# Market Study On Alternatives of Mercury Measuring Devices in Health Care in India

A Status Report on India





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# Section A Health Industry

Health Industry Chapter 1: Overview

# **Chapter 1**

**Overview** 

#### **Overview: World Health Industry**

The health care industry is one of the world's largest and fastest-growing industries. Consuming over 10 percent of gross domestic product of most developed nations, health care can form an enormous part of a country's economy. In 2003, health care costs paid to hospitals, physicians, nursing homes, diagnostic laboratories, pharmacies, medical device manufacturers and other components of the health care system, consumed 15.3 percent of the GDP of the United States, the largest of any country in the world. For United States, the health share of gross domestic product (GDP) is expected to hold steady in 2006 before resuming its historical upward trend, reaching 19.6 percent of GDP by 2016. In 2001, for the OECD countries the average was 8.4 percent with the United States (13.9%), Switzerland (10.9%), and Germany (10.7%) being the top three.

US healthcare expenditures totaled US\$ 2.2 trillion in 2006. According to Health Affairs, US\$ 7,498 is spent on every woman, man and child in the United States in 2007, 20 percent of all spending. Costs are projected to increase to \$12,782 by 2016.

China has implemented a long-term transformation of its healthcare industry, beginning in the 1980's. Over the first twenty-five years of this transformation, government contributions to healthcare expenditures have dropped from 36% to 15%, with the burden of managing this decrease falling largely on patients. Also over this period, a small proportion of state-owned hospitals have been privatized. As an incentive to privatization, foreign investment in hospitals — up to 70% ownership — has been encouraged.

#### **Key Statistics: World Health Industry**

#### Size of the Industry

The United States of America has one of the largest medical and healthcare industries in the world, followed by Switzerland and Germany. The USA's medical industry comprises of more than 750,000 physicians and 5,200 hospitals. USA witnesses approximately 3.8 million inpatient visits and 20 million outpatients visit on a daily basis. Furthermore, the United States of America has the largest workforce i.e. one in every 11 US residents employed in the health care business.

The Global prescription drug market was \$550 billion in the year 2006. Also, the total health care expenditures across the world were \$4.5 trillion in 2006. Of which, US solely account for \$ 2.2 trillion, \$ 2 trillion in OECD countries and remaining \$ 0.3 in other countries of the world.

#### Major Segments of the Industry

The global medical industry is highly fragmented, comprising of various ancillary sectors namely medical equipment and supplies, pharmaceutical, healthcare services, biotechnology, and alternative medicines sectors.

Medical Equipment and Supplies: Consists of various establishments or units engaged in designing, manufacturing, selling and distributing of surgical and medical instruments, ophthalmic, lab apparatus, electro medical, dental, irradiation, surgical appliances and supplies.



Fig: Share of Medical Equipment & Supplies In 2006

\*Pharmaceutical Industry: It comprises of several establishments involved in developing, researching, marketing and distributing drugs or medicines. Globally, the market share of pharmaceutical industry is US \$340 billion. The global pharmaceutical sales account for US\$

602 billion, with an annual growth rate of 7%. In the year 2006, the global pharmaceutical exports totaled US \$ 271.9 billion having an annual growth rate of 10%.

- Healthcare Services Industry: It includes various establishments dealing in different type of services like testing, outsourcing, transcription, quality assurance, validation, compliance, chemical analysis, and other types of services. The global market share of biotechnology services industry is worth US \$ 50 billion, which is soon expected to witness a hike in coming years. Presently, pharmaceutical testing service industry values to US \$ 5.9 billion, which is predicted to reach US \$ 9.5 billion by the end of 2009. Microbiological testing service industry accounts for US \$ 2.4 billion. Globally, the medical outsourcing services industry accounts for approximately US \$ 200 billion.
- Biotechnology Industry: It is one of the most research-intensive segments of the global healthcare industry. Biotechnology industry is composed of many establishments, which are engaged in making wide variety of biotech products. Biotechnology is primarily being used by the pharmaceutical industry but there are other industries like agriculture, mining, waste treatment industries as well, which are making continuous use of biotechnology. Biotechnology companies focus on developing methods or products used for preventing, diagnosing and treating dozens of life threatening and chronic diseases. The biotechnology industry has mushroomed since its inception and at present it is equivalent to US \$ 50.7 billion. China, USA, India, Australia, and France are the market leaders of biotech products in the world.

	USA	Europe	Asia/Pacific	Canada
Sales & Revenue	\$72 billion	\$12 billion	\$3 billion	\$2 billion
Annual R&D	\$19 billion	\$5 billion	\$0.3 billion	&0.6 billion
No. of Companies	>1,500	>1,600	>700	>470
No. of Employees	>146,000	>68,000	12,000	7,440
No. of Public Companies	363	120	140	81
Market Capitalization	\$491 billion	\$26 billion	\$15 billion	\$14 billion

Alternative Medication Industry: It includes various groups involved in the promotion of different forms of alternative medications and therapies like ayurveda, homeopathy, aromatherapy, massage therapy etc. The total market size of alternative medicine is valued at US \$2.7 billion while global market for traditional therapies accounts for US \$60 billion.

#### **Overview: Indian Health Industry**

In India healthcare is delivered through both the public sector and private sector. The public healthcare system consists of healthcare facilities run by central and state government which provide services free of cost or at a subsidized rates to low income group in rural and urban areas. With the Indian economy enjoying a steady growth, the industry is heading towards growth phase. The introduction of product patents in India is expected to boost the industry by encouraging multinational companies to launch specialized life-saving drugs. Attracted by the advantages such as lower costs of production and skilled workforce that India offers, these companies are looking to set up research and development as well as production centers there.

Initially the government imposed high custom duty on imported medical equipment making it difficult for private entrepreneurs to set up hospitals. But in post liberalization the duties have come down and some life saving medicines and equipments can be imported duty free.

India has leveraged its economic reform process initiated in 1991 to become one of the largest and fastest growing economies in the world and is anticipated to grow steadily from 2006 to 2010. The GDP and gross capital formation are expected to increase sturdily and the inflation rate is likely to reduce. The Government is also implementing suitable policies to considerably lower the unemployment rate.

Increasing investment in health infrastructure and facilities, combined with quality health education for professionals, has improved the quality of health services in the country. India is fast emerging as a regional hub for healthcare services, attracting patients from various countries. In fact, medical tourism is one of the most promising and dynamic sectors of the industry. Key healthcare initiatives undertaken by the government include establishment of new regulatory bodies, launch of several healthcare programs, and changes in patent laws. It is also implementing Telemedicine, one of the largest healthcare projects in the world, to revolutionize the delivery of healthcare services using information and communications technology.

Modernization of the healthcare systems and greater collaboration with the healthcare industry to provide innovative drugs, modern medical equipment, better healthcare services, as well as expand healthcare insurance are the primary aims of the Indian Government. It has stated in the National Health Policy that it hopes to increase the number of healthcare centers in remote areas and improve supply of essential healthcare services by boosting the public healthcare expenditure to 2.0 percent of the gross domestic product (GDP) by 2010. This is eminently achievable, considering the rising healthcare needs of the country, favorable economic conditions, and greater disposable income. The economic environment plays a crucial role in developing this industry. Economic policies greatly impact this demand-driven industry and industry-specific policies, wherever effectively enforced, provide added impetus.

#### **Key Statistics: Indian Health Industry**

India's healthcare industry was worth \$35 billion in 2006 accounting to approximately 5.1% of GDP. The industry is expected to grow by around 13% per year for the next four years. In India more than 50% of the total health expenditure comes from individuals as against a state level contribution of below 30%. The government funds allocated to healthcare sector have always been low in relation to the population of the country. In the private sector healthcare industry, healthcare facilities are run for profit by companies. Healthcare facilities run by charitable organizations also provide services totally free or at very low costs depending on the income of the patient or patient's family.



**Healthcare Market Distribution** 

The private healthcare providers consists numbers of fragmented private practitioners, hospitals and nursing homes, and charitable hospitals. The average size of private hospitals/nursing homes is 22 beds, which is low compared to other countries.

#### Segmentation: Indian Health Industry

The Indian healthcare sector constitutes:

- A Medical care providers (physicians, specialist clinics, nursing homes & hospitals),
- Diagnostic service centers and pathology laboratories,
- Medical equipment manufacturers,
- Contract research organizations (CRO's)/ pharmaceutical manufacturers,
- Third party support service providers (catering, laundry).

The healthcare industry is expected to increase in size from its current \$ 35 billion to \$ 75 billion by 2012. India as a country, on an economic upsurge, is witnessing changes in its demographic profile accompanied with lifestyle diseases and increasing medical expenses. Revenues from the healthcare sector account for 5.1% of GDP and it employs over 4 million people. By 2012, revenues are expected to reach 6.5% to 7.2% of GDP and direct and indirect employment can double.

Private healthcare will continue to be the largest component in 2012 and is likely to double to \$ 33.39 billion. It could rise by an additional \$8.21 billion if health insurance cover is extended to the rich and middle class. Coupled with the expected increase in the pharmaceutical sector, the total healthcare market in the country could increase to \$50 – \$70 billion in next five years.

Medical infrastructure forms the largest portion of the healthcare pie. As per the current statistics available (2006) bed per thousand population ratio for India stands at 1.03 as against an average 4.3 of comparable countries like China, Korea and Thailand. Hence inspite of the phenomenal growth in the healthcare infrastructure, India is likely to reach a bed to thousand-population ratio of 1.85 and in a best-case scenario, a ratio of 2 by 2012. Beds in excess of 1 million need to be added to reach a ratio of 1.85 per thousand, out of which about 896,500 beds will be added by the private sector with a total investment of \$ 64.47 billion over the next six years. However, the gains are commensurate in this capital intensive industry, since the revenues generated by private hospitals in the year 2012 will be to the tune of \$ 33.50 billion growing at a CAGR of 15%. Despite this investment, the bed to thousand population ratio would be far from comparison with other similar developing countries.

Size of hospitals in the private health care sector generally comprises of:

- +84% with less than 30 beds
- ♣ 10% with 30 -100 beds
- ♣ 5% with 100-200 beds
- \$1% with more than 200 beds

**Medical Care Providers:** The biggest challenge for the healthcare industry today is an acute shortage of trained personnel, ranging from doctors, nurses, technicians and even healthcare administrators. There could be a shortfall of over 450,000 doctors in the year 2012. Such challenges present an opportunity for both domestic and foreign players in the form of 'training & education'. Foreign players can enter the market to take a two-fold advantage. One, they get a piece of the booming education sector and two, they can source some of the talent for their own countries as human resources shortage in healthcare will be a global phenomenon.

Medical equipment forms another promising opportunity within healthcare. Analysis pegged the medical equipment industry at \$2.02 billion in 2006 growing at 15% per year and estimated that it would reach \$ 4.55 billion by 2012. Currently over 65% of the medical equipments are imported and thus lies a key area for forging partnerships across borders. Engineering excellence, cost-effective labor, increasing emphasis on intellectual property rights and most importantly a fast growing domestic market makes India an ideal manufacturing base.

Growth in medical infrastructure will be accompanied by demand for associated products and services. One such important industry is medical textiles, which shall almost double to a \$ 704 Million (industry by 2012 from the current \$ 378 million. Medical value travel is poised to grow at 22% annually. With hospitals moving in for quality accreditations like JCI, NABH & ISO and tie-ups between insurance players and hospitals, this sector has the potential to be a latent growth driver. A percentage of high end beds will provide treatment to medical tourists and the estimated value of the industry will reach \$1.37 billion by 2012 from its current size of \$ 421 Million.

Health insurance has the potential to show fantastic top line growth. Premiums grew 133% for private players and for the overall industry premiums grew at 47% in Q1 of 2006. The Health insurance sector will grow to \$ 3.54 billion in collected premiums by 2012 as compared to \$ 665 million in 2006.

