

**PHARMACEUTICALS, DIET-RELATED NON-COMMUNICABLE AND  
CHRONIC DISEASES IN CHINA: OPPORTUNITIES AND COSTS**

by

**Vinay Nand**  
**Bachelor of Science, Simon Fraser University, 2003**

**PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF  
THE REQUIREMENTS FOR THE DEGREE OF**

**MASTER OF BUSINESS ADMINISTRATION**

**In the  
Faculty of Business Administration**

**© Vinay Nand 2009  
SIMON FRASER UNIVERSITY**

**Summer 2009**

All rights reserved. However, in accordance with the *Copyright Act of Canada*, this work may be reproduced, without authorization, under the conditions for *Fair Dealing*. Therefore, limited reproduction of this work for the purposes of private study, research, criticism, review and news reporting is likely to be in accordance with the law, particularly if cited appropriately.

# Approval

**Name:** Vinay Nand  
**Degree:** Master of Business Administration  
**Title of Project:** Pharmaceuticals, diet-related non-communicable and chronic Diseases in China: Opportunities and Costs

**Supervisory Committee:**

---

**Dr. Sudheer Gupta**  
Senior Supervisor  
Assistant Professor  
Faculty of Business Administration

---

**Dr. Neil Abramson**  
Second Reader  
Associate Professor of International Strategy  
Faculty of Business Administration

**Date Approved:**

---

## **Abstract**

There is increasing evidence that the growing rate of chronic diseases in China is related to the transitions that the country is undergoing. This project will review the prevalence of chronic disease in China and make a case for how multinational pharmaceutical companies can position themselves to provide pharmaceutical drugs that prevent or treat chronic diseases. Worldwide chronic diseases, various types of chronic diseases, the risk factors, underlying determinants, and the increasing rate of chronic diseases in China will be discussed. The paper will also analyze China's healthcare system and give a better understanding of what condition the system is in to serve the needs of the people. A review of the forces within China's pharmaceutical industry will give a better insight for how multinational pharmaceutical corporations can penetrate into this market and establish operations. Recommendations are also made for how China can reduce chronic diseases via government policies, community based programs, and pharmaceutical interventions.

**Keywords:** Chronic disease; diet-related non-communicable diseases; communicable diseases; China; pharmaceutical market; nutritional transition; healthcare; hospitals; drugs; prevention; rural; urban; emerging market; developing country; risk factors;

## **Dedication**

To my family, thank you for being the guiding lights in my life. Mom, I hope to see you again one day.

To Marie, remember that all things are possible if you believe.

## **Acknowledgements**

I would like to thank the professors and administrative staff of Segal Graduate School of Business at Simon Fraser University for their dedication and guidance throughout my Master of Business Administration program.

I would also like to thank my project supervisors, Dr. Sudheer Gupta and Dr. Neil Abramson from Simon Fraser University, for their time and knowledgeable help in directing and enlightening me throughout the research and writing process.

Lastly, I would like to thank my fellow classmates and friends for their help, support, and encouragement over the last year while completing this MBA program.

# Table of Contents

Approval.....	ii
Abstract .....	iii
Dedication .....	iv
Acknowledgements .....	v
Table of Contents .....	vi
List of Figures .....	viii
List of Tables.....	ix
Glossary.....	x
<b>1: Introduction.....</b>	<b>1</b>
1.1 Objective and scope of paper .....	1
1.2 Understanding worldwide chronic disease.....	2
1.2.1 Various types of chronic diseases .....	2
1.2.2 Risk factors and underlying determinants .....	5
1.2.3 Consequences on health due to risk factors.....	8
1.2.4 Access to healthcare .....	9
1.3 The economic impact of chronic diseases.....	10
1.4 Summary .....	12
<b>2: Chronic diseases in China .....</b>	<b>14</b>
2.1 The nutritional transition.....	16
2.2 Behavioural risk factors .....	18
2.3 Conditions in need of pharmaceutical drugs .....	19
2.3.1 Hypertension .....	19
2.3.2 Obesity and overweight people .....	20
2.3.3 Diabetes.....	21
2.3.4 Tobacco Usage .....	22
2.4 Rural and urban areas.....	24
2.5 Summary .....	25
<b>3: Overview of China's healthcare system .....</b>	<b>27</b>
3.1 Weakened government role, communication, and control.....	27
3.2 Fragmentation of healthcare system.....	29
3.3 Market forces.....	30
3.4 Economic and healthcare costs to China.....	30
3.4.1 Health insurance.....	31
3.5 Commercialization of healthcare.....	32
3.6 Summary .....	34

<b>4: Business opportunities in China’s pharmaceutical market.....</b>	<b>36</b>
4.1 Background .....	36
4.2 Entry barriers for pharmaceutical MNCs .....	37
4.2.1 A changing market .....	38
4.2.2 Clinical research opportunities.....	40
4.2.3 Intellectual property rights .....	41
4.2.4 Bribery and Corruption .....	42
4.2.5 Tax incentives .....	44
4.2.6 Drug Pricing .....	45
4.2.7 Complex distribution channels.....	47
4.2.8 Strategic regions in China .....	50
4.2.9 Financial reporting .....	51
4.3 Bargaining power of buyers .....	52
4.4 Threat of substitutes .....	53
4.5 Bargaining power of suppliers .....	56
4.6 Rivalry within the environment.....	59
4.7 Summary .....	60
<b>5: Recommendations .....</b>	<b>62</b>
5.1 Key success factors for doing business in China.....	62
5.1.1 Organizational Behaviour and Competencies .....	65
5.2 Chronic disease prevention .....	66
5.3 Summary .....	70
<b>6: Conclusion.....</b>	<b>72</b>
<b>References .....</b>	<b>75</b>

## List of Figures

<b>Figure 1:1</b> Projected main causes of death, worldwide, all ages, 2005 .....	3
<b>Figure 1:2</b> Projected main causes of death, all ages, by World Bank Income group, 2005 .....	4
<b>Figure 2:1</b> Prevalence of diabetes in China, 2002 .....	15
<b>Figure 2:2</b> Percentage of children aged 7-17 years who were overweight and obese in China, 2002 .....	20
<b>Figure 4:1</b> Chinese pharmaceuticals market profile, 2000 .....	39
<b>Figure 4:2</b> Chinese pharmaceuticals market profile, 2010 forecast .....	39
<b>Figure 4:3</b> China's distribution channels - overview .....	48



## List of Tables

<b>Table 1:1</b> Death tolls from risk factors.....	8
<b>Table 2:1</b> Summary of costs of diet-related noncommunicable diseases in China, 1995 and 2025.....	16
<b>Table 2:2</b> Age-standardized prevalence rates and estimated populations at risk.....	23
<b>Table 2:3</b> Age-standardized rates of death from different causes in 2004 and 2005.....	24

## **Glossary**

ANDA – Abbreviated New Drug Application  
BMI – Body Mass Index  
CIT – Corporate Income Tax  
CMO – Contract Manufacturing Organizations  
CRO – Contract Research Organizations  
EPS – Epidemic Prevention Station  
GAAP – Generally Accepted Accounting Principles  
GDP – Gross Domestic Product  
GLP – Good Laboratory Practice  
GMP – Good Manufacturing Practice  
GSP – Good Supply Practice  
HNTE – High/New Technology Enterprise  
IFRS – International Financial Reporting Standards  
JAMA - Journal of American Medical Association  
KSF – Key Success Factor  
MNCs – Multi-National Corporations  
MOFCOM – Ministry of Commerce  
MOH – Ministry of Health  
MOST – Ministry of Science and Technology  
NDRC – National Development and Reform Commission  
OTC – Over the Counter  
PRC – People’s Republic of China  
PWC – PriceWaterhouseCoopers  
R&D – Research and Development  
RMB – Renminbi (7 Renminbi = US \$1)  
SARS – Severe Acute Respiratory Syndrome  
SFDA – State Food and Drug Administration  
TCM – Traditional Chinese Medicine  
WHO – World Health Organization  
WTO - World Trade Organization

# **1: Introduction**

China is undergoing a social, economic, and nutritional transition, and the result is a significant change in the social environments and lifestyles of people (Liu, 2008). China is becoming wealthier; however, the country faces public health risks and a growing prevalence of chronic diseases. Spending on healthcare has not kept up in pace with the economic growth that China has achieved (Liu, 2008). There are a rising number of middle class families with improved healthcare access that are more educated and aware of the benefits of Western drugs. The Chinese pharmaceutical industry is becoming more consolidated, and stronger intellectual property rights and laws are being enforced by the Chinese government. The return of Western-educated Chinese with technical and management skills can help market drugs and establish multinational corporations (Greene, 2006).

## **1.1 Objective and scope of paper**

There is a rising rate of chronic disease in China that is closely related to China's transition towards social reform, improved economics, less physical activity, and high fat, low nutrition diets. This paper looks at the changes in China's healthcare system and pharmaceutical industry, and examines what condition the healthcare system is in to serve the needs of the people. It makes a case for how multinational pharmaceutical companies can help fill the need for pharmaceutical drugs that prevent or treat chronic diseases. Additionally, a review of the forces within China's pharmaceutical industry will

provide insight into how multinational pharmaceutical corporations could penetrate into this market and establish operations. This paper also looks at chronic diseases in China and worldwide, various types, risk factors, and underlying determinants. It also makes recommendations on how China can help reduce the rate of chronic diseases through programs and pharmaceutical intervention.

## **1.2 Understanding worldwide chronic disease**

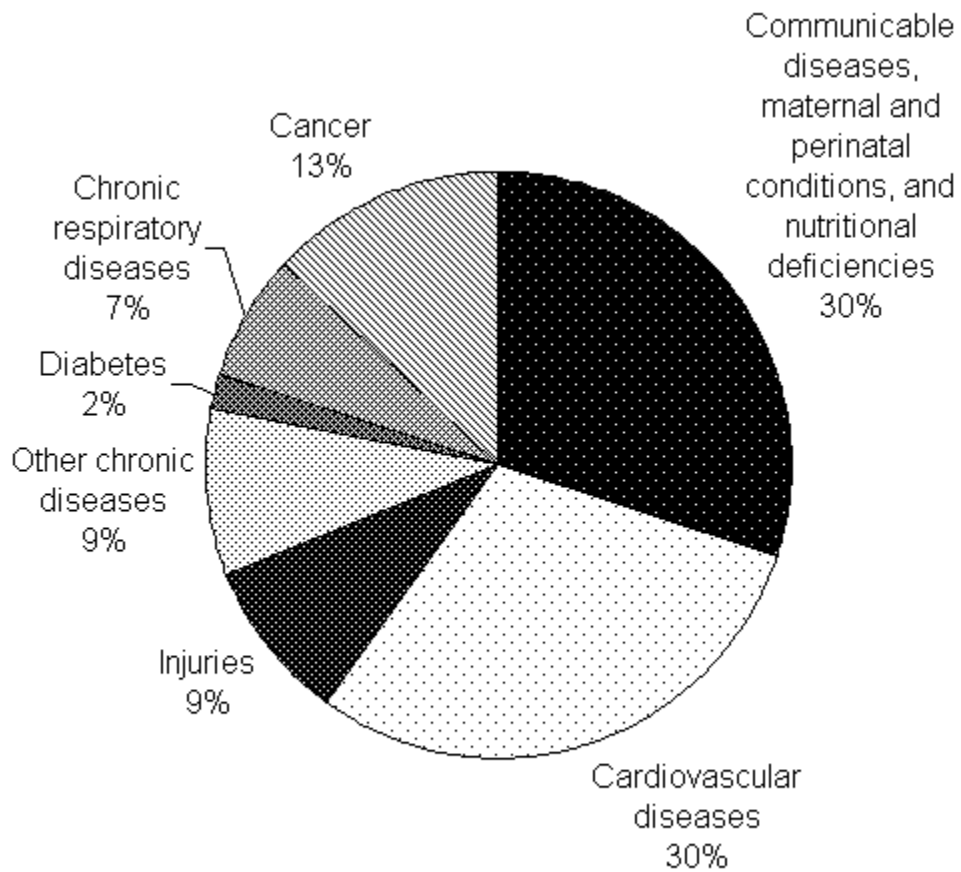
The following subsections discuss worldwide chronic diseases. The first subsections examine various types of chronic diseases, risk factors, and underlying determinants. The final subsection looks at consequences on health due to risk factors and access to healthcare.

### **1.2.1 Various types of chronic diseases**

The World Health Organization (WHO) tells us that there are different names in different contexts for chronic diseases. The term ‘non-communicable’ disease, they say, is used in place of chronic disease to differentiate it from ‘communicable’ diseases that are infectious. There are many different types of chronic diseases. The most prevalent ones include cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes. Figure 1:1 below shows the projected main causes of death worldwide for all ages in 2005. Nearly 30% of the worldwide deaths were a result of communicable diseases, maternal conditions, perinatal conditions, and nutritional deficiencies. Cardiovascular disease, cancer, chronic respiratory diseases, diabetes, other chronic diseases, and injuries accounted for the remaining 70% of deaths. Chronic disease epidemics can take decades

to develop, normally originating during childhood. With a long period needed for development, there are opportunities for people to find ways to prevent these diseases from worsening, usually through long-term treatments.

**Figure 1:1** Projected main causes of death, worldwide, all ages, 2005

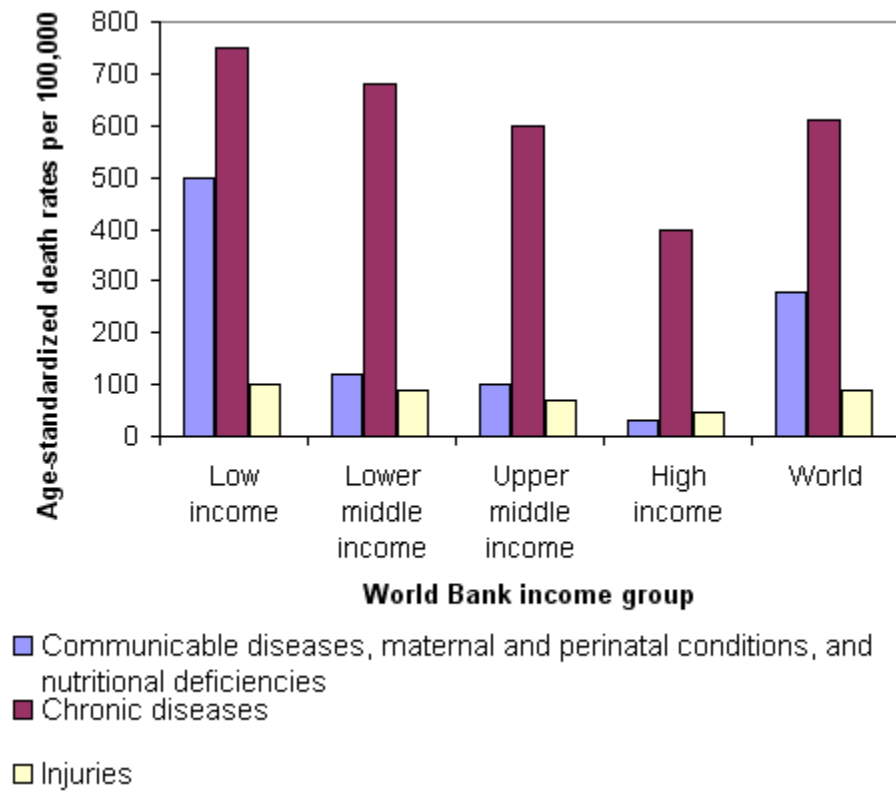


*(Source: WHO, 2005)*

A general assumption is that chronic disease-related deaths occur to the elderly. This is a misconception as approximately 16 million chronic disease-related deaths occur each year to those who are 70 years or younger. A more alarming fact is that nearly 80% of chronic disease deaths occur at earlier ages in low and middle-income countries

compared to higher income countries (WHO, 2005). These low and middle-income countries account for most of the world's population (WHO, 2005). Yach et al., (2004) expect the rate of occurrence for chronic diseases in these developing countries to increase substantially in the next two decades. Figure 1:2 shows the projected main causes of death by the World Bank Income group for all ages in 2005.

