

THE IMPACT OF THE WORLD ECONOMIC CRISIS ON CUBA'S HEALTHCARE SYSTEM AND BIOTECHNOLOGY SECTOR

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Cuba's vaunted healthcare sector is envied for the healthcare outcomes it achieves that equal or in some instances exceed those of developed countries, while spending a fraction of what developed nations spend. Cuba's biotechnology sector is producing some of the most innovative drugs in the world.

While Cuba's healthcare system has earned praise, the real test of the system is whether it can be sustained over the long-term. The recent world financial and economic meltdown is exacerbating Cuba's long crisis-ridden economy and putting pressure on the health system and on the biotechnology industry. Particularly since any economic recovery from the world economic melt-down is not going to happen anywhere in the near term, the next 2–3 years will be critical to the health system and the biotechnology sector.

THE HEALTHCARE SYSTEM

The role of political and public will in the establishment and maintenance and long-term sustainability of Cuba's healthcare system and biotechnology sector cannot be overlooked or underestimated. In 1960, Fidel Castro Ruz famously set out for Cuba this: "The future of our homeland must be that of men of science." This quote is found in hospitals, *policlinicos* and the research institutes of the Western Scientific Pole and throughout the island health and research facilities.

Healthcare for all is guaranteed and enshrined in Article 50 of the Constitution. Cuba's healthcare is vertically and horizontally organized with the public playing a significant role at the neighborhood and province level in the daily management of Cuba's healthcare sys-

tem. With a limited budget and resources, Cuba treats its healthcare system and biotechnology as sacrosanct. Both are used as collateral in its dealings with other nations, mostly developing countries.

Presently, there are approximately 498 *policlinicos* throughout all of Cuba each serving approximately 30,000–60,000 persons depending upon the province. In Havana, there are approximately 82 *policlinicos* offering about 24 essential services with about 22 specialty care services. Increasingly, more and more services are being brought from hospitals into the *consultorios* and *policlinicos* for both doctor and patient convenience and benefit.

Healthcare and the Economic Crisis

No matter what the economic crisis, Cuba has always supported its healthcare system. Work has already begun during the current crisis to upgrade healthcare facilities. While Cuba is masterful at long-term planning, with a healthcare needs analysis out to year 2015, it is hampered by its adherence to ideology and practices neither of which lead to encouraging economic growth. However, because of its ideological commitment, in the face of its on-going economic woes, Cuba proceeded to build an island-wide information system, INFOMED, which allows for real-time clinical evidence-based medicine in its *consultorios* and *policlinicos* and hospitals throughout the island and allows scientists connection to the outside world of its science colleagues. However, amongst information technology experts, it is widely felt that Cuba's IT leaves much room for further development.

The current economic crisis has neither destroyed Cuba's healthcare system nor its biotechnology sector. Instead, it is yet one more crisis Cuba is dealing with. The manner in which Cubans deal with shortages is through the use of black market, underground means. Favors are exchanged for access to more experienced doctors, drugs. However this practice of black-market on the one hand undermines the system while on the other hand it contributes to its sustainability. In acknowledgement of Cuba's economic woes, Raúl Castro has recently instituted an austerity program. Initially, he promised wage increases based on productivity but there is concern that wages will not rise as fast to compensate for state gratuities that are being eliminated such as paid vacations, and 50% reduction in government travel abroad. There are proposed wage increases for educators however.

The austerity program recently instituted includes limiting energy use during the day by turning off air-conditioners, refrigerators, etc., for 2 hours daily; food for employees will be reduced by half; and significant reductions in public transportation. All of these scarcity measures have medical consequences. Energy limits affect hours of operation at *consultorios* and *clínicas*. Hospitals will perform less minor surgery and elective surgery. Less money means less opportunity or ability to maintain medical facilities, medical equipment leaving equipment idle unless imported which is very costly and at less preferential world market prices. Food reduction for employees will create nutritional concerns not unlike the Special Period. Finally, cuts in public transportation will affect ambulance services.

Although healthcare is constitutionally guaranteed for all its citizens and enshrined in Article 50 of the Constitution, the economic crisis forces Cuba to ration its already scarce resources. Cubans must first be seen by someone in the *consultorio* that is the first level of entry into the healthcare system. If more specialized care is deemed necessary, then patients are referred to the next level of care at the *policlínicos*. Now however, faced with already aging population, care is moving from preventive care to far more expensive episodes of care, curative care, which undoubtedly is straining an already strained system. Exacerbating the problem is the almost 50-year-old embargo preventing Cuba

from acquiring medicine and medical equipment from the United States, 90 miles away from the shores of Cuba. The effect of the embargo is many but with respect to healthcare it requires Cuba to have to incur significant expense, as it must obtain medicines and supplies through circuitous importation from companies and countries that are willing to defy the extraterritorial reaches of the Helms-Burton Act. The embargo continues to severely affect the supply of basic drugs and medical equipment resulting in either equipment deterioration, or having it often left to remain idle.