Clinical trials has the potential of becoming a \$ 935 million industry by 2010, even though the advantages of trials in India is well known, the industry needs a boost in terms of effective government policies and active interest by the government including effective utilization of established government infrastructure.

The Health services outsourcing sector has real potential as most of the key components needed for success are present in India and the total size of the industry is set to grow to \$ 6.8 billion by 2012 growing at 11% per year.



#### **Healthcare Market Segmentation**

#### Infrastructure: Indian Health Care

The health care infrastructure in rural areas in India has been developed as a three tier system and is based on the population norms as shown:

Contro	Population Norms			
Centre	Plain Area	Hilly/Tribal/Difficult Area		
Sub-Centre	5000	3000		
Primary Health Centre	30,000	20,000		
Community Health Centre	1,20,000	80,000		

#### Sub-Centers (SCs)

The Sub-centre is the most peripheral health unit and first contact point between the primary health care system and the community. Each sub- centre has one Female Health Worker / ANM (Auxiliary Nurse Midwife) and one Male Health Worker. One Female Health Assistant (Lady Health Visitor LHV) and one male health assistant supervise six sub centers. Sub-centers are assigned to perform tasks related to components of primary health care. They are provided with basic drugs for minor ailments needed for taking care of essential health needs of population. The Government of India is providing 100% central assistance to all sub-centers in the country since April 2002 in the form of salaries of ANMs and LHVs and rent of buildings.

1, 45,272 sub-centers functioning in the country as on March 2007. The progress in number of existing sub-centers is shown in Figure NRHM has proposed strengthening of sub-centers in the form of provision of untied fund of Rs10,000 per annum. This fund to be utilized for local needs and maintenance of subcentres. The units will also be provided with essential drugs, both allopathic and AYUSH. Upgradation of subcentres is planned with provision of additional manpower in vacant positions.

#### Primary Health Centers (PHCs)

PHCs remain the first contact between village community and Medical Officer. They are manned by a Medical officer supported by 14 paramedical and other staff. It acts as a referral unit for 6 sub-centers. It has 4-6 beds for patients. There are 22,370 PHCs functioning as on March 2007 in the country. The progress in number of existing PHCs is shown in Figure

#### **Community Health Centers (CHCs)**

CHCs are manned by four medical specialists i.e. Surgeon, Physician, Gynaecologist and Pediatrician supported by 21 paramedical and other staff. It has 30 in-door beds with one OT, X-ray, labour room and laboratory facilities. It serves as a referral centre for 4 PHCs and also provides facilities for obstetric care and specialist consultations. As on March 2007, there are 4,045 CHCs functioning in the country. NRHM aims to strengthen services at CHCs by operationalising 100% CHCs as 24 hour First Referral Units (FRUs), including posting of anesthetists. New Public Health standards have been formulated for all cadres of primary health

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care functioning units including CHCs. The objectives of these public health standards are essentially to provide optimal expert care to the community; to achieve and maintain an acceptable standard of quality of care; to make the services more responsive and sensitive to the needs of the community. A set of assured service package is provided to population. An additional public health programme manager posting is recommended on contractual basis at all CHCs for supervising surveillance operations; coordination of national health programs; management of ASHAs etc. A standard set of essential drugs and equipment is enlisted at CHCs level. Quality assurance is envisaged in delivery of health care and is recommended that every CHC to have the charter of patient rights prominently displayed at entrance of CHCs. The progress in number of existing CHCs is shown in Figure.

The number of these centers has shown an increasing trend over the last years on continuous basis. According to the figures of population based on 2001 population census, the shortfall in the rural health infrastructure comes out to be of 20855 sub centers, 4883 PHCs and 2525 CHCs. About 50% of sub-centers, 76% of PHCs and 91% of CHCs are located in the Government buildings.

#### **Trends: Indian Health Industry**

**Emerging:** Private sector is more focused on tertiary-level as wells as preventive and diagnostic healthcare, whereas the public sector is ramping up prevention and elimination of infectious diseases as accessibility of basic healthcare facilities to the rural masses.

**Aggressive:** Corporate are sensing a huge untapped opportunity in delivery of quality healthcare to the Indian masses.

**Private equity:** It is not only the corporate who are interested in tasting the healthcare pie; global PE and VC's are equally vying to explore opportunities. They are playing a vital and varied role in Indian healthcare delivery to increasing the global footprint of local pharmaceutical companies to aiding the rapidly growing contract research outsourcing industry.

**Accreditation:** With increased competition for healthcare delivery, growing patient awareness and promotion of medical tourism 'Quality healthcare is the key for survival'. National Accreditation Board for Hospitals and Healthcare Providers (NABH) is the latest Board set-up under the National accreditation structure to establish and operate accreditation programs for healthcare organizations.

**Medical Tourism:** Perhaps nothing has gained more attention and achieved as much flamboyance as 'Medical Tourism'. Almost 50 per cent of the tertiary hospitals are actively focusing on tapping medical tourists as a significant chunk of their patient-base.

**Health Insurance:** For a developing nation like India, world-class healthcare is extremely challenging in the absence of a strong health reimbursement infrastructure. The introduction of TPA by the Insurance Regulatory Development Authority (IRDA) in 2002, added a new dimension to Medical Insurance–the availability of 'Cashless Hospitalization'.

**Pharma under WTO regime:** With regulations and patent laws being formalized, the pharmaceutical industry, which relied heavily on reverse engineering skill and generic exports, is now looking towards basic drug discovery, contract services and value added generics as growth drivers. Overseas acquisitions, entry into medical devices and setting-up of hospital chains are some strategic maneuvers reported by leading pharmaceutical players.

**Medical device regulations:** Policy framework for regulation of implantable medical devices is now in existence. It is step towards ensuring availability of quality medical devices to the Indian patient, who was until now susceptible to non-standardized and spurious products, both Indian and imported.

**Telemedicine:** The growing role of telemedicine in the Indian healthcare industry can only be understated. It has enabled the government to provide basic healthcare facilities in difficult-top-access terrain, as well as in providing emergency services to calamity spots.

Birth of indigenous medical device manufacturing: Imports constitute 65-70 per cent of the currently consumed medical devices in India today. With a strong engineering and manufacturing base, India has a potential of becoming a global provider of medical devices.

#### **Emerging Growth Drivers**

Over the last five decades India has built up a vast health infrastructure and manpower at primary, secondary and tertiary care in government, voluntary and private sectors. Currently private sector health services range from those provided by large corporate hospitals, smaller hospitals and nursing homes and clinics run by qualified personnel. A majority of the private sector hospitals are small establishments with 85% of them having less than 25 beds. Private tertiary care institutions providing specialty and super specialty care account for only 1 to 2% of the total number of institutions while corporate hospitals constitute less than 1%. The private sector accounts for 82% of all outpatient visits and 52% of hospitalization at all India level.

The rate of growth of the health care industry in India is moving ahead neck to neck with the pharmaceutical industry and the software industry of the country. The health care industry in India is reckoned to be the engine of the economy in the years to come. The health care sector encompasses health care instruments, health care in the retail market, hospitals enrolled to the hospital networks etc.

India's rapid growth has brought about a 'health transition' in terms of shifting demographics, socio-economic transformations and changes in disease patterns.

Healthcare, which is a US\$ 35 billion industry in India, is expected to reach over US\$ 75 billion by 2012 and US\$ 150 billion by 2017 according to Technopak Advisors in their report 'India Healthcare Trends 2008'.

Moreover, as per a PricewaterhouseCoopers study 'Healthcare in India, Emerging market report 2007', the revenues from the healthcare sector account for 5.2 per cent of the GDP, making it the third largest growth segment in India.

The sector's growth will be driven by the country's growing middle class, which can afford quality healthcare. Over 150 million Indians have annual incomes of more than US\$ 1,000, and many who work in the business services sector earn as much as US\$ 20,000 a year. If the economy continues to grow at its current rate and the literacy rate keeps rising, much of western and southern India will be middle class by 2020.

To meet this growing demand, the country needs US\$ 50 billion annually for the next 20 years, says a Confederation of Indian Industry (CII) study. India needs to add 2 million beds to the existing 1.1 million by 2027, and requires immediate investments of US\$ 82 billion as per the Technopak Advisors report.

Of late India is becoming a preferred healthcare destination for neighboring countries and the West due to low cost and high quality of treatment available giving rise to the term medical tourism. This has had a cascading effect with more and more hospitals in the private sector upgrading their facilities to land a slice of this business.

Medical insurance which was non existent earlier has now opened up. More and more of the Indian population is taking up insurance which results in increased spending on healthcare.

#### **Medical Device Market**

According to official statistics, the number of clinics and hospitals have increased almost four times than in the 1950's. This has also increased the demand for medical equipments which has made the medical device sector as one of the most promising markets in India. Even more alluring than the size of the market is its projected growth. The demand for medical equipments is rising annually at an impressive rate of 15%. The Indian Healthcare sector has seen progressive increase in investments in healthcare infrastructure and facilities, especially hi-tech medical devices.

The Medical Device Market is becoming too big to ignore. It is full of opportunities for investment in high quality, specialized medical equipments. Foreign participation is required, especially in high-tech devices that account for roughly 45-55 % of the entire market. Most Indian healthcare institutes use foreign medical equipments for the purpose of surgery, diagnosis of cancer and medical imaging.

Imports account for more than 65% of the medical devices, of which 85% are imported from US, Germany and Japan. The growth in demand is consistent and industry is expected to touch \$ 4.64 billion by 2012.

Medical devices market can be segmented as below:

#### **Medical Device Market**



The government has identified healthcare as a priority section and hence have taken some measures to promote one of its most important segment "Medical Device Market". The conditions for exporting to India have significantly improved since the economic reforms started in the middle of the nineties. Import license requirements have been cancelled, majority-owned subsidiaries are possible, and dividends can be paid out abroad.

#### Thermometer

A thermometer is a device used to measure temperature or temperature changes. Thermometers measure temperature, by using materials that respond in some way when they are heated or cooled. In a mercury or alcohol thermometer the liquid expands as it is heated and contracts when it is cooled so the length of the liquid column is longer or shorter depending on the temperature. Modern thermometers are calibrated in standard temperature units such as Fahrenheit or Celsius.

There are many different thermometers relying on different principles. These include:

- Thermistors
- Thermocouple
- Mercury-in-glass thermometers
- Bi-metal mechanical thermometers
- Silicon bandgap temperature sensors
- Infrared thermometers

Thermometers containing mercury are used in several processes in a hospital. Apart from the fever thermometer used in wards, they can be also found in the blood banks, incubators, water baths, and labs. Thermostats containing mercury can be found in ovens (laboratories), nursing incubators, room temperature control and refrigerators.

**Fever Thermometers:** Our body always responds to changes in temperature, but we cannot be accurate about the degree of change without measuring it. And that is what a thermometer does; it measures the degree of hotness or coldness in a body. The most common method of measuring body temperatures is with a mercury-in glass thermometer whose tip is inserted into the mouth (oral temperature), under the armpit (axilliary temperature) or into the rectum via the anus (rectal temperature).

**Uses:** Fever thermometers measure human body temperature including oral, rectal, or auxiliary (armpit). Fever thermometers are commonly found in homes and medical institutions; however, sales of mercury-containing fever thermometers have been decreasing as alternatives gain in popularity.

#### Sphygmomanometers/ Blood Pressure Instruments

Blood pressure is generated by the activity of the heart and blood vessel system and is widely accepted as a measure of cardiovascular performance. Therefore blood pressure levels and variations are considered to be an indicator of cardiovascular function and overall health. Sphygmomanometers are the commonest form of blood pressure measuring apparatus used in every clinic and every ward of the hospital. Most blood pressure devices use an air filled cuff to temporarily block blood flow through the artery, and then apply a particular technique to obtain blood pressure while the cuff deflates. The most common techniques for pressure measurement are the auscultatory method (listening for characteristic blood flow sounds) or oscillometric technique (using a pressure transducer).