**Figure 1:2** Projected main causes of death, all ages, by World Bank Income group, 2005



(Source: WHO, 2005)

### **1.2.2 Risk factors and underlying determinants**

The risk factors for chronic disease are the same for men and women in the varying regions. The most important modifiable risk factors include an unhealthy diet rich in high calorie foods, physical inactivity, use of tobacco, and alcohol abuse (Yach et al., 2004). These factors tend to cause an increase in blood glucose levels and shifts in blood lipids, which leads to an individual becoming overweight and obese. The current burden of chronic diseases reflects past exposure to risk factors, while current exposures determine the future burden of chronic diseases (Yach et al., 2004).

Underlying causes that aid the risk factors are more complex and are related to social, economic, and cultural changes due to global marketing of multinational corporations, trade and agricultural policies, urbanization, ageing populations, changes in living and working patterns, and the environment (Mohindra, 2007). Revolutionary changes in transportation, advertising, and food production have worked to alter lifestyles abruptly in many developing countries (Birt, 2006). Popular Western junk foods, cheap cigarettes, and automobiles has resulted in many citizens of poor countries eating worse and exercising less than they did a decade ago (Birt, 2006). The WHO (2005) states that globalization drives chronic disease population risks both directly and indirectly. There are health related advantages to globalization, such as the technological advancements in medical information and communication transfers used by health care systems (WHO, 2005). However, there are some negative health related effects from globalization as well. These negative effects are the result of a nutrition transition. People in low and middle-income countries are now consuming diets that are high in animal fats, trans fats,

salt, and sugar. The reason for this nutritional transition is that the demands for goods high in fats, salt, and sugar have risen. Public health awareness in these developing countries has not caught up to this new level of affluence (Birt, 2006). Populations in these low and middle-income countries are moving from the countryside to urban areas to earn higher incomes, and this results in reduced time to prepare food themselves (Birt, 2006). The supply of such processed foods has also increased in terms of production, promotion, and marketing.

The marketing of tobacco and other products that have adverse health effects has increased (WHO, 2005). As economic development occurs, tobacco use and obesity also increases (Yach et al., 2004). The uptake of risk factors eventually leads to the onset of diseases. Yach et al. (2004) notes that, in the absence of policy actions, consumption of tobacco, alcohol, and foods high in fat and sugar increases along with gross national product. This is followed decades later by associated increases in chronic diseases. Chronic disease rates generally do not decrease until the nation achieves high levels of wealth and literacy, whereupon governments are more likely to respond to public health concerns using a broad range of policy instruments to influence consumption trends (Yach et al., 2004).

Global marketing targeted at children has reached epidemic proportions worldwide, and it has led to an increase in unhealthy nutrition. The world populations are becoming unhealthy consumers of products such as caffeine and other drugs at an increasingly young age (Veracity, 2006). According to a study published in the Journal of



American Medical Association (JAMA) in 1991, almost all 6 year olds living in the United States could identify Joe Camel. This makes Joe Camel as recognizable to children as Mickey Mouse (Veracity, 2006). Corporations also market products such as soft drinks, which are a major source for sugar and caffeine, to children and adults. About one fifth of American one and two year olds drink soda, consuming a potentially dangerous stimulant and large doses of sugar before they are capable of consuming many adult foods (Veracity, 2006).

Body mass index levels and the total cholesterol increases in poor countries when personal incomes increase and the nations become wealthier. Increase in wealth and urbanization affects the rate of increase for chronic disease. Urbanization results in people being exposed to new products, technologies, unhealthy goods, and adoption of less physical activity (WHO, 2005). The type of general policy environment is also a determinant of people's health. Those in environments that have supportive systems for food, agriculture, trade, media advertising, transport, urban design, and the built environment allow people to make well-informed, healthier choices (WHO, 2005). Those environments that are unsupportive, especially those in low income or deprived areas, do not provide the population with the opportunity to benefit from the existing knowledge on causes and preventative measures for chronic diseases (WHO, 2005). The life expectancy is usually shorter and most diseases are more common further down the social ladder in most societies (ICHS, 2003). Those who are further down in the social ladder usually run at least twice the risk of serious illness and premature death compared to those who are at the top of the social ladder (ICHS, 2003).

### 1.2.3 Consequences on health due to risk factors

Chronic disease risk factors are a leading cause of death and disease burden throughout the world. The status or economic development of a country does not matter. According to WHO (2005), the leading risk factor globally is raised blood pressure, followed by tobacco use, raised total cholesterol, and low fruit and vegetable consumption. The major risk factors together, they say, account for around 80% of deaths from heart disease and stroke. Table 1:1 describes an approximate number of people that die each year from various risk factors such as tobacco, physical inactivity, obesity, high blood pressure, and high cholesterol. Nearly 24 million people die each year from these risk factors; however, the number would be even higher if one considers all risk factors.

**Table 1:1** Death tolls from risk factors

Each year at least:
<b>4.9 million</b> people die as a result of tobacco use;
<b>1.9 million</b> people die as a result of physical inactivity;
<b>2.7 million</b> people die as a result of low fruit and vegetable consumption;
<b>2.6 million</b> people die as a result of being overweight or obese;
<b>7.1 million</b> people die as a result of raised blood pressure;
<b>4.4 million</b> people die as a result of raised total cholesterol levels

*(Source: WHO, 2005)*

WHO estimated in 2005 that there were over 1 billion people globally that were overweight and over 300 million that were obese. If the current trends continue, it is estimated that by 2015 the total number of humans that will be either overweight or obese

will rise to 1.5 billion (WHO, 2005). Regardless of income levels, it is projected that there will be a rise in the average body mass index for men and women. The largest of these increases is projected to be for women in upper middle-income countries. This group of women has already surpassed those women in the high-income countries (WHO, 2005).

WHO expects the number of deaths from chronic disease to increase from 2005 to 2015. However, death from communicable diseases, maternal conditions, prenatal conditions, and nutritional deficiencies should decrease. This projected increase in death related to chronic disease is driven primarily by the ageing population and those populations that are now exposed to the risk factors associated with chronic diseases. It is approximated that there will be a total of 64 million deaths in 2015. Of the 64 million, 17 million will die from communicable diseases, maternal or paternal complications, or nutritional deficiencies. Additionally, 41 million people in 2015 will die from non-communicable chronic diseases (WHO, 2005).

#### **1.2.4 Access to healthcare**

The lack of access to quality healthcare such as diagnostic and clinical prevention services due to social and economic inequalities adds to the burden of chronic diseases. Low income and the poor have barriers to healthcare services. These include economic constraints, over priced drugs, means of transportation to healthcare centres, and poor responsiveness from the healthcare centres (WHO, 2005). Financial constraints and the inability to afford out of pocket healthcare charges contribute to the increasing number of people suffering and dying from chronic diseases. Dispersed healthcare centres in

developing countries results in high transport costs that many cannot afford. The lack of pharmacies and access to prescription drugs is a factor, and rural healthcare centres offer services that also might be lower quality than in urban centres. Even in countries such as South Africa where prescription drugs are subsidized or provided for free by the government to the low and middle-income people, the wealthier population is twice as likely to have received treatment compared to those who are poor (WHO, 2005). Communication and cultural barriers also affect the type and quality of healthcare services and treatment these people receive.

### **1.3 The economic impact of chronic diseases**

Chronic diseases affect the national economy of a country in direct, indirect, and intangible ways. The direct costs are the costs of medical care, which includes prevention, diagnosis, and treatment of the diseases (Suhrcke et al., 2006). Medical expenses incurred from these diseases results in reduced income for families, which affects other investments including the education of children. Expenditure on addictive products such as tobacco and alcohol are costly to poor households. The poor tend to spend a disproportionate amount of their income on tobacco and alcohol, potentially substituting for food purchases or investment in human capital such as health and education (Suhrcke et al., 2006). Studies conducted in Bangladesh in the 1990s found that on average people spent twice as much on cigarettes as they did on housing, clothing, health and education combined. The poorest households spent close to 10 times as much on tobacco as they did on education (Suhrcke et al., 2006).

The indirect costs of chronic diseases are realized through the loss of human resources and loss of productivity of labour due to ailment from chronic diseases (Suhrcke et al., 2006). Agricultural productivity, including critical activities such as timely planting of crops and harvesting may be delayed (WHO, 2005). Generally, healthier individuals can produce more output per hour worked thereby increasing labour productivity due to better physical and mental capacities (Suhrcke et al., 2006). In wealthy nations that are usually equipped with social insurance systems, evidence shows the negative labour market effects chronic diseases have on the national economy. It is reasonable to expect poor nations with underdeveloped and informal insurance system to experience a greater negative impact on their economy due to ill health and chronic diseases (Suhrcke et al., 2006).

The intangible costs of chronic diseases are reflected in the psychological dimensions of illness that include pain, bereavement, anxiety, stress, and suffering (Suhrcke et al., 2006). These factors contribute to the reduced earning potential of families that culminates in reduced national income or gross domestic product (GDP) for the nation. Based on literature reviews, the cost of chronic disease and their risk factors is significant and sizeable, ranging from 0.02% to 6.77% of a country's GDP (Suhrcke et al., 2006). Developing countries struggle between increasing the economic wealth trying to alleviate poverty and reducing social and health deprivations (Mohindra, 2007). The governments in poor countries face serious challenges in trying to develop public policies that serve the interests of the people. Limited resources especially during times of macro-economic instability have forced these poorer nations to seek financial support from

international financial institutions such as the International Monetary Fund and the World Bank (Mohindra, 2007).

Cost of illness and disease studies conducted in the United States can provide conceptual insight for other countries including developing countries for determining the effect risk factors have on driving healthcare costs (Suhrcke et al., 2006). Pronk et al. (1999), found that healthier lifestyles, defined by physical activity times three times per week, a moderate BMI, and non-smoking reduced healthcare costs by 49% compared to an unhealthy lifestyle for adults 40 and older. Sturm (2002) analyzed the per person annual healthcare costs associated with being obese, overweight, smoking, and heavy alcohol consumption among working age US population. His research found that obesity increased a person's annual healthcare cost by 36%, smoking increased cost by 21%, and heavy alcohol consumption increased cost by 10% (Strum, 2002). Further findings have found that healthcare costs associated with obesity are considerably large and have reached the costs of smoking and heavy drinking (Suhrcke et al., 2006).

## **1.4 Summary**

In summary, there are different types of chronic diseases; chronic disease can be referred to as non-communicable diseases to differentiate it from communicable diseases, which are infectious. Approximately 30% of worldwide deaths were a result of communicable diseases, maternal and perinatal conditions, and nutritional deficiencies. Cardiovascular disease, cancer, chronic respiratory diseases, diabetes, other chronic diseases and injuries accounted for the remaining 70% of deaths.

The ageing population and populations that are transitioning to increased risk factor association drives a projected increase in chronic disease-related deaths. Chronic diseases affect the national economy of a country in direct, indirect, and intangible ways. The direct costs are the costs of medical care, such as prevention, diagnosis, and treatment. A country realizes the indirect costs through the loss of human resources and compromised productivity of labour due to ailment from chronic diseases. The intangible costs reflect the psychological dimensions of illness that include pain, bereavement, anxiety, stress, and suffering.

These factors contribute to the reduced earning potential of families, and that culminates in reduced national income or gross domestic product (GDP) of the nation. Developing countries struggle between increasing the economic wealth, trying to alleviate poverty, and reducing social and health deprivations. The governments in poor countries face serious challenges in trying to develop public policies that serve the interests of their people.

## **2: Chronic diseases in China**

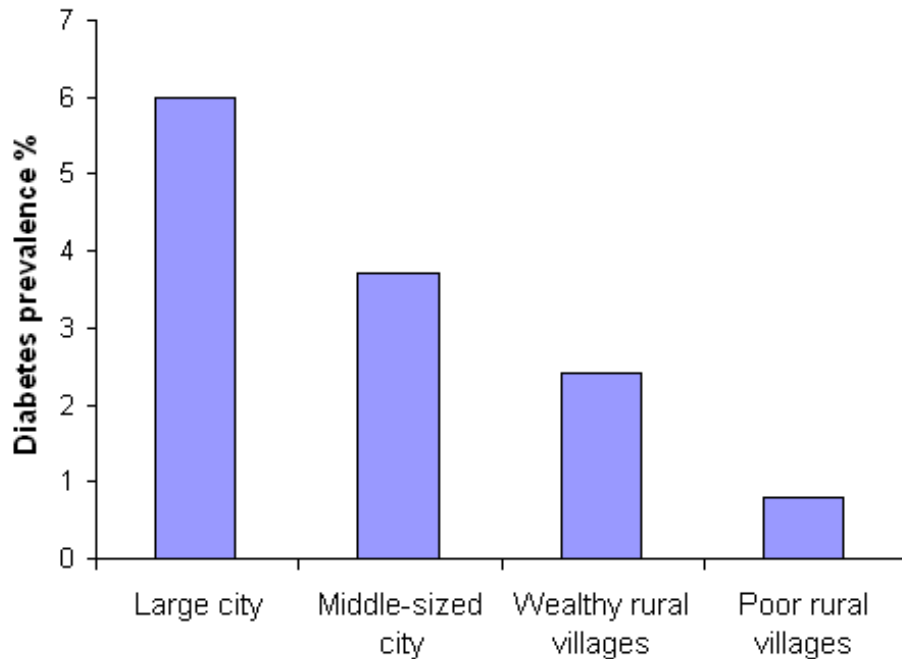
Since the 1950's China has improved the level of sanitation, hygiene, and water quality. They have increased vaccinations, improved medical care, and brought about increased social reforms. There have been advancements in universal education, higher incomes, better nutrition, and better housing (Yang et al., 2008). These changes, along with the one child policy, have shifted the age structure of the population and, as a result, fertility and mortality have declined, thereby increasing the proportion of elderly people (Yang et al., 2008). In 2000, China's above 65-age category accounted for 7% of the entire population, and by 2040 it is estimated that this number will increase to approximately 20% of the entire population (Wang et al., 2005).