The extraterritorial Helms-Burton Law and other measures with the U.S. economic, commercial and financial blockade of Cuba have been aimed at isolating and toppling the revolutionary government on the island. Those who evade the measures may face sanctions ranging up to 10 years in prison, \$1,000,000 in corporate fines, and \$250,000 in individual fines. Civil penalties can go up to \$55,000 for each violation. To illustrate the magnitude of the problem, recently the Dutch giant Philips was fined \$128,750 by the U.S. Office of Foreign Assets Control (OFAC) for selling medical equipment to Cuba. An employee of Philips Electronics of North America Corporation (PENAC), a Philips subsidiary, had traveled to Cuba without a license to sell medical equipment produced in Brazil. Philips, a multinational corporation with presence in 60 countries, is a major multinational based in Eindhoven, Netherlands, since 1891. It produces household appliances, medical technology, communication systems and light bulbs, with annual profits of 26.385 billion euros (\$37,466 million). PENAC is among the 100 largest U.S. manufacturing firms, with 35,000 employees and annual sales of \$5950 million with 20% of its assets owned in America. PENAC agreed to pay the fine imposed by OFAC, the largest assessed by OFAC for fiscal 2009. Interestingly, OFAC acknowledged recently that it has insufficient personnel to process the onslaught of applications by Cuban-Americans to visit Cuba since President Obama lifted some of the travel restrictions for Cuban-Americans.

The lack of access to the world capital markets due to Cuba's history of defaulting, together with the extraterritorial reaches of the Helms-Burton Act only serves as

yet more and expensive hurdles through which Cuba must jump over if it can obtain needed credit lines to maintain and upgrade its facilities and equipment. Against this backdrop, it is a familiar refrain in Cuba that “We live like the poor, but we die like the rich.” Cubans no longer die so much of infectious diseases as they do of cardiovascular diseases and other diseases of developed nations. This is what has come to be referred to as the Cuban Paradox. While Cuba spends about \$363 per capita, the United States spends about \$6,714 and outcomes on life expectancy and infant mortality run neck and neck. It should be noted however, that Cuba does have a very high abortion rate which may be attributable to its enviable infant mortality rate.

Medical Diplomacy

Medical diplomacy is one way in which Cuba raises revenue. Cuba sends doctors mostly to developing countries both as a form of solidarity and as an economic scheme wherein doctors are exchanged for dollars and/or oil, for example. An example of how medical diplomacy works is the example of Cuba's Chernobyl Children's Programme. Approximately 24,000 Chernobyl kids have been brought to Tarará Beach, 20 kilometers East of La Habana, where there is a small hospital and school with Ukrainian teachers and housing units. The program operates pursuant to agreements between the two countries' Ministries of Health. Funding by the Ukraine-based organization International Fund for Chernobyl, Ukraine, covers transportation cost. Cuba has spent an estimated \$350 million in medicine alone. Cuba covers room and board and medical services. There are some cracks in medical diplomacy, however. For example, patients in the poorest areas of Venezuela complain that Cuba is not sending doctors but instead paramedics and nurses. Also, countries to which doctors are sent experience a high defection rate of doctors, who either return to Cuba or defect to other parts of the world. Thus, while Cuba's investment in human capital is both enviable and well documented, a larger question is whether the return on interest is justified.

As medical tourism gains traction, it has the potential to become a significant revenue generator. However, it is also raising the ire of Cubans who don't have the fi-

nancial wherewithal to obtain treatment at these “showcase” facilities. Medical tourism has become quite sophisticated in Cuba. Servimed Turismo y Salud, with its own website, offers a full range of services, including spa services, ophthalmology, opticians, physicians rehabilitation, drug addiction and elderly care. Some of the dedicated facilities being used to deliver care include: the Cira García International Clinic, Hospital Clínico-Quirúrgico Habana, Hospital Ortopédico Habana, Hospital Pediátrico-Habana. It also remains to be seen if whatever income is generated from medical tourism will be sufficient to allow for any internal subsidization for use to maintain and upgrade medical facilities used for the average Cuban.