The auscultatory method of measuring blood pressure refers to listening to sounds produced by blood turbulence within the artery. The occlusive cuff is pumped up to about 180 mm Hg, then bled off at about 3 mm Hg/s. When the arterial pressure exceeds the cuff pressure, blood squirts through the partially occluded artery and creates turbulence, which creates Korotkoff sounds. A stethoscope placed distal to the cuff over the brachial artery detects the tapping noise that signals systolic pressure. When the cuff pressure decreases, the artery remains open the entire cycle. The sounds disappear, which indicates diastolic pressure. A piezoelectric sensor placed within the cuff replaces the stethoscope for automatic detection.

The oscillometric method relies on detection of variations in pressure oscillations due to arterial wall movement beneath an occluding cuff. Empirically derived algorithms are employed, which calculate systolic and diastolic blood pressure. Manufacturers develop their own algorithms by studying a population group.

Sphygmomanometers are manometers used to measure human blood pressure. Mercurial sphygmomanometers have been the standard in the medical field for many years but are being phased out and replaced with aneroid and digital products due to liability associated with mercury spills.

Mercury content can vary from 20 to 60 grams of mercury.

Health Industry Chapter 2: Thermometer & BP Instruments Industry in India

# **Chapter 2**

### Thermometer & BP Instruments Industry in India

#### Market size

Taking into account that there is no actual data available through secondary sources, a rather comprehensive technique is being used to estimate the market size of thermometer equipments.

#### **Clinical Thermometer**

In India, almost 50% of the domestic demand is catered through imports. With imports as high as USD 1.77 million and exports almost USD 1.1 million, the market size stands at USD 6.5 million. (2007-08)

Quantity wise in the year 2007-08, India imported almost 720,000 thermometers and exported around 300,000 units. The domestic demand for thermometers was almost 1.5 million units out of which "*HICKS*" had a market share of 40%. Total demand for thermometer in India including exports for the year 2007-08 was almost 4.5 million.

#### **Blood Pressure Instruments**

The market size of BP instruments is approximately USD 200 million. Almost 80% of the demand is catered through imports.

Quantity wise, India imported around 330,000 and exported around 25,000 units every year. The domestic demand for BP measuring instruments accounts for nearly 500,000 units every year.

#### Exports v/s Imports

#### Thermometers (values in USD)

· · · ·	:		
	2006-2007	2007-2008	%Growth
Total Exports	715,933	1,085,978	51.69
Total Imports	1,701,933	1,776,422	4.38

#### Blood Pressure Instruments (values in USD)

	2006-2007	2007-2008	%Growth
Total Exports	175,400	605,511	245.23
Total Imports	4,403,267	5,241,622	19.04

Though we can see exports showing a very high growth in both the devices but that is very insignificant when it comes to the total quantity imports. Imports are much higher than the exports.

The reason for this high rate of imports is because of the fact that there only a few factory producing high-quality digital thermometers in India, yet it produces almost exclusively for export, and its pricing is currently out of reach for much of the country's health care sector.

#### **Chinese Penetration in India**

China is predominant in the Indian market, in both the thermometer and BP market.

#### **Thermometer - Import**

Country	Va	alues in USD	)	Quant	ity in thousa	ands
Country	2006-07	2007-08	%Growth	2006-07	2007-08	%Growth
CHINA P RP	348,755	356,133	2.11	1,842.82	683.32	-62.92
SINGAPORE	461,444	579,888	25.67	26.74	3.09	-88.44

It can be observed that the Chinese penetration in the market is less in rupee value when compared to its nearest competitor i.e. Singapore, but if we look at the quantity of import, it is clearly visible the kind of penetration it has in the Indian market. China accounts for more than 90% of the total imports in terms of quantity.

#### **BP Instruments - Import**

Country	Values in USD		Quantity in thousands			
country	2006-07	2007-08	%Growth	2006-07	2007-08	%Growth
CHINA P RP	868,911	1,385,489	59.45	104.85	179.23	70.94
USA	989,444	998,933	0.96	22.46	24.33	8.33

Again, it is clearly visible that, China has a huge penetration in the Indian BP instrument market. Almost 90% of the Indian BP market is catered through imports of which China's share is approx. 80%.

#### **Role of China**

With the opening of trade routes, China is deeply penetrating into the market, out of the 50% imports; China contributes to almost 45% of the total imports. Traders/ importers bring in devices in India that costs them approx. 6-8 INR, which is further sold at a price of INR 30-50. The level of margin acts as a catalyst in the boom of trade from China. Even digital mercury free devices are directly imported from China because of its low price. In our study, almost all the traders import these devices from China. According to them it's cheaper to import thermometers rather than manufacture here in India. It costs around 100 INR to manufacture one mercury free thermometer here in India, whereas it costs around 50-60 INR to get it imported from China. However, it is just a matter of time; the government passes a law against use of mercury. There were also signs in the market that the import from China was going down. The reason stated was the loss of business due to inferior quality. Rejections by users due to quality problems like varied readings, frequent breakage etc. is leading to loss of business which is why it is observed a sharp decline of nearly 65% in imports from China.

#### **Domestic Demand & Supply**

Today, most mercury thermometers are produced outside India, with India also producing a small but significant percentage of the total.

Hicks, an Indian company, produce about 600,000 mercury thermometers annually for domestic consumption. This makes up roughly 40% of the Indian market. The rest of the demand is fulfilled by imports. Most of the manufacturers in India now import thermometer mainly from China, Japan, Singapore and UK to meet the Indian demand. India imports more than half a million thermometers every year for domestic consumption.

Whereas in case of BP instruments almost 90-95% market is catered through imports and Indian production is very minimal which does not meet the demand for BP instrument in the country. The same is imported from counties all over the world but major proportion is imported from China, Singapore, USA and Japan. India imports nearly 20 thousand BP instruments every month.

#### **Demand Pattern**

#### Individuals

Demand for products like thermometer or BP instruments or any other medical instruments depends on the need and the usage. Whenever, a need arises of checking either body temperature or blood pressure, it is either done manually indoors or through nearby hospitals/ clinics etc. this is mainly because the inability to read these instruments. For individuals who buy these instruments for own use, their demand for such products is affected by the following factors:

- Cost both direct and recurring
- Doctors Advice
- Chemists Advice
- Convenience in use
- Availability
- Knowledge of harmfulness

Individuals who use digital BP measurement instruments find it more convenient when compared to mercury or aneroid versions but again the above factors come into play.

#### Doctors

Doctors get the knowledge of updates through various journals, newspapers, internet, seminars, medical books etc. They are even updated from regular medical visits of medical representatives. They are well aware of the changes happenings and the pros and cons of mercury usage. Doctors have just one verdict, accuracy is very important in the field of healthcare, a slightest change in the reading of devices, may change their mode of treatment. Doctors prioritize accuracy of the product first, then other factors like cost, ease of use etc.

Their usage pattern is dependent on the place where they practice also, doctors who are against the use of mercury instruments are sometimes left with no options in hospitals where only traditional mercury instruments are used.

#### Hospitals/ Clinics

Large Private hospitals like Max Healthcare, Fortis, Wockhardt etc. are actively involved in shifting to alternates as they have a luxury to shift the extra cost involved to patients/ customers. Thus, their purchase pattern is not driven by cost. But again, their choice of alternates is limited. In a recent test to measure of accuracy of digital thermometers, most brands failed miserably in the most crucial test-measuring temperature accurately. Some were off the mark by as much as 4 degree Celsius. Even expensive digital thermometers did not perform any better, except Omron. So, the choice limits and they use both mercury and non-mercury devices.

#### Market Projections: Growth Potentials

Medical equipment industry in India was at \$2.02 billion in 2006 and is growing at 15% per year and estimated that it would reach \$4.55 billion by 2012. Currently over 65% of the medical equipments are imported and thus lies a key area for forging partnerships across borders. Engineering excellence, cost-effective labor, increasing emphasis on intellectual property rights and most importantly a fast growing domestic market makes India an ideal manufacturing base. Further the demand for medical equipments is rising annually at an impressive rate of 15 %.

The medical equipments are oh high demand and has a great market potential due to the following reason:

- Rise of lifestyle-related diseases such as diabetes, cardiovascular diseases, and diseases of the central nervous system.
- Increase in the number of private institutions
- Increase in diagnostic service
- The growth in affluence of the Indian middle-class is adding to this demand.



#### Health Industry Chapter 3: Product Segmentation

# Chapter 3

**Product segmentation** 

#### Mercury v/s Non-mercury

Mercury is a naturally occurring heavy metal. At ambient temperature and pressure, mercury is a silvery white liquid that readily vaporizes. When released into the air, mercury may stay in the atmosphere for up to a year, and is transported and deposited globally.

It is within this environment that inorganic and organic compounds of mercury are formed. Since the start of the industrial era, the total amount of mercury circulating in the world's atmosphere, soils, lakes, streams and oceans has increased by a factor of between two and four. This increase has been affected by human endeavors, which include the removal of mercury from its subterranean home through mining and the extraction of fossil fuels.

#### Thermometers

Identification of Mercury Thermometers- Mercury may be in fever, basal, and cooking thermometers. Thermometers containing mercury can be easily identified by the colour of the material in the bulb. If the bulb is silver, the thermometer most likely contains mercury. New fever thermometers containing gallium, indium, and tin are an exception to this as they will also appear silver in color. These thermometers are marketed as mercury-free thermometers. If the bulb is any other colour, e.g. red or blue, it is most likely spirit-filled.

Mercury content ranges from 0.5 to 3 grams.

Non Mercury Thermometers: Mercury-free alternatives include digital, alcohol, and glass galliumindium-tin thermometers. Other alternatives include ear canal thermometers and flexible forehead thermometers. These alternatives can be as accurate as mercury thermometers, and in many cases are easier to read.

#### Sphygmomanometers/ Blood Pressure Instruments

A mercury sphygmomanometer is a mercury manometer connected to a bladder cuff that wraps around a patient's arm. A vertical glass tube containing mercury indicates the cuff pressure while the person taking the pressure listens for arterial sounds in the patient's arm with a stethoscope.

Mercury contents vary from 20 to 60 grams of mercury.

Non Mercury Sphygmomanometers: Alternatives to mercurial sphygmomanometers are aneroid and digital products. Both are reliable, accepted as standard, and comparable to mercurial sphygmomanometers. Digital products continue to drop in price and are easiest to use.

Both mercury and mercury-free instruments have been in use for about 100 years and when working properly, either gives accurate results.

#### **Current Usage Scenario**

#### **Uses of Mercury**

As the metal (among others):

- for extraction of gold and silver
- as a catalyst for chlor-alkali production
- in manometers for measuring and controlling pressure
- + in thermometers & BP instruments
- + in electrical and electronic switches
- in fluorescent lamps
- \* in dental amalgam fillings

As chemical compounds (among others):

- \* in batteries (as a dioxide)
- + biocides in paper industry, paints and on seed grain
- \* as antiseptics in pharmaceuticals
- A laboratory analyses reactants
- catalysts
- pigments and dyes
- detergents
- explosives

#### Thermometer

In India, still more than 90% of the individual users prefer mercury containing thermometers, for a simple reason i.e., age old tradition. For ages, thermometers congaing mercury is present in the market.

There is little brand awareness of this product. Even when there is only one or two prominent brand in the market, customers are not able to relate this product to any brand. This gives an indication that the market is quite ignorant with the product. For individuals, cost in one big factor that governs the decision making for any product. Mercury free is approx. three times costlier than mercury containing thermometers. Thus whenever a need arises for such a product, the decision is made spontaneously and at the time of purchase.

