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Preemptive Economics:

New horizons

Public policy for a new generation

Preemptive Economics:
new horizons

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Social security institutions of 36 nations constitute the CISS, headquartered in Mexico. Presently, its nearly 80 member institutions integrate a cooperation network across the hemisphere. The CISS is a forum for communication, exchange, research and capacity building of the institutions in the region.

Preemptive Economics: new horizons
Public policy for a new generation



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Acronyms and abbreviations

ECLAC	Economic Commission for Latin America and the Caribbean
IADB	Inter-American Development Bank
ILO	International Labour Organization
ITU	International Telecommunications Union
PAHO	Pan American Health Organization
OECD	Organization for Economic Cooperation and Development
UN-Habitat	United Nations Human Settlements Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
WB	World Bank
WCRF	World Cancer Research Fund
WFP	United Nations World Food Program
WHO	World Health Organization

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Preventing is not anticipating;
it is building the future.

José Antonio González Anaya

Preface

Social security has reached its limits: Time to innovate

Social security launched and became an icon of the 20th Century. With its birth, the rights of workers took hold. Work conditions and the lives of workers benefited from this genesis. Industrial accidents were reduced, even as worker health improved and a path was cleared to dignified retirement through the use of pensions.

Since its inception, we have asked much of social security, and it has delivered unfailingly.

In the beginning, society asked that adequate resources be set aside to address the challenge of infectious disease and to help workers to recover from work-related accidents. We also asked that it facilitate the accumulation of contributions earmarked for pensions designed to cover the five years that individuals lived, on average, following retirement.

Over time, as we grew more confident of its enormous capacity, we began to make further demands on social security.

We achieved a reduction in the frequency of workplace accidents and, through advances in science, we drastically reduced infectious and acute disease rates, and went on to extend post-retirement life expectancy levels. The 5-year life expectancy for retirees during the 1950s rose to 21 years by 2015.

As a result, and after celebrating our achievements, we could not help but demand yet another effort from social security. A victim of its own achievements, social security had to find ways to extend its capabilities. Retirees who are living longer during the period following retirement and it became essential to ensure that resources were available to meet this need.

Social security responded. It commissioned its actuaries to prepare new projections. It developed new ways to save. It designed new systems, extended the retirement age and as always, faced its challenges head on, albeit with increasing difficulty and increasingly less resources.

It seemed an especially complicated scenario in which to demand even more. But as the sizable levels of inequality can and should not be ignored, we had no other choice but to show up on social security's doorstep to ask for

universal coverage in terms of pensions and healthcare. For everyone: employed or unemployed; formal-sector or informal-sector.

Social security faced a litany of challenges, but it has not let us down. It analyzed the situation, considered its options and, just as it began to prepare to undertake the longest and most complex journey in its history, a storm of unprecedented force made landfall.

Chronic, non-communicable and – paradoxically – completely preventable disease began to increase rapidly. They are here to stay and will not leave the patient alone until they pass away. At the same time, large regions of the world began to walk an inexorable path toward aging population.

Healthcare costs grew exponentially. Productivity was negatively impacted. The labor market was severely affected by the presenteeism and absenteeism that were caused by these diseases. Faced with a deteriorating labor market, a person's ability to accumulate retirement savings declined proportionately.

For its part, the population began to age and did so in the midst of serious and preventable diseases. Older adults' ability to remain productive was seriously curtailed.

And when society considered raising retirement ages, we realized that this is a very difficult challenge because, within the Americas, and individual's health and ability to work 11 years before dying are also on the decline.

Social Security faces a new reality. In addition to setting off on the longest journey of its history, it must also be prepared for a storm of unprecedented force.

In response, we asked what could be done? Will it be possible to begin and finish this new journey?

Could we do it via the same navigation system, same ships, and via the tried and true routes? Will we be able to raise contribution rates or create new taxes? Or has the time come to consider new options?

At the CISS, we think it is. In fact, that moment has come and gone. The time has come to make the required changes.

We believe that Preemptive Economics has a great deal to offer and may comprise an asset that is based on our recent realization that there is still time to make a change.

*The precepts of Preemptive Economics:
Time to alter the course of history*

Things are currently not as they should be. This assessment should not be perceived as a knee-jerk reaction or the result of what one might term black-and-white thinking. Although much progress has been made, social protection is in a precarious state. Our generation has witnessed extraordinary achievements. More and more progress has been made with regard to the care of individuals: from birth to retirement. There is also a growing consensus with respect to the perception that social security constitutes a human right. Additionally, these two upward trends have been accompanied by a concomitant effort on the part of society's institutions to address inequality, poverty and restricted access to quality healthcare; this trend, too, has gained momentum during our generation.

Therefore, no one can deny that social protection has achieved incredible headway with regard to the strengthening and scope of its efforts on behalf of society. Though, under the current social protection framework, the promise of universal well-being is unaffordable. Society does not currently have the resources to cover the risks associated with disease and aging which are looming on the horizon. Society yearns for universal health and pension coverage, and yet individuals do not earn enough money, governments fail to increase tax revenues and old age has become an issue of monumental expense. Our generation's upward trend in growth has never outpaced these issues and they have remained relevant in the strongest economies within the Americas. If we fail to make the necessary structural and paradigm changes, the dream of universal healthcare and pensions will remain a mirage out of reach.

The current scenario demands change, and our current trajectory vis-à-vis the problems we face is a bit too orthodox. An interesting approach to measuring the stages through which the human race has evolved might be better measured by our capacity to react to the circumstances we faced

and our ability to make the necessary changes, rather than measuring the scale of the challenges that we confronted. In this sense, the areas of opportunity for the field of social protection are almost limitless.

WHY HAVE NATIONS BEEN UNABLE TO COVER THE COSTS OF GUARANTEEING AN ADEQUATE SOCIAL SECURITY COVERAGE FOR THEIR POPULATIONS?

The complex macroeconomic outlook for the Americas and the rest of the world in the following years, in addition to fast-moving demographic shifts, changes in the labor market, the pension sector's state of affairs and current trends in population health, all point to the necessity for a social security course-correction.

MACROECONOMIC OUTLOOK

The prospects for an important upturn in the macroeconomic conditions of the Americas in the coming years may be somewhat limited for some nations due to the economic deceleration of the world's economy and the fact that the majority of the economies in the Americas are poorly diversified. Additionally, their economies fail to produce products of high added value, choosing to instead focus on commodities which are highly sensitive to the market fluctuations of the broader international markets.

Wealth in the Americas as measured by GDP per capita based on purchasing power parity (PPP) runs the entire gamut of possibilities. While Canada and the United States have a GDP (PPP) of between US\$53,960 and US\$42,590, respectively, Haiti's figure for this period was US\$1710.¹ The difference in per capita income has a direct impact on the well-being of individuals and their quality of life. Additionally, these variations constitute a major challenge to the ability of States to guarantee an individual's right to healthcare, employment, a decent pension and other benefits, as well as to social protection.²

Several international organizations have pointed out the need for the region to undergo a structural change which would diversify the productive sectors within nations in the Americas in order to reduce their dependency on raw material and strengthen sectors which are most reliant on knowledge and technology.³

However, a transition from a low-productivity economy to a high-productivity economy will require addressing the issues which currently drag productivity down: a workforce which does not possess a high-level skill sets; proportion of the economically active population engaged in the

¹ GDP (PPP) in the English speaking Caribbean for the same period was US\$17,290, in Central America and Andean sub-region US\$5573 and in South America US\$12,490.

² Social protection is a human right whereas it involves healthcare, employment, pensions and other benefits that comprise an individual's well-being. In order to ensure that a population has an equal opportunity to achieve development and security, a dynamic, integrated social protection system must be established which includes social assistance, social coverage and which facilitates the transition towards social security. Said social protection system must also comprise pension coverage, health care coverage, employment, education and housing issues within a framework of coordinated public policy which is underpinned by healthy and sustainable finances, and takes into account the issue of gender.

³ "Latin America and the Caribbean must close structural gaps in terms of

informal sector at low wages; a lack of investment capital; ineffective productive investment; infrastructure which is inadequate vis-à-vis the exigencies of international competitiveness.

Another factor which is impeding nations' ability to ensure the well-being of their population, as well as their ability to break the vicious circle in terms of achieving high levels of economic growth, is the issue of inequitable distribution of income. In the Americas, income concentration as measured by the Gini coefficient is high (0.496), much higher than the 0.313 OECD average and the 0.230 figure in nations such as Norway, Sweden and the Netherlands; nations which also have very high levels of well-being.^{4 5} The high levels of income concentration in the Americas, particularly in low and medium-income nations, constitute a significant series of challenges to social security and merit a more-urgent application of social protection policies.

HUMAN DEVELOPMENT

Given the importance of well-being in modern States, new methods and indicators have been designed to measure it. The inequality-adjusted HDI, for example, allows a society's development level to be measured vis-à-vis the following three indicators: life expectancy, healthcare and educational level.

Despite the fact that income inequality is the primary factor at work in inequality, it has been demonstrated that access to healthcare and education play a larger role in the reduction of inequality in lower-income nations than in their higher income counterparts. However, access to healthcare and education must be delivered vis-à-vis parameters such as prevention and quality.

DEMOGRAPHIC TRENDS

During the last 40 years, two factors have impacted the dynamics of demographics in the Americas. On the one hand, the population doubled from 565.3 million inhabitants in 1975 to 918.7 million in 2012. This trend has completely overwhelmed the ability of institutions and governments to satisfy the needs of said population, a fact which has correlated to drops in well-being, primarily in the field of social security.

One of the phenomena associated with this demographic shift is a rapid growth of the older-adult cohort. Drops in death rates and birth rates have transformed the population pyramid, narrowing its base and enlarging its apex. In the past, present or in the future, nations have always faced popula-

production, education and income levels if they are to advance towards inclusive and sustainable development; (whereas) inequality conspires against the stability of democracies." ECLAC declaration at forums carried out in conjunction with VII Summit of the Americas.

⁴ Concentration of income, as measured by the Gini coefficient, is desirable or acceptable if it is below 0.350; if between 0.351-0.400, it is considered a high level of concentration of income; and if greater than 0.401 income concentration is very high.

⁵ What is meant by well-being? "Well-being is the result of a set of objective situations or material conditions (access to education, healthcare, housing, a given income level) used by individuals to make subjective judgments or perceptions (attitudes, disappointments and satisfaction)." (Pena, 1977) in (Zarzosa, 1996: 20).

tion changing and will continue to do so in the future; the only variable being the speed of said aging. (CONAPO, 1999)

In the Americas, the median age rose from 27.7 years in 1990, to 29 years in 2012; while the life expectancy of individuals aged 60 for the period rose from 19.3 years to 21.6 years. This demographic shift means society must introduce changes in the fields of healthcare, education, employment and housing. These changes need to take place at a fairly brisk pace and must be accompanied by a willingness on the part of relevant institutions to adapt to their new surroundings.

The increase in life expectancy, which rose from 45 to 75 years of age during this period has serious implications for pension and healthcare systems. Pensions are now being called upon to provide sustenance for longer periods of time, whereas the demand for medical care, as well as the costs thereof, will continue to rise in the face of the noncommunicable and chronic disease epidemic which was completely avoidable. The current over-60 population is expected to live between 20 to 25 years. It is a population which is being displaced from the formal labor market, with a life expectancy that is almost equal to the number of years worked, but with a high probability of living their last 10 years in unhealthy and unproductive conditions and without the ability to be self-sufficient. In many cases, individuals within this population group will end their lives in poverty. This reality is what drives the debate on the criteria and suppositions used to design social security systems.

EVOLUTION OF THE LABOR MARKET

Labor reforms have been directed largely towards increasing the flexibility of hiring and firing methods, measures which have increased the overall volatility of the labor market as well as an individual's ability to remain therein. Although said flexibility may have been introduced in order to increase productive investment, it will likely increase the scale of challenges faced by social security systems in their attempts to guarantee an individual's right to a decent pension.

Other changes have been identified in the labor market, which correlate to the following factors: an increasingly rapid modernization and automation of production processes; the globalization of production sectors and the economy; the increased logistical efficiency of the production sector; a reduction of work permanency (career-long positions); increased levels of international competitiveness due to increased productivity levels; informal hiring of personnel at formal sector firms; subcontracting;

home-based employment; and the disappearance of the traditional barriers between paid and unpaid work (Ramírez, 2014). These factors all point to a new reality which obligates society to perform an in-depth analysis of what type of entities, regulatory frameworks and scopes modern social security systems should entail.

An important part of this transformation involves the technological revolution which is evidenced by the exponential increase in processing power, the ubiquity of digitized information and the capacity of computers to perform repetitive tasks on an ever-increasing scale of magnitude, at lower cost and higher efficiency. A primary example of this evolution is the proliferation of Big Data and Open Data.

The University of Oxford estimates that 47% of current jobs will become automated within the next 20 years. Should this prediction proved correct, the fallout in terms of impact on society will be enormous. The jobs which are at highest risk are located in the following sectors: logistics; transport; and work which involves repetitive and highly structured operations. This will include accounting, the legal profession, technical writing and many other white-collar professions.

The Oxford analysis, for example, predicts that 99% of those employed in telemarketing will be out of a job within the next 20 years; additionally, 94% of accountants and auditors, and 92% of retail staff, among others.

This change will be abrupt. It will start with with the most developed countries and then make its way to poorer nations and those who fail to prepare for the new paradigm will be faced with serious difficulties in terms of dealing with this steep rise in inequity.

THE CURRENT STATE OF PENSIONS

Due to demographic shifts, epidemiological changes, transformations in the labor market and increasingly restricted tax budgets, inter alia, pension systems are facing structural challenges which threaten their viability as well as their ability to meet their medium-term objectives, due to increasing uncertainty with regard to the benefits available to enrollees (OCDE/CISS/CIEDDES, 2012). Some of the proposed ways out of the dilemma are extending working-life periods; concentrating the efforts of State-funded pension systems on the most vulnerable; and encouraging individuals to save for their retirement in order to offset the drops in public pensions. These measures are designed to keep the current social security model afloat but fail to resolve the long-term issues and the systemic complexities inherent to universal social protection.

In general, all public pension systems are primarily based on two models: the defined benefit system where contributions are withheld from

wages and used to pay retirees' pensions; and the defined contribution model, wherein individual account payments are invested and not paid out immediately.

The defined benefit system works well when demographic and economic growth, as well as in terms of productivity, are strong. The working age population is able to subsidize the retired population, but as the aggregate income in the capacity of the working age elation begins to founder under the weight of the retired population, the system goes into crisis.

The mechanism of defined contribution and individual capitalization has also failed to resolve the core problem of ensuring a decent pension. This is mainly for two reasons. Firstly, it requires a long period of time in order to build up enough resources to cover the minimum pensions of its enrollees. As a result, it is currently unable to address the issue of the current generation of workers who are retiring and do not qualify to receive a minimum pension from the funded system. Additionally, the individual capitalization mechanism is deeply dependent on financial markets in order to accrue capital. These markets have proved themselves to be highly volatile.

Regardless of the pension system dichotomy, a huge proportion of population is not included in any due to unemployed or informality. The active contribution of population between 15 and 64 years of age is 41.8%.

The new parameters established by the International Labor Organization (ILO) to measure the informal sector include, in addition to the agricultural sector subsistence farmers, includes informal-sector workers employed at formal-sector firms, informal-sector workers and domestic staff who often total up to 60% of the economically active population (EAP). This significant proportion of the EAP, by definition, has no social security coverage.

THE IMPACT OF HEALTHCARE

Beginning in the middle of the 20th century, the combination of advances in the medical field, the slowing down of social conflicts, wars and revolutions, as well as the advent of social security and social well-being policies resulted in increases in life expectancy and significant lifestyle changes for society.

Advances in medicine, such as vaccinations, antibiotics and improvements in sanitation and hygiene, resulted in a demographic shift which involved decreased population growth and increased life expectancy. Additionally, the epidemiological panorama shifted away from communicable disease and towards non-communicable disease.

In the Americas, life expectancy increased 30 years in the second half of the 20th century. However, living longer has not had a concomitant increase in quality of life. For example, currently, at least 7% of the over-60 population in Mexico is arriving to said cohort with five or more concurrent diseases. This means that when they reach 65, these individuals are extremely unhealthy older adults. They have much less capacity to function within an individual who has an isolated ailment. This will mean that, even though they may wish to be, this group of individuals will not be productive and, as a result, represent one of the main challenges to the health care system, due to rising costs; and to the pension system, due to increases in unhealthy years of life without the possibility of being economically productive.

Changes in production systems brought new life styles; free-time decreased and diets changed. The food industry experienced a rapid growth and resulted in the consumption of ultraprocessed foods containing added sugar, unhealthy fat and salt is continuously growing.