In addition to the ageing population, the shift towards more social reform has affected the rate of increase in chronic diseases in China. There has been a steady increase in the standard of living and the rate of urbanization. From 1990 to 2000, the proportion of people living in urban settings in China has increased from 26% to 36%. The number of cities in China and the number of townships has also increased (Wang et al., 2005). By 2010, urbanization is expected to reach 45%; by 2030, urbanization is expected to reach 60%; and by 2010, 200 million more people are expected to be living in urban areas. This growth comes at a cost to the healthiness of China's population. There is a clear relationship between urbanization and the prevalence of diabetes in China



(Wang, et al., 2005). Figure 2:1 illustrates the increasing prevalence of individuals with diabetes in larger cities and those who have accumulated more wealth. Additionally, behavioural changes as a result of environmental change are occurring. These behaviour changes include changing diets, increased automobile usage, increased tobacco consumption, and decreasing levels of physical activity.

**Figure 2:1** Prevalence of diabetes in China, 2002



(Source: Wang, et al., 2005)

Table 2:1 is a summary of the costs to the Chinese economy in 1995 and the projected costs in 2020 of only diet-related non-communicable diseases. Annual healthcare costs of diet related non-communicable diseases in 1995 reached a staggering \$11.74 billion dollars with productivity costs owing to premature death of approximately \$3.41 billion (Popkin et al., 2001). The total cost as a percentage of the GDP as a result of the healthcare system and loss of productivity accounted for 2.1% in 1995.

**Table 2:1** Summary of costs of diet-related noncommunicable diseases in China, 1995 and 2025

Type of Cost	China
Number of deaths/year owing to DR-NCDs: 1995	2.57 million
Deaths owing to DR-NCDs as percentage of all deaths: 1995	41.6%
Number of deaths/year owing to DR-NCDs: 2020	7.63 million
Deaths owing to DR-NCDs as percentage of all deaths: 2020	52.0%
Annual healthcare system costs of DR-NCDs: 1995	\$11.74 billion
Healthcare system costs DR-NCDs as percentage of all diseases: 1995	22.6%
Healthcare system costs DR-NCDs as percentage of GDP: 1995	1.6%
Productivity costs DR-NCDs owing to premature death: 1995	\$3.41 billion
Productivity costs as percentage of GDP: 1995	0.5%
Total costs DR-NCDs (health + productivity): 1995	\$15.1 billion
Total costs DR-NCDs as a percentage of GDP: 1995	2.1%

(Source: Popkin et al., 2001)

## 2.1 The nutritional transition

The dietary structure, physical activity levels, obesity, and diet-related non-communicable diseases are changing at a rapid pace throughout the emerging markets. China, with over 1.3 billion people as of 2008, is the largest populated nation in the world reflecting many of these changes (Popkin, 2001). China has experienced increased urbanization in the past decade, but a large number of people remain in the rural areas. These two societies differ in their economic and nutritional transitions. However, the rate of occurrence of diet-related non-communicable diseases is quite similar (Popkin, 2001).

Since the end of the Second World War, emerging markets such as India and China faced extreme poverty levels and hunger. However, the recent shifts in the past decades towards improved economic gains have made China into one of the largest growing economies. Between 1978 and 1997, they achieved the largest annual average

rate of growth for real gross domestic product (GDP) per capita of 8.5% (Popkin, 2001). This rate of growth has enabled the country to achieve improved living standards and to decrease the number of people living in poverty. Along with this growth, China has improved its supply network for securing food, which in turn has affected the dietary structure of the country (Popkin, 2001).

It is important to consider that these economic shifts have not been consistent throughout all regions in China. There are large subpopulations that have been bypassed by progress. According to Barry Popkin (2001), some of the western and south central provinces of China face extensive poverty compared to the eastern provinces that appear to have much lower signs of economic deprivation. Popkin (2001) notes that, while the number of people living in poverty has decreased, an increasing disparity between incomes is emerging. Some population groups have seen a decrease in living standards because of changes in income or nutritional intake.

The people are consuming different type of foods in both the urban and rural areas. Research shows that half of the adults in China are consuming a high fat diet (Popkin, 2001). A larger consumption of rice and wheat has occurred in place of sorghum, barley, maize, and millet (Popkin, 2001). The diets of all income groups have shifted, with the greatest shifts seen in those in the urban locations and those with high incomes (Popkin, 2001). Lower income people are able to afford more fat from edible oils, resulting in an upward transition towards increased fat consumption. According to Popkin (2001), the income elasticity for the consumption of edible oils, pork, and eggs has increased significantly at all income values. Additionally, the quantity of fat in the diet increases much more rapidly with increases in income. These changes in dietary

intake will lead to a deterioration of the overall healthiness of the people. This results in a trend towards an increase in obesity in China.

## **2.2 Behavioural risk factors**

There has been a rapid increase in the adoption of a Western lifestyle that is more sedentary (Popkin, 2001). The transition in nutrition and activity level is a result of the shift in the economic structure of China. The economy has shifted from a preindustrial agrarian state to one that is more industrialized (Popkin, 2001b). The advancement and introduction of technologies has created more sedentary service sector occupations (Popkin, 2001). A growing number of those living in urban areas now work in offices or on assembly lines. These jobs require less physical activity and energy expenditure compared to the rigorous physical activity needed to work on farmland. Sedentary work combined with a high fat diet increases the body mass index and the risk of obesity (Popkin, 2001b). Another area that has caused significant changes in nutrition and the level of physical activity is an increase in television ownership. With increased incomes, large segments of poorer population can now afford television. Television subjects viewers to various forms of persuasive marketing campaigns promoting high fat snacks, foods, and drink. Additionally, television watching has adversely affected the amount of time children spend actively playing as opposed to sitting motionless staring at a television. The advent of video games has also reduced the amount of active playing time. According to Popkin (2001), of the total number of adults aged 25 to 45 years in eight provinces of China, 17.6% were overweight or obese in 1997. During the eight year

period of collecting data the proportion of overweight adults in this group for females doubled and almost tripled for the males (Popkin, 2001).

## **2.3 Conditions in need of pharmaceutical drugs**

This subsection discusses some of the main conditions requiring pharmaceutical drugs for treatment. These include hypertension, obesity, being overweight, diabetes, and tobacco usage.

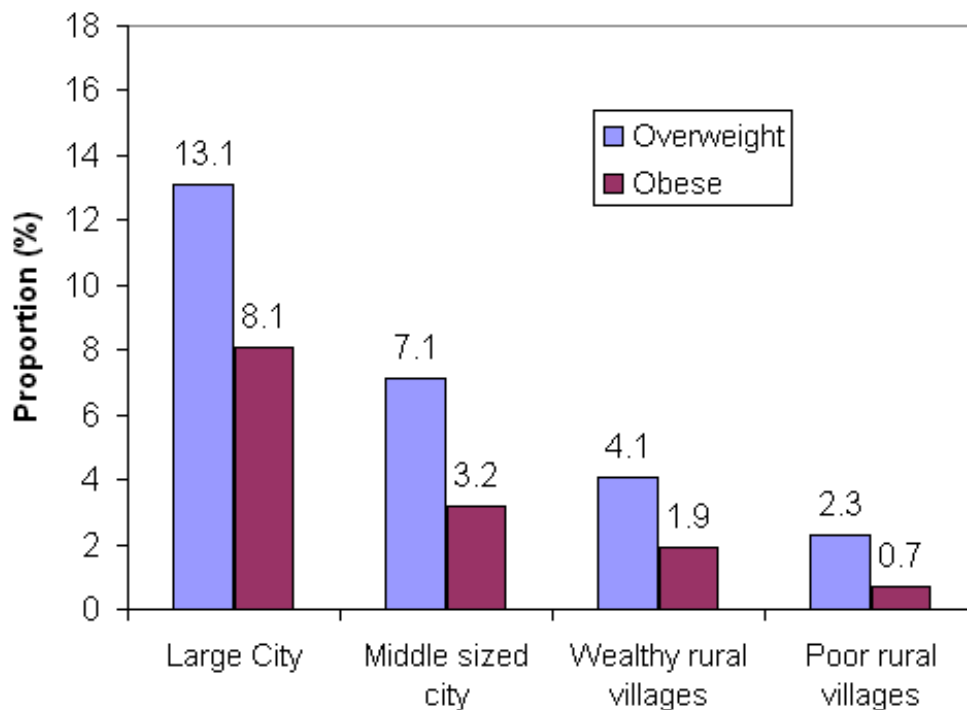
### **2.3.1 Hypertension**

Over the past 30 years, the number of people with hypertension has been steadily increasing in China. In 2002, reports found that nearly 18% of the Chinese adults aged 15 years and older had hypertension, which corresponds to 177 million people (Yang et al., 2008). One of the causative factors for hypertension is high salt intake. According to Yang et al (2008), in 2002, the average daily salt intake for a reference man (aged 18 years with light level of physical activity) was 12 grams per day, which is approximately twice that recommended by Chinese dietary guidelines. Some rural areas had an intake of salt as high as 14.7 grams. Controlling hypertension by individuals is quite low, only 30% of adults with hypertension are even aware of their condition. The need for pharmaceutical drugs specific for combating hypertension is high within China. Drugs for treatment, such as adrenergic inhibitors, peripheral agents, alpha-blockers, beta-blockers, direct vasodilators, and calcium antagonists will be needed for treatment.

### 2.3.2 Obesity and overweight people

According to Yang et al. (2008), nearly 18.9% of Chinese adults over the age of 18 were overweight in 2002, and nearly 3% were obese. There was an increase of 39% from 1992 to 2002 in the proportion of overweight adults (Yang et al., 2008). In 2002, the larger cities accounted for 13% of children and adolescents aged 7-17 years that were overweight while 8% were obese (Wang et al., 2005). Figure 2:2 illustrates the increasing proportion of obese and overweight children from those living in rural villages to those in larger cities.

**Figure 2:2** Percentage of children aged 7-17 years who were overweight and obese in China, 2002



(Source: Wang, et al., 2005)

One significant factor to consider in terms of obesity and overweight people in China is that over 20 years from 1982 to 2002 the caloric intake has changed very little. The approximate intake has remained at about 2491-2250 Kcal per day. This indicates that the increase in weight is due to a change in the type of foods and, more importantly, reduced physical activity (Yang et al., 2008). The average time spent watching television is increasing and only 15% of urban Chinese adults exercised regularly in 2002 (Yang et al., 2008). Pharmacological drugs that reduce food intake, alter metabolism, or increase energy levels, such as adrenergic thermogenic drugs, will be in demand as the proportion of overweight and obese people increases.

### **2.3.3 Diabetes**

The number of people with diabetes in China is escalating, with the potential of reaching unknown dimensions. According to Festel et al. (2005), Diabetes is a multifactorial disease in which the genes not only interact with each other, but also with environmental factors. Genetically predisposed individuals will not necessarily develop Type 2 diabetes unless they are also exposed to environmental factors. With the increasing demographic shifts and affluence, Festel et al. (2005) estimates that the number of people with diabetes in China may exceed 150 million by 2025. There are three principle explanations for the rising prevalence of diabetes in China. Cheng (2003) points out that the prevalence of diabetes is much higher than previously reported because three out of four diabetic patients in China are undiagnosed. The lack of population-based screening programs is one the reasons for the large number of people who are unaware of their condition. Additionally, Cheng (2003) explains that a lower

baseline body mass index among the Chinese to begin with means that it takes less increments to reach an obese level and smaller increments to increase the risk of type 2 diabetes in the Chinese population. There is a close relationship between those who suffer from diabetes and obesity. Another relationship also exists with hypertension, which is one the most common co-morbidities linked to diabetes (Festel et.al, 2005). The third explanation for the growing prevalence of diabetes among the people in China is a result of the positive association between cigarette smoking and the risk of diabetes in Chinese men. Smoking is growing in usage in China, and it has an odds ratio of 1.7 on the risk of diabetes (Cheng, 2003).

#### **2.3.4 Tobacco Usage**

China is the world largest grower and consumer of tobacco; for every three smokers in the world, one is a Chinese man (Yang et al., 2008). The rate of tobacco production has increased from 80 billion individual cigarettes in 1949 to 1723 billion in 2002, while consumption of cigarettes increased to 2022 billion in 2006 (Yang et al., 2008). China only exports 0.8% of the cigarettes produced in China. They consumed the remaining 99.2%. On average, a Chinese man consumed about 15 cigarettes per day in 2002. Passive exposure to tobacco smoke affects 52.5% of the Chinese population, and this number did not change between 1996 and 2002. Table 2:2 shows the age-standardized prevalence rates and estimated populations at risk from smoking compared to those suffering from hypertension and obesity. According to Yang et al. (2008), 82% of passive smokers reported exposure at home; 35% at their workplace; and 67% in public places. A study in rural China found that money spent on tobacco negatively



affected the amount of money spent on health, education, farming equipment, and seeds (and thus future productivity). Tobacco expenditures also affected savings and insurance (Wang et al., 2006). Every 100 Yuan spent on tobacco resulted in a decline in spending on education by 30 Yuan, on health care by 15 Yuan, on farming by 14 Yuan, and on food by 10 Yuan (Suhrccke et al., 2006).

**Table 2:2** Age-standardized prevalence rates and estimated populations at risk

	<b>Age-standardized prevalence rate</b>	<b>Average increase, compared with most recent survey</b>	<b>Estimated population at risk</b>
People with hypertension	17.7%	2.67%	177000000
Overweight people	17.6%	3.23%	218000000
Obese people	5.6%	5.43%	68000000
Current smokers	28.2%	-2.91%	303000000
Male current smokers	53.2%	-3.01%	290000000
Female current smokers	2.2%	-8.26%	13000000
Passive smokers	52.2%	-0.49%	530000000

*(Source: Yang et al., 2008)*

There are numerous risk factors associated with smoking. Of the 4000 known chemicals in cigarettes, 50 or more are carcinogenic. With passive and full time smokers combined, there are well over 800 million people at risk in China. Pharmaceutical intervention with nicotine-replacing drugs or non-nicotine drugs, such as Chantix, will be needed to help reduce the urge for smoking as a preventative measure. Cancer drugs needed for chemotherapy or radiation therapy will be needed to help those who will or

already suffer from diseases such as throat cancer, lung cancer, or chronic bronchitis, to name a few.