#### **BP Instruments**

BP Instruments again is such a product that is demanded by hospitals/ clinics and also by a certain set of individuals, those who belong to the higher age bracket. In hospitals, still mercury containing BP instruments are used. The purchase of this product is dependent on the management of the hospitals/ clinics. Cost is a prime criterion, followed by the feedbacks of the doctors. Doctors usually complain about the accuracy of the mercury free BP instruments.

#### Health Industry Chapter 4: Mercury Free Instruments

# **Chapter 4**

**Mercury Free Instruments** 

#### Market scenario/ Presence

The health care sector is a key source of global mercury demand and emissions. Mercury is found in many health care devices, including fever thermometers, blood pressure cuffs, and esophageal dilators. The health care sector emits mercury waste into the environment when any of these devices are spilled or broken. Health Care generated mercury waste enters the global environment via incineration, solid waste disposal or waste water.

In most hospitals in developing countries like India, patients and health care workers are regularly and unknowingly exposed to dangerously high levels of mercury; there is regular and ongoing breakage of thermometers and the lack of mercury waste management protocols.

Mercury waste from broken fever thermometers is significant. For instance, thermometers used and broken in Argentina's health care sector emit an estimated 1 metric ton of mercury per year. The estimate for Mexico is similar. For India, it is 2.4 metric tons.

These spills and breakages create a hazardous hospital environment for patients and health care workers alike, while contributing to the global mercury load.

Chemicals containing Mercury	Alternatives
Mercury (II) Oxide	Copper catalyst, Sodium Iodate
Mercury Chloride	None identified
Mercury (II) Chloride	Magnesium Chloride/Sulfuric Acid or Zinc Formalin, Freeze drying
Mercury (II) Sulfate	Silver Nitrate / Potassium Sulfate / Chromium- (III) Sulfate
Mercury Nitrate (for corrosion of copper alloys) for antifungal use (mercurochrome)	Ammonia/Copper Sulfate, Neosporin, Mycin
Mercury Iodide	Phenate method
Sulfuric Acid (commercial grade; mercury as impurity)	Sulfuric acid from a cleaner source
Zenker's solution	Zinc Formalin

In general, different kinds of mercury have different alternatives, listed below:

#### **Fever Thermometers**

Mercury thermometers follow the simple principle that liquids change their volumes relative to their temperature. As temperatures rise, the mercury-filled bulb expands into the capillary tube. Its rate of expansion is calibrated on the glass scale. Traditionally, mercury has been used because it has a large liquid range [melting point =  $-38^{\circ}$ C; boiling point =  $35^{\circ}$  C] as well as a linear, and fairly large coefficient of expansion. There is about 0.7 grams of mercury in a regular fever thermometer and three grams in larger thermometers. Though the amount may seem small, it is enough to pollute a small lake.

#### Alternatives to Mercury Containing Thermometers

The risks of mercury poisoning and of chemicals pollution in general gained worldwide attention in the 1960s and 70s when several thousand people living on the shores of Minamata Bay in Japan sickened or died after eating seafood contaminated with mercury from a nearby factory.

Several types of non-mercury thermometers are available commercially. These include:

**Digital electronic thermometers:** It is now common to measure temperature with an electronic thermometer which functions with the help of some in-built sensors. The most common sensor used in an electronic thermometer is a thermoresistor (or thermistor). This device changes its resistance with changes in temperature. A computer or other circuit measures the resistance and converts it to a temperature, either to display it or to make decisions about turning something on or off.

**Glass alcohol thermometers:** These thermometers use the same principle as mercury except the mercury is replaced by red coloured alcohol. Both the thermometers, like mercury thermometers, can be used to take oral, rectal or axilliary (armpit) temperature. Digital electronic fever thermometers are readily available at retailers. Newest entrants to the list include Ear canal thermometers and Flexible "forehead thermometers."

#### Sphygmomanometers

Different type of blood pressure measurement equipments available in markets are:

**Mercury sphygmomanometer:** This includes a mercury manometer, an upper arm cuff, a hand inflation bulb with a pressure control valve and requires the use of a stethoscope to listen to the Korotkoff sounds. Relies on the auscultatory technique.

**Aneroid sphygmomanometer:** As for mercury sphygmomanometer, except an aneroid gauge replaces the mercury manometer. The aneroid gauge may be desk mounted or attached to the hand bulb. Relies on the auscultatory technique.

**Semi-automated device:** This includes an electronic monitor with a pressure sensor, a digital display, an upper arm cuff and a hand bulb. The pressure is raised manually using the hand bulb. The device automatically deflates the cuff and displays the systolic and diastolic values. Pulse rate may also be displayed. Battery powered and uses the oscillometric technique.

**Automated device:** This includes an electronic monitor with a pressure sensor, a digital display and an upper arm cuff. An electrically driven pump raises the pressure in the cuff. Devices may have a user-adjustable set inflation pressure or they will automatically inflate to the appropriate level, about 30 mm Hg above the predicted systolic reading. On operation of the start button the device automatically inflates and deflates the cuff and displays the systolic and diastolic values. Pulse rate may also be displayed. Devices may also have a memory facility that stores the last measurement or up to 10 or more previous readings. Battery powered and uses the oscillometric technique. **Wrist device:** This includes an electronic monitor with a pressure sensor, an electrically driven pump and a wrist cuff, or the device itself may be attached to the wrist. Function is similar to the automated device, mentioned above. Battery powered and uses the oscillometric technique.

**Finger device:** This includes an electronic monitor and a finger cuff, or the device itself may be attached to the finger. Generally battery powered and uses oscillometric, pulse-wave or plethysmographic methods.

Automatic-cycling non-Invasive blood pressure (NIBP) monitor: This is a more sophisticated version of the automated device above, with the addition of an automatic- cycling facility to record the patient's blood pressure at set time intervals. There may also be an option to measure temperature or. Alarm limits can usually be set to alert nursing staff when one or more patient functions have exceeded the limits. Mains and battery powered and uses the oscillometric technique.

**Ambulatory blood pressure monitor:** This includes an upper arm cuff and an electronic monitor with a pressure sensor and an electrically driven pump that is attached to the patient's belt. The unit is programmed to record the patient's blood pressure over a 24-hour period during normal activities and stores the data for future analysis. Battery powered and uses auscultatory and oscillometric techniques.

The majority of non-invasive automated blood pressure measuring devices currently available use the oscillometric method.

#### Alternatives to Mercury Containing Sphygmomanometers

The two most common alternates to the mercury blood sphygmomanometer available in the Indian market are:

- Aneroid
- Electronic

In reality, mercury and aneroid sphygmomanometers are widely used because of their low purchase price. When both units are in proper working order, either will give acceptable results. Both styles require calibration checks at regular intervals (at least annually). For aneroid devices, the procedure requires adjusting calibration at several pressure points, not just at zero like a mercury device.

Although simpler to calibrate, mercury sphygmomanometers have some inherent disadvantages when compared with the aneroid sphygmomanometer.

- Mercury is a toxic substance that threatens humans and wildlife. As a result, spills require careful and costly cleanup.
- It requires excellent technique to read the meniscus of a mercury column. Even if both types are in good working order, the aneroid dial is easier and requires less effort to read than a mercury column.
- Maintenance of mercury devices is cumbersome. For accuracy, the mercury tube must be perfectly perpendicular in its unit and perfectly vertical to the ground. The more off-vertical, the greater the inaccuracy.
- Each mercury sphygmomanometer has a vent or filter allowing outside air to be drawn in. Without frequent filter replacement, the mercury column experiences lag. "Lag" is a delay in the mercury response, which may result in an inaccurate reading.

Most hospitals calibrate the BP apparatus in-house. It's done without any formal training on methods of calibration or the hazards of mercury. According to some experts the mercury vapour level in such calibration rooms is much higher than the permissible limit.

#### **Demand pattern**

Potential Growth drivers

Demand for mercury free thermometer and BP instruments dependent on the following factors:

- Presence of Alternatives: It was observed that mercury free thermometer and BP measuring instruments were more prevalent in the metro cities when compared to other cosmopolitans and smaller cities. This was proven correct when; the smaller cities like Patiala, Ranchi and Surat were studied. The presence of alternatives was less than 10%.
- Quality: Quality of mercury free in comparison to mercury containing is low, but glass thermometers break more often which causes spillage. Mercury free does not break too often.
  "Readings taken by a mercury free gives fluctuative readings (4 out of 5 times)" were one of the quotes given by one of the individual respondents. This gives an idea of the disbelief in the mercury free segment of thermometer.
- Cost: In Indian context cost or price is the ultimate deciding factor, cost of mercury free thermometers are 8-10 times higher than its mercury containing counterpart, and a BP Instrument costs around 2-5 times more than the mercury containing device.

Drivers	Current Impact in Market
Awareness of health hazards due to mercury	No impact
Legislative Regulations	Not working positively
Shift of health care from public to private	Positive impact
Price difference between mercury containing and mercury free.	Negative Impact
Organized retail	Working Positively
Rise in health insurance	Indirect positive impact

- ♣ Growth in the private health care sector: This acts as a driver to growth. Large private players like Apollo, Max are high end hospitals that have the flexibility to shift their cost to their customers.
- Increase in retailing of products: Retail giants like Reliance Wellness, Religare Wellness etc. are actively involved in promoting safe health products.
- **A Mass media:** The coverage of mass media has become significant in the past decade.
- \* Rise of Health Insurance: With the rise in health insurance coverage, the spending in the health care within the family has increased significantly, leading them to visit better health care centers. The possibility of adoption of mercury free products then rises.

**Government Interventions:** Government is the law making authority. If the govt. itself passes a law to ban mercury, it will rapidly help in phasing out mercury.

#### Barriers to current demand

Seven potential barriers have been identified to higher penetration of non-mercury products:

- Lack of Awareness
- Perception of accuracy
- Ease of Use
- Lack of concern for environment
- & Price
- Force of habit

These barriers have been discussed statistically in the following sections.

#### Health Industry Chapter 5: Regulatory Issues

# Chapter 5 Regulatory Issues
#### **Rules & Regulations**

As India does not produce any mercury, all of it has to be imported. In developed countries, the use of mercury in various products is either banned or regulated. No concrete initiative has however been taken by the government of India to address the issue.

A draft notification was circulated by the Ministry of Environment and Forest (MoEF) in 2000 for a phased elimination of mercury from consumer products, but so far no action has been taken. The government is also dragging its feet on the phasing out of existing mercury-based chlor-alkali plants. India is one of the very few countries to allow the use of catalytic mercury compounds in industrial chemical processes.

Government is still in process to bring about legislation for phased elimination of mercury from consumer products such as thermometers, fluorescent tubes, batteries, electrical thermostats and switches, medical instruments and certain pharmaceutical and agricultural products with an exemption for essential products.

New mercury-based chlor-alkali plants have been banned, but the old ones are still allowed to operate.

In India the rules and regulations regarding the use of mercury is laid down by the Ministry of Health and Environment, other sectors are mere followers of those set guidelines.

### The Indian standard for code of safety for mercury published by the Indian Standards Institute (ISI)

Section 0.2.1 of this standard says that mercury and its compounds are toxic. A code of safety for mercury will be helpful in taking preventive measures for protection of health of persons exposed to this material in industry.

Section 0.5 – Mercury poisoning is included in the schedule of Notifiable diseases under the Factories Act, 1948. It is a compensable disease under the Workmen's Compensation Act, 1923.

Section 4.1.4 gives the threshold limit value in air for mercury as 0.05mg/m3 of air for repeated exposure for 8 hours workday and 40 hours work week.

Section 5 deals with storage and handling and states that since spillage of mercury is practically unavoidable, the spilled material should be washed away to drains and collected in water sealed traps. Lime sulphur may be sprinkled over the surface to get rid of finer particles, which may be left behind.

