and 10 years prevalence is available by age.
- Most of the data available is mainly from reports published by the Korean government, local cancer registries, and the National Statistics Office while the rest is from scientific publications.
- Partial data on treatment level information for different stages of bladder cancer is available.
- There is an increasing trend towards studies related to biomarkers and prognostic markers in bladder cancer treatment in the last 5 years.
Taiwan:

Epidemiological study of bladder cancer in Taiwan shows that the data available is quite comprehensive

- Data collections have been primarily sourced from PubMed, articles, and registries.
- There are many articles, reports, and registries that help understand the types of bladder cancer (invasive, non-invasive, urothelial, metastatic, etc.).
- As far as incidence data is concerned, there are some reports from the Department of Health and the local cancer registry that give information on incidence rate by age and gender for the period 1998–2012. But most of these reports focus on the incidence of bladder cancer in men.
- Studies published between 2007 and 2012 give information on the survival rate, diagnostic methods, treatment options, and biomarkers for bladder cancer in Taiwan.
- According to a published article, the incidence of urothelial cancer is particularly high in the southwestern coast of Taiwan.
- There are several articles and reports that discuss the incidence of bladder cancer, however, there is very little prevalence and treatment related data.

Thailand:

A comprehensive literature review shows that the availability of epidemiology data at a granular level is limited for prevalence, diagnosis, survival, treatment, and biomarkers.

- The incidence of bladder cancer in Thailand is the only detailed information available with granularity level by gender, age, and stage for the years 2000-2011.
- Publications, review articles, and other sources do not have much information about other parameters apart from incidence.
- Though there is no splitting of information on the incidence of bladder cancer among the urban and rural population, data from hospital and population based registries captures the relevant statistics for incidence.
- Major information on the incidence of bladder cancer has been collected from various cancer registries. Out of all the registries in Thailand, few hospital based cancer registries have been the most significant ones to capture the incidence of bladder cancer throughout the various regions and provinces of the country.

Vietnam:

Epidemiological data for parameters of incidence, prevalence, diagnosis, survival, and treatment of bladder cancer in Vietnam is very scarce.

- The best possible data that can be found on the incidence of bladder cancer in Vietnam is from a population based report for the period 2001-09.
- There are a few publications that show the incidence rate for bladder cancer in Vietnam for the years 2001-04 and 2006-07.
- Granular level data is not available for prevalence, survival, treatment, diagnosis, and biomarkers.
- Information on the rural and urban split for bladder cancer is also not found in any of the sources.
- Ethnic studies conducted in different countries (USA, Australia, etc.) discuss the incidence of bladder cancer among the Vietnamese population.
- Apart from data on incidence, no information is available on bladder cancer in Vietnam.

Table 1: Status of availability of bladder cancer epidemiology data at a granular level in 10 emerging countries

<table>
<thead>
<tr>
<th>Incident</th>
<th>Age</th>
<th>Gender</th>
<th>Diagnosis</th>
<th>Stage Distribution</th>
<th>Receptor Status</th>
<th>Treatment</th>
<th>Therapies</th>
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### Availability of Prevalence (1,3,5 years) Data at Granular Level in 10 Asia-Pacific Countries

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<th>Country</th>
<th>Prevalence</th>
<th>Age</th>
<th>Gender</th>
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### Availability of Survival Data at Granular Level in 10 Asia-Pacific Countries

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<th>Country</th>
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<th>By Stage</th>
<th>Gender</th>
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<th>3 Yr SR</th>
<th>5 Yr SR</th>
<th>Relative Survival</th>
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### Availability of Treatment Data at Granular Level in 10 Asia-Pacific Countries

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Conclusion

To date, there has been limited data on the burden of bladder cancer in the 10 Asian countries mentioned in this paper. There is a huge data scarcity for epidemiology of bladder cancer at a granular level in emerging countries. Most of the countries have data mainly for incidence by age, gender, and stage split but availability of data for prevalence, survival, and treatment patterns at a granular level is very poor. Cancer registries have published very limited information from these countries and this information is restricted to a superficial level only. It is observed that only few countries have published papers on the burden of epidemiology in specificity to the above mentioned parameters. Majority of the published data and reports pertain to studies from the period 2000-08 but not beyond. There are very few countries where epidemiology data is also available with a split of rural and urban population but this does not reflect anywhere. Extensive research conducted to check the availability of epidemiological data in Asian countries shows that there is a need for more in-depth and comprehensive research to understand the burden of bladder cancer at various granular levels.

References: References available on request
Genpact Limited (NYSE:G), a global leader in business process management and technology services, leverages the power of smarter processes, smarter analytics and smarter technology to help its clients drive intelligence across the enterprise. Genpact’s Smart Enterprise Processes (SEPSM) framework, its unique science of process combined with deep domain expertise in multiple industry verticals, leads to superior business outcomes. Genpact’s Smart Decision Services deliver valuable business insights to its clients through targeted analytics, reengineering expertise, and advanced risk management. Making technology more intelligent by embedding it with process and data insights, Genpact also offers a wide variety of technology solutions for better business outcomes.

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