## 2.4 Rural and urban areas

The death rates in China vary between the rural and urban areas and between the populations in the eastern, middle, and western regions of the rural areas (Yang et al., 2008). The rural areas have seen a higher mortality rate from communicable diseases, maternal and prenatal conditions, chronic obstructive pulmonary diseases, and injuries. However, the urban areas have had higher death rates from cardiovascular diseases and cerebrovascular disease. Table 2:3 outlines various communicable and non-communicable disease-related deaths per 100,000 people through the various regions in rural China and the urban regions.

**Table 2:3** Age-standardized rates of death from different causes in 2004 and 2005

	Urban	Rural			
		Total	Eastern regions	Middle regions	Western regions
Communicable diseases	16	27	18	23	42
Maternal and perinatal conditions	5	7	6	7	10
Cancer	127	125	131	133	107
Cerebro-cardiovascular causes	193	210	195	254	180
Chronic obstructive pulmonary disease	52	81	65	80	103
Other non-communicable diseases	49	48	43	42	61
Injury	44	66	63	65	72
Unknown	13	8	10	7	6
<b>Total</b>	<b>499</b>	<b>572</b>	<b>531</b>	<b>610</b>	<b>581</b>

Data are deaths per 100,000 population.

(Source: Yang et al., 2008)

In both the urban and rural areas, the 2006 mortality survey showed that lung cancer, breast cancer, and leukaemia were higher in urban areas, while oesophageal cancer and cervical cancer were higher in rural areas (Yang et al., 2008). These variations in types of disease based on regions and rural and urban locations give healthcare providers and pharmaceutical companies a better understanding of not only the increasing incident of chronic diseases, but also a better insight on where to sell specific disease-related drugs and where to conduct clinical trials.

## **2.5 Summary**

In summary, the ageing population of China and the shift towards more social reform has affected the rate of increase in chronic diseases in China. There has been a steady increase in the standard of living and the rate of urbanization. The dietary structure, physical activity levels, obesity, and diet-related non-communicable diseases are changing at a rapid pace throughout the emerging markets. China is the largest populated nation in the world reflecting many of these changes.

It is important to consider that these economic shifts have not been consistent throughout all regions in China. There are large subpopulations that have been bypassed by progress. The type of foods being consumed has shifted in both the urban and rural areas. The diets of all income groups have shifted, with the greatest shifts being seen in those in the urban locations and those with high income. Some of the conditions in need of pharmaceutical drug intervention include hypertension, obesity, diabetes, and tobacco

addiction. The rural areas of China have seen a higher mortality rate from communicable diseases, maternal and prenatal conditions, chronic obstructive pulmonary diseases and injuries. However, the urban areas have had higher death rates from cardiovascular diseases and cerebrovascular diseases.

### **3: Overview of China's healthcare system**

The severe acute respiratory syndrome (SAR) crisis in China revealed some of the failures of the Chinese health care system, as well it showed some fundamental structural deficiencies (Liu, 2004). The decentralized and fragmented healthcare system of China is not well suited for making a rapid and coordinated response to public health emergencies (Liu, 2004). According to Liu (2004), the commercial orientation of the health sector on the supply-side and the lack of health insurance coverage on the demand side have exacerbated the under provision of public services problems, such as health surveillance and preventive care. A closer analysis of China's healthcare system is needed to understand its ability to handle the rising number of people with chronic diseases within the country.

#### **3.1 Weakened government role, communication, and control**

The state council is the premier governmental body that is responsible for implementing the national policies and having jurisdiction over the 22 provinces, 3 municipalities, and 5 autonomous regions of China (Hiller & Shen, 1996). Below the provincial governments are the county governments. With the increase in urbanization, the number of counties within the country is estimated to be around 2000 (Hiller & Shen, 1996). The county government has control over the independent township governments. The lowest on the hierarchy in terms of governmental power are the individual villages.

The public health system utilized throughout these provinces is comprised of Epidemic Prevention Stations (EPSs). These EPSs are situated on different administrative levels of the government. These EPSs are responsible for conducting health surveillance, collecting information from hospitals, and reporting to the next level up of EPS administration. However, as noted by Liu (2004), communication between these various levels of EPS is weak. This results in missing data in the Ministry of Health's annual statistical reports. Consequently, the Ministry of Health's role in creating and sustaining public health programs has diminished.

China's total health spending as a percentage of the country GDP has increased from 4.11% in 1991 to 4.82% in 2000. However, all government spending on health as a share of total health spending has decreased from 22% in 1991 to 14% in 2000 (Liu, 2004). The individual citizen of the country has increased their out of pocket spending as a share of total health spending from 38% to 60% from 1991 to 2000. The weakened government role on health spending has occurred at a time when China is facing increased complications in national health. Increased industrial pollution, increased chronic diseases, and urbanization because of easing of restrictions for mobility are increasing the strain on the health system. The lack of investment by the Chinese government has undermined health surveillance services and prevention services (Hu et al., 2003).

### **3.2 Fragmentation of healthcare system**

The clinics and hospitals in China are owned and operated by a diverse number of groups, such as state owned enterprises, military establishments, private investors, and local cooperatives (Liu, 2004). There are inadequate regulations regarding health responsibilities by these organizations. Additionally, there are few mechanisms in place for enforcing the regulations. According to Liu (2004), ever since China's decentralization of the fiscal system in the late 1980's, competition for investment and a desire for marketplace dominance among provinces and cities has been intensified which possibly makes it difficult for local governments to share information and work in partnership in areas such as public health. There are bureaucratic challenges associated with detecting and reporting chronic diseases. Some authorities find that releasing information of such diseases will cause civil unrest within the province or affect the amount of foreign investment and tourism.

The decentralized fiscal system in China is leading to increased variations in investment in the healthcare system by the individual provinces, cities, towns, and other entities. Variations in the level of performance have become a growing concern as well. While some regions are equipped to detect and control epidemics in their area, for example Guangzhou and Beijing, other areas are unprepared for major public health challenges (Liu, 2004). The townships are worst off, as they often do not have EPSs in place. These townships also lack supervision and coordination in healthcare providers that are present in these areas (Liu, 2004).

### **3.3 Market forces**

The government of China's role in the healthcare system has been reducing; instead, the role has been shifting to the market forces (Jamison, 1984). Market forces have enabled a positive progress in the health sector, most noticeably is the increase in the supply of modern health facilities and the increase in the variety of medicine available for treating diseases and illnesses (Liu, 2004). China's total supply of health professionals and hospital beds have increased significantly. By 2001, there were 5.5 million health professionals and 3.2 million hospital beds. However, these improved health services benefit people who are able to afford it. The increasing privatization of health care financing, says Liu (2004), creates inequalities in health care and in health status. Moreover, healthcare providers have become less interested in public health work than medical treatment because there is little or no remuneration for preventative services, and there is increasing pressure for providers to generate revenues.

### **3.4 Economic and healthcare costs to China**

China's population faces substantial direct and indirect costs associated with chronic diseases. Direct costs stem from admission to hospitals, medical costs, costs of prevention, and care related travel, nursing, and family support (Yang et al., 2008). Low productivity, sick leave, loss of workforce due to early retirement, and premature deaths are a few examples of the indirect economic costs to the country. Costs to families who may or may not have some form of medical insurance for treating conditions such as hypertension, diabetes, coronary heart diseases, stroke and cancer averaged 4000-10000 Renminbi (7 Renminbi = US \$1) (Yang et al., 2008). The average yearly urban income is



9422 Renminbi per year, and 2936 Renminbi for a rural family (Yang et al., 2008). These in-patient treatments for chronic diseases can cost up to half the annual salary for urban residents and three times the annual income of rural residents. Chronic diseases not only have health burdens but economic ones as well, especially upon the newly reformed healthcare system of China. Chronic diseases drive up costs because of the need to use advanced technologies for treatment. There needs to be a tighter integration of primary, secondary, and tertiary care services in order to channel the treatment for chronic disease to the most cost efficient levels of the healthcare system (Yang et al., 2008).

For cardiovascular diseases alone, says Wang (2005), Chinese people aged 35-64 years lost 6.7 million years of productive life during the year 2000. This cost China approximately US \$30 billion, of which only a quarter of this amount was direct health care costs. Wang (2005) estimates that, if the current trend for this age group continues, the total years of productive life lost will increase to 10.5 million by 2030. China is estimated to lose \$18 billion in national income ever year after 2005 as a result of heart disease, stroke, and diabetes on labour supplies and savings (Wang, 2005). The cumulative loss over the period of 2005-2015 would be about \$556 billion.

#### **3.4.1 Health insurance**

The percentage of urban and rural people with health insurance dropped from 12% to 9% in 1998. Due to the high cost of medical care, pharmaceuticals, and the lack of medical insurance, the total health care utilization rate in China has fallen (Liu, 2004). In poverty-stricken regions, the admission rate into hospitals for those without insurance is 35 per 1000, while those with insurance are 251 per 1000. The patient initiates the

majority of the discharges out of the hospitals in these regions mainly because they can no longer afford the medical treatment (Hu et al., 2003). Many of those without insurance do not report illnesses or seek professional help, which leads to the eventual deterioration of their health. From a public health perspective, those not reporting illnesses may have infectious diseases that could spread. If officials do not identify and isolate these diseases on time, it can lead to potential epidemic outbreaks (Liu, 2004). China has implemented government-subsidized insurance for those in rural areas. However, this insurance is only intended to cover medical costs that become 'catastrophically' expensive for an individual.

### **3.5 Commercialization of healthcare**

Towards the mid 1980s, the Chinese government tightened the budget for public hospitals and health care organizations (Yin, 2002). The public sector hospitals were expected to generate funds to meet the costs not covered by the government budget allocation. Government policies have kept the price of hospital services relatively low. However, hospitals and health care providers are allowed to add a 15 – 20% mark up on the wholesale price of drugs (Liu, 2004). This creates an incentive for the hospitals and healthcare providers to prescribe and sell more drugs. Pharmaceuticals MNCs need to be aware of these drug pricing policies by hospital when selling their products to them. If the MNCs sell the product for too high a price, the hospitals will demand even more from the patients, possibly making the drug unaffordable for many.

The EPS has also had to find ways to deal with budget cuts for providing public health services. In 1985, the government funded 80% of the EPS's total income; by 1997, this number had dropped to less than 40%. The EPS have had to find ways to generate funds, one way was to add service fees to annual physical examinations for urban workers and middle school students (Liu, 2004).

An important aspect for pharmaceutical companies to consider is the convincing of health practitioners to prescribe their drugs to patients. However, with the commercialization of the health sector, identifying practitioners with qualifications to understand the effects of their drugs has become difficult. Before the economic system was reformed, the rural health system was an integrate system with formal bottom up referral processes for patients. There were regular technical supervisions provided to the lower health facilities by the upper facilities (Liu, 2004). However, the reform has lead to the collapse of the Cooperative Medical System, resulting in the fragmentation of the rural health care delivery system (Liu, 2004). This fragmentation in the system has created different health facilities competing for revenues from the patients. The village medical supervisors who once were supervised by upper level facilities now have little supervision or professional training.

The village health practitioners are the first point of contact for many rural patients in this medical system (Liu, 2004). With practitioners not receiving further training or supervision, these villagers may suffer from unsafe medical practices. Liu (2004) discovered a joint study between the United Nations Children's Fund and the

Ministry of Health that found that the practice of unsafe prescribing and giving of unnecessary prescriptions was widespread among China's village health practitioners. A study in 1998 found these village practitioners unnecessarily prescribed corticosteroids in 20-36% of the prescription given out. While 46-64% of children received intramuscular injections for the common cold (Liu, 2004). Most of these practitioners did not keep medical records of the drugs prescribed to their patients thereby raising technical and ethical concerns.

### **3.6 Summary**

The decentralized and fragmented healthcare system of China is not well suited for making a rapid and coordinated response to public health emergencies. China's total health spending as a percentage of the country's GDP has increased; however, all government spending on health as a share of total health spending has decreased. The weakened government role on health spending has occurred at a time when China is facing increased complications in national health. Rising industrial pollution, chronic diseases, and urbanization have increased the strain on the health care system. The lack of investment by the Chinese government has undermined health surveillance services and prevention services.

In-patient treatments for chronic diseases can cost up to half the annual salary for urban residents and three times the annual income of rural residents. Chronic diseases not only have health burdens but economic ones as well, especially upon the newly reformed healthcare system of China. Variations in the level of healthcare performance have

become a growing concern. While some regions are equipped to detect and control epidemics in their area, other areas are unprepared for major public health challenges.

The percentage of urban and rural people with health insurance has dropped. Due to the high cost of medical care, pharmaceuticals, and the lack of medical insurance, the total health care utilization rate in China has fallen. Pharmaceutical companies convincing health practitioners to prescribe their drugs to patients need to be aware that the commercialization of the health sector has made it difficult in identifying practitioners with the necessary qualifications to understand the effects of their drugs.

## **4: Business opportunities in China's pharmaceutical market**

Pharmaceutical corporations will find many opportunities in China's changing markets to establish a profitable presence. This chapter explores the entry barriers for pharmaceutical multi-national corporations, such as the changing market, clinical research opportunities, intellectual property rights, bribery and corruption, tax incentives, and drug pricing. Other entry barriers include complex distribution channels, strategic regions in China, and financial reporting. This chapter also covers the bargaining power of buyers, the threat of substitutes, the bargaining power of suppliers, and the competitive environment.

### **4.1 Background**

China's pharmaceutical market has achieved record growth and is becoming increasingly healthy. As of 2007, China represents a \$15 billion market for pharmaceutical products (Zhou, 2007). It is expected that China will become the world's fifth largest pharmaceutical market, rising to \$24 billion (PWC, 2004). With such expectations, there has been an increased interest in foreign investment into China. Currently, there are about 1700 Sino-foreign joint ventures in the pharmaceutical sector (PWC, 2004), including many of the largest pharmaceutical companies such as Novartis, Pfizer, and Roche. These multinational companies (MNCs) want to expand Chinese operations to gain greater market share, but there are obstacles to consider.

The amount of heterogeneity in customers, suppliers, competitors, regions, and government entities adds to the business complexity. Nearly 60% of the economy is represented by China's east coast provinces; however, only 30% of the population live there (Festel et al., 2005). Some positive factors for investment into China include vast consumer demand for pharmaceutical products, lower labour costs, and cost-effective opportunities for R&D and clinical trials.

The following chapter will use Michael Porter's (1979) five forces framework. It will go into detail regarding entry barriers, the bargaining power of customers, the bargaining power of suppliers, the threat of substitute products, and the rivalry in the pharmaceutical industry environment.