Ultraprocessed foods utilized fat to flavor their products and salt to preserve them, but research in the 1980s and 90s on the causes of cardiovascular disease resulted in this sector substituting saturated fats with different kinds of sugars. This, combined with a major shift in lifestyle habits, triggered an increase in the incidence of a group of risk factors known as metabolic syndrome (high blood pressure, high blood glucose levels, increased levels of triglycerides, low levels of healthy cholesterol and obesity). These factors increase the probability for an individual to suffer from cardiovascular disease, certain types of cancer and type II diabetes.

Non-communicable diseases are the most expensive illnesses for society and individuals. They represent 36% of the 30 primary causes of premature death. The amount of healthy years of life lost throughout the Americas due to non-communicable disease rose from 9.9 years in 1990 to 10.7 in 2012.

The rise in diabetes incidence rates drove the World Health Organization (WHO) to denominate the disease as an epidemic. In the next 20 years, US\$1.5 trillion will be expended on the disease throughout the world; US\$848 billion of which will correspond to treatment costs, US\$668 billion due to productivity drops due to disability and US\$40 billion due to diabetes-related premature death.

Additionally, mental disorders such as depression and anxiety, as well as alcohol and drug intake, are on the rise. However, health care systems are not giving these issues the attention they merit and, in many cases, they are not considered work-related diseases.

Healthcare has played, and will continue to play, an increasingly important role in social protection.

EDUCATION

Education is considered the most important factor at play in development and improving quality of life levels. A good education gives individuals an opportunity to pursue the best paying jobs, makes society more conscious of the costs of failing to employ preventative measures and is the best mechanism by which we can reduce the social costs.

In the Americas, there is a huge area of opportunity with regard to education. According to the Inter-American Observatory on Social Protection, only 54% of the population aged 25 and over has nine years of education or less.

The Programme for International Student Assessment (PISA) is performed in 61 nations, of which ten are in the Americas.⁶ It is used to determine the level of preparedness of the population aged 15, who are about to embark on post-secondary education or enter into the job market. The instrument evaluates a set of skills, abilities and aptitudes which, taken as a whole, permit an individual to solve problems and situations in life.

The PISA results appear to correlate highly with the economic conditions in any given nation, as well as its growth levels during the latest decades. Other issues include poverty, access to public services, health care and in some cases may be related to cultural and historical process and even the extant effects of colonialism.

THE ROLE OF HABITAT

Cities have contributed enormously to the improvement of the quality of life of a big portion of population with access to health, education and housing basic services. However, they are faced with challenges such as poverty, inequality and an increasing demand of services, as well as the need to foster policies that limit the causes and effects of climate change.

Half of the urban population at the CISS region is concentrated in big cities. The urban growth determines social, political, cultural and environmental trends. Therefore, a sustainable urbanization is one of the most pressing challenges of the community of the world in the 21st century.

The future risks are significant, but may be controlled or reduced if decision makers include in their policies regarding habitat issues such as health, employment and education, that guarantee social well-being in a financial and environmental sustainable way.

⁶ Argentina, Brazil, Canada, Colombia, Costa Rica, Chile, Mexico, Peru, Uruguay and the US.

WHY DON'T WE CHANGE?

All societies have to deal with some degree of resistance to change, whereas change is often viewed with a fair degree of uncertainty and anxiety. For individuals, resistance to change relates to basic human characteristics, habits or fear of operating outside one's comfort zone, the fear of a loss (or a reduction) of income, a feeling of losing one's security, fear of the unknown and fundamentally because we are taught to utilize a selective processing of information which tends to produce an affinity for a hearing to customs and habit that often prove to be unproductive or counterproductive.

PREEMPTIVE ECONOMICS: PUBLIC POLICY THAT PRODUCES CHANGE

It is time for long-term thinking. For social security, resistance to change is based on the identification of limits or restrictions which are taken as gospel truth and require a huge effort to change. Related issues include budget structure, tax structures, the behavior of politicians in democratic societies with regard to short-term decision making which is based on results.

And practically all nations' budgets are approved annually and are accompanied by promises which often address created interests, which often have high social economic and financial costs. Additionally, tax structures applied by nations leave little margin for innovative collection and distribution mechanisms; mechanisms which would provide an opportunity to incentivize synergies between said tax structures, on the one hand, and healthcare and productivity, on the other.

Politicians and political parties in modern-day democratic societies have no incentives to propose medium and long term strategies where as they have become habituated to winning elections in highly competitive arenas. The rolling horizon of election season contributes to the building of administration agendas with short term solutions that fail in the long term.

Additionally, in low and middle income countries, many administrations, upon taking office, confront a series of cost-cutting pressures which are the result of structural problems which, in turn, oblige administrations to concentrate on short-term measures. Regardless of whether or not they wish to undertake long-term strategies, frequently outdated regulatory frameworks prevent them from putting forth longer term solutions during their time in office.

Short-term thinking is not the exclusive domain of the public policy sector. It often contaminates the rest of society. Voters often become accustomed to backing candidates who put forth quick fixes. Impatient, incredulous and untrusting as we are, we prefer to leave things to a leader who can deliver results in the blink of an eye that, over time, prove to be illusory.

Long-term thinking is a concept which the modern citizen needs to internalize. If voters fail to do this, politicians will fail to do this. Or worse still, they will do it in the midst of a storm of criticism and pressures.

Time to act empirically. The trial and error method is mandatory in laboratories and the natural sciences, but when it comes to social policy, errors involve a high degree of cost.

During the 20th century many public policies were based on intuition of political leadership, but the costs of implementing unviable policies has driven a trend towards the application of proven methods to evaluate the projected impact of a given policy decision. Nowadays, the vast majority of governmental actions and programs have been evaluated.

Time to optimize resources. The 21st century has afforded us an opportunity to prove the premise that economic resources are indeed finite. In the theoretical realm, experts in economics have battled to stretch social protection coverage to its limits. However, the coverage is increasingly less flexible and even resistant to growth. When it comes to covering a new need, other parts which were previously covered end up unprotected.

The new ideas, policies, projects and purchases which States need to pursue are no longer fundable. Budgets can no longer keep pace with the velocity of emerging needs and even less so with that of universal coverage. Decent pensions for all! Quality health care for all! These are all justified, needed and legitimate calls for progress. They are also, unfortunately, completely unviable in financial terms.

The current scenario will require more than true curtailing or optimizing public outlays. Avoidable costs need to be prevented. The lion's share of diseases which represent this monumental financial dilemma for governments, as well as individuals, are patently avoidable. The problem is that we are still viewing things from the standpoint of curative medicine and, in the best of cases, early detection. Although early detection *does* reduce costs, it fails to address the root causes which trigger disease and are usually preventable. If we are to engage in the art of avoiding costs and suffering, structural change and truly cross-cutting public policy will have to be employed.

Time for cross-cutting policies. Fields of knowledge, and even the abilities and actions of governmental ministries, are divided. We act in

traditional stove-pipe hierarchies wherein each individual is responsible for their own fiefdom; fiefdoms which lack the knowledge experience and perspective of an expert to answer the toughest questions. For example, society often tends to think that doctors are responsible for increasing life expectancy. We heap upon their shoulders the responsibility of complicated surgical procedures and administration of hospitals. And then ascribe exclusive responsibility for preventing disease to the same individuals. Here is where we begin to note the inefficiency of our current model. What do physicians know about the food sector? Sugar tax incentives? Or the regulation of fast food in our schools? What does it position though about designing preschool content, which currently fails to inculcate in our boys and girls the healthy habits and food choices that will affect their lives, health and ability to be productive later in life? Or what do actuaries, or pension experts, know about the biological ramifications of aging? Or the cognitive or physical options by which an older adult might continue to be productive in life?

These questions, which cry for a cross cutting approach to public policy, can be asked of any profession; or, for that matter, of any branch of government. And the traditional answers to these questions might have grave consequences. Not because they are incorrect; but because they are incomplete. The indications that the new panorama is giving us are clear. If we plan to raise our probabilities for being successful vis-à-vis the challenges of the 21st century, cross-cutting policy is essential.

In a series of lectures delivered at Harvard in 1925, philosopher and mathematician Alfred North Whitehead stated: “The growing dangers of specialization are important, especially in our democratic society. The power of rationally-based leadership is weakening. The intellects which currently lead us lack balance. Able to observe one series of circumstances or another; they lack the ability to perceive both at the same time.” Leadership is not a specialized pursuit; it demands the ability to synthesize and coordinate.

TIME FOR PREEMPTIVE ECONOMICS

This proposal involves transitioning away from the current way of doing things and towards the Preemptive Economics model. Preemptive Economics involves a conceptual framework and systemic vision for the design, implementation and evaluation of public policy, especially with regard to that of social protection. It is based on a multi-entity, multidisciplinary approach that simultaneously utilizes a variety of areas and disciplines

within the fields of science (both natural and social) and technology in order to prevent and anticipate the advent of the largest risks currently facing modern society. It also seeks to put forth optimal, dynamic, flexible solutions for the short, medium and long term if and when said risks materialize. The optimization of the use of public resources and cost-effectiveness analyses comprise the fundamental axioms of preemptive economics, with the understanding that prevention is the key to minimizing the economic, political and social costs of social protection.

The roots of Preemptive Economics lie in the public health sector which, when faced with the fear generated by huge increases in public outlays on the treatment of chronic degenerative diseases (expenditures that eventually become impossible to cover), determined that prevention was the best remedy to the medical-financial challenges besetting it.

Currently, Preemptive Economics is not limited to the healthcare sector, whereas it has evolved and become applicable to the entire sphere of social protection; i.e., its cross-cutting, systemic approach is effectual in the analysis of economic, demographic, ecological and political issues, to name a few.

Preemptive Economics can help. It can free us of the problems and costs that are as huge as they are avoidable. This is not about panaceas or simply trying something new. It is about using our existing body knowledge and experience to avoid the trajectories we know end in tragedies of apocalyptic proportions. Nor is this about acting in time. Or changing the tires on our vehicle for a set of more durable treads for the narrow road that lies ahead. This is about changing the course of history.

The following chapters analyze the current state of affairs with regard to the main components of social protection with a particular focus on healthcare, labor market, pensions, education and housing. The aim is to identify progress made and the challenges that loom on the horizon from the perspective of Preemptive Economics. We will then address a variety of public policy recommendations designed to employ a long-term multidisciplinary and multi-entity approach that is evidence-based and focused on the issue of optimization.

Methodological framework
Preactive Social Policies:
Building Blocks of the Preemptive Paradigm¹

**NEW SOCIO-DEMOGRAPHIC CHALLENGES
FOR SOCIAL SECURITY**

Except in parts of the developing world in Africa and Asia, populations are currently aging globally (Vanhuysse and Goerres 2012). As a result, social security systems are increasingly facing a new set of socio-demographic challenges and related social risks as a result of longevity (such as Alzheimer and dementia) and of modern diets and sedentary lifestyles (such as diabetes and obesity) (e.g. Lustig 2012; Lustig et al. 2012). These challenges are large-scale socio-demographically and ominous fiscally and politically. But they also are precisely why we need to reflect on new foundations for future social security policies. After all, social security systems are the largest macro-level buffer against such large-scale social changes that OECD societies have built over time (Gough and Therborn 2010). As Francis Castles (2010: 97) argues, many social policies were created precisely 'because we predict that the circumstances under which we will have to use them may reoccur, even though we do not know when that is likely to happen.' Perhaps the single largest social challenge is population aging as a result of reduced fertility and increased longevity. Its manifold social policy consequences are likely to be a major stressor for social security systems, including in the Americas (Miller et al. 2011; Vanhuysse and Goerres 2012). National Transfer Accounts studies that look both at the allocation of primary income and its secondary distribution in the form of taxes and benefits, and at the tertiary redistribution of after-tax revenues within and between households, show that public transfer flows in all European countries but also in Latin American countries such as Chile, Uruguay, and, first and foremost, Brazil nowadays already flow upward, from the working-aged to the elderly (Lee

¹ Special collaboration by Pieter Vanhuysse, PhD (LSE).

Demography is not destiny: policy design is the intermediary factor between constraints and outcomes.

² On the other hand, in Mexico the imbalance flows downward from older to younger age groups, amounting to around 0.9 times the average annual labor income of working age individuals aged 30-49. See Lee and Mason (2011b: 94).

³ See Lee and Mason (2011b: 96). Demographic structure was controlled for here by assigning the same (23-country average) population age distribution to all countries. In fact, once one singles out the structure of transfer patterns (policy) by controlling for demographic structure (population), Brazil turns out to be by far the most pro-elderly biased country in the 23-country sample, with a young-to-old imbalance of around 2.9 times the average annual labor income of working age individuals aged 30-49 - ahead of demographically older countries like Uruguay (0.6 times) and Costa Rica (0.6 times) (Lee and Mason 2011b: 96).

⁴ See Tepe and Vanhuyse (2010), Vanhuyse (2012,

and Mason 2011a; 2011b). In demographically young Brazil and somewhat older Uruguay, for instance, the current young-to-old imbalance in public transfers amounts to respectively 1.2 and 0.5 times the average annual labor income of working age individuals aged 30-49. This is a significant imbalance, comparable to a demographically older country like Japan (1.1 times).²

The need to reform unsustainable imbalances in the inter-age transfer flows of public policies in these societies that are still relatively early in the process of further population aging is clear. When controlling for demographic structure, public transfers flow downward even in most of aging Europe, but they still flow upward in demographically younger Latin American countries such as Chile, Uruguay, and Brazil.³ The urgency of policy reforms aimed at preemptively addressing unsustainable financing in the latter societies is further driven home by the following observation. If public transfer patterns were to stay as they are today, then by 2050 all Latin American countries (but not, for instance, those in South and Southeast Asia) will have strongly upward flowing inter-age reallocation patterns. In fact, at current demographic projections, in the absence of policy reform, Brazil by 2050 would be the single most pro-elderly biased welfare state in the sample, with a young-to-old imbalance of around 6.4 times the average annual labor income of working age individuals aged 30-49 - ahead of Latin American countries such as Chile (2.9 times), Costa Rica (2.3) and Uruguay (1.5), and of demographically much older countries like Japan, Germany, Finland, and Sweden (Lee and Mason 2011b: 98).

However, demography, while a strong constraint on resources, is not destiny when it comes to social policy. Good policy design is the key intermediary factor between socio-demographic constraints and policy outcomes. For instance, perhaps counterintuitively, the degree to which various social security systems around the world are biased in the social spending patterns towards growing elderly age groups is not strongly determined by demographic structure (Vanhuyse 2012; 2013). Rather, it is mediated by the way in which social policies and social institutions allow population to be activated in terms of labor market participation and human capital value-added.⁴ In other words, well designed policies can make a significant difference in boosting the productive and fiscal foundations of even the fastest-aging societies. Clearly, an aging society need not be morally blamed for lower fertility; still less so for longer life expectancy. Living longer lives (of quality) is actually a yardstick of social progress. And moderately low levels of fertility may even be desirable – not least from an environmental point of view. But crucially, the way in which so-

cial policies react to population aging is important for the long-term sustainability of social security systems (Vanhuysse 2014; 2015b).

THE ROLE OF PREEMPTIVE POLICY:

CONCEPTUAL AND THEORETICAL FOUNDATIONS

Preemptive policies across all stages of education, active labor market policies for the working-aged and for elderly workers are key elements for a long-term solution to the socio-demographic challenges discussed above. Such policies, of course, cover a wide number of policy domains, including also health policy measures such as (but not limited to) anti-tobacco and anti-alcohol measures, stick-and-carrot policies to discourage unhealthy diets, and new genetic-research driven diabetes medicines. For instance, in one key application in the domain of health policy, the state of Uruguay has since 2005 successively implemented a series of anti-smoking measures that have placed the country at the forefront of tobacco control policy worldwide (Harris 2015). These measures have included increased cigarette taxes, incentives for healthcare providers to treat nicotine dependence, and the regulation of cigarette packaging and marketing (Harris et al. 2015). They have proved highly effective in significantly reducing tobacco consumption among the Uruguayan population – not least among teenagers. Harris et al. (2015) analyzed a nationwide registry of all pregnancies in Uruguay during 2007–2013 to assess the impact of three of these tobacco control measures (provider-level interventions aimed at the treatment of nicotine dependence, national-level increases in cigarette taxes, and national-level non-price regulation of cigarette packaging and marketing), finding that smoking cessation rates during pregnancy increased from 15.4% in 2007 to 42.7% in 2013.⁵

Another key preemptive policy in the health and lifestyle domain regards measures to mitigate the intake of sugars and high fructose corn syrup products in diets, especially among younger citizens (Lustig 2015). The introduction of high fructose corn syrup after 1965 and especially from the 1970s in the USA has caused a strong deterioration in the quality of diets and a dramatic deterioration especially among young Americans born since the 1970s (Lustig et al. 2012). This has led to widespread, wide-ranging and socially costly current and expected future health problems. In economic terms, American society has been losing triple the amount of resources (as a result of all forms of subsequent social problems) that the food industry has been able to earn in extra profits from the introduction high fructose corn syrup (Lustig 2015; 2012). The above

2013). As Vanhuysse (2013) shows, of the OECD's four demographically oldest societies, Italy and Japan do show a distinct pro-elderly bias in their social spending patterns (more than six times more for each elderly as for each nonelderly citizen), whereas Germany shows only a moderate pro-elderly bias and Sweden shows relatively little bias.