Section 7 talks about the preventive measures- protective gear mentioned include overalls, respirator with a desired filter; emphasises on training of staff and monitoring of ventilation and working conditions, mercury vapour concentration (to be measured with electrically operated mercury vapour meters or chemical based methods)

The standard code for mercury should apply to any place, which uses mercury including the hospitals. Their implementation in the hospital setting would mean that the hospital would need

to have a mercury policy and training on aspects of mercury exposure and spill management. It would also entail occupational safety through the use of protective gear; monitoring exposure limits; and ensuring water-sealed traps for mercury collection in drains. This code needs to suggest better ways for spill handling rather than suggesting washing of mercury in drains.

Assuming all these provisions and clauses given in the Indian laws and standards, it is apparent that mercury toxicity has been acknowledged by the government bodies but adequate measures have not been adopted for safe use and disposal of this metal. Even after the availability of much safer alternatives for all mercury uses in medical sector, the government policies are silent on eliminating use of toxic products. Considering the order of Supreme Court on Hazardous waste, the government needs to look into minimizing use of toxic material and ensuring proper disposal etc.

The new 2003 Amendment rules excluded the following three categories from the list of hazardous waste:

- a. Bio-medical wastes, covered under the Bio-Medical Wastes (Management and Handling) Rules, 1998
- b. Wastes covered under the Municipal Solid Wastes (Management and Handling) Rules, 2000
- c. The lead acid batteries covered under the Batteries (Management and Handling) Rules, 2001

It is interesting to note that, currently products containing mercury are used in large scale in hospitals and clinics and still the waste generated from these units are not considered as hazardous waste.

Schedule-1 of the Hazardous Wastes (Management and Handling) Amendment Rules 2003, lists the hazardous waste with related process/ industry. Table 2 below lists the process and corresponding wastes containing mercury included in Schedule-1.

The wastes generated from industry producing products that contain mercury such as thermometer, battery, fluorescent lamp, thermostats, etc., are not included in the list, which shows that CPCB is not serious about the problem of waste containing mercury.

**Schedule-3** of the Hazardous Wastes (Management and Handling) Amendment Rules 2003, lists the waste applicable for import and export. The following are the two types of waste containing mercury, which are permitted for import and export.

- a. Waste Electrical and electronic assembles or scrap containing, compounds such as accumulators and other batteries included on list A, mercury-switches, glass from cathode-ray tubes and other activated glass and PCB-capacitors, or contaminated with constituents (e.g. cadmium, mercury, lead, polychlorinated biphenyl) or from which these have been removed, to an extent that they do not possess any of the constituents mentioned in Schedule 2 to the extent of concentration limits specified therein. [Schedule 2 lists wastes constituents with concentration limit; Mercury and mercury compounds are grouped in Class A with concentration limit 50 mg/kg]
- b. Waste batteries conforming to specification, excluding those made with lead, cadmium or mercury.

**Schedule-B** of the Hazardous Wastes (Management and Handling) Amendment Rules 2003, lists the hazardous waste prohibited for Import and Export

- a. Mercury
- b. Waste having mercury: Mercury compounds as constituents or contaminations.
- c. Clinical and related wastes; that is wastes arising from medical, nursing, dental, veterinary or similar practices and wastes generated in hospital or other facilities during the investigation or treatment of patients, or research projects.

In Schedule B, the waste mercury and waste containing mercury compounds are included that are prohibited for import and export, thus it gives permission to industry to import recycled mercury and pure mercury.

Schedule B prohibits the import and export clinical and related wastes as they are hazardous but still within the country they are not considered as a hazardous waste. They are placed under the Bio-Medical Wastes (Management and Handling) Rules, 1998.

#### **Governing bodies**

Worldwide environmental NGO's includes the following:

**The European Environmental Bureau**, **(EEB)**, is a federation of more then 140 environmental citizens' organizations based in all EU Member States and most Accession Countries, as well as in a few neighboring countries. These organizations range from local and national, to European and international. The aim of the EEB is to protect and improve the environment of Europe and to enable the citizens of Europe to play their part in achieving that goal.

**Zero Mercury Working Group (ZMWG)**, (www.zeromercury.org) is an international coalition of more than 80 public interest environmental and health non-governmental organizations from 42 countries from around the world formed in 2005 by the European Environmental Bureau and the Mercury Policy Project. ZMWG strives for zero supply, demand, and emissions of mercury from all anthropogenic sources, with the goal of reducing mercury in the global environment to a minimum. Our mission is to advocate and support the adoption and implementation of a legally binding instrument which contains mandatory obligations to eliminate where feasible, and otherwise minimize, the global supply and trade of mercury, the global demand for mercury, anthropogenic releases of mercury to the environment, and human and wildlife exposure to mercury.

**The Health and Environment Alliance (HEAL)**, (www.env-health.org) raises awareness of how environmental protection improves people's health, and works to strengthen European policies. We do this by creating better representation of expertise and evidence from the health community in decision making processes. HEAL a diverse network of over 60 citizens', patients', health professionals', women's and environmental groups. Our members include international and Europe-wide organisations, as well as national and local groups.

**Health Care without Harm Europe (HCWH)**, is an international coalition of hospitals and health care systems, medical and nursing professionals, community groups, health-affected constituencies, labor unions, environmental and religious organizations. HCWH is in association with the United Nations Environment Programme (UNEP), and with support from the Philippine Heart Center (PHC), Department of Health (DOH) and the Department of Environment and Natural Resources (DENR). HCWH is dedicated to transforming the health care industry worldwide, without compromising patient safety or care, so that it is ecologically sustainable and no longer a source of harm to public health and the environment. And with the support of NGOs from the USA (Natural Resources Defence Council), India (Toxics Link), China (Global Village of Beijing), Brazil (Association for Combats against the POPS).

**British Hypertension Society (BHS)** provides a medical and scientific research forum to enable sharing of cutting edge research in order to understand the origin of high blood pressure and improve its treatment. The British Hypertension Society has a track record of producing internationally renowned guidelines for the management of hypertension which are widely adopted in primary care in the UK and elsewhere.

To meet these criteria, devices must achieve a minimum B grade for both systolic and diastolic measurements for the revised BHS protocol or pass the accepted criteria of the International Protocol or the AAMI (American Association for the Advancement of Medical Instrumentation) Protocol.

#### Health Industry Chapter 5: Regulatory Issues

The accuracy of devices may deteriorate with use. The devices must be checked for accuracy and if necessary re-calibrated every 6-12 months.

- Aneroid Sphygmomanometers for Clinical Use
- Automatic Blood Pressure Devices for clinical use and also suitable for home/self assessment
- Wrist Blood Pressure Devices for clinical use and also suitable for home/self assessment
- Automatic Blood Pressure Devices for clinical use
- Automatic Blood Pressure Devices for clinical use with children
- Automatic Blood Pressure Devices for use in Special Cases (e.g. Pregnancy)
- Aneroid Sphygmomanometers for Clinical use
- Ambulatory Blood Pressure Monitors Oscillometric Mode
- Ambulatory Blood Pressure Monitors Auscultatory Mode
- Ambulatory Wrist Devices

#### Guidelines

Indian laws and guidelines on mercury:

The two rules that deal with hazardous substances are:

- A) The Hazardous Waste Management and Handling Rules (1989), which list mercury and mercury containing waste as hazardous waste.
- B) The other rule is the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989, which covers a few mercury compounds.

By the definition and categories mentioned in the Hazardous Waste Rules, mercury release from products or instruments of mercury (used in healthcare) would be covered under this rule. However, the authorities admit that mercury used in healthcare was not considered significant enough to draft any individual policy for this sector or take it into account within the existing framework.

#### Role of QCI (Quality Council of India) in relation to Thermometer and B.P. Instruments

QCI is the organization which is providing guideline and Legal License to Thermometer manufacturing companies.

They are taking care of weather the manufacturers are following the Standard (which is meant for manufacturing) or not and also look after calibration of these equipments. They also give instructions about the +/- factor that this can be the tolerance for a particular kind of instrument. Hicks is a company that has taken the license from the QCI.

QCI is not providing license to Digital manufacture for B.P. and thermometer instrument.

QCI has its own standard for manufacture Mercury instrument.

QCI charges around 10-15 lakh for calibration of instruments. It is advised by QCI to calibrate the industrial instruments every six months.

#### Tariffs

Mercury is not extracted in India; it is totally imported. Mercury and mercury containing wastes are included in the waste streams of the Basel Convention on trans-boundary movements of hazardous waste and their disposal.

Mercury bearing wastes has been banned under Schedule 8 of the Hazardous Waste (Management and Handling) Amendment Rules 2003.

India is importing as well as exporting several mercury as well as digital (non- mercury based) equipment. Following is the tariff classification of the same:

#### Import policy and duty

Articles/ Items/ Goods	Policy	Duty
Mercury	N/A	26.0%
Clinical Thermometer	N/A	36.7%
BP Instrument	N/A	36.7%

#### Quality assessment

For mercury in glass clinical thermometers BIS certification Mark has been made compulsory in public interest.

The specification relating to Sphygmomanometers (Blood pressure measuring instruments) is being revised to align it with the international Recommendation.

#### Role of CERC (Consumer Education and Research Center)

CERC is a non profit, non government body, dedicated to the protection and promotion of consumer interests through active use of research, media, law, and advocacy and information dissemination. CERC does not belong to any political party, nor does it subscribe to any political ideology. CERC is recognized as a research institute by the Government of India and as a consumer organization by the Government of Gujarat. The United Nations has recognized CERC as one of the approved non government organizations.

CERC tested 32 samples of 21 brands of thermometers. Three of these were of the enclosed scale type where the readings are marked on a card placed within the thermometer, 14 were of the solid stem type where the readings are marked on the glass itself and 4 were of the digital type in which the temperature is shown electronically. The enclosed scale and solid stem thermometers were tested according to the appropriate Indian Standards (IS). Since the IS does not cover digital thermometers, they were tested for accurate temperature and marking-packing based on the method for the solid stem thermometer.

Hicks (Oval) and Safety among the enclosed scale thermometers did not have the correct dimensions. Animex Doctor Swan's Doctor, Hicks did not have the correct measurements. None of the thermometers conformed to the standards of markings.

# Section B Demand Side Mapping

#### Demand Side Mapping Chapter 1: Executive Summary

### Chapter 1 Summary of Findings

#### **Overall Findings**

A study was conducted in 12 cities with a sample size of 458 customers, 116 doctors and 36 retailers across India to:

- Gauge the Thermometer & BP Instruments market in India;
- Assess customer's behavior & preferences; and
- Get the retailer's assessment of buying behavior.

The study was conducted to:

- Assess current market in terms of-
  - Awareness
  - Adoption
- Understand & simulate future prospects

Key findings are summarized below.

#### **Equipment Exposure- Current Scenario**



Customer Doctors

- Mainly traditional mercury containing products are being used among the customers as well as doctors category.
- Usage of only mercury free product is extremely low among customers as well as among doctors.
- North zone shows a comparatively more usage of mercury free thermometers amongst customers.
- For BP instruments, few doctors acknowledge the use of only mercury free instruments at the place they practice.
- No customer reported the use of mercury free BP instrument at doctor/ hospital they visit.
- Few customers in South acknowledge the use of mercury containing as well as mercury free BP instruments at the hospitals/ doctors they visit.
- In rest of the zones only traditional mercury containing BP instruments are used.
- Doctors practice in multiple hospitals/ clinics where the usage of mercury containing or mercury free equipments is governed by the administration of hospital.
- Majority of doctors practicing at their home clinics use traditional mercury containing instruments.
- Retailers also validated that the mercury containing product are sold 3 folds more than mercury free products.

#### Demand Side Mapping Chapter 1: Executive Summary

#### Behavior

#### Awareness- III Effects

- Awareness on ill effects of mercury containing products is found to be quite low among all categories (doctors & retailers) of respondents.
- There is a significant difference in the awareness pattern among doctors in the metros vis-à-vis doctors in other small cities.