## **4.2 Entry barriers for pharmaceutical MNCs**

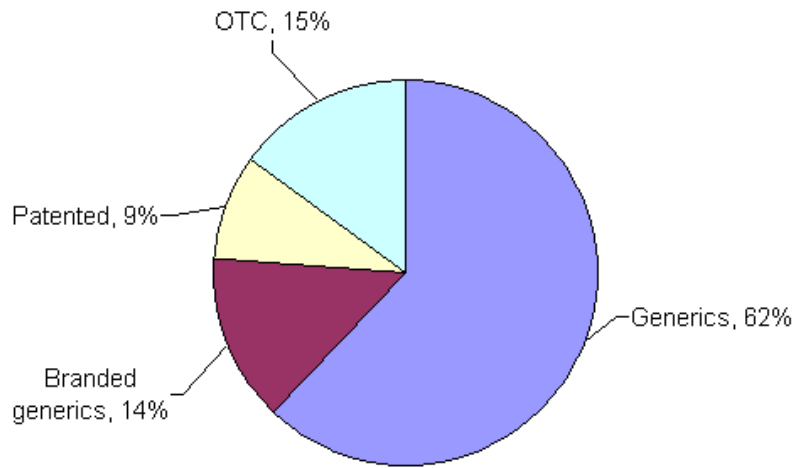
China's entrance into the World Trade Organization (WTO) has helped to reduce the threat of entry into this market; however, the threat of entry remains high. The WTO has enabled implementation of medical insurance, increased pharmaceutical regulations, and created a stronger patent system. China's pharmaceutical market was already quite competitive before the country gained WTO membership (Festel et al., 2005). As of 2004, foreign drug makers will be able to import and distribute products in any part of China, with an average import tariff of 4.2 %, with an additional 17 percent value-added tax (APBN, 2003). However, only approximately 10% of China's national population is covered by the country's health insurance network. Urban insurance reform is a significant issue facing foreign MNCs and the Chinese government (PWC, 2006).

#### **4.2.1 A changing market**

The market is quite fragmented with about 6000 small-scale domestic producers struggling to make profits (PWC, 2004). These producers perform relatively little R&D as approximately 97% of the drugs they produce are copies of foreign products (PWC, 2004). The State Food and Drug Administration (SFDA) are in charge of monitoring pharmaceuticals and enforcing the Good Manufacturing Practice (GMP). However, only two thirds of the manufacturing base in 2004 was GMP certified. Some companies are unable to meet the capital investment required to get GMP certification and are thus faced with either consolidating or being acquired by foreign investors (PWC, 2004). The following pie charts (Figure 4:1 & 4:2) show the projected change in the pharmaceutical market profile from 2000 to 2010. There is a shift towards increased usage of over-the-counter, patented, and branded generics, with a 25% reduction in the usage of generic products.

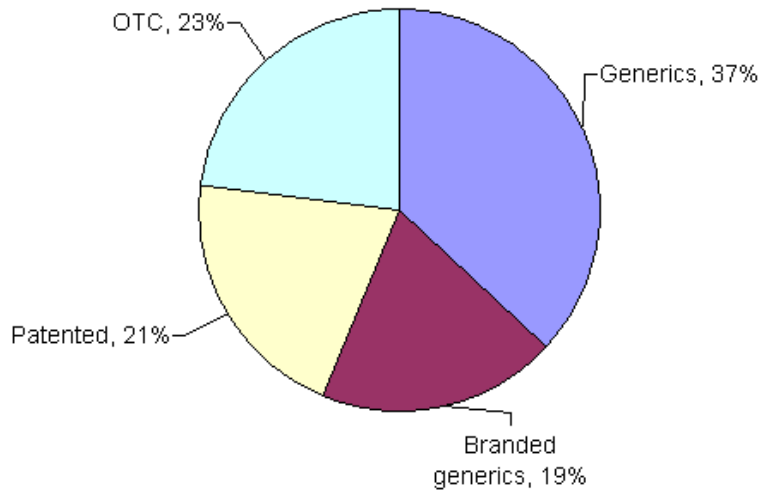


**Figure 4:1** Chinese pharmaceuticals market profile, 2000



*(Source: PWC, 2004)*

**Figure 4:2** Chinese pharmaceuticals market profile, 2010 forecast



*(Source: PWC, 2004)*

#### **4.2.2 Clinical research opportunities**

Entry barriers have been reduced with China offering a competitive advantage for foreign MNCs investing in Chinese pharmaceutical research. Between 2000 and 2007, China's research and development expenditure increased at an average rate of 26.5% annually (PWC, 2009). During this same period, the R&D/GDP ratio for China increased to 1.49% in 2007, compared to United States R&D/GDP ratio of 2.66% in 2007. The cost for performing clinical trials in China is significantly lower than in North America. The cost to employ a Chinese college graduate is US \$3,980 per year. This provides opportunities for pharmaceutical MNCs to hire locally and conduct R&D activities at significant cost advantages (PWC, 2009). There are over 200,000 highly skilled research scientists willing to participate in clinical trials for approximately one-fifth of American salaries (PWC, 2004). As of 2007, China has nearly 20,000 hospitals, over 2 million physicians, and 1.42 million nurses, making the country an attractive location for clinical trials. China also has a liberal research environment and a large number of untreated patients. Clinical trials conducted in China would provide access to data that covers a different ethnic population and genetic variations. The acquisition of such data would play a large part in determining both susceptibility to disease and the safety and efficacy of the drugs needed to treat the conditions (PWC, 2004). Clinical research centres in China have the support of the Chinese government through strong incentive programs to support the industry. These incentives come by way of tax reliefs, direct funding opportunities, and development of numerous technology parks (PWC, 2009).

The most important government agencies driving pharmaceutical and biopharmaceutical R&D include the Ministry of Science and Technology (MOST), the State Food and Drug Administration (SFDA), the National Development and Reform Commission (NDRC), and the Ministry of Commerce (MOFCOM). MOST is responsible for overall management of technology developments. This includes studying and formulating policies, laws and regulations; evaluating, issuing and organizing implementation of projects; formulating annual programs; determining the direction of investment; monitoring and checking the implementation of plans; and organizing international cooperation (Webber, 2003). The SFDA is responsible for numerous aspects of drug regulation and registration. The NDRC is responsible for setting prices of medicines. According to Webber (2003), the NDRC can achieve a principle impact on R&D through supporting pricing of products that reflect the high levels of investment needed for R&D. Similarly, the Ministry of Health (MOH), which is responsible for hospital management generally, can affect the industry through its policies on hospital bidding and procurement. MOFCOM is the body that is responsible for investment and business policies for domestic and foreign enterprises (Webber, 2003). This ministry sets the policies for foreign investment.

### **4.2.3 Intellectual property rights**

MNCs face certain barriers to entry into the pharmaceutical R&D market in China. The protection of intellectual property (IP) rights in China serves as a deterrent, with the People's Republic of China (PRC) showing political and legal reluctance in upholding patent rights of foreign investors. Intellectual theft occurs on various levels

including small scale reversing and copying, counterfeiting, systematic reverse R&D, and reverse engineering (PWC, 2004). Counterfeit drugs account for 192,000 Chinese deaths every year and a cost of \$2.6 billion in losses as a result of piracy. Regulatory difficulties are another deterrent. Getting drugs registered and obtaining production and sales permits involves various central, provincial, and local authorities, taking at times several years for approval (PWC, 2004). Large-scale improvements in IP enforcement cannot be expected until Chinese-made pharmaceutical brands begin to require the protection (PWC, 2006). However, in recent years Chinese domestic pharmaceutical producers have successfully sued foreign and domestic companies in Chinese court for intellectual proprietary violations. Pharmaceutical corporations are looking to other sectors and have reason to be pleased, as the Chinese government has begun cracking down on all types of intellectual property infringement, such as unlicensed music downloads. The legal framework enabling MNCs to protect their property and successfully sue violators is strengthening across all IP industries in China (PWC, 2009). A key success factor for multinational pharmaceutical corporations entering China would be to find ways to ensure that they have protected themselves as best as possible from intellectual property infringements.

#### **4.2.4 Bribery and Corruption**

The pharmaceutical industry in China is prone to bribery and corruption due to the many levels of distribution, sales, representatives, physicians, and government officials involved in the market. As recently as mid 2008, the US Department of Justice handed out a \$2 million dollar fine against AGA Medical Corporation due to allegations of illegal payments to government officials in China, and payments to the China State

Intellectual Property Office (PWC, 2009). In 2007, China investigated over 1000 bribery cases regarding the purchasing and distribution of drugs. The government has outlined that it will take aggressive steps to reduce bribery and corruption in the medical and pharmaceutical sectors. It plans to do this through the expansion of its online procurement system for hospitals (PWC, 2009). This system is used in 20 provinces and handles 85% of the purchasing of hospital drugs. It allows for monitoring, controlling costs, and improving transparency. However, drug companies still give incentives to those doctors that write more prescriptions for their drugs.

Doctors distribute most pharmaceuticals through hospitals in China, which depend on drug sales for nearly 80% of hospital revenue. This has led to some barriers for foreign pharmaceutical corporations as the hospitals tend to favour locally produced generic drugs, a market in which corruption exists (PWC, 2004); multinationals may be asked to provide incentives or bribes for hospital officials and doctors (PWC, 2006). In an attempt to combat this problem, the government has put regulations in place to encourage local development of retail pharmacies and has permitted foreign investment (Zhou, 2007). A key success factor would be for foreign companies to invest in and improve underdeveloped retail options for Chinese consumers, which not only can increase brand awareness but also increase drug usage. The government has gone further to segregate the entities responsible for the writing and filling of prescriptions, reducing the chances that doctors and hospitals will collude to write excessive prescriptions to be filled by the hospital's dispensaries. The growth of retail pharmacies outside the hospitals can help to reduce this corruption in the hospital system (PWC, 2009).

Foreign multinational corporations considering investment or acquisitions in China should be aware of the risk they take in acquiring Chinese companies that may carry out illegal practices or regulation violations. New owners can be held accountable for these allegations after purchasing or acquiring the company (PWC, 2009). Foreign companies looking to expand in China via mergers or acquisitions should put in place procedures and policies in their due diligence for detecting bribery and corruption (PWC, 2009).

#### **4.2.5 Tax incentives**

As of January 1, 2007, the Chinese government introduced the new Corporate Income Tax (CIT) law along with other regulations to act as tax incentives and schemes to encourage R&D growth and investment by foreign MNCs in China. Some of the key income tax incentives that are available to pharmaceutical companies to improve their overall tax efficiency in regards to Chinese operation include the High/New Technology Enterprise (HNTE) Incentive, the CIT super deduction, and the income tax exemption for the transfer of technology (PWC, 2009). The HNTE incentive is for those corporations that are qualified as HNTEs upon assessment by relevant authorities. In order to qualify, the company should have ownership of core proprietary IP rights, products/services falling under the scope of “encouraged” domains and R&D expenditures, income from relevant activities, and a minimum number of R&D/technical personnel meeting requirements (PWC, 2009). Companies may need to consider re-planning, restructuring, and managing their IP strategies differently in order to obtain HNTE status. Upon

approval, these HNTE corporations are entitled to a reduced corporate income tax of 15% as opposed to the standard CIT rate of 25%.

The Chinese government created the CIT super deduction to encourage pharmaceutical R&D activities. The super deduction gives companies an extra 50% expense deduction for eligible R&D costs endured. These R&D costs include expense from development of new technologies and products, salary expenses for R&D personnel, and the depreciation of instruments and equipment used for R&D purposes (PWC, 2009).

The income tax exemption for the transfer of technology, which is defined as the portion of the income derived from the transfer of technology during a tax year- not exceeding RMB \$5 million- can be exempt from CIT. The portion that exceeds RMB \$5 million is eligible for a 50% reduction in corporate income tax (PWC, 2009).

#### **4.2.6 Drug Pricing**

The NDRC has put in place policies to control the pricing of drugs, as this is in the main interest of the Chinese government who is the primary payer of healthcare costs. Nearly 2,400 types of drugs have a maximum retail price that is set. However, this accounts for only 20% of the available drug products and 60% of overall drug sales revenue in China (PWC, 2009). Drug pricing is still not under control because of the drug distribution system and hospital dependence on drug pricing for revenues. The drug distribution system in China is highly complex with many intermediaries that operate

between the drug manufacturers and the hospitals. This results in the cost of the drug inflating several times over as it moves along the chain. With government subsidies covering only 6% of hospital expenses, hospitals are dependent upon the revenue from drug sales. The government gives hospitals the right to mark up prices on drugs by 15% (PWC, 2009). Thus, the hospitals buy the most expensive drugs from those intermediaries that have inflated the price several times over, making the intermediaries and the hospitals wealthier while putting the consumer at a disadvantage.

Since 1996, the Chinese government has imposed 24 price cuts on over 2,000 pharmaceutical compounds and 300 traditional Chinese medicines. On average, each price cut across all categories was approximately 20%. From 2003 to 2006, the average profit percentage in the pharmaceutical industry decreased from 9.7% to 6.3% (Ziyan, 2007). These drug-pricing cuts have failed to have a significant impact because hospitals and retailers simply switch brands when prices drop too low. Drug manufacturers change packaging, or make subtle changes to the ingredients in drugs so that they can register these altered drugs as new products and avoid the prices restrictions (PWC, 2009). In 2007, Chinese pharmaceutical companies filed a complaint stating that the drug pricing cuts were not fair to the manufacturers as the hospitals are the culprits in setting high prices and raising drug costs. The NDRC is expected to introduce price-ceiling regulations for all prescription drugs at different stages in the supply chain, including ex-factory, wholesale, and retail, in an attempt to keep healthcare costs down and prevent irregularities and price manipulations through the distribution system (PWC, p.15, 2009). It is important for foreign and domestic pharmaceutical companies to incorporate drug



pricing into their corporate strategies. More importantly, a key success factor for foreign pharmaceutical corporations would be to find ways to manage the pricing controls and pressures within the Chinese pharmaceutical market.