While catering to medical tourists, Cuba is beset with a significantly aging population that is already straining its resources. By the year 2015, Cuba will have the most aged population in Latin American and the Caribbean. By the year 2050, Cuba will have one of the most aged populations in the world. This means that Cuba will have to reallocate its resources and certain aspects of care provided to all as a matter of due course will be sacrificed to treat its significant aging population. More care and more expensive episodes of care will require more use of more services. Increased demands and strain on the an already strained economy in Cuba raises questions about Cuba's ability to not only maintain but sustain its highly vaunted healthcare system.

While medical tourism has the potential to bring revenue to Cuba it brings with it problems for average Cubans as well. Insurance companies outside of the United States are encouraging medical tourism and governments that allow easy travel to Cuba to combine medical care with tourism. These patients are also cash-paying, who receive care in “showcase” clinics and hospitals while Cuban citizens are restricted to care in facilities that are neglected.

THE BIOTECHNOLOGY SECTOR

Cuba's biotechnological sector is one of the most innovative in the world, with drugs being developed that are the only one of their kind in their class in the world. The biotechnology sector is one of, if not the crown jewel, of the Cuban nation. The island's biotechnology sector was created in 1981. The collapse of

the Soviet Union and the embargo, taken together, have forced Cuba to become self-reliant and develop its own drugs for its healthcare system and patients. The Western Scientific Pole, located in Western Havana, has approximately 40 research institutes; other research institutes are now found in Sancti Spiritus, Villa Clara, and Santiago de Cuba. Drugs and vaccines are exported for revenue.

The primary focus of Cuban biotechnology is to improve the health of Cubans, with emphasis on life saving drugs, not life style drugs. Cuba's biotechnology sector stands to benefit from a global economy that increasingly is blurring the lines between biotechnology and healthcare. Internally, as Cuba's population continues to age, there will be a significant increase in the need for drug therapies to treat chronic and neurodegenerative diseases. Cuba's biotechnological advances already include treatment for Parkinson's disease (not necessarily limited to affecting only older patients) and other drugs will be used to treat its own population.

Organizationally, the biotechnology system is known for its closed cycle system which means that from bench to commercialization, all work is done within Cuba—research, production, domestic distribution and international marketing all are done within one administrative unit which creates a shared sense of responsibilities. This closed cycle system results in the reduction of transaction costs, close coordination of efforts, seamless cooperation during all phases, and reduction of needless duplication of efforts. It allows for focused integrated project management. Unlike for-profit pharmaceutical companies, one does not see “me too” drugs produced in Cuba like one sees in the for profit sector in developed countries with the duplication of drugs and put onto the market for price competition. While there is no outsourcing, Cuba does enter into joint ventures with other countries. Joint ventures are significant in that the conduct of clinical trials is very costly and importantly they tell the world that Cuba is willing to abide by the international standards governing clinical trials.

Cuba's biotechnology sector was developed without foreign investment. This allows its scientists to focus entirely on research. Unlike for-profit pharmaceutical companies, Cuba is not pressured to report quarterly

earnings like others do to Wall Street. The lack of reporting pressure leaves its Cuban scientists to concentrate on research and development of world-class drugs that in some cases are the only ones of their kind. Its projects are not linked to probable flow, cash rate of return, or profitability but that will change and sooner rather than later. This is evidenced in Cuba's lack of involvement with life-style drugs like Viagra and hair growth and other vanity oriented drugs which have proven to be financial blockbusters. Instead, Cuba invests in biotechnology for societal health benefit gain but with regime change, investments for economic gain will gain traction.

Pharmaceutical research in Cuba is one of the most innovative in the world. Cuba's pharmaceutical research and development is one that continues to develop world-class drugs and vaccines that often are one of their kind in the world and the only drugs and vaccines in their class. Already playing a significant role in providing needed drugs and vaccines to its own citizens, the importance will only grow due to the already significant aging population facing Cuba which will require more drugs for treatment of chronic illnesses including neurodegenerative diseases. As medical tourism continues to gain traction, it will provide a needed infusion of capital for healthcare and pharmaceutical services. Joint ventures in clinical trials are fostering Cuba's creditability in its willingness to adhere to international research standards. These joint ventures also provide research dollars.

While there are benefits to be derived in its joint ventures and alliances at some point, nevertheless with all of the joint ventures and alliances that continue to be entered into, will Cuba be to retain its own character and its autonomy without putting in to jeopardy of its political tenets? With respect to its biotechnological sector, Cuba is adopting already some at least some market-based schemes. Adopting more of the conventional advertising, marketing, patenting, typically seen in biotechnology firms will serve to enhance Cuba's ability to become a major global player in an ever growing economy. In conclusion, “Can a revolutionary process be irreversible, or not? When those who were among the first, the veterans, are disappearing and making room for new generations of leaders, what is to

be done and how should it be done?" He went on to conclude, "This revolution can destroy itself. We can destroy it, and the fault would be ours."