⁵ Harris et al. (2015) further find that national-level non-price policies had the largest estimated impact on cessation. The price response of the tobacco industry attenuated the effects of tax increases. Provider-level interventions had a significant effect but were adopted by few health centers. Quitting during pregnancy increased birth weight by an estimated 188 g. Tobacco control measures had no effect on the birth weight of newborns of non-smoking women.

Globalized knowledge economies have increased both the initial entry ticket and the subsequent payoffs of the human capital acquired before labor market entry.

observations point to clear preemptive policy prescriptions and models in the fields of respectively tobacco and sugar consumption mitigation.

The rise of highly competitive globalized knowledge economies has increased the need for social policies aimed at bolstering human capital, and through it, the fiscal foundations of social security systems. Early contributions by Becker (1964), Psacharopoulos (1994) and others have shown that policies aimed at boosting human capital can significantly contribute to a nation's economic welfare and the fiscal foundations of its social welfare (see also Barro 2002; Hanushek and Kimko 2000; Hanushek and Woessman 2011). They do so in at least two ways. They increase (future) workers' ability to invent, adopt, or diffuse new ideas and technologies, and they raise workers' output per unit of time. But since the 1990s, the rise of the knowledge economy has dramatically increased both the initial entry ticket (mainly but not solely in terms of skills requirements) and the subsequent payoffs throughout the lifecycle (mainly but not solely in terms of wage earnings) of the human capital acquired between birth and labor market entry, such as marketable knowledge, non-cognitive traits and skills (Autor 2014; Goldin and Katz 2008; Vanhuysse 2008; 2015a).

That is, knowledge, cognitive and noncognitive skills, and physical and cognitive fitness acquired before labor market entry are both increasingly required for finding good jobs, and increasingly rewarded once these jobs are found. On the requirements side, those with low levels of literacy record much lower levels of labor market participation and much higher risks of unemployment in most OECD economies. On the rewards side, for instance, in the USA the gap in earnings between individuals with an advanced degree and those with a high school degree has increased from around 1.8/1 in 1979 to around 2.6/1 in 1999 (Powell and Snellman 2004: 213). And this rise of returns to education is ongoing still. The US college/high school wage premium has essentially doubled between 1979 and 2012, going from 30,000 US\$ to 58,000 US\$ (in 2012 dollars) (Autor 2014). Skill biased technical change implies that the right types of skills are likely to continue commanding high premiums also in the decades ahead. This has further increased the importance of preemptively investing in human capital (Romer 2002; Goldin and Katz 2008).

In recent years, there has been in increasing awareness among academics and policymakers of the strong importance of preemptive human capital health- and education-improving policies in improving the economic wellbeing of persons and nations. The theoretical and empirical foundations of the preemptive paradigm in this context have been established within economics notably in the work by the 2000 Economics

Policies need to prepare rather than repair: prevention is key to minimize social problems all along the lifecourse.

Nobel Prize laureate James Heckman, Janet Currie, William Barnett and others⁶ and within social policy by Goesta Esping-Andersen, Anton Hemerijck, Frank Vandebroucke and others.⁷ As Vandebroucke et al. (2011) summarize the approach, central here is ‘the attempt to reconcile social and economic goals. In policy terms, the focus is on public policies that ‘prepare’ individuals, families, and societies to adapt to various transformations, such as changing career patterns and working conditions, the emergence of new social risks, population aging and climate change, rather than on simply generating responses aimed at ‘repairing’ any damage caused by market failure, social misfortune, poor health or prevailing policy inadequacies. By addressing problems in their infancy, the social investment paradigm stands to reduce human suffering, economic instability and environmental degradation, while enhancing social resilience.’ Esping-Andersen (2002a: 6) similarly argues that ‘the foremost challenge we face is to avert that social ills become permanent, that citizens become entrapped in exclusion or inferior opportunities in such a way that their entire life chances are affected’ (original italics).

Key to the preemptive paradigm for social policies is the aim to prevent and anticipate various social risks (often through in-kind service provision), rather than dealing with them post hoc (often through cash transfers). Unequal material circumstances and life opportunities start at birth – indeed, even before birth – with inevitable social security consequences later on (Currie 2011). In other words, new policies need to be implemented that are about preparing rather than repairing: prevention is a key element to minimize economic, political and social costs. In terms of poverty, this means, for instance, a social policy approach that seems to tackle poverty’s cognitive and developmental causes, rather than remedying poverty’s negative effects through social assistance transfers, unemployment benefits, food vouchers, retraining programs and similar classic social programs (Esping-Andersen 2002a). This is all the more important since any remedial policy is unlikely to be effective in the first place unless beneficiaries possess the necessary abilities and motivation (Esping-Andersen 2002b).

This points to a second key element in the preemptive policy paradigm: the adoption of a life course framework for analyzing social problems and social policies. This is crucial because different social problems relevant to social security at one stage in life are often directly related to events or conditions earlier in the lifecycle. The life chances open to young children will determine the skills they acquire (or not) before labor market entry. These skills will in turn determine employment chances and earnings. These labor market opportunities will in turn determine the presence

A life course framework is key: social problems at one stage in life are often related to conditions in an earlier stage.

⁶ See e.g. Heckman (2000; 2007; 2013), Heckman et al. (2010), Barnett (1998; 2002), Barnett and Masse (2007), Campbell et al. (2014), Carneiro and Heckman (2003), Cunha and Heckman (2007), Currie (2011), Garces and Currie (2002), Heckman and Masterov (2007), Knudsen et al. (2007), Doyle et al. (2011), Heckman and Kautz (2012).

⁷ See e.g. Esping-Andersen (2002a; 2002b; 2008; 2009; 2015), Bonke and Esping-Andersen (2011), Gingrich and Ansell (2015), Nelson and Stephens (2012), Nikolai (2012), Vandebroucke et al. (2011), Vanhuyse (2008; 2015a).

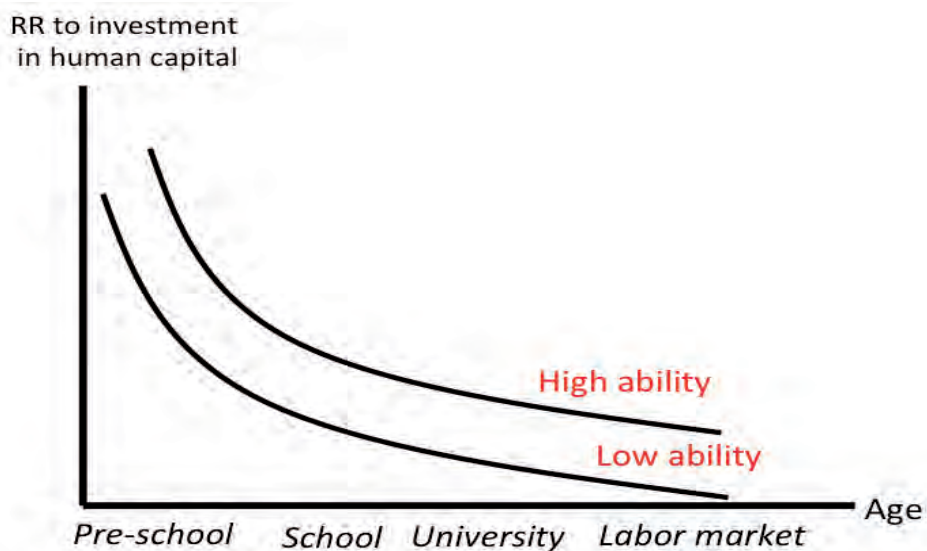
or absence of old age poverty, and so on. In one key study on early-life family environments, for instance, Crosnoe and Elder (2004) use a longitudinal and decade-long dataset of talented children started in 1922 to study whether and how family experiences early in life relate to patterns of adjustment and functioning in later life. Identifying four different holistic life course profiles of aging (less adjusted, career-focused but socially disengaged, family focused, and well-rounded), they find a clear connection of these aging profiles with experiences much earlier in the life course. They statistically identify three specific family experiences in childhood and adolescence that can predict membership in holistic profiles of aging in the later years: the socio-economic status of the family, early parental divorce, and parent-child attachment. The authors argue that these distal associations from early to later life reflect both ‘mediational pathways’ (that is, adult experiences and current circumstances such as intact marriages, alcoholism, and educational attainments can explain the observed influence of early experiences) and supplemental pathways (the significance of early life experiences on aging profiles is direct, i.e. not filtered through adult and current experiences).

The challenge in terms of policy design is to determine and implement those particular preemptive policies that evidence-based research indicates will be both cost-efficient and effective. Viewing various social policies increasingly in terms of social investment, rather than as social expenditure or consumption is an integral part of this new focus. Importantly, the dynamic notion at the heart of applying the ideas of the preemptive paradigm to these domains is the notion of improving and investing in the right type of human capital, broadly conceived and applied especially to health and education and skills. Figure 1, the notorious Heckman (2000) graph, captures the lifecycle returns to human capital interventions.

A cumulative body of research in economics has established that returns to social policy investment in late childhood or in young adolescents, let alone in adults later in life, are lower than those associated with early childhood interventions, even though investment in these later life course stages can be justified on numerous other grounds, such as equity, or poverty or social exclusion prevention.⁸ This explains why preemptive policies targeting the first years of childhood can be particularly effective. Younger children have longer time horizons over which to recoup the benefits of human capital increases. Moreover, skill formation is characterized by dynamic complementarities and it is a strongly cumulative process: ‘early learning makes later learning easier and more effective’ (Carneiro and Heckman 2003: 90). This dynamic mechanism is what Cunha and

⁸ See Heckman (2000; 2007), Heckman et al. (2010), Carneiro and Heckman (2003), Cunha and Heckman (2007), Heckman and Masterov (2007).

FIGURE 1. Rates of return to human capital investment over the lifecycle



Source: Pieter Vanhuysse 2015.

Heckman (2009) refer to as self-productivity. Cognitive skills and noncognitive traits acquired prior to a given human capital investment increase the productivity of that investment.

Ability gaps between individuals and across socioeconomic groups open up at early ages, both for cognitive skills such as educational outcomes and IQ, and, equally importantly, noncognitive socio-emotional traits such as perseverance, motivation, and self-control – traits sometimes jointly referred to as ‘grit.’ Even after controlling for test scores, such noncognitive and behavioral traits are significant predictors of later-life outcomes such as university completion and earnings (Heckman and Rubinstein 2001, Heckman and Kautz 2012). Importantly, these gaps are strongly correlated with family background factors, such as parental education and maternal ability. When controlling for these family variables, the ability gaps are almost eliminated (Ramey and Ramey 2000; Heckman 2007). High-SES families in the USA, for instance, spend about seven times as much privately on their children as poor SES families do (Kauschal et al. 2011). Yet, raising a well-functioning child, above and beyond any private benefits it conveys to parents, is also a public good with positive externalities, as it conveys substantial social returns to investment.⁹ These are consequently strong prima facie economic efficiency grounds for state intervention through preemptive interventions to enrich learning environments especially of very young and young children from disad-

Skill begets skill: early learning makes later learning easier and more effective.

⁹ See Wolf et al. (2011), Folbre (1994; 2008), Vanhuysse (2014). For instance, Wolf et al. (2011) estimate the fiscal external-ity of an average newborn child (in paying for pen-sions, health and long term care) born to a parent with above high school educa-tion at 400,000USD in 2012 dollars.

vantaged backgrounds (Carneiro and Heckman 2003; Heckman 2007). As Heckman (2013) notes, the key message for policymakers is that the earlier the intervention, the better the results (see Figure 1). Accordingly, this is a framework for discussion of the Preemptive Economics for human capital as regards two key lifecycle stages: early life including early development, childhood, youth and beyond and later working life, including older working adults and the young-old elderly.

THE PREEMPTIVE PARADIGM IN EARLY LIFE: EARLY DEVELOPMENT, CHILDHOOD, YOUTH AND BEYOND

POLICY INTERVENTIONS IN THE EARLY DEVELOPMENTAL STAGE

Three early childhood factors are crucial in determining life chances: health, income poverty, and developmental priming mechanisms such as being read to, social stimuli, and guidance (Esping-Andersen, 2002b: 49; 2015; Waldfogel, 2006). One of the key mechanisms explaining the high impact of preemptive policies in early-life stages stylized in Figure 1, is that these policies intervene at the time when most neural and cognitive progress and priming is made, often irreversibly so. Neurologically, the early childhood years are the critical juncture during which the brain architecture is established that will subsequently determine lifecycle cognitive, social, emotional and health outcomes (Nelson and Sheridan, 2011; Knudsen et al., 2007). Policies targeting the early-life stage can be particularly goal-effective because they intervene at a time when most neural and cognitive progress and priming is made. Human capital deficits tend to arise mainly from inadequate learning environments in the family. When controlling for parental education and maternal ability, early ability gaps are almost eliminated (Heckman, 2000; 2007; Carneiro and Heckman, 2003).

The scientific foundations of our knowledge on the short- and longer-term effects of preemptive investment policies in the early-life stage are strong. Much of this evidence comes from a number of early childhood pilot programs that have been implemented in the 1960s and 1970s in the USA, with participants having been followed subsequently through their lifecycle. Most important among them were the Perry Preschool Program (Ypsilanti, Michigan), the Syracuse Preschool Program, the Abecedarian Program (Carolina), and the much larger Head Start Program. These pilot programs provide simultaneously the best practice of high-quality intensive early childhood intervention and the best economic evidence for the costs and benefits of early childhood intervention programs. The key scientific advantage of this evidence is that they relied on

randomized participation. Within the total identified target population (typically, the children of a certain age cohort in pre-identified low-SES neighborhoods), participation in the early childhood intervention program (the experimental group) and non-participation in the program (the control group) were determined randomly. This allows for a better measurement of the policy effects, since important socio-economic and environmental factors (such as neighborhood quality, and parental socio-economic status) affecting outcomes of relevance were controlled for, and self-selection and other sources of participant bias were avoided (Barnett 2002; Heckman 2000; 2004). A second major advantage of this evidence base is that these randomized programs were started in the 1960s and 1970s, thus allowing proper longitudinal analysis by following the members of control and experimental groups (who had initially been very young children) over the course of their life time as they later attained school age, high school age, and subsequently in the labor market.

After participants had entered the labor market, follow-up studies showed the degree to which early intervention policies can have long-lasting positive effects. In a meta-survey of altogether 84 experimental or quasi-experimental early childhood programs focusing on disadvantaged children from low-income families, Duncan and Magnuson (2013) found that the average effect size of these programs on cognitive and achievement scores for young children was .35 standard deviations. This effect is sizable: it equals nearly half of race differences in kindergarten achievement gaps. Moreover, the effect, with the sole exception of IQ scores, is also remarkably long-term. In a meta-analysis of 36 studies explicitly focusing on the independent long-term effects of small-scale and large-scale early childhood intervention programs for disadvantaged children aged 4 or earlier, Barnett (1995) concluded that these programs produced benefits that were sizable, or long-lasting, or both. The long-term effects were measured in terms of cognitive variables such as IQ and educational achievement and non-cognitive variables such as social adjustment in terms of classroom behavior, aggression, crime, delinquency, and, with most overwhelming effects, student grade retention and placement in special education. This indicates why well-designed early childhood intervention is the quintessential preemptive social policy: it prevents a wide array of social problems throughout the later lifecycle, the post hoc treatment of which would in all likelihood have been many times more expensive.

Early childhood interventions are the quintessential preemptive policy: they prevent many social problems later in life which would be much more expensive to deal with post hoc.

*LONG-TERM EFFECTS DURING CHILDHOOD,
YOUTH, AND YOUNG ADULTHOOD*

While an early-life start is crucial for the effectiveness of preemptive human capital investment, continuity is needed, throughout childhood and early youth (Farkas, 2011) into early adolescence (Bailey and Dynarski, 2011). In a best-practice example of life course-sensitive policy analysis, Waldfogel (2006) offers a book-length empirical social science survey of what public policies children need, specifically distinguishing four different stages for policy recommendations: infancy, preschool, school age, adolescence. As early as primary school entry age, children from disadvantaged backgrounds tend to be less attentive to schoolwork and more likely to engage in troublesome behavior patterns (Rowan, 2011). Many noncognitive and (especially) cognitive gains achieved in the first life years will be preserved into school age, youth and beyond only if the environment sustains them. Providing add-on programs in childhood during primary school age can make an extra difference to the extent that the treatment is extensive enough, but only conditional upon these children receiving prior early childhood intervention treatment (Barnett, 1995: 42).