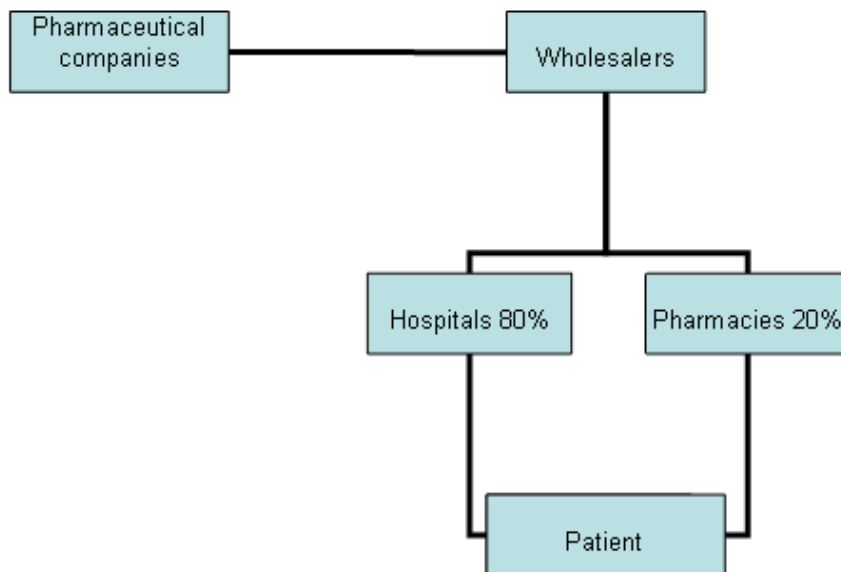
#### **4.2.7 Complex distribution channels**

Foreign pharmaceutical corporations also need to consider the obstacles involved in working with limited distribution systems. The state-owned traditional distribution system has hindered the creation of a national distribution system because it favours provincial and local networks (PWC, 2006). With the introduction of the “Good Supply Practice” (GSP) certification, the number of wholesalers within China has dropped from 16,000 down to 7,500 (Zhou, 2007). The state has also created pharmaceutical logistics and electronic trade systems in many Chinese cities. However, the industry continues to be 80% dominated by small distributing companies. Only 10 wholesalers throughout China have exceeded 1 billion RMB in revenue and even fewer have exceeded 5 billion RMB (Zhou, 2007). The market share for three of the largest distributors was only 17% in 2005 (Zhou, 2007), indicating an unhealthy competitive environment. These distributors will likely attempt to become product agents and try to earn profits through commission-based sales and discounts from manufacturers (Zhou, 2007). A thorough understanding by foreign multinational corporations of the complex distribution channels can act as a key success factor to doing business in China.

The distribution system in China is three tiered. Most pharmaceutical MNCs distribute their manufactured goods through national and provincial wholesalers, who

then sell the drugs to hospitals, clinics, and pharmacies. From there the products are sold to the consumers (PWC, 2009). Approximately 80% of the Western style drugs are distributed through the hospitals and clinics while the remaining 20% is distributed through the retail pharmacies. Leading distributors in China include CNPG, Shanghai Pharmaceutical Group, and Guangzhou Pharmaceutical Group, which are building regional networks and selling directly to hospitals and the retail sector (Brueckner, 2005). The retail sector is comprised of three different outlets for selling medical drugs and healthcare products. The first of these are chain drugstores; the second are the discount pharmacies (there are estimated to be over 1,000 of these discount pharmacies selling low price generic drugs); and the third are pharmacies that are designated for reimbursements (Brueckner, 2005).

**Figure 4:3** China's distribution channels - overview



*(Source: PWC, 2009)*

Drug manufacturers are demanding increased transparency in the distribution system to better track where their product is being sold (PWC 2006). In response, the Chinese government has allowed foreign third party logistic providers to enter and create joint ventures with local distributors (PWC, 2006). The government has also provided financing to encourage domestic distributors to build new logistical systems to help reduce the barriers to entry for foreign MNCs. The current operation modes of most distributors also need to be more in line with the requirements of modern distribution, which includes increased scale, automation, and tracking capabilities (Zhou, 2007). Increasing logistical management knowledge and improving market development and service capabilities is imperative (Zhou, 2007). Improving these distribution channels would directly affect drug pricing, which is hugely inflated by these distribution intermediaries (PWC, 2006). The lack of scale by distributors forces manufacturers to use multiple distribution firms to get their products to retailers. Without tracking systems in place by distributors, pharmaceutical manufacturers do not have full guarantees on the whereabouts of all their products. This makes it very difficult to initiate product recalls, and creates an enormous vulnerability for counterfeit products entering into distribution channels. Furthermore, having multiple distributors through the chain can negatively affect product quality, especially for cold products.

In 2004, Beijing Pharmaceutical Group Co. Ltd. built the first modern pharmaceutical logistics centre, using foreign bought advanced logistics equipment and technologies (PWC, 2009). However, foreign firms dominate in certain areas. For instance, the global giant, World Courier Inc., launched a cold chain logistics network in

China, and provided pharmaceuticals to 36 major cities with access to temperature-controlled shipments (PWC, 2009).

#### **4.2.8 Strategic regions in China**

With over 9.5 billion square kilometres, China does not have uniform population dispersal, wealth, and economic power. There is a decreasing GDP per capita per province from the east to the west of China, and foreign MNCs are focusing their business on the wealthier coastal provinces (Zedtwitz, 2005). The eastern provinces have more people that are able to afford expensive and modern drugs because they have higher incomes. In addition to this, the eastern provinces have better education and higher disease awareness. With different market characteristics, foreign MNCs investing in China need to adjust their market development strategies to fit the demands and opportunities of targeted Chinese provinces (Zedtwitz, 2005). Having a clear understanding of the market and regulatory landscape can be a key success factor for foreign multinationals investing in the country. Surveys have found that GDP growth per capita is nearly twice as high in certain eastern provinces than those in the west. Strategically important eastern provinces include major cities such as Beijing, Shanghai, Tianjin, Guangdong, and the comparatively wealthy provinces of Shandong, Zhejiang, Jiangsu, Guangzhou, and Fujian (Zedtwitz, 2005). The city of Chongqing is of strategic importance to drug manufacturers because it is one of the largest cities with a population of over 30 million. This makes Chongqing ideal for distributions and clinical trials. These provinces and cities listed above represent approximately 75% of the prescription business in China.

Pharmaceutical companies also need to consider the different ways of conducting business in these varying regions. The strategic wealthier provinces and cities need to be managed at a higher professional level, including more transparency in the implementation of drugs, hospital bidding processes, and availability of data for patients and diseases (Zedtwitz, 2005). However, the central and western regions require more relationship-driven business, paying close attention to price sensitivity. Pharmaceuticals tend to introduce more innovative, newer drugs in the eastern regions and to distribute more mature and less expensive drugs in the developing central and western markets of China (Zedtwitz, 2005).

#### **4.2.9 Financial reporting**

Pharmaceutical MNCs establishing operations or making mergers and acquisition need to be aware of China's financial reporting methods. Companies investing in Chinese pharmaceutical companies will find that many of these firms have not been using comprehensive accounting rules such as the Generally Accepted Accounting Principles (GAAP) used in the U.S., or the International Financial Reporting Standards (IFRS) (PWC, 2009). Public Chinese companies were required to adopt Chinese Accounting Standards (CAS) as of January 1, 2007; however, this was not required of private companies. As a result, many of the private companies in China prepare their accounting records on a cash basis resulting in many unrecorded or undisclosed transactions. PWC (2009) recommends that foreign MNCs investing in companies in China's pharmaceutical market put in place ongoing monitoring of performance and accounting

methods to ensure proper operating and financial decisions. Investors should also consider their exit strategies through either selling the company or making initial public offerings. Investors need to ensure that the company's financial statements and accounting methods are in alignment with those of the exchange and regulatory bodies (PWC, 2009).

### **4.3 Bargaining power of buyers**

China has effectively two markets, urban and rural. The bargaining power of buyers from both these markets for drugs remains relatively low (PWC, 2004). Although personal disposable income and awareness for medicine and drugs is increasing nationally, it has not given the consumers the ability to control prices. Demographic influence on the use of drugs has been the result of mass movement of people from the rural countryside into the major cities of China (Bao, 2000). The urban population has been steadily increasing at about 4.5% per year. According to Qi Bao (2000), urbanization generates lifestyles more conducive to pharmaceutical usage. It also generates awareness and enables greater access to drugs through retail pharmacies (Bao, 2000). Foreign companies attempting to enter China should consider that the rural population accounts for approximately 70% of the total population; however, they only consume 20% of the pharmaceutical products sold (Bao, 2000). Though national disposable income may be increasing, rural disposable incomes remain low, along with the consumption of modern drugs (PWC, 2004).

Even though these income disparities exist, the overall demand for drugs is growing rapidly, particularly for those drugs that are used in certain therapeutic categories (PWC, 2004). As China becomes a more developed nation, its epidemiological profile is changing; people are eating more and exercising less. This has led to an increase in the incidence of cardiovascular disease, which is now the most frequent cause of death in China (PWC, 2004). The over 60 population within China also serves as a tremendous opportunity for pharmaceutical companies. This group accounts for 10% of the total population, but is expected to grow to 30% within five decades (Bao, 2000).

#### **4.4 Threat of substitutes**

Current substitutes to foreign pharmaceutical products include generic drugs, generic over the counter (OTC) drugs, and traditional Chinese medicine. These substitutes create a high threat for MNCs. In 2007, traditional Chinese medicine (TCM) generated sales revenue of approximately US \$21 billion in China. These traditional Chinese medicines represent about two-thirds of drug sales in China (PWC, 2009). This widespread use TCM poses as a threat and a significant competition to the conventional drug industry. It is forecasted that TCM sales will reach US \$28 billion by 2010 (PWC, 2009). The traditional medicine market is quite fragmented with 10 of the major producers accounting for only 14% of the market. Many of the larger producers are state owned (PWC, 2009). The TCM market faces numerous challenges that can act as an opportunity for pharmaceutical MNCs. TCM producers are struggling with inconsistencies in the manufacturing process of their products. Although the Chinese State Food and Drug Administration (SFDA) has enforced the Good Manufacturing

Practice (GMP) on these producers, there remains widespread corruption that has undermined the effectiveness of the certification and the products being produced (PWC, 2009). Up until January 2009, only one third or 300 out of the 1100 traditional Chinese medicine manufacturers have been able to comply with the new GMP guidelines. The reason for such low numbers is that the manufacturers cannot acquire the necessary capital needed to improve manufacturing controls, productions methods, and be able to follow the stringent certification process (PWC, 2009).

There is an opportunity for Western drugs to erode the TCM market. People are becoming increasingly aware that Western medicines are more effective for treating infectious diseases and illnesses (PWC, 2004). A study performed in 2007 found that Chinese consumers overall tend to prefer the traditional Chinese medicines. However, Western drugs were sought by these consumers when they were certain of what their illnesses were or wanted quick alleviation from their symptoms (PWC, 2009). Those pharmaceutical companies that will benefit from this trend will have drugs and treatments in place to help with chronic diseases (PWC, 2004).

China's over the counter (OTC) market is approximately valued at US \$7.45 billion as of 2007. This accounts for 22% of China's pharmaceutical market, while 64% of the market is for generic drugs and the remaining 14% is for patented drugs. This excludes traditional Chinese medicines (PWC, 2009). PWC (2009) estimates that the market for over-the-counter drugs will increase to US \$21.49 billion by 2012 as Chinese patients choose OTC drugs at pharmacies instead of the prescription drugs administered



at hospitals. In 2005, the Chinese government approved the use of the Internet for purchasing drugs within China. This approval has helped drive growth in the OTC market even though traditional sales channels, such as pharmacies, still dominate (PWC, 2009). The people prefer to purchase drugs from pharmacies where they can see the product and discuss the product with pharmacists. However, Internet purchasing of drugs has added to the problem of counterfeit trafficking thereby making it easy for fake medicines to enter the market.

Growth in the OTC market has not translated into profit for all the manufacturers. The rising number of competitors is forcing manufacturers to compete over pricing, thereby reducing their profit margins. This in turn has hurt the smaller producers as they are left with little profit to reinvest into new capital needed for growth. Larger manufacturers that are capable of leveraging their scale have been less affected and are continuing the trend of expansion through mergers and acquisitions (PWC, 2009).

Imported drugs and OTC drugs produced by MNCs now have the same status as locally made OTC drugs in terms of registration, reimbursement, and pricing (PWC, 2006). However, these foreign OTC drugs retail for three to four times more than locally produced drugs and thus narrow the consumer market (PWC, 2006). The OTC products may reduce MNC revenues in China in the short term; however, they serve to build brand awareness.

## **4.5 Bargaining power of suppliers**

The bargaining power for the chemical producers and raw materials producers is increasing from low levels throughout China as the need for quality products for manufacturing is growing. With China's government enforcing the GMP regulations, many of the smaller wholesalers for chemical products and materials have been shutdown due to being unqualified and lacking necessary capital. Larger corporations that have economies of scale are now becoming capable of setting prices for manufacturers. A key success factor for foreign pharmaceutical corporations would be a thorough understanding of the supply network and competencies for sourcing active ingredients. However, raw materials suppliers are not the only ones gaining power. The market for outsourcing to China is growing and contract research organizations (CROs) and contract manufacturing organizations (CMOs) are becoming the new suppliers for foreign pharmaceutical MNCs looking to outsource work to achieve lower costs and increased profits. The need to expand into China remains the objective for many pharmaceutical MNCs but, during hard economic times, more MNCs are looking to outsource instead of starting their own operations.

Western pharmaceutical companies face increased research and development costs, shorter cost recovery times, and decreasing drug applications and approvals (PWC, 2009). Western pharmaceuticals need to find solutions for securing long-term profitability. China's strong economy has helped the country become a strong R&D outsourcing destination for foreign pharmaceutical MNCs (PWC, 2006). Pharmaceutical MNCs are looking to China's strong R&D market to help reduce their products' time and

cost to market. This has led to an increase in the number of contract research organizations (CROs) in China. These CROs cost significantly less than the Western based CROs; at the same time, these Chinese CROs have shown their ability to meet Western guidelines and standards for drug quality and safety (PWC, 2009). The Chinese CROs are not limited to chemistry-based research; they are now moving into genomics and gene therapy, while simultaneously offering services such as Good Laboratory Practice (GLP) level preclinical outsourcing and full scale clinical trials (PWC, 2009).

Western pharmaceutical MNC suppliers for clinical research and R&D are using the Chinese CROs increasingly. A number of factors are increasing the bargaining power of these CROs, such as their cost, timesavings, large talent pool, large patient pool, animal resources for animal testing, and a tremendous number of affluent Chinese people in need of diabetic, cancer, and cardiovascular drug development. China's low cost base offers significant savings in labour and laboratory set-up costs. China also offers strong government incentive programs such as tax holidays, tax cuts, and value added tax exemptions (PWC, 2009). China offers a large pool of talent in the sciences, including Western-educated Chinese returning to work in China. In 2006, the reported number of Chinese graduates in the field of chemistry and pharmaceuticals reached over 39,000 and 22,000 respectively. The patient pool in the country is composed of a large number of people who are unable to afford treatment and are willing to undergo testing, thereby enabling easy and cost-effective patient recruitment (PWC, 2009). Animal testing conducted in China helps Western pharmaceutical MNCs save money on transportation

and quarantine expenses. In addition to this, most of the animals needed for testing are normally imported from China.