#### **Awareness of Ill Effects of Mercury**

- The awareness levels among doctors in North & South are comparatively better than East & West.
- Awareness about ill effects of mercury containing products is lacking in customers especially in the East zone.
- Awareness of ill effects of mercury containing product is negligible amongst retailers except in Mumbai.

#### Alternatives

- Customers are not sure whether the equipment they are using is containing mercury or not.
- Customers mainly rely upon doctors & WOM for getting updates.
- Awareness of alternatives to mercury containing thermometers/ BP instruments is high amongst doctors & retailers.
- Major source of information for doctors on such products is internet, medical journals, seminars
   & in general cases medical representatives.

#### Brand

- Customers surveyed are not brand specific in their purchase for thermometers & BP instruments.
- There found to be good brand awareness for mercury containing thermometers whereas the brand awareness for mercury free is extremely low amongst customers.
- *"Hicks"* is the most known brand in both mercury containing as well mercury free thermometers amongst customer as well as doctors.
- Majority of doctors are aware about the BP instrument brands whereas the percentage is as low amongst customers.
- Retailers also acknowledge the customer preference for "Hicks" in thermometers.
- ♣ "Diamond" is most well known brand in BP instruments amongst all category of respondents.

#### Acceptability of alternatives

	Doctors	Customers
Aware of ill effects of mercury containing products	53%	15%
Awareness of alternatives to mercury containing products	77%	28%
Ever used mercury free products	61%	13%
Shift back to traditional	13%	1%
TOTAL	116	458

- Out of 116 doctors surveyed 61% of doctors have ever used mercury free products & only 25% became regular/ alternative user of these products.
- Out of 458 customers surveyed 13% of them have used mercury free products & due to some or the other reason 1% of the total shifted back to traditional mercury containing products.

#### Preference

- Since the customers are not much aware of the ill effects of mercury containing equipments, they are not very much specific about the product & its preference.
- For individuals price is a major criterion governing the preference of the product which is why mercury containing equipments are more accepted over mercury free equipments.
- Since Hicks in thermometer & Diamond in BP instruments have wide market coverage, customers (doctors as well individuals) by default has a preference for these brands.
- More than half the doctors surveyed were aware of the ill-effects of mercury. However they have some issues with the use of mercury free products i.e. accuracy, availability and quality which act as hindrances to their willingness to shift. Thus, their preferences are not specified.
- Doctors practicing at their home clinics prefer using traditional mercury containing instruments. Thus, it can be inferred that these doctors have a preference of mercury containing over mercury free products.

#### Effect of influencers

- According to customers doctors have highest influence on their buying decision.
- A Retailer's advice only accounts when asked for as there is negligible push from retailer's side.
- + Word of mouth have an influence within the society, it also reflects the age old force of habit.

#### Demand Side Mapping Chapter 1: Executive Summary

#### Retailer Customer 83.24 Lack of awareness 64.14 Price 53.52 57.50 Force of habit 55.58 54.00 Lack of influencers working 52.57 53.91 Lack of concern for environment 48.86 53.80 Ease of Use 49.84 49.07 Perception of accuracy 52.88

#### **Barriers to Mercury Free Equipments**

**Barriers** 

- Awareness is the biggest barrier to shift to mercury free products. Its relative importance on the scale of 100 is 83.24.
- Price, which is one of the factors influencing the buying decision of any product, is also one of the crucial barriers. Hospitals do not show signs of discomfort as the recovery of the extra cost involved can be recovered over a period of time.
- Mercury containing thermometers are being used traditionally. People have a force of habit to use such traditional equipment. It takes time for to push the customers towards alternative products.
- Many customers feel that the mercury free devices are difficult to use, this too prevents these people in using such instruments.
- For hospitals and doctors, the perception of accuracy is also important. In an operating room, the body temperature or pressures are the deciders of the treatment. Doctors prefer to keep their fundamentals clear.

#### Demand Side Mapping Chapter 1: Executive Summary



### Chapter 2

Segmented Analysis (Category Wise)

#### Findings- Individuals/ Customers

No. of Zones	4
No. of Cities	12
No. of Customers	458

A study was conducted in 12 cities with a sample size of 458 customers across India to assess the consumer's preferences and buying behavior for thermometers & BP instruments. Key findings are summarized below:

#### **Respondent's Profile**

7000	Gender		Income				Total
zone	Female	Male	< 2.5 L	2.5 L-10 L	10 L-20 L	>20 L	Total
East	15%	85%	80%	13%	6%	2%	120
North	18%	82%	20%	55%	16%	<b>9</b> %	103
South	14%	86%	38%	53%	7%	2%	115
West	17%	83%	14%	70%	11%	5%	120
All India	16%	84%	39%	47%	10%	4%	458

A male biased sample was covered because males were more involved in the purchase of product under study as assessed from retailer's survey.



- Exposure to mercury free equipments was found to be very less amongst the customers.
- Mercury free thermometers are more used vis-à-vis BP instruments in hospitals/ doctors where customers visit frequently.
- No distinct pattern was observed in different zones & income groups. The exposure pattern fairly remains the same.
- Customers using thermometers & BP instruments at homes also show the same pattern.

#### Awareness- III effects

- Awareness about ill effects of mercury containing products is lacking in customers especially in the East zone.
- Customers mainly rely upon doctors for any updates and as assessed from doctor's survey most of them are unaware of ill effects of mercury.
- There were cases where customers responded that mercury is not hazardous as they recalled few memories where they play with the mercury leaked out from thermometers.
- Few customers also recalled of deliberately breaking the thermometer & taking the mercury on hand to play with it.

#### Alternative- Awareness & Acceptability

- Customers are aware of mercury free equipments only as a product and not as a shift towards alternatives to mercury containing products.
- Customers are least concerned about the contents of the equipment; for them alternative means digital version irrespective of its content.
- The sole purpose of thermometer/ BP instrument for customers is measurement of body temperature/ pressure. Thus they are not drived for choosing alternative.
- Thermometers & BP instruments being need based products is used & purchased once in a while thus make customer not very particular about contents of equipment.

#### **Brand- Awareness & Preference**

Brand awareness for mercury containing thermometers is above average (61%) whereas for mercury free it is merely 26%.

Brand (Thermometers)	Mercury Containing	Mercury Free
Hicks	35%	16%
Doctors	5%	1%
Dr. Morepen	1%	2%
Omron	0%	1%
Others	17%	5%

- *"Hicks"* is the most known brand for thermometers in both the categories i.e., mercury containing & mercury free.
- Others include local brands available in market at lower price. These are mainly imported from China & branded in India.
- Customers fail to differentiate among Indian, Foreign or Chinese brand.
- A Penetration of Chinese brand (named OK) is persistent in the Southern region.
- Brand awareness for BP instruments is extremely low at 26% for mercury containing equipments & 21% for mercury free equipments.
- Most known brands for BP instruments are "Diamond" & "Dr. Morepen".
- A No distinctive pattern of brand awareness is observed amongst different income groups.
- Low sales promotion by companies resulting in low brand awareness & hence pushing customer to opt for age old brands like "Hicks" for thermometer & "Diamond" for BP instruments.

#### Influencers

#### **Affect of Influencers**



- Doctors are the biggest influencer affecting customer's buying behavior for BP instruments whereas retailers has highest affect on customer's demand for thermometers.
- As there is not much difference in profit margins for mercury containing and mercury free equipments, retailers do not push customers for BP instruments.
- Word of mouth affect customer behavior only when the customer is purely ignorant otherwise it has the least impact on customer.

#### Barriers



- As is the case with most of products lack of awareness is the major barrier to the higher penetration of mercury free products in the market.
- Price consciousness amongst the customer in North zone is boosting the importance of price as a barrier to penetration of mercury free equipments. Lack of concern for environment is the least significant barrier in North zone, weightage as low as 15 on the scale of 100.
- . In rest of the zones each barrier except lack of awareness has almost equal weight.

#### Findings- Doctors/ Hospitals

No. of Zones	4
No. of Cities	12
No. of Doctors (Individuals)	36
No. of Hospitals (Pvt. large)	24
No. of Hospitals (Pvt. small)	35
No. of Hospitals (Government)	21

A study was conducted in 12 cities with a sample size of 116 doctors/ hospitals (small & large, private & government) across India to assess their usage pattern, awareness of alternatives & buying behavior for thermometers & BP instruments. Key findings are summarized below:

#### **About Respondents**

♣ 62% doctors covered practice at only one place.

• 38% doctors covered are practicing at more than one place.

#### **Current Usage Scenario**



- Majority of doctors use mercury containing equipments at the place of their practice.
- Pattern remains same for the doctors practicing at multiple locations as well as at single location.
- Responses for usage of mercury free thermometers were reported by nominal numbers of doctors whereas the usage of mercury free BP instruments reported is negligible.
- Usages of mercury free equipments are mainly reported by the doctors practicing either in large private hospitals like MAX, APPOLLO, NANAVATI HOSPITAL, and TATA MEMORIAL or at their home clinics.

Hospitals in government sector have start using mercury free equipments but have not shifted completely.



#### III effects- Awareness & Knowledge

- Overall awareness of ill effects of mercury is quite low (53%) amongst doctors community.
- Awareness is more in metros vis-à-vis non-metros or tier 2/3 cities.
- ♣ The worst scenario is in East where 62% doctors are not aware of the ill effects of mercury.
- Doctors/ hospitals in North & South have the highest awareness level.
- The most known ill effect among doctors are stomach related problems like diarrhea, vomiting, stomach ache & some skin related problems.
- A Medical journals & internet are the main source of updates for doctors in all zones.
- Doctors are not much updated on Government regulations regarding the use of mercury containing products. This is uniform throughout all the zones.

#### **Alternative- Awareness & Acceptability Adoption Pattern- Mercury Free Equipments** Shift back to No Ever used Never used mercury Particular mercury free mercury free containing choice equipment quipment equipments 41% 61% 39% 17% Shift to mercury free equipments 3%

- Doctors/ hospitals are well aware (78%) about the mercury free equipments available in the markets.
- Awareness among doctors/ hospitals about alternatives to mercury containing equipments is highest in North Zone. Whereas 56% of doctors/ hospitals in Eastern region are unaware of mercury free equipments.
- Majority of doctors/ hospitals who are aware of alternatives to mercury containing equipments (78%) have used the mercury free equipments atleast once (61%).
- Only 3% of those who have ever used marked a permanent shift to mercury free equipments whereas 17% have shifted back to traditional mercury containing equipments.
- The above facts shows that there is a willingness to shift but because of discrepancies in the results of mercury free vis-à-vis mercury containing equipments they opted to shift back to traditional mercury containing equipments.
- The highlighted satisfiers were ease of operation, easy to read, long lasting & in some cases quick in reading.
- The perceived dis-satisfiers are accuracy, cost, easy availability, quick discharge & prone to defects.

#### **Brand- Awareness & Preference**

- *"Hicks"* for thermometers and *"Diamond"* for BP instruments are the well known brands amongst doctors/ hospitals.
- Doctors/ hospitals also advocate the quality of these brands on account of their wide & age old presence in the market.

#### Influencers

- Though doctors are the biggest influencer affecting customer's buying behavior for thermometers & BP instruments there is no active participation by the patients, only 11% patients discussed about the hazardous effects of mercury containing equipments with doctors.
- ♣ 25% of the doctors surveyed recommend the use mercury free equipments on voluntary basis.
- Doctors feel awareness & knowledge is lacking significantly among customers. The best way to enhance it is by running regular campaigns highlighting the hazards of mercury.
- Uses of mass media like television, radio, newspapers etc are the best medium to communicate with the general public.
- Government initiatives are much required to ban the use from hospitals and other health centers.