While effect sizes of policy interventions may be lower during primary and middle school ages (Figure 1), the causal mechanisms and the life course effects remain essentially similar. Thus, test scores, behaviors, and attitudes, and curriculum enrolment of middle and high school students are key predictors of later schooling and labor market outcomes, as well as arrests in adulthood (Farkas, 2011). In particular, among eighth-graders and twelfth graders, the strongest negative effect on later-life outcomes, such as high school graduation, postsecondary degree graduation and labor market earnings at age 26, are due to persistently low math scores (a cognitive skills) and to persistent learning behavior problems (a noncognitive trait) (Farkas, 2011).

From a preemptive policy intervention perspective, a key recent additional insight separation the later lifecycle stages from the earliest ones regards the differential impact of policy interventions. We know that cognitive abilities appear to be plastic (i.e. malleable) and responsive to environmental enrichment predominantly during early childhood (Nelson and Sheridan 2011; Duncan and Magnuson 2011; 2013). Consequently, cognitive skills tend to be already relatively crystallized, hence little responsive to policy intervention, by primary school age. In contrast, noncognitive skills appear to be malleable and responsive to well-designed policy intervention much longer - until at least late adolescence (Heckman 2013, Dweck 2012). There is strong evidence, albeit non-randomized and

*Cognitive skills are
crystallized by primary
school age, but
noncognitive traits are
policy-responsive into
late adolescence.*

not long-term, that interventions aiming to teach adolescents and adults that their learning capacities are malleable can have major effects at a much lower cost than early childhood interventions (Dweck, 2013).

Focusing on the Abecedarian Project, which provided full-time year-round classes from infancy through pre-school, Campbell et al. (2002) and Bracey and Stellar (2003) report that by age 21, participants had completed more years of schooling than controls (12.2 versus 11.6), many more of them were still in school (42 v. 20 percent) and two and a half times as many of them had enrolled in four-year colleges (36 versus 14 percent). While there is by now much accumulated evidence on the impact of high-quality early childhood intervention programs in reducing crime, raising earnings, and promoting education, an innovative recently study has started to provide evidence on adult health outcomes as well. Campbell et al. (2014), using new biomedical data, find that disadvantaged children randomly assigned to participate in the Abecedarian program have significantly lower prevalence of risk factors for cardiovascular and metabolic diseases in their mid-30s, with the strongest results shown for men. One in four males in the control group are affected by metabolic syndrome, whereas none in the treatment group are affected. Men who had gone to the preschool had average blood pressure of 126 over 79 as compared to a more problematic 143 over 92 for the control group members. Those men who had attended preschool were less than one-third as likely to be severely obese. Because they were also doing better in life, those preschool graduates were far more likely to have health insurance. This evidence shows the potential of early life interventions for preventing disease and promoting health.

Focusing on the Perry Preschool Program, which intensively treated disadvantaged Michigan children at ages 4-5, Heckman (2000: 29) similarly reports that compared to randomly assigned controls, participants in the program systematically recorded statistically significant differences with respect to a wide range of variables including education (better achievements at ages 9 and 15, lower rates of classification as mentally retarded, and higher high school graduation rates), employment at age 19, and average monthly earnings, crime (arrests incidence by age 19 and multiple arrests incidence by age 28) and welfare dependency at age 19 and at age 28. Similarly, by age 27, significantly more Perry participants than control group members had earned high school degrees or the equivalent thereof (71 versus 54 percent) and ECEC treatment group members were also likely to earn more, to own their own homes, and to have longer and more stable marriages. Members of the control group were arrested twice

The benefits in later life of high-quality early-life interventions are sizable and multiple.

as often as Perry participants, and five times as many control group members (35 percent) had been arrested five times or more (Heckman 2000).

Barnett (1995: 45), reporting a conservative cost/benefit analysis of the returns to investment in the Perry Preschool Program, estimates the measured benefits (in terms of child care, K-12 and adult education, college, employment, crime and welfare) at US\$8,814 for the program's participants and at US\$61,972 for the general public, and the total benefits (which include, in addition, projected benefits in terms of earnings, crime and welfare) at respectively US\$19,569 and US\$88,433. Distracting from the societal benefits the actual cost of the Perry program of about US\$12,356 (1990) dollars per child, this led Barnett to estimate the net present value of the program at US\$76,077 for the general public. Heckman (2000: 26) reports that by age 27, every dollar spent on the Perry program had returned US\$5.70 dollars, and returned US\$8.70 dollars over the remainder of the participant's life (see also Carneiro and Heckman, 2003; Heckman and Masterov, 2007).

While early-life preemptive investment benefits young children as well as society in the long run, it is a sound policy for families in active two-earner societies. Mothers, in particular, can expect major benefits. Barnett and Masse (2007) estimate a benefit/cost rate of 7/1 for the Perry program and of 4/1 for the Abecedarian Program. Children who took part in the Abecedarian program earned an estimated US\$143,000 more over their lifetime than those who did not. In addition, the mothers of children who participated would earn an estimated US\$133,000 more, as a result of the fact that mothers with stable child care availability tend to establish better, longer-term and more productive relationships with employers. In addition, teenage mothers whose preschool children participated in the Abecedarian program were more likely to be employed and to have skilled or semi-skilled jobs. By the time their children reached 54 months of age, these mothers were more likely to have graduated high school, to have received post-secondary education, to be self-supporting, and less likely to have had additional children subsequently (Masse and Barnett, 2006). Lastly, the children of children who participated in would earn an estimated US\$48,000 more, as a result of the fact that higher earnings of their parents (Barnett and Masse, 2007). The provision of high-quality daycare and similar work-family policies is thus likely to have multiple beneficial effects also on families and adults (Esping-Andersen, 2009; 2015; Morgan, 2012). As Esping-Andersen (2002a: 9) put it: 'if society is not capable of harmonizing motherhood with employment, we shall forgo the single most effective bulwark against child poverty – which is that mothers work.'

THE FOUNDATIONS OF THE NEW ELDERLY ECONOMICS: THE PREEMPTIVE PARADIGM IN LATER LIFE, ACTIVE AGEING FOR ELDERLY WORKERS AND THE YOUNG ELDERLY

CONCEPTUAL APPROACHES:

PRODUCTIVE, HEALTHY, AND ACTIVE AGING

At the other end of the lifecycle, two age groups greatly affected by the health, labor market and mortality consequences of population aging and technological progress are elderly workers and the young elderly. As a result of better lifestyles, health technologies, and early-life conditions, in many rich or growing economies chronologically elderly citizens (say, sixty-five-plussers) are actually likely to grow both cognitively and physically fitter and prospectively younger (i.e. with an increasing remaining life expectancy) in the next decades (Skirbekk, 2008; 2012; Sanderson and Scherbov, 2010; Goerres and Vanhuyse, 2012). These trends are unlikely to be translated in proportional increases in productivity and (longer) labor market participation on the part of older workers. A key preemptive approach is therefore to boost the skills and fitness of older workers and young-old citizens as much as possible through active ageing policies specifically aiming to reduce early retirement, prolong working lives, and to reactivate and better integrate already retired individuals who are still willing and able to work. This section surveys recent social scientific advances in the academic literatures, mainly in the fields of economics, sociology, social psychology and public policy, which theoretically inform the design of such active ageing policies. A life course perspective is the guiding line emphasizing the importance of preemptively boosting human capital across the life cycle.

The policy literature presents multidimensional views of active aging that emphasize the importance of preemptively boosting the physical, mental, and social well-being of individuals as they age (Walker, 2010; also WHO, 2002; Hutchinson et al. 2006; Van Dijk and Turner 2010). Buys and Miller (2012: 104) distinguish between the related concepts of active, healthy, productive, and successful ageing. Active ageing is defined by the WHO (2002) as ‘the process of optimizing opportunities for physical, social and mental well-being throughout the life course, in order to extend healthy life expectancy, productivity and quality of life in older age’. Healthy aging on the other hand can be defined as the ‘ability to continue to function mentally, physically, socially and economically as the body slows down its processes’. Productive aging is in turn defined as ‘any activity by

Old-age citizens will grow cognitively and physically fitter and prospectively younger in the next decades.

A key preemptive approach in later life is to boost activation, skills, and fitness levels before they decline, through active ageing policies.

an older individual that produces goods or services, or develops the capacity to produce them, whether they are to be paid for or not'. Lastly, successful aging is defined as a 'low probability of disease and disease-related disability; high cognitive and physical functioning and active engagement with life.' These related concepts have in common the emphasis on fostering physical, emotional, social and economic well-being before it deteriorates. The successful aging approach (Rowe and Kagan, 1998) emphasizes 'adaptive and agentic, wherein individuals are able to "call the shots" in order to attain optimal outcomes' (Hendricks and Hatch, 2006: 308). The 10-year MacArthur Study argued that aging is neither predetermined nor inflexible, and that individuals are capable of exercising personal preferences to modify their environments and lifestyles (Rowe and Kahn, 1998).

In other words, successful aging is a result of lifestyle choices of individuals aided by preemptive policies that help them avoid predictable risk factors. The successful aging approach claims that such preemptive lifestyle targeted policies can make a major difference, as lifestyle choices are more important in determining the experience of older age than hereditary factors or even certain diseases (Buys and Miller, 2012: 104). Two such lifestyle choices can be singled out as especially crucial in this approach: what people eat (diets) and how people live, that is, (active) exercise, (active) social interaction, (active) mental stimulation, and constructive (or positive) mental outlooks. For instance, maintaining an optimistic outlook may add up to ten years to life, (Danner et al., 2001; Hendricks and Hatch, 2006). In a classic study from the US nuns project that fits the successful aging approach, Danner et al (2001) investigated handwritten autobiographies from 180 Catholic nuns, composed much earlier when these nuns had been on average 22 years old. Danner et al. (2001) scored these essays for emotional content and relate them to survival during ages 75 to 95. They found a statistically significant and strong inverse association between positive emotional content in these writings and risk of mortality in late life. As the quartile ranking of positive emotion in early life increased, there was a stepwise decrease in risk of mortality, resulting in a 250 percent difference between the lowest and highest quartiles. Again confirming the importance of adopting a lifecycle perspective in the preemptive policy paradigm, Danner et al. (2001) conclude that positive emotional content in early-life autobiographies was strongly associated with longevity as much as six decades later.

The productive ageing approach, in turn, highlights the fact that the common idea that productivity stops once a person becomes older, is misguided. Productive aging have become an important focus on the agenda

of both policy makers and social scientists across the aging world (e.g. Erlinghagen and Hank, 2006). Cross-national comparisons of productive activities in middle and later adulthood suggest considerable diversity between countries with regard to engagement in both paid employment and various domains of unpaid work (e.g. Hank, 2011). The productive aging approach proposes a primary focus on the economic contributions of older people in terms of paid employment and volunteering (Eurofound, 2007; Skirbekk, 2008; Saint-Paul 2009; Dorn and Souza-Poza, 2010). This productive focus can also explain why the concrete policy instruments thus far developed to translate active aging into public policies have been overwhelmingly in the labor market policy realm (Walker, 2010). Activation policies have acquired a central status within the labor market policy mixes of aging OECD member states in recent year (Bonoli, 2012; Tepe and Vanhuyse, 2013). For instance, one of five headline targets of Europe 2020, the 10-year strategy proposed by the European Commission in 2010 for smart, sustainable, inclusive growth, is to boost growth and employment was raising the employment rate of the working-age population to at least 75%. Similarly, among the seven ‘flagship initiatives’ of the Europe 2020 Strategy, the agenda for new skills and jobs set out to modernize labor markets by facilitating labor mobility and the development of skills throughout the life cycle with a view to increasing labor participation.

When looking at past trends over the past five decades, the direction has generally been strongly upward for most OECD countries as regards life expectancies at 65, yet strongly downwards as regards labor force participation for older workers from ages 55 or 60 until 64 (OECD, 2006; Wise, 2010). Most new hires among older workers tend to be workers who change jobs, rather than previously unemployed or inactive workers (OECD, 2006). Inactivity, in particular, tends to be a one-way street for older workers. Once older workers leave the labor market, they are very unlikely to get back into it subsequently. Combined with steadily increasing life expectancy both at birth and at retirement age, these are clearly untenable developments that need to be addressed by the extension of working lives, including the activation of older workers. As many experts have noted, working longer must be seen as a logical consequence of living longer (Wise, 2010; Hering, 2012).

Interestingly, adopting a life course perspective on active aging would lead one to expect active labor market policies to also have a positive effect (often unintended) in enhancing the active capabilities not just of older citizens, but also of working age citizens. In the wake of liberalized labor markets, growing international competition and increasingly punctuated

Job loss must be prevented: inactivity is a one-way street for most older workers.

Working longer must be seen as a logical consequence of living longer.

working careers, working-age citizens in advanced economies, even traditional labor market insiders with highly protected jobs increasingly demand more activation policy spending rather than standard employment protection, as they view such activation policies as an investment in their future re-employability chances.¹⁰ But beyond economic security, there are some indications that investing in active labor market policies, in addition to upskilling jobholders and re-activating unemployed workers (the main intended goals), can have positive side-effects on the social participation levels of working-age citizens. In a cross-national study of the impact of active labor market spending on citizens' social networks and their perceptions of social exclusion in 17 European countries, Anderson (2009) shows that activation spending tends to significantly boost citizens' social connectedness and to significantly reduce their sense of social exclusion. In countries that spend more on activation policies, citizens report more frequent social interactions both with family members and with friends and co-workers. Moreover, citizens in such high activation-spending countries tend to be significantly more active in voluntary organizations and to report more often that they participate in social activities. Anderson (2009) argues that this heightened level of social participation and social inclusion is boosted both by the overall investment in active labor market policies and by these social programs' orientation to enhance people's skills (but see Breidahl and Clement, 2010). Moreover, these beneficial effects on social participation and social inclusion tend to be more pronounced among individuals who occupy a more precarious labor market position – i.e. labor market outsiders. In other words, activation policies have the potential to affect both the employability and the social lives of those citizens who are most targeted by these policies.¹¹

The World Health Organization, in its Active Ageing Framework paper (2002), proposes a comprehensive multidimensional approach to active aging that synthesizes and subsumes the previous approaches (see also Buys and Miller, 2012; Walker, 2010). It is based on three basic approaches to preemptively activate older workers and elderly citizens: health, defined as encompassing 'all aspects of physical, mental and social wellbeing, as expressed in the WHO definition of health,' participation, (defined as providing 'education and learning opportunities; recognize and enable participation in formal and informal work; encourage full participation in community life'), and security (defined as ensuring 'the protection, safety and dignity of older people by addressing the social, financial and physical security rights and needs of people as they age'). The WHO approach positions active ageing as the preminent conceptual framework for investi-

¹⁰ See Anderson and Pontusson (2007), Tepe and Vanhuyse (2013). In fact, since the onset of economic crisis in 2008, citizens generally see labor market policies as more important for providing them with a sense of employment security in current crisis times than job protection policies such as employment protection legislation (Chung and van Oorschot 2011).

¹¹ Moreover, Anderson (2009) notes that labor market insiders and outsiders both benefit because they do not have exclusive social ties; when outsiders interact socially, insiders are often parties to the interaction. On the other hand, in a study on Denmark alone, Breidahl and Clement (2010) fail to find an effect of participation in such activation programs on three different indicators of social marginalization relating to individuals' social networks, their stigmatization and their self-esteem.

gating and preemptively improving multiple aspects of older adults' activities on quality of life and their general well-being as they age. But importantly, this approach, like the others reviewed above is mainly conceptual, not empirical. As various reviews of active aging approaches note, this comprehensive WHO nevertheless provides little guidance and even less consensus regarding the specific quantifiable indicators to be used for measuring active aging (e.g. Buys and Miller, 2012; Hutchinson et al., 2006; Walker, 2010). Note, in addition, that the WHO approach mainly considers (chronologically) old people. That is, even though it pays lip service to the concept, it does not provide a life course perspective.

Yet such a perspective is crucial. As noted in Sections 1 and 2, policy outcomes and family and educational environments during early life stages often have significant impacts on individuals deep into late adulthood. As Esping-Andersen (2009: 163) summarizes the life course perspective on social security policies: 'good retirement policy must begin with babies. The distribution of welfare among tomorrow's retirees will above all hinge on the inequalities in life chances among today's children.' Clearly therefore, given the strong impact of early-life dimensions such as cognitive and non-cognitive educational and behavioral outcomes and life environments, there is a strong case for adopting a life course perspective also on preemptive policies targeted at elderly workers and elderly citizens. According to Walker (2010: 596), active ageing should be 'a comprehensive strategy to maximize participation and well-being as people age. It should operate simultaneously at the individual (lifestyle), organizational (management) and societal (policy) levels and at all stages of the life course'. As Settersten (2006: 4) puts it, understanding the life course is about describing individual and collective experiences and statuses 'over long stretches of time and explaining the short- and long-range causes and consequences of these patterns.' Applied to work and retirement, this means we ought to pay special attention to shifts in the boundaries between the three boxes: education, work, and leisure (early retirement but also un-retirement, longer education, increased longevity; lifelong learning due to fast technological change).¹² Yet, as Settersten points out, the three-box structure remains largely intact in policymakers' minds, although a growing number of scientists are becoming more aware of boundary shifts.