With several hundred CROs currently operating in China, the CRO market is highly fragmented. There is an increasing number of domestic CROs that are emerging as one-stop service providers that have the capability of offering numerous services along the value chain from drug discovery to registration and marketing (PWC, 2009). The increasing competency of these organizations raises their bargaining power over pharmaceutical corporations both domestic and foreign.

Bargaining power for the contract research organizations is growing steadily along with the bargaining power for contract manufacturing organizations (CMOs). CMOs in China enable the large pharmaceutical MNCs to protect their bottom line—profit margin. These Chinese CMOs provide significant cost advantages for foreign pharmaceuticals who are seeking ways to reduce cost, have growth potential, provide flexible capacity, and improve time to market (PWC, 2009). China is ranked the best country for pharmaceutical outsourcing over other Asian territories including India, Singapore, Japan, Korea, Taiwan, and Malaysia. In 2007, the export value of China's CMOs was valued at US \$453 million with an annual growth rate of 23% (PWC, 2009). China's CMOs adhere to the Chinese GMP regulations that were based on concepts similar to the US Good Manufacturing Practices. With an increased commitment to international standards, Chinese CMOs are securing more orders that are international

from large pharmaceutical MNCs, such as AstraZeneca that spends US \$9 billion a year on purchasing from CMOs.

#### **4.6 Rivalry within the environment**

The first multinational companies to enter China in the mid 1980s established manufacturing, sales, and marketing branches (Brueckner, 2005). These companies came from Japan, United States, and Europe, and either formed joint ventures with Chinese companies (e.g. Xian-Janssen) or established wholly owned subsidiaries (e.g. Roche). The Chinese pharmaceutical environment is becoming increasingly competitive as smaller domestic firms are exiting the market due to their inability to comply with GMP regulations. According to Brueckner (2005), the true challenge of MNCs is not how to become profitable in China, but how to sustain a strong market position. He argues that China's growth and competition requires every market leader to continually reinvest their profits to maintain market share with the high level of rivalry that exists.

Chinese drug producers have significant market offerings. These producers have an enormous pool of workers, provide flexible working conditions, and provide an average hourly pay of US \$0.50. These wages are lower than Mexico's US \$2.30 and India's US \$0.80 (Festel, et al., 2005). In addition, Chinese producers have access to raw and processed materials that meet global quality standards and these materials cost 20% to 40% less than comparable products sold on established markets.

Competition in the domestic OTC drug market is expected to increase as more MNCs and global players attempt to break into the OTC market. Positioned in this market are a number of MNCs, including large corporations such as GlaxoSmithKline,

Johnson & Johnson, and Novartis (Brueckner, 2005). Both domestic and foreign OTC manufacturers are aggressively marketing their goods and increasing brand awareness in order for consumers to distinguish their products (PWC, 2009). In order for foreign or domestic OTC manufacturers to make their products stand out from one another there needs to be an increase in product quality, packaging design improvements, and increased access to better distribution channels.

Domestic Chinese pharmaceutical companies are spending more money on improving their research and development sectors in an attempt to move up the value chain. Zhejiang Huahai Pharmaceutical Co. Ltd. achieved a breakthrough in 2007 by getting US FDA approval for its Abbreviated New Drug Application (ANDA) for nevirapine tablets. This marked the first time that a Chinese pharmaceutical company had received US FDA certification for a finished (formulated) drug (PWC, 2009).

#### **4.7 Summary**

Pharmaceutical corporations wanting to expand into China should consider the forces analyzed in this chapter. These forces include the threat of entry (high but dropping), bargaining power of buyers (low), threat of substitutes (high), bargaining power of suppliers (low but rising), and competitive rivalry (high). Some of the key success factors to establish business in China's pharmaceutical market would be to utilize the complex distribution channels effectively to reach the consumer, sourcing of active ingredients, and production/selling of generic and proprietary drugs. Other KSFs would be to find ways to protect intellectual property from infringements; understanding pricing controls and pressures by the government, hospitals and consumers; to improve the

underdeveloped retail options; and to gain a clear understanding of the market and regulatory landscape.

## **5: Recommendations**

Multi-national corporations interested in investing in China's pharmaceutical industry will encounter many differences compared to establishing a business in North America. This chapter explores the key success factors for doing business in China. In particular, it will examine organizational behaviour and competencies. Chronic disease prevention is also discussed.

### **5.1 Key success factors for doing business in China**

Pharmaceutical multinationals looking to invest into China via mergers, acquisitions, or joint ventures should consider the key success factors (KSFs) of doing business in China as outlined by Abramson and Ai (1999). These authors identified four key success factors. The first and most important is building a guanxi relationship based on shared goals and trust. The guanxi relationship avoids transactional relationships based on competition for positive outcomes. The second KSF is having the experience to understand and deal with uncertainties that would arise in Chinese business. The third KSF is the informal coordinating of interaction patterns with the relevant Chinese so that information is shared easily and informally. The fourth most important KSF would be local investment in China through value chain activity transfer (Abramson & Ai, 1999).



The building of guanxi, or good connections, can lead to sustained and competitive advantages while working in China. However, guanxi has to be valuable, rare, and imperfectly imitable before it can lead to a sustainable advantage (Tsang, 1998). Even if an advantage is gained, sustaining guanxi can be difficult because it can be easily disrupted by a simple conflict. A study performed by Abramson and Ai found Chinese managers mentioning that having guanxi relationships was a source of success for doing business in China. However, developing shared goals implies that both sides respond to each other's needs and that both sides develop a platform of interdependent goals that can only be achieved by working together (Abramson & Ai, 1999).

Experience and continuous awareness of and adaption to the changing Chinese business environment are important for pharmaceutical MNCs to be aware of while conducting business in China. Experience in other international markets has value; a more general international experience and the knowledge gained from them can be applied to doing business in China. Abramson & Ai (1999) found that companies that have a stronger perception of uncertainty and a greater need to vary marketing strategies as a response to environmental change had higher performance and sales in China.

Foreign MNCs managers should reconsider how they rely upon the expertise from their local Chinese experts for ways of conducting business. According to Abramson & Ai (1999), the usage of formal group processes, meetings, problem solving groups, policies, procedures, and schedules may not be an effective means for gathering information. There is Chinese reluctance, which is based on Confucian hierarchal values,

to challenge the thoughts and opinions of those higher up the chain of command. These local Chinese experts are more comfortable and willing to provide information on an informal basis with those whom they have built a more trusting relationship.

Local investment by transferring through value chain activity may produce more customer value by adapting products to local Chinese conditions (Abramson & Ai, 1999). Research conducted by Abramson and Ai (1999) found that companies transferring R&D, sourcing, and manufacturing may not obtain significant advantages by investing locally; however, Chinese managers interviewed emphasized the importance of local investment and the need for foreign companies to transfer value chain activities. The research suggested that local investment is needed to close the gap between the companies and the customers by providing locally oriented and available marketing, sales, and service.

These key success factors are essential for successful operations in the Chinese pharmaceutical market. This is addition to the ones identified in Chapter 4. These include utilizing the complex distribution channels to reach the consumers, sourcing of active ingredients, production and selling of generic and proprietary drugs, finding ways to protect themselves from intellectual property infringements and pricing controls or pressures, improving the underdeveloped retail options, and gaining a clear understanding of the market and regulatory landscape.

### **5.1.1 Organizational Behaviour and Competencies**

Pharmaceutical corporations expanding into China should consider external environmental conditions along with their internal capabilities. A few key internal factors for success in China include managerial persistence, financial resources, and permanent learning and adaptation (Yau, 2000). Managerial persistence in China's pharmaceutical market can create a competitive advantage. According to Bruche (1996), this advantage can only be created if local managers in China are backed up by an understanding headquarters that works on the assumption that local conditions are better understood by local managers. Management can achieve persistence via a selection of expatriate managers that are capable of taking on hardships associated with the positions over an extended period. In addition, companies should have an effective means for rotating expatriates to ensure that persistence based on growing know how is maintained (Yau, 2000). Companies should have incentives and policies in place to help nurture a core of open minded, capable, and loyal Chinese managers in order to maintain a competitive advantage in the pharmaceutical market (Yau, 2000). Investing in foreign countries also requires a high degree of adaptability. Companies need to be able to unlearn routines that were created to meet environmental situations that are now outdated (Yau, 2000). Research conducted by Bruche (1996) found that companies might be more successful by having a soft organizational structure that is able to cope with emerging new environments and make quick changes without disrupting operations.

Companies already established in China's pharmaceutical market face tremendous pressures from followers that are now entering. In order to maintain a competitive

advantage early movers into China need to protect their assets and use their assets to create advantage. Managerial personnel are one of the key internal assets these companies have and their knowledge and proprietary information must be retained within the company. Leveraging assets to create more products or deepening the outreach to more customers through established logistics can help reduce the threat of competitors (Yau, 2000).

Those pharmaceuticals that are followers into China's market need to take on a more offensive strategic posture. They can try through obtaining managers already trained by the first movers to help establish their new company. They can also try to exploit weaknesses of early movers such as lack of adaptability or try to penetrate less competitive areas either product wise or region wise (Yau, 2000). The most important consideration stated by Bruche (1996) for new comers into a market would be product positioning and demonstrating the benefits and effectiveness of their products over existing pharmaceutical products already established in the market.

## **5.2 Chronic disease prevention**

Many countries throughout the world are dealing with the rising epidemic of chronic diseases. Implementation of a stepwise framework for preventing chronic disease offers a practical approach for ministries of health in balancing diverse needs and priorities while conducting evidence based interventions (Beaglehole et al., 2005). The framework focuses on a public health approach to chronic disease prevention. According to Beaglehole et al. (2005), the first step requires the national level of government to

provide the basic framework for chronic disease prevention and control so that actions at all levels by all stakeholders are mutually supportive. Next, intersectoral action is needed at all stages of policymaking and implementation because major determinants of chronic disease lie outside the health sector. Policies and plans must focus on the common risk factors and cut across specific diseases, while population wide and individual interventions need to be combined (Beaglehole et al., 2005). For those countries that do not have the resources to immediately do everything implied by the overall policy, Beaglehole et al. (2005), recommends that activities that are feasible and likely to have greatest impact should be selected first for implementation. The programs needed for implementation should be categorized as interventions that are core, expanded, or optimum – based on availability of resources and political and community support (Leeder et al., 2007). Lastly, locally relevant and explicit milestones should be set for each step at each level of intervention with the main focus on reducing health inequalities (Beaglehole et al., 2005).

In China's case, prevention is the best and most important strategy to be implementing. Reduction in behavioural risk factors alone could generate substantial health benefits (Koplan et al., 2008). China needs to prioritize prevention strategies such as tobacco reduction, awareness of exposure to second hand smoke, education on the dangers of high dietary intakes of salt and fat, and promotion of increased physical activity. These prevention strategies cannot be isolated from other sectors such as employment, income maintenance, social welfare, housing, education, and mass media (Koplan et al., 2008). According to the research conducted by Koplan et al. (2008),

undertaking prevention activities in China will require strengthening of the existing health prevention and disease control systems. Institutional reforms will have to be realigned to establish strategies for controlling chronic diseases. Social action will be one of the major strategies for reducing non-communicable diseases. Koplan et al. (2008), argues that reducing non-communicable diseases is the key intervention for reduction of poverty, and the reduction of social inequalities and inequities in health. They believe that social actions need to include mobilisation of allied sectors, including transport, education, fiscal policy, regulatory action, and urban design. Transport will address the growth in automobile use and less friendly environments for cycling and pedestrians; education will enhance comprehensive school-based health education and promotion; fiscal policy will increase tobacco taxes; regulatory action will ensure food safety and content, and prohibit smoking in public places; and urban design can provide parks, green spaces and paths for bicycles and walkers.

China's Ministry of Health should develop more broad capabilities and skills. It should create a national campaign for the reduction of salt intake, including dietary guidelines and food labelling (Koplan et al., 2008). People should have blood pressure monitored and measured during healthcare encounters and in non-traditional areas such as shopping areas and recreational sites. Some of China's successful projects included the use of cancer registries, which allowed the government to focus on areas of high prevalence. Cancer registries led to the institution of the Program of Cancer Prevention and Control in China. Other community based intervention programs focused on diabetes and hypertension control have helped reduce the number of stroke victims (Burton et al.,

2005). The Ministry of Health has established more than 32 community based sites that diagnose, train, and help in developing intervention programs for combating cardiovascular disease, hypertension, mental health, cancer, and other chronic diseases (Burton et al., 2005).

Intervention programs at schools can also play a large part in the prevention of chronic diseases. Chang et al. (2004) conducted a pilot project in the Zhejiang Province of China to create a health-promoting school program aimed at improving the nutrition and health status of students, school personnel, and parents. Their research found that a coordinated intervention of nutritional education in the classroom, changes to school policies, school environment, school-based health and nutrition services, and active outreach to family and community members resulted in an a significant improvement in nutrition-related attitudes, knowledge gains, and hygienic habits (Chang et al., (2004). However, Chang et al. (2004) found that schools alone could not meet the need for increased nutrition, information, and education. These schools, they believed, needed help from institutions such as the health sector, medical corporations, and pharmaceutical corporations for funding and support. A vast majority of the activities undertaken in this pilot project were extracurricular. Although they were valuable and effective and can have dramatic effects on China's health care system, establishing nutrition and health education on a regular basis in schools remains an important objective (Chang et al., 2004).

On January 21, 2009, the Ministry of Health of China outlined five areas of reform for the healthcare system in the coming years:

- Expansion of basic medical insurance programs to enrol more than 90% of urban and rural residents
- Establishing a national drug system for essential drug selection, production, supply, clinical applications, and medical insurance reimbursements
- Building a competent primary medical care service infrastructure in rural township centres, village clinics and urban community healthcare centres
- Enhancing equal access to basic public health services by urban and rural residents
- Moving public hospital reform forward: this includes reform for the funding of hospitals, which is now predominantly based on sales of drugs and diagnostic examination fees (PWC, 2009)

### **5.3 Summary**

Investing in China's pharmaceutical industry through mergers, acquisitions, or joint ventures requires MNCs to consider key success factors (KSFs) of doing business in China. These KSFs include building a guanxi relationship based on shared goals, avoiding transactional relationships based on competition, having the experience to understand and deal with uncertainties, coordinating interaction patterns for information sharing, and local investment in China through value chain activity transfers.

Pharmaceutical corporations expanding into China should consider external environmental conditions along with their internal capabilities. A few key internal factors



for success in China include managerial persistence, financial resources, and permanent learning and adaptation.

Implementation of a stepwise framework for preventing chronic diseases offers a practical approach for ministries of health in balancing diverse needs and priorities while conducting evidence-based interventions. The framework focuses on a public health approach to chronic disease prevention.