#### Barriers

- A major barrier in the shift to mercury free equipments highlighted was accuracy. Their willingness to shift will only materialize once they get quality.
- Cost involved to shift is comparatively high in context of the patients. Doctors feel that the price needs to be lowered for mass acceptance.
- Force of habit is another strong barrier, as more than 50% of the doctors themselves are unaware of the ill effects of mercury.

## Section C Supply Side Mapping

#### Supply Side Mapping Chapter 1: Market Understanding

# Chapter 1

Market Understanding

#### **Industry Overview**

The industry is majorly divided into two segments:

**Large organized players** that are small in numbers but have captured a big chunk of the market. The current leader in mercury containing thermometers is Hicks, which has a market share of almost 60%. It is one of the oldest organizations which is certified by QCI. Other large players include Hanimax, Dr. Morepen and Doctors.

**Small players** that have limited supply & market share like Asco, Proton, Smic etc. These were traditional manufacturers but are now importing both mercury containing and mercury free products from countries like China, Taiwan, Japan, Singapore etc.

#### **Market Scenario**

#### Thermometer

Market is dominated by 2-3 major players that can be termed as players of the organized sector. *"Hicks"* is the leader in the mercury segment with almost 60% market share. Digital mercury free thermometers are practically not manufactured here in India. The demand for mercury free thermometers is catered through imports mainly from China. Chinese penetration in the Indian market is almost 80% of the total imports in terms of quantity. Direct routes of import are followed

#### **BP Instruments**

BP Instruments is such a product that has its existence in an oligopolistic market. SMEs, both manufacturers and private labelers, are providers of products that are not certified or calibrated by any of the qualified institutes like ISI or the Weights and Measure Department.

Around 60% of the market is fragmented into SMEs and private labelers who are not actually manufacturers instead they are importers/traders from China, and sell these products by their own brand name.

#### **Sector Segmentation**

According to estimates, 65% of the Indian manufacturers in this sector can be classified as belonging to the SME sector, which means that their average annual sale volume is not above \$ 114,936

#### **Classification of the Indian Manufacturers**



Source: Study- Industry Government steps in the right direction: need for more

There are a few large players who have a good brand image in the market, namely: Hicks

- Hanimax
- ADr. Morepen
- A Omron

*"Hicks"* was the market leader with almost 80% of the market share till the year 2006. With the penetration of Chinese products in the market its market share dropped to almost 60%.

Omron is an MNC which has its Automobile base in India but does not have a manufacturing setup for medical devices. The digital mercury free thermometers and BP instruments are imported from its manufacturing bases of China.

Apart from the above, brands such as Deluxe and Diamond have a good market presence in the BP market structure. Deluxe, a mercury containing product is an ISI certified.

#### Supply Side Mapping Chapter 1: Market Understanding

#### Price Waterfall Diagram

#### **Indian Manufacturers**



#### Waterfall Diagram Value Chain (assuming price Re.1)

Normally, its costs Rs. 15-20 to manufacture a prismatic thermometer, and it costs more than Rs. 50 to manufacture a Mercury free thermometer here in India.

#### Imported





Normally, it cost around Rs 12 to import 1 flat mercury containing thermometer and Rs 5-6 to import a prismatic thermometer (including import duty). In case of a mercury free thermometer it costs Rs 30-50 (including import duty). Lower the cost of import higher becomes the margin. The fig indicates min. margin within the value chain.

#### Supply Side Mapping Chapter 2: Retailer's Perspective

### Chapter 2 Retailer's Perspective

#### Findings- Retailers/ Chemists

No. of Zones	4
No. of Cities	12
No. of Retailers	36

A study was conducted in 12 cities with a sample size of 36 retailers across India to understand the retailer's assessment of consumer buying behavior for thermometers & BP instruments. Key findings are summarized below:

#### **Current Market Scenario**

- Current market is still dominated by mercury containing equipments reason being the low awareness of mercury free products.
- A Mercury free equipments are soon catching up but will take time.
- A Market is price sensitive, majority of customers opt for the cheaper product.
- The demand for these medical equipments in general is low.
- Demand for BP instruments for self/ family use is negligible.
- Hospitals/ clinics also prefer mercury containing products.
- They have an influence in the decision making process of the individuals.
- These products are need based & the demand is not seasonal.
- Profit margins are not too differentiated among mercury containing & mercury free products.

#### Awareness-III effects

- There is zero awareness about ill effects of mercury containing products amongst retailers.
- No company trading mercury free equipments is influencing them to stock their product because of their product being non-hazardous in nature.

#### Alternative- Awareness & Acceptability

- Retailers are aware of the presence of the alternatives to mercury free equipments just as a product for sale & not as a non-hazardous or environment friendly product.
- Demands from hospitals are again encashed as an opportunity to earn more rather than taking care of social issues.

#### Brand- Awareness & Preference

- The most known & easily available brand for mercury containing as well as for mercury free thermometers is "Hick".
- The next best competitor is "Hanimax" for mercury containing & "Dr. Morepen" for mercury free thermometers.
- Presence of Chinese brands was also observed.
- Presence of digital type mercury thermometer was also observed. Most common brand was "Diamond"
- A Imported thermometers branded here in India were available on large scale in all the zones.
- + The most known brand for mercury containing BP instruments is "Diamond".
- "Omron" was known as a brand but had limited presence in the market.

Supply Side Mapping Chapter 2: Retailer's Perspective

- No significant difference in the profit margin among products of mercury free and mercury containing products were observed.
- Average profit margin in mercury containing products is 20-25%, and average profit margin in mercury free products is around 30-35%.
- Retailers prefer those brands that have regular supplies and also have some demand. Brands like "HICKS" and "Doctors" have good brand recall among doctors and individuals.

#### Barriers



- Lacks of Awareness- Retailers are not too concerned with the hazards of mercury.
- Price wise mercury free products are costly which prevents them to sell. On an average, a mercury free thermometer costs around INR 250- 300 as compared to mercury containing product which is priced at INR 35- 60.
- The demand of the customers is of a cost effective product, i.e. mercury containing product. Thus, to cater to the demand retailers prefer selling mercury free products.
- The demand of the customers is affected by the influencers like doctors. Significant number of doctors are not able to deliver their influence, thus the demand is more for mercury containing product.
- Retailers are not concerned about the generation of wastes due to the use of mercury containing devices. Hence no concern for the environment.
- Retailers perceive that the mercury free devices are not easy to use and the accuracy level is also low. Readings are improper and not accurate when compared to mercury containing product.

### Section D Recommendations

#### In context of global exposures

#### Denmark's experience

A good example of the potential achievements of a coherent substitution strategy is evident from the experience of Denmark. In recent years Denmark decided to strongly encourage substitutes for mercury products, including placing a ban on the sale and use of most mercury products. As in a number of other countries, a substantial decrease in mercury consumption for intentional uses has been observed. As can be seen in table 8.3, during the period 1983-1993 the annual consumption of mercury in intentional uses fell from about 16 metric tons in 1982/83 to 6 metric tons in 1992/93, and decreased further to 1.5 metric tons in 2000/2001. In the same period, releases to the environment were reduced from an estimated 6.9-9.9 metric tons in 1983, to 2.3-3.0 tons in 1993 (of which 0.3-0.8 tons originated from trace amounts of mercury in fuels and minerals). Finally now is the time when Denmark has fully phased out mercury.

#### Cases of EU and US

Sweden and Norway have banned or phased-out the manufacture, import, or sale of thermometers, barometers, manometers, tilt switches, float switches, pressure switches, thermostats, relays.

12 states in the US have already phased out mercury BP instruments under legislative mandates

#### **Other Countries**

In Argentina more than 28 hospitals have completely switched to mercury-free thermometers. Twenty-nine more and several clinics have committed to change over to mercury-free thermometers and blood pressure devices.

In Sao Paulo, Brazil, more than 92 hospitals have signed agreements committing to eliminate mercury based thermometers and sphygmomanometers—more than 42 have already done so.

Two hospitals in China and two hospitals in Mexico are taking the first steps toward mercury substitution in those countries.

In the Philippines more than 50 hospitals are moving toward mercury-free health care.

#### Recommendations

- Legislative Actions-
- A Creating a Central Governing Body in the health care sector-
- Cashing market opportunities-
- \* Rigorous use of media for generating awareness-
- Adopt fear marketing strategy to abandon the use of mercury because of its hazards-
- Bringing together the associations- like govt., hospitals, NGOs, manufacturers, global institutions like World Bank.
- \* Focus shift to influencers-

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### Annexure
# Annexure I – Brand Presences and Prices

### City Wise brand Presence

### **Thermometer Mercury Containing**

Zone/City	Brands
East	
Bhubaneswar	Hicks
Kolkata	Hicks
Ranchi	Hicks
North	
Agra	Hicks
	Comet
Chandigarh/ Patiala	Icon
	Smic
	Hanimax
	Hindustan
Denninck	Hicks
	Proton
South	
	Hicks
Chennai	Неха
	Enbee
	Hindustan
Hyderabad	Hicks
	Enbee
Vizag	Lifeline
	Pulsewave
	Hicks
West	
Mumbai	Septi
Pune	Hanimax
	Easybee
	Hicks
Surat	Cosmic
	Hicks

### Thermometer Mercury free

Zone/City	Brands
East	
Bhubaneswar	Hicks
Kolkata	Hicks
Panchi	Dr. Morepen
	Hicks
North	
Agra	Hicks
Chandigarh/ Patiala	Icon
	Profix
	Hanimax
	Hicks
	Hicks
Delhi NCR	Dr Morepen
	Asco
	Infinity
	Citizen
South	
	Hicks
Chennai	ОК
	Bizz
Hydorabad	Digital
Пуйегарай	Hicks
Vizoa	Inficheck
vizag	Hicks
West	
Mumbai	Hicks
Pune	Hicks
	Hanimax
	Proton
Surat	Hicks

Zone/City	Brands
East	
Bhubaneswar	Elko
Kolkata	Proton
Danchi	Diamond Regular
Ranchi	Diamond Regular
North	
Agra	Diamond Regular
Chandigarh/ Patiala	Diamond Regular
	Protex
	Proton
Dalhi NCD	Diamond Deluxe
Deini NCR	Asco
	Diamond
	Hicks
South	
Chennai	Diamond Regular
Hyderabad	Diamond Regular
Vizag	Diamond
West	
	Proton
Mumbai	Diamond
	Telelin
Pune	Pegoda
	Lifetime
	Elite
	Diamond Deluxe
Surat	Diamond

## BP instruments Mercury Containing

## **BP Instruments Mercury free**

Zone/City	Brands	
East		
Bhubaneswar	Hicks	
Kolkata		
Ranchi		
North		
Agra	Hicks	
Chandigarh/ Patiala	Icon	
Chanulyarn/ Pallala	T&T	
	Omron	
	Hicks	
Delhi NCR	Citizen	
	Dr Morepen	
	Citizen	
South		
Chennai	Dr. Morepen	
Hyderabad	Dr. Morepen	
Vizag	Dr. Morepen	
West		
Mumbai	Hicks	
	Omron	
	Citizen	
Pune	Hicks	
Surat	Hicks	

### **Brand Wise Prices**

Brand	Prices (INR)
Hicks Oval	60
Hicks Akutem	36
Comet	20
Icon	40
Smic	40
Неха	40
Enbee	38
Hanimax	45
Hindustan	40
Proton	45
Septi	70
Easybee	80
Lifeline	100
Pulsewave	100
Cosmic	70

### **Thermometer Mercury Containing**

### **Thermometer Mercury free**

Brand	Prices (INR)
Hicks Digital	130
Icon	200
Profix	300
ОК	300
Bizz	175
Digital	200/225
Hanimax	210
Proton	250
Dr. Morepen	450
Hicks Digital	210
Rubber	210
Inficheck	200
Dr Morepen	210
Asco	155
Infinity	210/280
Citizen	300