The 1993 Economics Nobel Prize laureate Robert Fogel (1999; 2003) has shown the empirical relationship between early-life nutrition and later health outcomes in adulthood. Similarly, regarding educational outcomes, Banks and Mazzona (2012) evaluate the causal effect of a real-world policy reform - the historical raise in the minimum school leaving age in England

Retirement policy must begin with babies: tomorrow's pensioners' welfare depends on today's children's life chances.

¹² Settersten (2006) goes on to point out that such a life course perspective should include (a) aging along multiple dimensions (physical, cognitive, psychological,...) and social spheres (family, work, education, leisure), (b) aging in multiple directions: decline and growth, (c) processes and mechanisms how experiences in old age are shaped by earlier periods near and far away in time, (d) how aging-related experiences are shaped by specific characteristics of social environment: proximal settings of everyday life (family, social networks, work,...) and distal settings (state, policies, macro-demographic and macro-economic parameters,...).

from 14 to 15 - on cognitive abilities at much older ages; after age 50. They find a large and significant effect of the policy reform on memory and executive functioning at older ages as measured by cognitive tests. This result is particularly remarkable since the reform had a powerful and immediate effect on about half the population of 14-year-olds. Other studies similarly underscore the positive association between education and old age cognitive abilities. Thus Glymour et al. (2006) find evidence of a causal relationship between education and memory. Exploring geographical variation in US compulsory school reforms they found a positive effect of an additional year of education on memory test scores at older ages.

The argument, stylized in Figure 1, that government intervention in learning, training and skill acquisition is more effective and cost-efficient in earlier than later lifecycle stages has also been bolstered at the other end of the career cycle. Kristensen (2012) uses a unique individual employer-employee longitudinal dataset on the entire 1936-1944 birth cohort in Denmark conditional on being active in the labor market in 2001, in which year the selected cohorts were aged 57-65. The dataset provides information on comprehensive government co-sponsored training records spanning three decades and was employed in order to study the effect of these older workers' participation in formal life-long learning on the decision to retire early. The dataset includes both basic courses targeting individuals with low to medium levels of formal education and focusing on basic literacy and numerical skills as well as language classes, vocational and technical courses targeting all groups of workers and with a short duration of a few days or less than two weeks, and post-secondary courses including general and more specific training from college education and up to university level. Contrary to expectations that more lifelong training will lead to longer working lives, Kristensen finds that participation in formal life-long learning has only a marginal impact in prolonging working life by delaying retirement. On average, one year of training only adds one month to career length. This indicates lifelong training on its own may not suffice to substantially prolong careers and activate the older working age population, although it does not necessarily mean that government co-sponsored training programs cannot increase elderly workers' productivity.

PREVENTING WELL-BEING DECLINE AND COGNITION DECLINE AFTER RETIREMENT

The literatures in psychology and economics indicate a strong set of policy rationales for preemptively activating older workers both by reducing early retirement and by prolonging working lives, and for reactivating already

retired individuals who are still willing and able to work. Early retirement is associated not just with lower income and consequently fewer resources to invest in health, but, crucially from a social security viewpoint, also with less cognitive and physical activity (Rohwedder and Willis, 2010) and with changes in daily lifestyles that may lead to unhealthy behavior (Kuhn et al., 2010). At the individual level, healthy life expectancy is increasing faster than life expectancy in most advanced economies. This implies that the average period an individual will need elderly long-term care over his lifetime is actually shrinking.¹³

The effects of retirement on health and mortality are increasingly understood in recent years. For instance, Behncke (2012) investigates the effects of retirement on various health outcomes with data from the first three waves of the English Longitudinal Study of Ageing. Retirement significantly increases the risk of being diagnosed with a chronic condition. In particular, it raises the risk of a severe cardiovascular disease and cancer. This is also reflected in increased health risk factors (e.g. BMI, cholesterol, blood pressure) and increased problems in physical activities. Furthermore, retirement worsens self-assessed health and an underlying health stock.

In the same vein, Kuhn et al. (2010) take advantage of a major change to the unemployment insurance system in Austria, which allowed older workers in eligible regions to retire up to 3.5 years earlier than comparable workers in non-eligible regions. Methodologically, this allows them to solve the adverse health selection problem (that is, unhealthy workers retire because they are unhealthy) and to make a causal argument about the effect of retirement on mortality. They find that a reduction in the retirement age causes a significant increase in the risk of premature death (defined as death before age 67) for men, but not for women. The effect for men is not only statistically significant, but it is also quantitatively important. Kuhn et al. (2010) estimate that one additional year of early retirement causes an increase in the risk of premature death of 2.4 percentage points; this amounts to a relative increase of about 13.4%; or 1.8 months in terms of years of life lost. Kuhn et al. (2010) make a second contribution by providing strong indications that the reasons for these higher levels of premature death among retired men are linked to changes in men's health-related behaviors mainly associated with smoking, drinking, an unhealthy diets and less physical exercise. Analyzing cause-of-death statistics, they find that excess mortality is concentrated on three specific causes of deaths (ischemic heart diseases, mostly heart attacks; diseases related to excessive alcohol consumption; and vehicle injuries) that jointly account for no less

¹³ Christensen et al. (2008) use a longitudinal survey of the entire Danish 1905 cohort from 1998 to 2005 to assess the loss of physical and cognitive independence in the age range of 92 to 100 years. Multiple functional outcomes were studied, including independence (defined as being able to perform basic activities of daily living without assistance) and having a MiniMental State Examination score of 23 or higher. In the aggregate, the 1905 cohort had only a modest decline in the proportion of independent individuals at the four assessments that took place between age 92 and 100 years: 39%, 36%, 32%, and 33%, with a difference between the first and the last assessment of 6%. For participants who survived until 2005 (meaning one hundred years old), however, the prevalence of independence was reduced by more than a factor of 2, from 70% in 1998 to 33% in 2005. Similar results were obtained for the other functional outcomes. Christensen et al. (2008) argue that the discrepancy between the population trajectory and the individual trajectory is caused by increased mortality among dependent individuals. For the individual, long life brings an increasing risk of

Subjective health and quality of life are worse, and depression higher, for those who leave the labor market early.

loss of independence. For society, mortality reductions are not expected to result in exceptional levels of disability in cohorts of the very old. But at the macro level, due to the developing shape of the population pyramid as a result of overall population aging, the share of the population in need of elderly long-term care is increasing while lower average family sizes reduce the share of elderly people who can rely on family care.

¹⁴ For instance, investigating the relationship between the choice of workforce participation or non-participation and physical and psychological well-being among 1339 participants over 55 in the Americans' Changing Lives Survey (which oversampled in the

than 78% of the causal retirement effect (while accounting for only 24% of all deaths in the sample). In fact, Kuhn et al (2010) estimate that 32.4% of the causal retirement effect can be directly attributed to smoking and excessive alcohol consumption alone.

Beyond the extra leisure time and the lower stress levels but higher health and mortality risks often associated with being retired, there are manifold influences of labor market exit on subjective wellbeing levels. On the one hand, a key reason for the prominence of voluntary job loss among older workers may be the higher sense of subjective well-being (or quality of life) associated with having the choice to decide one's own labor market status. While employed people generally record higher subjective well-being levels than those who are no longer active, among the latter group those persons who had some degree of agency and control over their labor market exit clearly record higher levels of well-being.¹⁴ By contrast, being forced out of the labor market and into early retirement tends to lead to lower levels of subjective well-being. Analyzing 1167 questionnaires of employed, unemployed and retired British men and women aged 50-74, and distinguishing between those voluntarily lacking employment (such as those who had voluntarily retired early) and those whose lack of employment was imposed (e.g. those forced to retire early), Warr et al. (2004) found that the ability to choose one's current role is significantly associated with higher subjective well-being. In addition, in a study of over 15000 people in 11 countries, Waginger (2009) found that subjective health and quality of life are generally lower, and depression symptoms higher, for those who left the labor market early, even after controlling for those who left early because of health problems. Waginger also reports that forced early exit is associated with still lower levels of well-being than chosen early exit.

Moreover, another strong rationale for activating older workers is that early retirement also appears to lead to a form of cognitive deterioration that has been labeled 'mental retirement.' Rohwedder and Willis (2010) report that cross-nationally, retirement is associated with significant cognitive decline, as the likely result of the fact that retirees on the whole tend to live less cognitively stimulating lives in retirement as compared to working lives. Suggesting a causal argument from retirement to cognitive decline at the macro-level, Rohwedder and Willis (2010) show that countries with a more permissive early retirement scheme do not just have fewer older workers working. They also record lower average cognitive scores on word recognition tests for this age group. However, there are some indications that this cognitive effect of labor market exit into retirement may not

be uniform. Studying the link between retirement and cognitive development, De Grip et al. (2012) find that retired persons face greater declines in information processing speed than persons who remain employed. But, interestingly, retirees' cognitive flexibility declines less, and this effect persists for six years after retirement. These two opposite effects of retirement on cognitive development are comparable to those of a five to six-year age difference. De Grip et al. (2012) suggest that these two opposite effects can be explained neither by a relief effect (after being employed in low-skilled jobs), nor by changes in lifestyle. And when controlling in addition for changes in blood pressure (which are negatively related to cognitive flexibility), the authors still find lower declines in cognitive flexibility for retired persons. De Grip et al. argue that since the decline in information processing speed after retirement holds particularly for low educated persons, re-activating these persons after retirement could lower the social costs of an aging society. This clearly provides an extra rationale for keeping these older workers in the labor market under cognitively stimulating working conditions, but also for promoting various active forms of being retired, such as social participation to voluntary work. More radically, it also provides a rationale for promoting a second form of active aging: un-retirement.

One recent dimension of very active aging deserves a special mention: the phenomenon of un-retirement among silver workers. Un-retirement is a little studied phenomenon that regards retired workers who go back to the labor market after having already retired. As such un-retirement is a distinct concept from partial retirement (which regards currently working workers leaving the labor market in part). In a study of older workers in the USA, Hardy (2006) finds that only half of all older workers experience retirement as a once-and-for-all withdrawal from full-time employment. The other half phases into full retirement via partial retirement (fewer hours worked), bridge jobs (lower paid jobs, different from previous career jobs) or un-retirement. Hardy finds that the latter phenomenon, un-retirement, is most common among retirees in their early and mid-50s, and it tends to happen mainly within the first two years of retirement. On average, American un-retirees stay un-retired for four years and mainly involve bridge-type jobs paying lower wages and requiring fewer working hours than the previously held jobs, most often in self-employment. In a first-ever study on European data, Pettersson (2011) studies un-retirement (similarly defined as the extent of re-entry into the labor force) in Sweden for already fully retired persons aged 56 and above between 1994 and 2007. He finds un-retirement to be significant, though smaller in scale

Use it or lose it: cross-nationally, retirement is associated with significant cognitive decline.

60+ group), Herzog et al. (1991) found that it was not the amount of work that affected the well-being of retirees, but the choice of current role (i.e. being employed or retired). Those people whose current employment (respectively retirement) status was personally preferred showed higher levels of well-being than those whose current role was imposed. The ability to retire voluntarily was associated with higher life satisfaction and less cognitive decline than exiting the workforce involuntarily. Even if the latter findings were statistically significant for the over-65s only, the results showed consistency in so far as the feeling of control over one's choice was related to higher health and well-being.

than appears to be the case in the USA (the only other country where un-retirement was studied): up to 14 percent of the stock of fully retired Swedes actually go back to work at least once during their spell of retirement. And these un-retirees, most of whom are men, then tend to work, on average, for almost 3 years. Pettersson (2011) finds that the likelihood to unretire is negatively related to the states of being female; being older among the retired; being welfare-dependent; having been born outside Sweden; having low education; having higher pension income; and being married to a spouse that has retired. Un-retirement appears to be a lifestyle decision rather than a decision driven by financial need. Once retired, re-entry to the labor market tends to happen as a result of voluntary choice rather than from economic necessity.

CONCLUSIONS AND POLICY IMPLICATIONS

The review of the academic literatures in economics, social policy, sociology and public policy has provided key elements of policy design and lifecycle targeting for the preemptive paradigm in social policies. This paradigm aims to reorient social policies toward ‘preparing’ individuals to adapt to changing working conditions and social risks rather than to respond post hoc by ‘repairing’ any social problems caused by market failure, social misfortune, poor health or prevailing policy inadequacies. By addressing, indeed preempting, a wide array of social problems in their infancy, this paradigm can be key to boosting the fiscal foundations and long-term resilience of aging social security systems. This also points to the need for adopting a lifecycle perspective, whereby current expenditures through preventive social policies can cause major cost savings later on in the lifecycle of those affected. A key general policy message is that high-quality, publicly subsidized early-life child care and education programs have enormous potential for boosting the effectiveness of social policies in anticipating and preventing a wide array of social problems in ways that save public resources in the long run and improve equality of opportunity for all. The best available evidence from key US pilot programs on the impact and socio-economic costs and benefits of well-designed early childhood programs that involve aspects of education, care and family environment augmentation shows that the boost in human capital in the form of various cognitive and noncognitive skills can have lifelong beneficial consequences not just for the individual involved (private returns), but crucially also for society (social returns).

Longitudinal analyses have followed the members of control and experimental groups (initially very young children) over the course of their life time as they subsequently attained school age, high school age, and subsequently later on in the labor market. They cumulatively, this body of research supports a strong policy prescription. Such early-life policy interventions can be a major boost for equality of opportunity by leveling the playing field especially for citizens born in disadvantaged class and family environments (Vanhuysse 2014; 2015b). But importantly, even when viewed from a purely economic point of view, these programs constitute both an efficient use of tax revenues (the public finance constraint) and a massive boost for the future fiscal foundations of pensions health, longterm care and other social security programs that are near-certain to expand in aging welfare states in future decades (the demographic constraint). In sum, preemptive early intervention policies can achieve significant and long-lasting effects throughout the subsequent lifecycle. They can be very high value for money when their cost is compared to the wide range of benefits they provide both to the individuals concerned and to societies.

High-quality, subsidized early-life education interventions are the quintessential preemptive social policy. Much of the substantial social returns to early-life investment comes in the form of lower levels of a whole range of lifecycle social ills that would be much more costly to treat post hoc. Compared to randomly assigned controls, participants in a number of early childhood education pilot programs across the USA score systematically better on a wide range of variables measuring school readiness, educational achievements and high school graduation rates, and, later on in life, employment rates, welfare dependency, monthly earnings, house ownership, levels of crime and incarceration. But what constitutes quality in such interventions? At least six explicit policy prescriptions follow from the cumulative evidence on early childhood intervention programs (Barnett 2002): (1) Class sizes and child-teacher ratios must be kept low. (2) Teachers must be highly qualified, with at least a bachelor's degree and with specialized training in early education, and must be paid well. (3) Curricula must be intellectually rich and sufficiently broad to address children's developmental needs in all domains. (4) Programs must engage in an active partnership with parents and accommodate their needs, including their needs for childcare. (5) Programs should start no later than age three. (6) Resources should be focused primarily on disadvantaged children. Such high-quality preemptive policy interventions appear to be more effective than interventions later in life, such as class size reduction, job training, and adult learning and literacy programs (Carneiro and

Heckman 2003; Heckman 2000; 2013). While early childhood intervention programs may seem expensive in absolute terms, they are also cost-efficient once we incorporate the wide range of future benefits that they yield, both to individual participants and to society at large.

Another key policy lesson is that individual life chances depend not just on cognitive traits and skills but in equal measure on 'soft' behavioral and personality traits such as socio-emotional learning, perseverance, motivation, and self-confidence in learning and task completion (Rowan, 2011; Heckman and Kautz, 2012). In fact, cognitive and noncognitive skills are about equally predictive of later-life socio-economic outcomes relevant to social security, such as teenage pregnancy, incarceration, high school and college graduation, daily smoking behavior, and lifetime earnings (Heckman 2013: 13). This points to the need to incorporate soft skills more explicitly into preemptive intervention programs throughout the early life stages. But it also has a bearing on how policy design can be adjusted for greater effectiveness during primary, middle and high school stages (childhood and adolescence). Among eighth graders and twelfth graders, the strongest negative effect on later-life outcomes, such as high school graduation, postsecondary degree graduation and labor market earnings at age 26, are due especially to persistently low math scores and to persistent learning behavior problems (Farkas 2011).