Prevention is an important strategy that the Chinese government needs to focus on in order to reduce the rising number of people with chronic diseases. Reduction in behavioural risk factors could generate substantial health benefits. Creating health-promoting school programs aimed at improving the nutrition and health status of students, school personnel, and parents is imperative for the reduction of chronic diseases. Coordinated intervention of nutritional education in the classroom, active outreach to family and community members, and changes to school policies and services can significantly improve nutritional-related attitudes, knowledge gains, and hygienic habits in China.

## **6: Conclusion**

Chronic diseases can also be referred to as non-communicable diseases to differentiate it from communicable diseases that are infectious. In treating chronic diseases, a national economy is impacted by the direct costs of medical care, the indirect costs through loss of human resources and productivity, and the intangible costs through psychological ailment. Together, these different costs lead to reduced earning potential among families and reduced national gross domestic product. This places a particular strain on developing countries that must decide between increasing economic wealth or alleviating social, economic, and health deficiencies.

In China, urbanization, an ageing population, and an improved standard of living have resulted in an increase in chronic diseases. Physical activity has decreased, while the diet has gravitated towards a Westernized high fat, low nutrition diet. Urbanized areas with higher incomes have been most noticeably afflicted with hypertension, obesity, diabetes, and tobacco addictions. However, rural areas have also seen an increase in chronic diseases as their diets and lifestyles are changing as well.

Unfortunately, China's health care system is decentralized and fragmented. It is not well suited to making a rapid coordinated response to public health emergencies. In addition to this, there is a disproportionate percentage of government spending on health

care compared to the vast proliferation of chronic diseases. Many residents lack health insurance and cannot afford medical care. Treatments for chronic diseases can cost up to half the annual salary of urban residents or three times the annual income of rural residents. This is partially due to the commercial relationship between pharmaceutical companies and medical drug distributors, such as hospitals. The pursuit of wealth by these companies and the distributors drives up the cost of pharmaceuticals for patients to the point where it is unattainable. This makes China ill equipped to detect and control epidemics as diseased individuals often go undiagnosed and untreated.

The inadequacies of the health care system in China lend many opportunities for pharmaceutical multinational corporations. Threat of entry is high, but dropping; bargaining power of buyers is low; threat of substitutes is high; bargaining power of suppliers is low, but rising; and competitive rivalry is high. Key success factors are to use the complex distribution system to reach the consumer, the sourcing of active ingredients, and the production and selling of generic and proprietary drugs. Pharmaceutical corporations trying to establish operations in China should also consider ways to protect intellectual property from infringement, understand pricing controls and pressures, improve the underdeveloped retail options, and gain an understanding of the market and regulatory landscape.

Future recommendations for China are to implement a stepwise framework for preventing chronic disease. Reduction in behavioural risk factors is crucial to generating substantial health benefits. Additionally, school programs that educate students, staff,

and parents on how to improve their nutrition and health can create awareness and long-term benefits towards the reduction of future chronic diseases. The health sector, medical corporations, and pharmaceutical corporations can also play a large part in terms of funding and support for these educational programs.

The rise of chronic diseases is not isolated to China; India and other developing countries are on pace of reaching epidemic levels. The number of people in need of healthcare, education regarding diet and healthiness, and pharmaceutical drugs is increasing. Despite the challenges, foreign MNC's pharmaceutical prospects for growth and profitability are immense. China and now India have the capability of becoming the world's largest pharmaceutical markets, boasting low development and manufacturing costs while offering increased opportunities for R&D and clinical trials.

## References

- 2008 report on china's pharmaceutical industry*. Market Report. Retrieved June 4, 2009 from [www.marketavenue.cn](http://www.marketavenue.cn)
- Abegunde, D. et al., (2007). The burden and costs of chronic diseases in low-income and middle-income countries. *Lancet*, vol. 370:1929-38. Retrieved June 7, 2009 from [www.thelancet.com](http://www.thelancet.com)
- Abramson, N. & Ai, J. (1999). Canadian companies doing business in China: Key success factors. *Management International Review*, vol.39
- Bao, Q. (2000). Pharmaceuticals. *The China Business Review*. Retrieved March 1, 2009 from SFU Business Source Complete, <http://cufts2.lib.sfu.ca/CRDB/BVAS/resource/5781>
- Beaglehole, R. et al., (2005). Preventing chronic diseases: taking stepwise action. *Lancet*, vol. 366, 1667 – 1671. Retrieved May 28, 2009 from [www.thelancet.com](http://www.thelancet.com)
- Birt, M. (2006). Chronic neglect – meet the developing world's new health emergency: the rich world's disease. *Foreign Policy* (ISSN 0015-7228), September/October 2006 vol. 156
- Campbell, T. et al., (2006). *The china study*. Benbella Books, Inc., Dallas Texas
- Chang, X.S et al., (2004). Creating health-promoting schools in China with a focus on nutrition. *Health Promotion International*, vol. 19, No.4: 409-418, Oxford University Press
- Chen, Z. et al., (2005). Cohort profile: The kadoorie study of chronic disease in China (KSCDC). *International Journal of Epidemiology*, vol. 34:1243-1249, Oxford University Press
- China's 2002 Pharmaceutical Market*, (2003). APBN, vol. 7, No. 12. Retrieved March 2, 2009 from SFU Business Source Complete, <http://cufts2.lib.sfu.ca/CRDB/BVAS/resource/5781>
- Dongo, Fu., (2003). Implementation and quantitative evaluation of chronic disease self-management programme in Shanghai, China: randomized controlled trial. *Bulletin of the World Health Organization*, vol. 81 (3), p174-182
- Du, S. et al., (2002). A new stage of the nutrition in China. *Public Health Nutrition*, 5(1a) 169-174
- Festel et al., (2005). *The chemicals and pharmaceutical industry in China*. Springer, New York

- Ge, K. et al., (2007). Is China facing an obesity epidemic and the consequences? The trends in obesity and chronic disease in China. *International Journal of Obesity*, vol. 31 177-188. Nature Publishing Group
- Gopalan, C. & Shetty, P. (1998). *Diet, nutrition and chronic disease: an Asian perspective*. Smith-Gordon and Company Limited, Great Britain
- Hiller, S. & Shen, J. (1996). Healthcare systems in transition: people's republic of China part 1: an overview of China's healthcare system. *Journal of Public Health Medicine*, vol.18, No. 3, 258-265, Oxford University Press
- Hitt, M. & Colline, J. (2007). Business ethics, strategic decision making, and firm performance. *Business Horizons*, vol. 50 353-357. Retrieved June 5, 2009 from [www.sciencedirect.com](http://www.sciencedirect.com)
- Hsiao, W. (1995). The Chinese health care system: lessons for other nations. *Soc. Sci. Med*, vol. 41, No 8, 1047-1055, Elsevier Science Ltd
- Hu, F. (2008). *Obesity epidemiology*. Oxford University Press, Oxford New York
- Hu, S. & Liu, R. (2003). Towards establishing of a health protection system in rural China. Beijing Asian Development Bank
- Investment Hotspots: China OTC market*, (2004). APBN, vol. 8, No. 24. Retrieved March 2, 2009 from SFU Business Source Complete, <http://cufts2.lib.sfu.ca/CRDB/BVAS/resource/5781>
- Jamison, DT., & Prescott, N. (1984). *China: the health sector*. DC: World Bank
- Koplan, J. et al., (2008). Emergence of chronic non-communicable disease in China. *Lancet*, vol. 372, p1697-1705, Retrieved June 2, 2009 from [www.thelancet.com](http://www.thelancet.com)
- Kwo, D. (2003). China's 2002 pharmaceutical market. APBN, vol. 7, No. 12. Retrieved March 1, 2009 from SFU Business Source Complete, <http://cufts2.lib.sfu.ca/CRDB/BVAS/resource/5781>
- Lam, M. (2009). Beyond credibility of doing business in China: strategies for improving corporate citizenship of foreign multinational enterprises in China. *Journal of Business Ethics*. Springer, vol. 87:137-146
- Leeder, S. et al., (2007). Prevention of chronic diseases: a call to action. *Lancet*, vol. 370, 2152-2157, Retrieved May 25, 2009 from [www.thelancet.com](http://www.thelancet.com)
- Liang, K. (2006). Good manufacturing practices in China. *Pharmaceutical Technology Asia*. Retrieved March 3, 2009 from SFU Business Source Complete, <http://cufts2.lib.sfu.ca/CRDB/BVAS/resource/5781>
- Liu, Y. (2004). China's public health-care system: facing the challenges. *Bulletin of the World Health Organization*, vol. 82 (7)

- Liu, Y. (2008). A healthier china? China Business Review. Retrieved June 4, 2009 from [www.chinabusinessreview.com](http://www.chinabusinessreview.com)
- Liu, Y. et al., (1998). Economic transition and health transition: comparing China and Russia. Health Policy vol. 44 103-122. Elsevier Science Ltd.
- Meng, Q. et al., (2005). The impact of China's retail drug price control policy on hospital expenditures: a case study in two Shandong hospitals. Oxford University Press
- Mohindra, K.S. (2007). Healthy public policy in poor countries: tackling macro-economic policies. Health Promotion International, Oxford University Press
- Pfizer Inc. (2009). Retrieved: June 17, 2009, from <http://www.chantix.com/>
- Pharmaceuticals in China – industry profile*, (2004). Datamonitor. Retrieved May 21, 2009 from SFU Business Source Complete, <http://cufts2.lib.sfu.ca/CRDB/BVAS/resource/5781>
- Popkin, B. et al., (2001). Trends in diet, nutritional status, and diet-related non-communicable diseases in China and India: the economic costs of the nutrition transition. Nutrition Reviews, vol. 59, No. 12, 379-390 December issue
- Popkin, B. et al., (2001b). The nutrition transition and obesity in the developing world. The Journal of Nutrition 131:871S-873S. Retrieved June 6, 2009 from [jn.nutrition.org](http://jn.nutrition.org)
- Popkin, B. & Larsen, G. (2004). The nutrition transition: worldwide obesity dynamics and their determinants. International Journal of Obesity, vol. 28, Nature Publishing Group
- Porter, M. (1979). How competitive forces shape strategy. Harvard Business Review, 137-145. Reprint 79208
- PriceWaterhouseCoopers. (2004). China: Prescription for growth. Retrieved March 2, 2009 from [www.pwc.com/extweb/pwcpubs/nsf/docid/2992C71A5CA9BE1285256F5000662664](http://www.pwc.com/extweb/pwcpubs/nsf/docid/2992C71A5CA9BE1285256F5000662664) -
- PriceWaterhouseCoopers. (2006). Investing in China's pharmaceutical industry. Retrieved March 5, 2009 from [http://www.pwc.com/Extweb/pwcpubs/nsf/docid/4D287C2BE1191F4A80257131004D6464/\\$File/china-pharma-paper-mar2006.pdf](http://www.pwc.com/Extweb/pwcpubs/nsf/docid/4D287C2BE1191F4A80257131004D6464/$File/china-pharma-paper-mar2006.pdf)
- PriceWaterhouseCoopers. (2009). Investing in China's pharmaceutical industry – 2<sup>nd</sup> edition. Retrieved May 28, 2009 from [http://www.pwchk.com/home/eng/invest\\_cn\\_pharma\\_apr2009.html](http://www.pwchk.com/home/eng/invest_cn_pharma_apr2009.html)
- Pronk, N. et al., (1999). Relationship between modifiable health risk and short-term health care charges. Journal of American Medical Association, 282(23): 2235-2239
- Suhrcke, M. et al., (2006). The chemical and pharmaceutical industry in China *opportunities and threats for foreign companies*. Strauss Offsetdruck Printing: Springer-Verlag, Berlin

- Sturm, R. (2002). The effects of obesity, smoking, and drinking on medical problems and costs'. *Health Affairs*, 21: 245-253
- Tang, J. & Hu, Y. (2005). Drugs for preventing cardiovascular disease in China. *BMJ*, vol 330, 610-611. Retrieved June 7, 2009 from <http://bmj.com/cgi/content/full/330/7492/610>
- Tremblay, J. (2007). China strides toward global pharma role. *Chemical & Engineers News*, vol. 85, Number 11, pp 15-19. Retrieved March 4, 2009 from <http://pubs.acs.org/cen/coverstory/85/8511cover.html>
- Tsang, W.K. (1998). Can guanxi be a source of sustained competitive advantage for doing business in China? *Academy of Management*
- Tsung, O. (2003). Rising prevalence of diabetes in China. *Journal of the National Medical Association*, vol. 95, No.11, November issue
- Veracity, D. (2006). Child-centered marketing causing kids to carry unhealthy food habits into adulthood. Retrieved June 22, 2009 from <http://www.naturalnews.com/020920.html>
- Wang, H. et al., (2006). The impact of tobacco expenditure on household consumption patterns in rural China. *Social Science and Medicine* 62(6): 1414-1426
- Wantanabe et al., (2007). Pharmaceutical industry in China-intellectual property protection, pricing and innovation-. IDE-JETRO. Retrieved March 3, 2009 from <http://www.ide.go.jp/English/Publish/Asedp/075.html>
- Weng, X. & Caballero, B. (2007). *Obesity and its related diseases in China*. Cambria Press, Youngstown, New York
- Wu, F. et al., (2005). Preventing chronic diseases in China. *Lancet*, vol. 366 1821-1824. Retrieved May 28, 2009 from [www.thelancet.com](http://www.thelancet.com)
- Xia, S. et al., (2004). Creating health-promoting schools in China with a focus on nutrition. *Health Promotion International*, vol.18, No.4, Oxford University Press
- Yach, D. et al., (2004). The global burden of chronic diseases: overcoming impediments to prevention and control. *JAMA* 291(21): 2616-2622. Retrieved May 20, 2009 from <http://jama.ama-assn.org/cgi/content/full/291/21/2616>
- Yau, O. & Steele, H. (2000). *China business challenges in the 21<sup>st</sup> century*. The Chinese University Press, Hong Kong
- Yin, HB. (2002). The national rural health conference was convened in Beijing. *People's Daily*, vol. 29, October issue
- Yusuf, S. et al., (2001). Global burden of cardiovascular diseases: part 1: general considerations, the epidemiologic transition, risk factors, and impact of urbanization. *Journal of the American Heart Association*, Retrieved May 20, 2009 from <http://circ.ahajournals.org/cgi/content/full/104/22/2746>



Zhai, F. et al., (2009). Prospective study on nutrition transition in China. *Nutrition Review*, vol. 67: S56-S61

Zhou, E. Y. (2007). China Today: Pharmaceutical distribution in China. *International BioPharm*. Retrieved March 1, 2009 from SFU Business Source Complete, <http://cufts2.lib.sfu.ca/CRDB/BVAS/resource/5781>