As capitalism begins to creep into Cuba, the island continues to enter into more joint ventures in the biotechnology sector. Depending on how these deals are structured, foreign investors willingly ignore the extra-territorial reaches of the Helms-Burton Act and are going forward investing in Cuba, helping to further develop badly needed infrastructure.

There are opportunities to be realized for the biotechnology sector. The vaccine market is growing due to a world emphasis on prevention and disease eradication. However, due to legal risks associated with vaccine production and administration to patients and because vaccine production is not profitable to pharmaceutical companies, Cuba has taken the lead especially in the production of the world supply of the meningitis vaccine. Cuba is already using some of its cancer vaccines in its own clinics and they could potentially be imported into the United States to begin clinical trials in a few years. Cuba's strengths are many: the investment in human capital with the guarantee of education for all produces PhD scientists and doctors who are paid a scant \$20 per month, thereby giving Cuba a competitive edge against the rest of the world pharmaceutical companies that must pay competitive wages for its researchers.

Cuba is very heavily reliant upon expensive importation of medical equipment and basic medicines. While there is scant medical equipment that Cuba produces, it is a nascent market with Cuba producing equipment that is exportable and thus revenue generating. Cadiocid D200 provides EKGs at rest and can send electronic signals via email. Doctus VI monitors physiological parameters, Excorde 3C-Cardio analysis of functioning of the myocardium under normal conditions of life and stores information for 72 hours. The Audix is a computer-based equipment used to measure neurological responses to audio stimuli that does not require patient cooperation. This is the only kind of equipment in the world and sells for the equivalent of about \$20,000 per machine. It is through its exportation of vaccines and other drugs that are income producing that Cuba can sustain its biotechnology sector. Cuba

faces challenges which includes self-funding its R&D and extremely limited access to capital. Finally, Cuba does not advertise or market its drugs, nor maintain pharmaceutical sales forces like is typically done by international pharmaceutical companies. These factors will most likely change as Cuba moves more toward a market-based economy.

Cuba transfers its technical know how and manpower in exchange for a share in its joint ventures. While Cuba has 74 patents registered with the United States Patent Office, generally Cuba currently does not actively patent its discoveries. However, there currently is a movement underfoot to create patent pools easily transfer knowledge and to reduce very expensive R & D costs. In order to better serve developing countries and their pharmacy needs. Patent pools would allow discoveries to be easily spread to those countries most in need. The issue of patent pools, intellectual property protection and transfer will need to be addressed if Cuba is to become more competitive. If payment for patented technology and products is required, however, it will increase production costs for Cuba. Cuba will place even more emphasis on its biotechnology sector for income from exports and is benefiting from growing relationships with NGOs. Cuba is integrating more into the Americas. Economic reforms are being discussed but require implementation and the recent austerity program is too young for any adequate assessment as to its bottom line effects.

CONCLUDING REMARKS

Three hurricanes in a row that caused major devastation will require Cuba years to rebuild and recover. On top of the hurricanes, mounting trade deficits, lack of lines of credit due to defaults, and illiquidity remain serious issues affecting incentives to continue investing in Cuba and a decline in exports are taking their toll. Given that global recovery appears not immediately in sight, the magnitude of damage to Cuba's ability to maintain, upgrade and achieve long-term sustainability is a central issue.

To overcome the crisis, Cuba and its leaders must step up to the plate to implement actions that incentivize its youth and other idle workers who must be made to realize they can benefit from the fruits of their labor through rewards from their productivity. In the men-

tioned four-hour speech delivered on November 17, 2005 Fidel Castro expressed his concern about the future.

If Cuba fails to adapt by adopting some market-based schemes, its vaunted healthcare system will be most unlikely to be sustained over the long-term either through neither medical diplomacy nor medical tourism. Cuba will need to implement more market-based reforms than Raúl Castro appears to be attempting. The next challenge is how to motivate its citizens to become productive. But wages will have to become liv-

able and allow for discretionary income as well. This will occur with the next generation of workers most likely and amongst those presently entering the work force for the first time. Productivity and reward for one's work may also necessitate structural and political change in Cuba if it is to become less vulnerable economically. Even if the embargo, long blamed by the leadership of Cuba for its economic ills were to be lifted totally or even partially, a stable and viable economy will not happen over night.