From a policy intervention perspective, however, a key additional insight is that cognitive skills tend to be already relatively crystallized (hence little responsive to policy intervention) relatively early in life. In contrast, noncognitive skills are malleable and responsive to well-designed policy intervention much longer - until at least late adolescence (Heckman and Kautz, 2012; Dweck, 2012, 2013). As Heckman (2013: 38, 126) notes, whereas cognitive skills solidify around age eleven, as a consequence of the slowly developing prefrontal cortex (which regulates judgment and decision-making behavior), personality traits are malleable much longer, until the mid-twenties. In other words, as children age, preemptive policies should shift from a focus on cognition, problem-solving and school readiness in the early years toward a stronger focus on grit, perseverance, individual belief and self-efficacy in later primary, high school, and adolescence ages.

At the other end of the lifecycle, a key preemptive approach is to boost the skills and physical and mental fitness levels of older workers and young-old citizens as much as possible through active ageing policies specifically aiming to reduce early retirement, prolong working lives, and to prevent as much as possible cognitive and wellbeing decline. To a surpris-

ingly a large degree, the mere fact of being (or staying) active is important in this respect. A concrete model of how to translate these concerns into public policy goals and dimensions is the European Centre Vienna's (2013) Active Aging Index. This is a four-domain, 22-dimensional indicator for 27 countries. It includes four core dimensions: (1) elderly workers' employment across four age categories (55-59, 60-64, 65-69 and 70-74), (2) a participation in society domain across four dimensions (voluntary activities, care for children and grandchildren, care for adults, and political participation), (3) an independent, healthy and secure living across six domains (physical exercise, access to health and dental care, independent living, financial security, physical safety, and lifelong learning), and (4) a 'capacity and enabling environment for active aging' domain across six dimensions (remaining life expectancy at age 55, share of healthy life expectancy at age 55, mental wellbeing, use of ICT, social connectedness, and educational attainment). These four domains and 22 dimensions provide as many clear, measurable targets for preemptive public policies to focus on in an attempt to activate and prepare the older segment of the workforce and the young-elderly in retirement.

In sum, it is necessary to further developing the emerging paradigm of preemptive social policies, as envisaged by CISS. The core idea of such a new paradigm ought to be to shift from the short to the long term in social policy design, to come up with policies that are proactive rather than reactive to social problems and needs, and to include multiple dimensions of inequality and inequity beyond income, including, but not limited to, health, poverty, and information. Such policies hold great potential in terms of fiscal savings and population health. Future research avenues could fruitfully include efforts to: (1) widen the list of knowledge-based preemptive social policies with proven success records, (2) widen the domains of the preemptive economics paradigm to include all dimensions of social security, (3) establish more clearly the political economy foundations and micro-behavioral mechanisms that are most likely to be conducive to the successful implementation of preemptive social policies, and (4) develop preemptive social policy prescriptions tailor-made to the specific budgetary, demographic and socio-economic constraints of various individual CISS member states.

Healthcare: New challenges and new diseases

Illness makes one appreciate
the luxury of health;
even as hunger, satiety;
and work, rest.

Heraclitus

In terms of healthcare, we are confronted by an entirely new litany of challenges. Population aging, as the result of lower birth rates and increased life expectancy among the over-60 population, further complicates a healthcare sector faced with a highly complex epidemiological scenario in which non-communicable diseases are on the rise. This context makes providing affordable and quality healthcare services to every member of society more challenging than ever.

Additionally, there is international consensus on the relevance of two challenging goals. The first involves challenging nations to provide universal access to health care coverage. This includes providing timely and proper medical care, in addition to affordable and high-quality medicines, regardless of an individual's employment status (PAHO/WHO d). As part of the new UN's Sustainable Development Goals adopted in September 2015, the second objective involves States committing to advancing towards guaranteeing good health and the promotion of well-being for all people before 2030 (United Nations, 2015b).

These goals represent an enormous effort to address the current demographics dynamic. In the Americas, there are nearly 1 billion inhabitants whose life expectancy is 74.6 years in Latin America and the Caribbean and 79.3 in Canada and the US. These figures are in stark contrast to the average life expectancy of 45 years in 1950 (CISS).

The progress made by 20th-century public policy places new demands on health care, some of which are rooted in old age and others caused by unhealthy lifestyle choices. The entire epidemiological context has shifted

from a scenario which was principally centered on communicable diseases, towards one involving diseases which are increasingly more expensive and that involve longer treatment regimes. Additionally, the financial and economic crises have exerted more and more pressure upon health care budgets in the public sector.

TABLE 1. Aging in selected countries of Latin America and the Caribbean

Incipient aging	Moderate aging	Moderately advanced aging	Advanced Aging	Very advanced aging
Belize Bolivia Guatemala Haiti Honduras Nicaragua Paraguay	Colombia Ecuador El Salvador Dominican Rep. Panama Peru	Bahamas Brazil Costa Rica Mexico St. Lucia	Argentina Chile Uruguay Trinidad y Tobago	Barbados Cuba

Source: Centro Latinoamericano y Caribeño de Demografía (CELADE).

The public policies pursued during the 20th century were highly effective. In the Americas, for instance, infant mortality rates for children under five dropped precipitously. Additionally, efforts to control, eliminate and eventually eradicate many communicable diseases were highly effective.

These two indicators reflect the efficacy of public policy and public outlays on healthcare. The majority of infant mortality cases are preventable. According to the ECLAC, Latin America and the Caribbean reduced under-5 infant mortality rates by nearly two-thirds – dropping from 54 deaths per 1000 live births to 18 between 1990 and 2013 as per the Millennium Development Goals.

A wide spectrum of public health initiatives, timely healthcare protocols, the promotion of breast-feeding (in addition to being the best nutritional alternative for newborns, it immunizes them) and vaccination programs¹ have resulted in tangible gains across the board. The region almost completely eliminated measles at the beginning of the new millennium, its latest achievement in a series which included, inter alia, the regional eradication of polio, rubella, diphtheria, *Haemophilus influenzae* type B and hepatitis B through vaccination programs (PAHO, 2013).

¹ The PAHO/WHO initiative entitled Integrated Management of Childhood Illness (IMCI) involves measures designed to combat pneumonia, diarrhea, malaria, tuberculosis, dengue fever, meningitis, child abuse, eating disorders and preventable diseases via vaccinations, in addition to complications related thereto.

According to UNICEF, vaccination coverage within Latin America and the Caribbean exceeds that within high-income nations. The high coverage rates are the product of routine vaccination programs, the introduction of new vaccinations and a legal framework regulating childhood vaccinations, considering resources involved as public interest.

The success of these programs is also the result of public-private sector alliances, wide-reaching national commitments, and international as well as international and bilateral cooperation initiatives. The region's willingness to launch regional immunization strategies has further bolstered the impact.

Although the advances are tangible and significant, successful measures designed to address non-communicable diseases need to remain a foot. Additionally, it is necessary to focus on less-addressed diseases and diseases which are transmitted by vectors such as HIV/AIDS, tuberculosis, hepatitis and sexually transmitted diseases, in addition to epidemics.

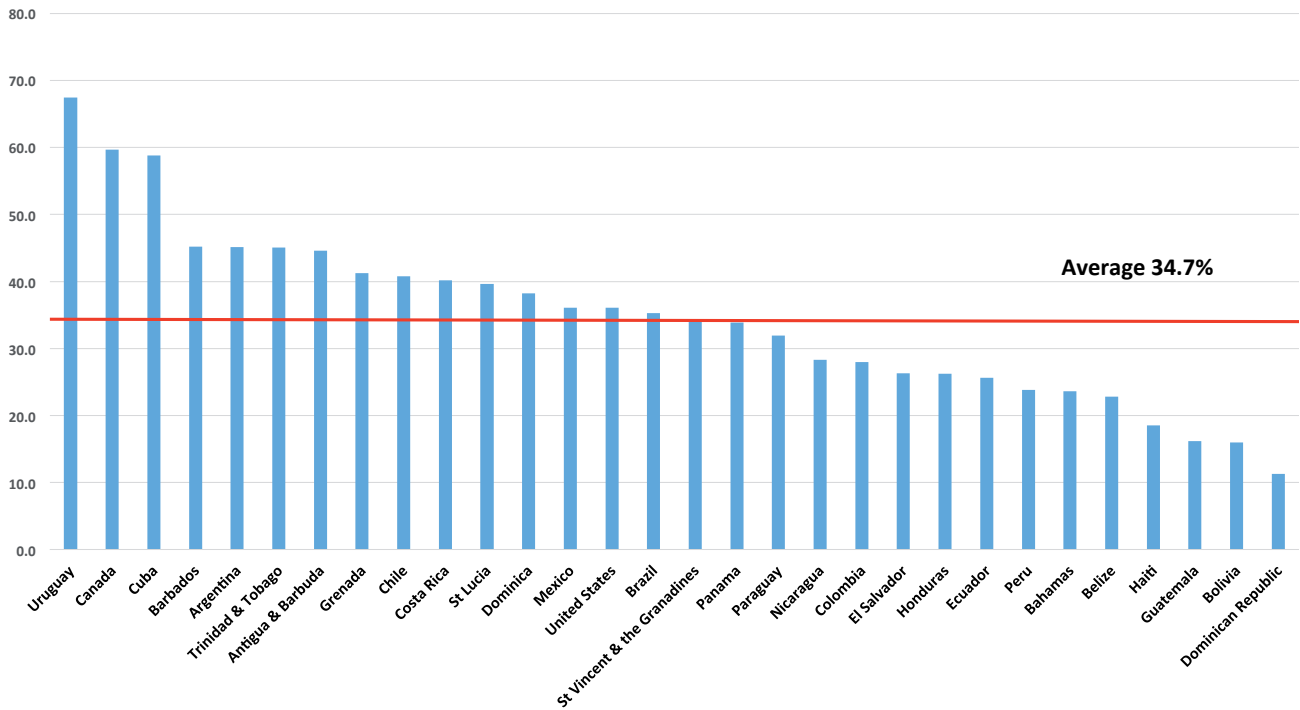
THE NEW EPIDEMIOLOGICAL SCENARIO: THE NON-COMMUNICABLE DISEASE STORM

Progress made against communicable diseases have resulted in increased life expectancy. Inactive lifestyles and a higher consumption of ultra-processed food and drink products have changed the epidemiological profiles. Diseases known to involve longer duration, such as chronic and degenerative conditions, are increasingly seen among younger populations. This dynamic is not limited to high-income nations. It is also, worryingly, increasingly seen in medium and low-income nations.

In North America, mortality due to non-communicable diseases is 85%, while communicable diseases rate is 6% and 9% due to injuries. In Latin America and the Caribbean, the same figures are 75%, 15% and 10%, respectively (CISS). According to the Pan American Health Organization (PAHO/WHO), more than a third of all deaths due to non-communicable diseases (37%) involve the premature death of individuals under the age of 70 (Figure 2).

PAHO data also indicates that more than 200,000,000 individuals within the region suffer from a non-communicable disease. Many of these patients suffer from several diseases, a fact which only served to complicate the formulation of effective treatment and care regimes. Today, non-communicable diseases causes three out of every four deaths in the Americas. This translates into 1.9 million deaths per year due to cardiovascular disease, 1.1 million due to cancer, 260,000 due to diabetes and 240,000 due to chronic respiratory diseases (PAHO/WHO, 2011).

FIGURE 2. Deaths in the CISS region due to noncommunicable diseases



Source: Inter-American Observatory of Social Protection of the CISS.

According to the Inter-American Observatory of Social Protection of the CISS, the most frequent causes of death in North America are ischemic heart disease, stroke, lung cancer, Alzheimer’s, chronic obstructive lung disease and diabetes. In Latin America and the Caribbean, heart disease, stroke and diabetes are also among the leading causes of death.

Non-communicable diseases comprise the majority of avoidable healthcare costs. They comprise a complex public health problem and hinder economic development. To place their impact into context and illustrate the enormous amount of economic resources which might be saved, a joint Harvard-World Economic Forum study estimated that if left unchecked, non-communicable diseases will end up costing low and middle-income nations USD\$500 billion per year, which amounts to 4% of their GDP (Bloom, 2011).

It is estimated that within Latin America and the Caribbean diabetes alone represents an annual outlay of USD\$65 billion. On average, treating a diabetic patient within the CISS region cost between USD\$300 to over USD\$2,800.

TABLE 2. Ten leading causes of death in North America, Latin America and the Caribbean

North America

Causes	Deaths	Relative percent
1. Coronary disease	619,299	35.9%
2. Stroke	191,463	11.1%
3. Lung cancer	182,692	10.6%
4. Alzheimer's disease	175,300	10.2%
5. Chronic obstructive lung disease	167,552	9.7%
6. Diabetes	94,934	5.5%
7. Lower respiratory tract infections	93,871	5.4%
8. Colon cancer	72,887	4.2%
9. Cardiovascular disease	61,313	3.6%
10. Other diseases	65,936	3.8%
Deaths due to 10 leading causes of death	1,725,247	100%

Latin America and the Caribbean

Causes	Deaths	Relative percent
1. Coronary disease	466,663	24.1%
2. Stroke	322,737	16.6%
3. Lower respiratory tract infections	193,177	10.0%
4. Diabetes	166,421	8.6%
5. Natural disasters	183,317	9.5%
6. Domestic violence	149,502	7.7%
7. Chronic obstructive lung disease	130,308	6.7%
8. Chronic kidney failure	113,381	5.8%
9. Automobile accidents	109,561	5.7%
10. Cirrhosis	103,487	5.3%
Deaths due to 10 leading causes of death	1,938,554	100.0

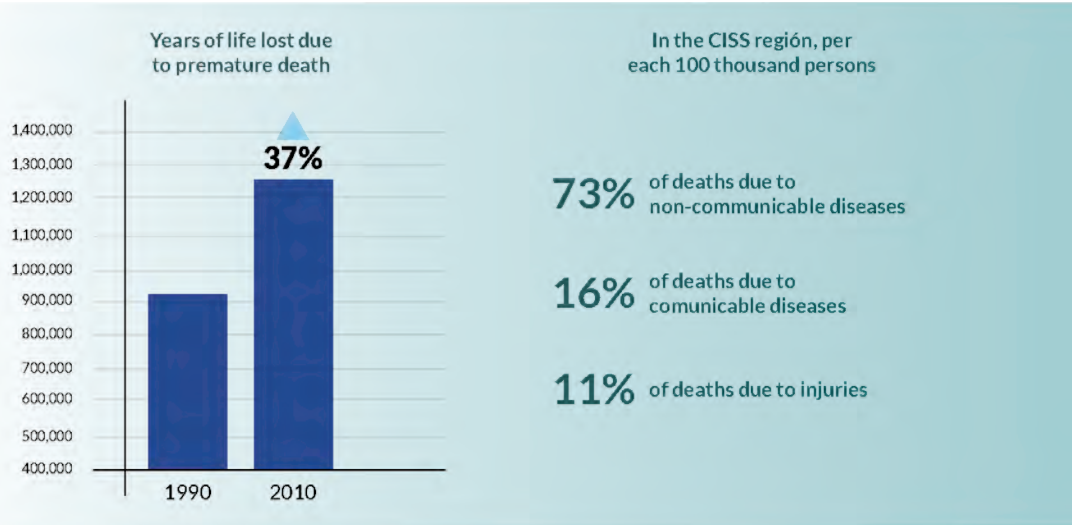
Source: Inter-American Observatory of Social Protection of the CISS.

In the US, a study reported that diabetics missed more than eight days per year of work. This translates into 14 million sick days. Their non-diabetic counterparts missed 1.7 days on average (US Department of Health and Human Services, 2003).

Considering that 1.5 million persons die annually before reaching the age of 70, the burden of premature death for noncommunicable diseases complicates development. The number of years lived with disabilities and lesser activity that generally precede death for these illnesses implicate a heavier social and economic burden for families, communities and countries.

At the CISS region, 10.7 years of healthy life are lost due to premature death and disability. Between 1990 and 2010, the number of years lost due to premature death increased 37%.

FIGURE 3. Years of life lost due to premature death attributable to non-communicable diseases



Source: Inter-American Observatory of Social Protection of the CISS.

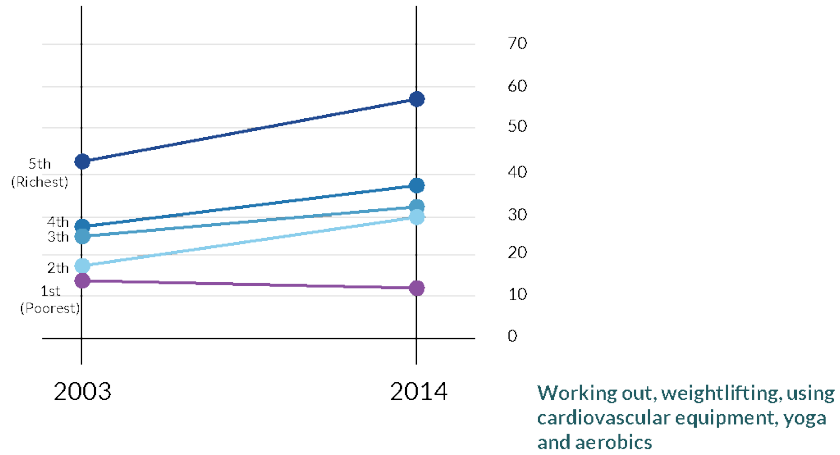
Additionally, the population living in poverty suffers an even higher impact from non-communicable disease. According to PAHO/WHO estimates, 30% of premature deaths due to stroke and related diseases within the region are concentrated among 20% of the poorest population, whereas only 13% of said premature deaths occur among the top 20% of earners (PAHO/WHO, 2012a).