## **BP Instruments Mercury Containing**

Brand	Prices (INR)
Pegoda	1000
Lifetime	1000
Elite	1000
Protex	800
Proton	600
Asco	500
Elko	1050
Telelin	800
Diamond	
Box Lid Type	450
Deluxe BPMR 120	550
Regular	500
Wall Mounting Type	800
Dial Type	650

## **BP Instruments Mercury Free**

Brand	Prices (INR)	
Diamond		
Digital	1200	
Citizen		
Citizen 432 B	2300	
Citizen CH606	2200	
Citizen Wrist Type	1500	
Digital	1500	
Omron		
Model-MX3	2900	
REM2 Wrist Monitor	2500	
Hicks		
Electronic BP	2200	
Dr Morepen		
BP3BG-1	2589	

### Annexure II

## Profile of Major players- organized sector Manufacturers

Company Name:	NISCO (INDIA)
Business Type:	Manufacturer
Product/Service:	Bed Pan Fiber Female / Perfection Type, Aneroid Sphygmomanometer, Black Berry Mercurial Sphygmomanometer Table Model, INFRA RED LAMP, Spirit Stethoscope
Brands:	Pulse-Wave Stethoscope And Pulse-Wave Sphygmomanometers
Number of Employees:	51 - 100 People
	North America
	South America
	Eastern Europe
	Southeast Asia
Main Markets:	Africa
	Oceania
	Mid East
	Eastern Asia
	Western Europe
Total Annual Sales Volume:	US\$1 Million - US\$2.5 Million
Export Percentage:	31% - 40%
Total Annual Purchase Volume:	US\$2.5 Million - US\$5 Million
Factory Size (Sq. meters):	1,000-3,000 square meters
Factory Location:	Narela industrial Estate
QA/QC:	In House
Number of Production Lines:	4
Number of R&D Staff:	5 - 10 People
Number of QC Staff:	Less than 5 People
Management Certification:	ISO 9000/9001/9004/19011: 2000 Others
Contract Manufacturing:	OEM Service Offered Buyer Label Offered

Company Name:	APOTHECARIES SUNDRIES MFG. CO. (ASCO)
Business Type:	Manufacturer
Product/Service:	Clinical Thermometer mercurial
Number of Employees:	11 - 50 People
Main Markets:	India

Company Name:	TELELIN INSTRUMENTS (India)
Business Type:	Manufacturer
	Manometer, Rota meter, Level Indicators, Orifice
	Plates, Fittings Gauges And Indicators, Pressure
Product/Service:	, Hydraulic Manifolds, Air Manifolds , Indicators,
	Flow, Recorders, Liquid Level, Testers, Dead
	Weight
Brands:	Telelein
Total Annual Sales Volume:	Below US\$1 Million
Export Percentage:	1% - 10%
Total Annual Purchase Volume:	US\$ 2.5 Million – US \$5 Million
Factory Size (sq. meters):	10,000-30,000 square meters
QA/QC:	No
Number of Production Lines:	10
Number of R&D Staff:	Less than 5 People
Number of QC Staff:	Less than 5 People
Contract Manufacturing:	OEM Service Offered

Company Name:	PROTON
Business Type:	Manufacturer
	Digital Wrist Blood Pressure Monitor
	Digital Upper Arm
	Blood Pressure Monitor
	Digital Ear Thermometer
	Bendable
	Thermometer
	Flexible
	Thermometer
	Standard Digital
	60 seconds Thermometer
Product (Sorvico)	Digital 10 second
	Thermometer
	Baby Temp
	Thermometer
	Desktop Ultrasonic
	Nebulizer
	Medical Ultrasonic
	Nebulizer
	Ultrasonic
	Humidifier
	Mercurial
	Sphygmomanometer
Number of Employees:	11-50 People
Main Markets:	India

Company Name:	Jindal Medical & Scientific Instruments Company (Pvt.) Ltd.	
Business Type:	Manufacturer	
	Clinical thermometers, stethoscopes, heating	
	pads, sphygmomanometer, paper tape, rubber	
	goods, nebulizers, surgical dressings, laboratory	
	glassware, needle destroyer	
Product/Service:	Forehead Thermometers, Veterinary	
Floduct/Service.	Thermometers, Rectal Thermometers, Clinical	
	Thermometers, Digital Thermometers, Room	
	Thermometers, Wet & Dry Thermometers, Nipple	
	Thermometers, Basal Thermometers, Mercury	
	Sphygmomanometer Desk Model	
Number of Employees:	11 - 50 People	
	North America	
	South America	
Main Markots:	Western Europe	
Main Markets:	Eastern Europe	
	Eastern Asia, Southeast Asia, Mid East Africa,	
	Oceania	
Number of R&D Staff:	11 - 20 People	

Company Name:	Hicks Thermometers(I)Limited	
Business Type:	Manufacturer	
Product/Service:	Thermometers, B.P. Instruments /	
	Sphygmomanometer	
Number of Employees:	101 - 500 People	
Main Markets:	North America	
	South America	
	Western Europe	
	Eastern Europe	
	Eastern Asia	
	Southeast Asia	
	Mid East	
Total Annual Sales Volume:	US\$ 2.5 Million – US \$5 Million	
Number of R&D Staff:	Less than 5 People	
Certification:	QCI approved	

	New Scientific Repairs & Trading Co
	Thermometer
Business Type:	Manufacturer
	Industrial dial thermometer, pressure gauges,
Product/Service:	power cylinder, pressure & temperature
	recorders, glass thermometer
Number of Employees:	11 - 50 People
Main Markets:	North America
	South America
	Western Europe
	Eastern Europe
	Eastern Asia
	Southeast Asia
	Mid East
	Africa
	Oceania
Total Annual Sales Volume:	US\$ 1 Million – US \$2.5 Million
Number of R&D Staff:	5 - 10 People

Company Name:	Atlas Surgical Company	
Business Type:	Manufacturer, Trading Company	
	Autoclaves, Instruments Sterilizer, Dressing	
	Drums, Stainless Steel Hospital Hollowares,	
Broduct /Sorvice	Hospital Furniture, Anaesthesia Products,	
Floudel/ Selvice.	Diagnostic Instruments, Suction Units,	
	Disposables, Gynecological Products, Patient	
	Rehabilitation Aids, Surgical Rubber Goods	
Brands:	Atlas	
Number of Employees:	11 - 50 People	
Main Markets:	North America	
	South America	
	Southeast Asia	
	Mid East	
	Eastern Asia	
	Western Europe	
Export Percentage:	21% - 30%	
Total Annual Purchase Volume:	Below US\$ 1 Million	
Factory Size (Sq. meters):	1,000-3,000 square meters	
QA/QC:	In House	
Number of QC Staff:	Less than 5 People	
Management Certification:	ISO 9000/9001/9004/19011: 2000	

Company Name:	J.R.M Mullick & Co.Pvt.Ltd	
Business Type:	Manufacturer	
Product/Service:	A. S. T. M. I. P. Thermometers, Wet & Dry	
	Hygrometers, V Line Thermometer for Shipping	
	Engines, Food Thermometer, and Mason's	
	Thermometer and any kind of Custom	
	Thermometer as per requirement.	
Number of Employees:	11 - 50 People	
Main Markets:	Mid East	
Total Annual Sales Volume:	Below US\$1 Million	
Number of R&D Staff:	Less than 5 People	
Contract Manufacturing:	OEM Service Offered	

Company Name:	Medicare Products Inc.	
Business Type:	Manufacturer	
	Thermometers, Micropore Surgical tapes, blood	
Product/Service:	pressure instruments, Scientific& lab glass wares	
Number of Employees:	11 - 50 People	
Main Markets:	North America	
	South America	
	Western Europe	
	Eastern Europe	
	Eastern Asia	
	Southeast Asia	
Total Annual Sales Volume:	US\$ 1 Million - US\$ 2.5 Million	
Number of R&D Staff:	Less than 5 People	
Contract Manufacturing:	OEM Service Offered	

Company Name:	Dr. Morepen Laboratories Limited	
Business Type:	Manufacturer	
	AccuMAM Blood Pressure Monitor, Wrist Blood	
Product/Service:	Pressure Monitor, Digital thermometer,	
	Sphygmomanometer etc	
Number of Employees:	250-500	
Production Facilites	3 Factories in HP	
Main Markets:	USA	
	Canada	
	Europe	
	India	
Total Annual Sales Volume:	US\$ 2588 million	
Number of R&D Staff:	40 people	

#### Indian Importers

Company Name:	Saify Group (Omron)	
Business Type:	Importers	
	Personal Body Weighing Scales	
	Blood Glucose Monitor	
	Digital Blood Pressure Monitor Omron	
Product/Service:	Omron Nebulizers	
FIGULE SEIVICE.	Thermometer	
	Body Fat Monitor	
	Digital Pedometers	
	Littman Stethoscope	
Number of Employees:	51 - 100 People	
Main Markets:	North America	
	South America	
	Eastern Europe	
	Southeast Asia	
	Mid East	
	Eastern Asia	
	Western Europe	
Management Certification:	ISO 9000/9001/9004/19011: 2000	

Company Name:	Infinity Mediquip India	
Business Type:	Trading Company	
	Leading importer, supplier and Distributor of	
	quality healthcare Medical equipments in India,	
	specialized in import from all over the globe and	
	distribute the same to the Indian market.	
	Engaged in the field of Family Healthcare	
	products since 1996.	
	Glucometers, Nebulizers, Blood lancets, digital	
Product/Service:	thermometers, electronic automatic digital blood	
	pressure monitor meter, mercury BP Monitors	
	(sphygmomanometer), air mattress for bed soars	
	etc.	
Number of Employees:	11 - 50 People	
Main Markets:	Eastern Asia	
Total Annual Sales Volume:	US\$ 2.5 Million - US\$ 5 Million	

### Indian Distributors/Whole seller

Company Name:	H K SHAH & CO	
Business Type:	Distributor/Wholesaler	
Product/Service:	Industrial Heating and sensing material,	
	Thermostats, Thermocouples, Industrial	
	Ceramics, Temperature Measuring and controlling	
	instruments, Panel Componenets.etc.	
Number of Employees:	11 - 50 People	
Main Markets:	India	

## List of Dealers/ Retailers of Mercury and Mercury free Devices

Dealer's name	City	Contact	State
Ranish Impex Pvt Ltd.	Mumbai	022 66377815	Maharashtra
C. K. Surgical Traders	Ahmadabad	079 25510009	Gujarat
Priyanka Agencies	Secunderabad	040 27818147, 040 27817475	A.P.
South India Surgicals. Co.	Bangalore	080 26705431	Karnataka
Surgichem	Bangalore	080 22203426	Karnataka
South India Surgical Co.	Chennai	044 28411064	Tamilnadu
Advance Surgical Pvt Ltd.	Chennai	044 28419217	Tamilnadu
East India Surgicals. Co.	Thiruvantapuram	0471 22461870	Kerala
Venus Surgical Co.	Cuttak	0671 22614199	Orissa
K. R. Lynch & Co.	Kolkata	033 22372182	West Bengal
P. Bhogilal & Co.	Kolkata	033 22351515	West Bengal
Indo Foreign Surgico	Guwahati	0361 22540888	Assam
Delbros	Imphal	03815 2411091	Manipur
Ambitious Enterprises	Shillong	0364 2226485	Meghalaya
Vijayalaxmi Surgicals.	Jaipur	0141 22362974	Rajasthan
Cash Surgicals	Indore	0731 22536023	M.P.
Saifee Traders	Indore	0731 22704481	M.P.
Allied Surgical Emporium	Lucknow	0522 2623009	U.P.
Alfa Surgicals	Jallandhar	0181 2403959	Punjab
Hamdard Traders	Shrinagar	0194 2452974	J & K
Sales & Agencies	New Delhi	011 23251031	Delhi (UT)