Economic inequalities are further reflected in an individual's health and access to services. Variances in exposure to health-risk levels are associated with poverty, the decline of the environment, dangerous work conditions and other risk factors related to behavior.

The principal causes of non-communicable disease are our ascent of risk factors related to lifestyle decisions such as, inter alia, smoking, unhealthy diet, lack of exercise and the consumption of alcohol. Exogenous risk factors include globalization, urbanization, economic and demographic indicators, the private sector, culture and environment. Endogenous factors that impact an individual's health include inequality, poverty, education, employment and work conditions, ethnicity, gender and lifestyle (PAHO/WHO, 2012a). When combined with population aging, these factors contribute to increases in noncommunicable disease incidence and prevalence rates.

FIGURE 4. Average weekly exercise hours for US full-time workers, by income level

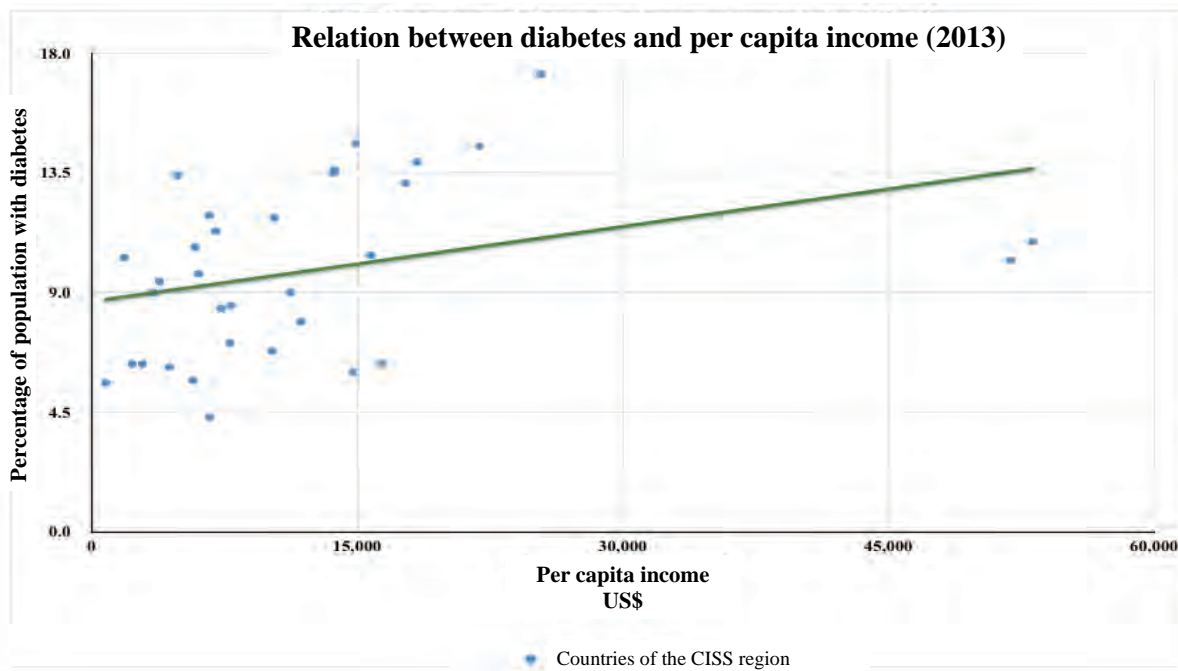
Average time spent exercising* each week full-time workers, by income quintile, minutes



Source: American Time Use Survey, The Economist (2015).

To further illustrate, the following figure demonstrates that diabetes is concentrated in medium and low-income nations, which are experiencing higher incident rates.

FIGURE 5. Relation between diabetes and GDP within CISS region

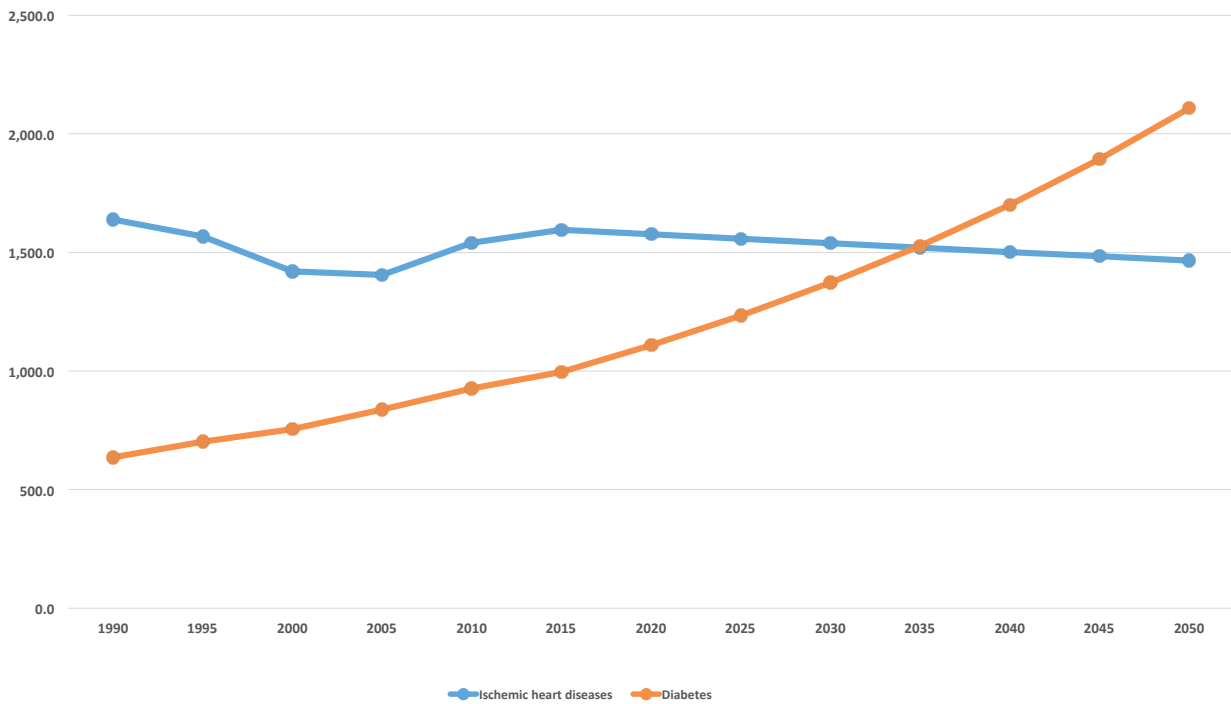


Source: Inter-American Observatory of Social Protection of the CISS.

Within the region, heart disease is the leading cause of death and represents 24% of the total mortality rate in Latin America and the Caribbean, and 36% in North America. According to the PAHO/WHO, women present higher rates of complications due to heart attack than their male counterparts. This correlation is also present in the number of deaths whereas they tend to request assistance from emergency services too late. In some nations, individuals of African descent suffer from higher rates of heart attacks and frequently do not receive timely medical treatment; a factor which leads to higher death rates due to heart attack vis-à-vis their counterparts from other racial or ethnic groups.

While a decrease in cardiac disease is present, diabetes is decidedly on the rise. Should current trends within the Americas continue diabetes will overtake cardiac disease as the leading cause of death by the year 2050.

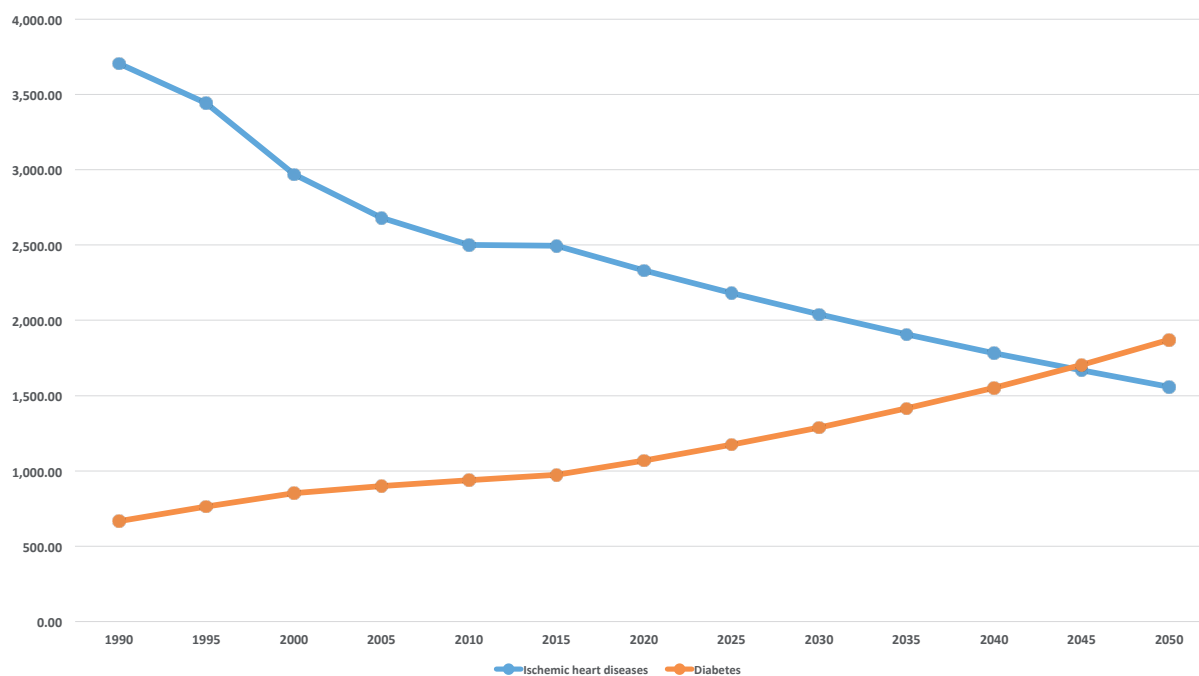
FIGURE 6. Years of healthy life lost due to coronary disease and diabetes during the period 1990-2050, within the CISS region, Latin America and the Caribbean



Note: For ischemic heart disease, historic average of decrease of the disease -8.078 was considered. For diabetes, average growth 11.3.

Source: Inter-American Observatory of Social Protection of the CISS with data of Global Burden of Disease.

FIGURE 7. Years of healthy life lost due to coronary disease and diabetes during the period 1990-2050, within the CISS region, North America



Note: For ischemic heart disease, historic average of decrease of the disease -8.078 was considered. For diabetes, average growth 11.3.

Source: Inter-American Observatory of Social Protection of the CISS with data of Global Burden of Disease.

Diabetes has become one of the leading causes of death and disability. Nearly 62.8 million individuals in the Americas are diabetic according to the latest figures from PAHO/WHO. All things being equal, this figure is set to rocket to 91.1 million by 2030 (PAHO Chile, 2012).

In Latin America, and in particular the Caribbean, diabetes has the highest incidence rates in the world. While in Latin America there are more than 25 million diabetics, a figure which will reach 40 million by the year 2030, in North America and English-speaking Caribbean this statistic may jump from 38 to 51 million diabetics in the same time period.

Chronic kidney disease, primarily caused by diabetes-related complications, is also on the rise within the region. Additionally, in most Central American nations many experts realize the urgent necessity to better understand the scale, causes and strategies for prevention and control chronic kidney disease – which is not associated with diabetes – which is affecting young man working in rural communities. This particular type of kidney disease is having an enormous impact on the social and economic life of the families and health services involved.

RISK FACTORS OF NONCOMMUNICABLE DISEASES

Cardiovascular disease, diabetes, cancer, lung disease and mental disease are fairly incurable. As a result, it is paramount to identify and treat the conditions which are associated with the development of these diseases, whereas they take a terrible toll in terms of years of healthy life lost, drops and productivity and death.

TABLE 3. Leading healthcare risk factors vis-à-vis Preemptive Economics*

1. Risks for dietary risks	<ul style="list-style-type: none"> 1. High sodium intake; High added sugar intake; High red meat intake; High trans fat intake; Low intake of fruits, vegetables, grains, nuts and seeds Low intake of whole grains; Low intake of fiber; Low intake of calcium and milk; Low intake of Omega 3; Low intake of polinsaturated fatty acids (PUFA)
2. Risks for fisiological factors	<ul style="list-style-type: none"> 2. High blood presure 3. Overwight and obesity 4. High blood glucose 5. High colesterol 6. Low bone mineral density
3. Tobacco use	<ul style="list-style-type: none"> 7. Smoking
4. Air pollution	<ul style="list-style-type: none"> 8. Particles in the air PM10 and PM 2.5 mc 9. Indoor air pollution 10. Ozone
5. Alcohol and drug use	<ul style="list-style-type: none"> 11. Drinking alcohol 12. Drug use
6. Physical inactivity	<ul style="list-style-type: none"> 13. Lack of physical activity
7. Injuries	<ul style="list-style-type: none"> 14. Automobile accidents 15. Inter-personal violence
8. Work-related risks	<ul style="list-style-type: none"> 16. Work-related risks
9. Malnutrition	<ul style="list-style-type: none"> 17. Children with low birth weight 18. Iron deficiency 19. Suboptimal breastfeeding 20. Vitamine A deficiency 21. Zinc deficiency
10. Risks due to water and sanitation	<ul style="list-style-type: none"> 22. Non-potable water 23. Sanitation
11. Other environmental risks	<ul style="list-style-type: none"> 24. Lead 25. Radon
12. Sex abuse and violence	<ul style="list-style-type: none"> 26. Sexual abuse of children 27. Family violence

* Risk factors are considered by Preemptive Economics, as per the classification of Global Burden of Disease in 12 components and 27 indicators.

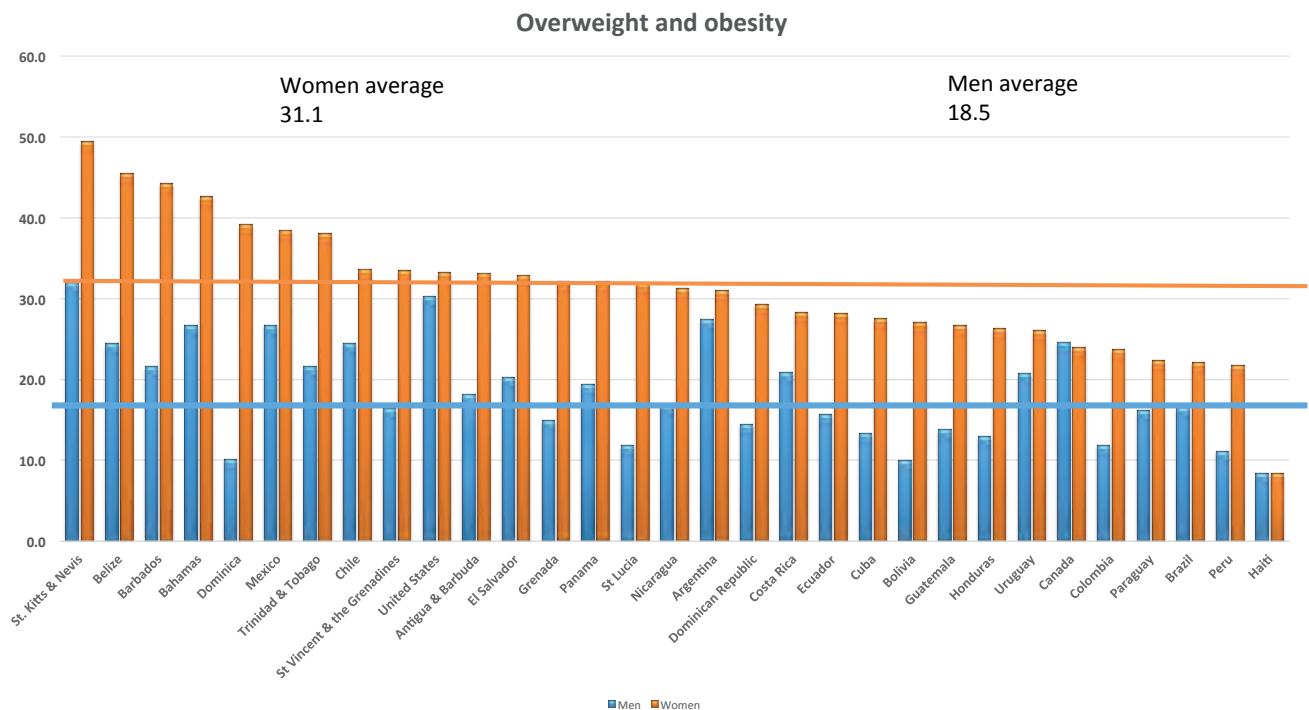
Noncommunicable diseases are among the primary causes of death in the region and are related directly with risks related to nutritional and physiological factors, as well as the consumption of tobacco and alcohol.

The prevalence and incidence of these diseases correlate highly to lack of exercise, an increase supply and consumption of ultra-processed foods containing high levels of saturated fats, trans fats, sugars and salt, in addition to larger portions.

Obesity is a marker for at-risk populations, whereas it is often a precursor to non-communicable diseases such as cardiovascular disease and diabetes, etc. Within the CISS region, obesity levels are increasingly on the rise especially among children and young adults, where one in five adolescents is obese.

According to data from the Inter-American Observatory of Social Protection, 18.5% of men and 31% of women within the region are overweight and obese. This represents nearly half the population, and exceeds estimates made in 2005.

FIGURE 8. Overweight and obesity within the CISS region



Source: Inter-American Observatory of Social Protection of the CISS.

Among school-aged children (ages 5 to 12), obesity and overweight rates have increased rapidly in the last three decades. For example, they have reached 30% in Colombia Ecuador and Peru, while Mexico and the US have surpassed 40%.

Obesity primarily correlates to two trends which are out of control: a shift in the population's eating habits (towards ultra-processed, high-calorie foods that are high in saturated fats, added sugar and salt) and a steep drop in physical activity levels (between 30 and 60% of the population in the Americas do not even meet the low end of exercise standards, such as walking 30 minutes per day).

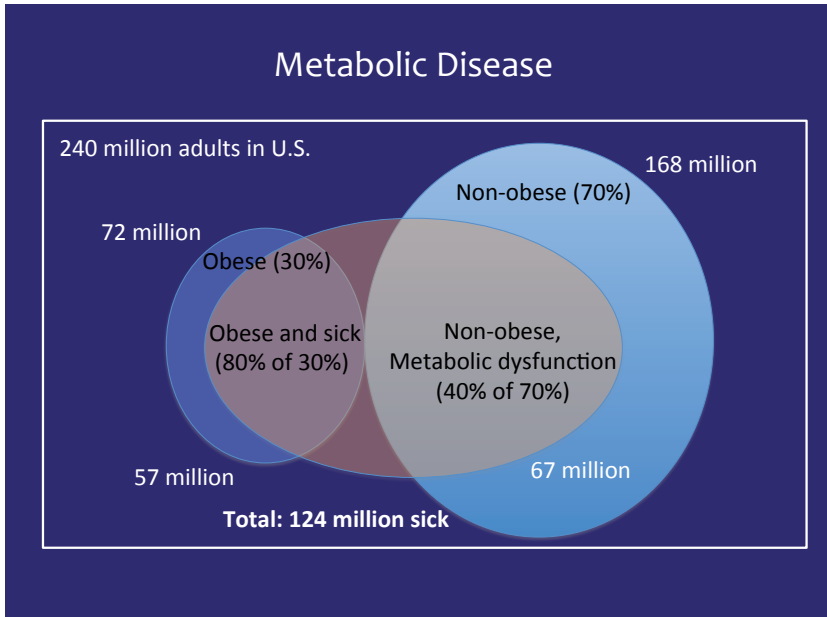
According to PAHO/WHO statistics, Brazil and Mexico are on track to experience an increase in adult obesity rate of between 13% and 17% during the period 2010-2030. It is estimated that this trend will cause these nations \$400-\$600 million per year in additional health-care outlays. Were body mass index rates to drop between 1% and 5% during said period, the savings would amount to between \$100 million and \$200 million.

However, not all obese individuals are ill. As Dr. Robert Lustig (the eminent UC-San Francisco researcher) indicates, patients don't die from obesity. His research shows that 80% of obese individuals in the US are ill; but 40% of individual with normal BMC parameters are also sick. As a result, it is clear that obesity is a marker which comprises an entire gamut of risk factors which are known as metabolic syndrome. These factors interact to cause cardiac disease, cancer, dementia and other illnesses. Metabolic syndrome includes hypertension, dyslipidemia (abnormal levels of fat in the bloodstream) and glucose-level variances, and fatty liver. Eight out of every 10 obese individuals present some or all of these symptoms. Metabolic syndrome, however, is preventable and reversible via the indicated nutritional and exercise regime.

The consumption of salt, unhealthy fats and sugar correlate highly to increase chances of an individual ending up with metabolic syndrome and the concomitant noncommunicable diseases. These components are highly abundant in industrialized, ready to eat or drink, ultra-processed foods (PAHO/WHO, 2015).² The majority of these food products contain little to no real food. Their nutritional value is so poor due to unfair extremely low content of protein and fiber, which is accompanied by high levels of sugar, salt, fats, additives and food coloring. Due to the chemical design of these products, which tends to be extremely pleasing to the palate, the mechanisms in the human brain which control satiety levels are distorted. Clearly, this often leads to excessive consumption levels (PAHO/WHO, 2015).

² Includes a wide spectrum of high calorie foods such as sweet and breakfast cereal, cookies, cakes, soft drinks, fast food, reconstituted animal products and ready-to-eat meals. *Report on ultra-processed foods*, PAHO/WHO (2015).

FIGURE 9. Obese and non-obese populations suffering from metabolic syndrome in the United States



Source: Dr. Robert Lustig, UC-San Francisco (2015).

The ad campaigns used to market these products are extremely well-funded and tend to reflect tactics used by the cigarette and alcohol sectors. The low and middle income markets currently comprise the lion's share of consumption. During the period 2000-2013, per capita sales of these products rose by an astonishing 26.7% in 13 Latin American nations. Conversely, sales for the same products dropped by 9.8% in North America. Soft drinks sales doubled in Latin America during 2000-2013. And according to recent data from the PAHO/WHO, there is a strong correlation between obesity rates and the sale of ultra-processed foods.

The WHO and the World Cancer Research Fund have concluded that soft drinks, high calorie snacks and fast foods cause obesity, diabetes, cardiovascular disease and some types of cancer.

TABLE 4. Daily maximum limit of salt to reduce risk of cardiac disease, diabetes and cancer

<i>Maximum daily intake of salt</i>	
World Health Organization	
Maximum	5 g. per day
American Heart Association	
Maximum	1.5 g. per day

TABLE 5. Daily maximum limit of added sugar to reduce risk of cardiac disease, diabetes and cancer

<i>Maximum daily intake of sugar</i>	
World Health Organization	
It should not exceed 5%-10% of calories consumed per day	
Adults	25 - 50 g. or 6 - 12 teaspoons
Children	19 - 38 g. or 5 - 9 teaspoons
American Heart Association	
Adults	24 - 36 g. or 6 - 9 teaspoons
Children	12 - 16 g. or 3 - 4 teaspoons

TABLE 6. Sugar and salt reference levels in selected products

Arizona tea can, 680 ml.	Frosted flakes 1 ½ cups, 120 g.	Apple juice, Del Valle Brand bottle, 413 ml.	Coca-cola can, 335 ml.
Sugar 78 g. or 19.5 teaspoons	Sugar 48 g. or 12 teaspoons	Sugar 45 g. or 11 teaspoons	Sugar 37 g. or 9 teaspoons
Salt 0 g.	Salt 45 mg.	Salt 96 mg.	Salt 78 mg.
Gatorade bottle, 600 ml.	Yoghurt Danone liquid bottle, 250 ml.	Hershey's chocolate milk carton, 236 ml.	Snickers 52.7 g.
Sugar 36 g. or 9 teaspoons	Sugar 32 g. or 8 teaspoons	Sugar 30 g. or 7.5 teaspoons	Sugar 28 g. or 7 teaspoons
Salt 280 mg.	Salt 98 mg.	Salt 0 g.	Salt 125 mg.
Vitamin Water, bottle, 500 ml.	Frutsi children's drink 250 ml.	Oreo cookies 6 cookies, 52 g.	All Bran Cereal 1 ½ cups, 120 g.
Sugar 27.5 g. or 7 teaspoons	Sugar 22 g. or 5.5 teaspoons	Sugar 21 g. or 5 teaspoons	Sugar 21 g. or 5 teaspoons
Salt 0 g.	Salt 40 mg.	Salt 280 mg.	Salt 240 mg.
Hamburger with mayonnaise, mustard, ketchup, pickles and American cheese on a bun	Branfrut cereal bar 48 g.	Quaker instant oats, nuts/raisin/dates flavor 1 packet, 37 g.	Caesar salad with low- calorie dressing, croutons and Parmesan cheese
Sugar 15 g. or 4 teaspoons	Sugar 13.5 g. or 3.7 teaspoons	Sugar 12.5 g. or 3 teaspoons	Sugar 9 g. or 2 teaspoons
Salt 960 mg.	Salt 160 mg.	Salt 190 mg.	Salt 304 mg.

Source: Prepared by the editors with information of labels of products as well as FatSecret.

PUBLIC POLICY ON THE MOVE

The epidemiological and demographic profile of the CISS region necessitates new strategies, programs and resources if it is to maintain the important achievements gained during the 20th century. These three aspects are also needed to combat long and expensive diseases which imply providing universal access to high quality, timely and precise healthcare services.

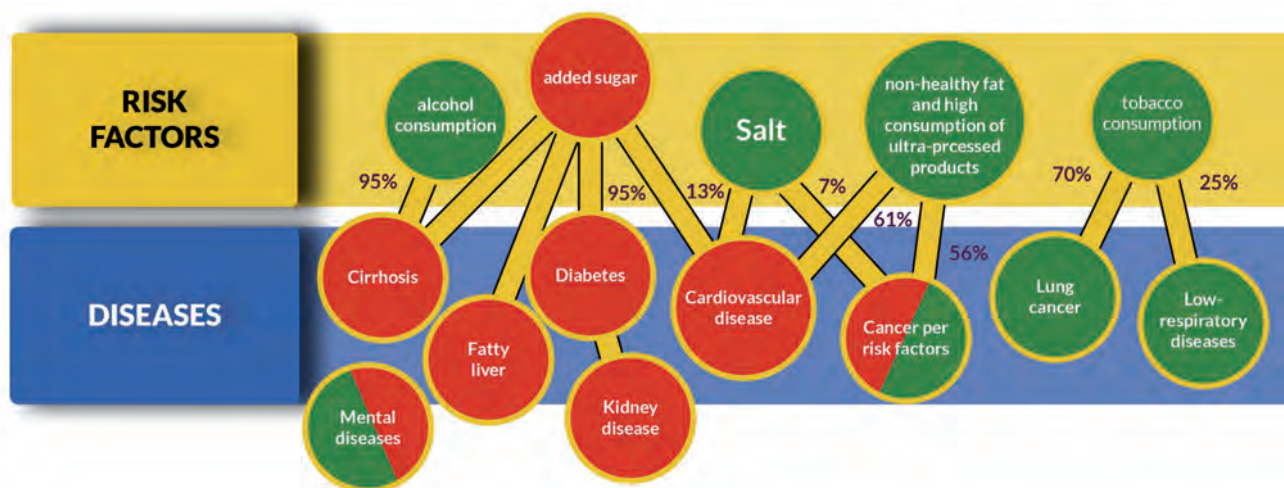
Universal health care coverage is not solely comprised of quality, safe, effective and affordable pharmaceuticals. It involves ensuring that the majority of diseases are avoided. This, in turn, involves more than diseases which can be addressed via vaccines. Achieving universal health care coverage will involve a particular focus on non-communicable diseases, whereas they entail high social and economic costs capable of destabilizing all the progress made by society in the last century. As a result, it is fundamental to define and implement multi-sector public policies and initiatives that address endogenous and exogenous factors. Healthcare must comprise a commitment involving every member of society because it forms the basis of well-being and drives development.

It is fundamentally important to execute initiatives designed to increase the quality of medical care, whereas establishing high standards serves to reduce the mortality rate even as it optimizes public outlays on healthcare. As a result, efforts to improve early detection of non-communicable diseases are more relevant than ever because they have a high degree of potential for cost savings. Additionally, the fight against diabetes, cardiovascular disease, lung disease and cancer may deliver synergies which might be employed in society's battle with other conditions, such as mental illnesses, kidney disease, dental and gum disease and conditions which impact an individual's ability to see.

However, prevention is still going to be the key here. We must not lose sight of the successes gained through vaccination programs. Additionally, any successful measure will involve a high degree of coordination between a wide spectrum of government and private-sector entities from throughout society who deliver actionable healthcare initiatives.

In terms of said actionable initiatives, we have the examples of successful frontline measures such as anti-smoking campaigns, alcoholism intervention programs and foot care for diabetic patients. Additionally, there are examples of successful policies such as food labeling, restrictions on food and drink advertising directed at children, campaigns designed to promote exercise in the workplace and schools, the improvement of workplace conditions and visiting nurse programs for individuals with a non-communicable disease.

TABLE 7. Main risk factors for non-communicable diseases



Source: Inter-American Observatory of Social Protection of the CISS.

Many nations within the CISS region – such as Brazil, Chile, Costa Rica, Ecuador, Mexico and Peru – are working on, or have already launched, regulatory and legislative packages designed to protect children from certain types of food advertising and marketing techniques. These measures are also designed to improve nutrition through school-based programs. Mexico fired the first shot in this battle against soft drinks and fast food through the passage of its Federal tax on these items.

The PAHO/WHO promotes its *Strategy for the Prevention and Control of Non-Communicable Diseases 2012-2015*, which it launched in 2012 in order to reduce premature death rates due to non-communicable disease by at least 25% by the year 2025. It has other initiatives which are underway, in addition to others that are on deck and available for implementation by governments, society and the PAHO/WHO itself. The action plan for its non-communicable disease strategy was formalized in October 2013 and includes an action agenda and tangible goals that involve governments and society as a whole.

One of its initiatives involves promoting exercise. While initiatives such as the SmartSalt Consortium involves public and private-sector resources utilized vis-à-vis tangible goals. Clearly, this framework can be extremely useful and may prove of paramount importance in any multi-entity, multidisciplinary approach to reducing sugar consumption in society. An anti-sugar campaign, at any rate, would do well to take into account the recommendations included in a chapter which appears below. Healthy nutrition is key to avoiding disease and regular exercise is highly relevant when it comes to reducing the risk of heart attacks and strokes.

Employment: A development pillar

I feared to see myself at last
altogether nothing but words,
so to speak – a man who
would never willingly lay hand
to any concrete task.

Plato

Employment necessarily comprises one of the pillars of development. It is as important as education, healthcare, social security and housing. A population with paid employment is able to avail itself of the benefits of a salary that, in turn, allows individuals to improve their quality of life, access to healthcare services and save for old age.

The unemployment rates seen in the CISS region are relatively low, due to the economic growth experienced by Latin America and the Caribbean during 2000-2013. This resulted in tangible reductions in poverty in inequality within the region. Increases in the economically active population have fundamentally triggered the high demand for raw materials and the demographic dividend, though not due to an increase in productivity which is the true engine of sustainable economic growth (IADB, 2015).

Employment was included in the 2000-2015 Millennium Development Goals, as part of the measure to achieve reducing the proportion of individuals earning under \$1.25 per day, as well as achieving full, productive and decent work for all members of society, including women and young adults. Although by 2010 the nations of Latin America and the Caribbean had reduced the number of individuals earning less than one US dollar per day by 50% (CEPAL, 2015b), full time employment and decent work was not achieved for all (UN, 2014).

The post-2015 development agenda, launched in September 2015, includes goal eight “promoting sustained, inclusive and sustainable economic growth, full and productive employment, and decent employment for all”;

through the strengthening of the productive capacity of less developed nations in all sectors through the adoption of policies that raise said “productive capacity, productivity and productive employment, financial inclusiveness, sustainable development of agriculture, grazing and fishing, sustainable industrial development, universal access to affordable, reliable, sustainable and modern energy services, sustainable transport systems and quality and resilient infrastructures” (UN, 2015).

EMPLOYMENT, UNEMPLOYMENT AND THE DEMOGRAPHIC DYNAMIC

Population growth places pressure on the labor market. Due to demographic dynamics, many nations within the region still benefit from the demographic dividend. This requires productive economies and strong job creation in order to absorb the population which enters the job market each year. However, the job market has failed to meet this challenge (CISS).

According to data from the Inter-American Observatory of Social Protection at the CISS, the region’s population grew by 14% during 1990-2012, while the EAP grew by 21.4% and the unemployment rate averaged 7.5%.

A number of factors contribute to working-age individuals being able to find decent and well paid employment. Some of these involve relatively unforeseen situations such as financial crises, while others can be detected and addressed in time through the use of preemptive, multi-entity and multidisciplinary approaches in, for example, the education and health-care sectors.

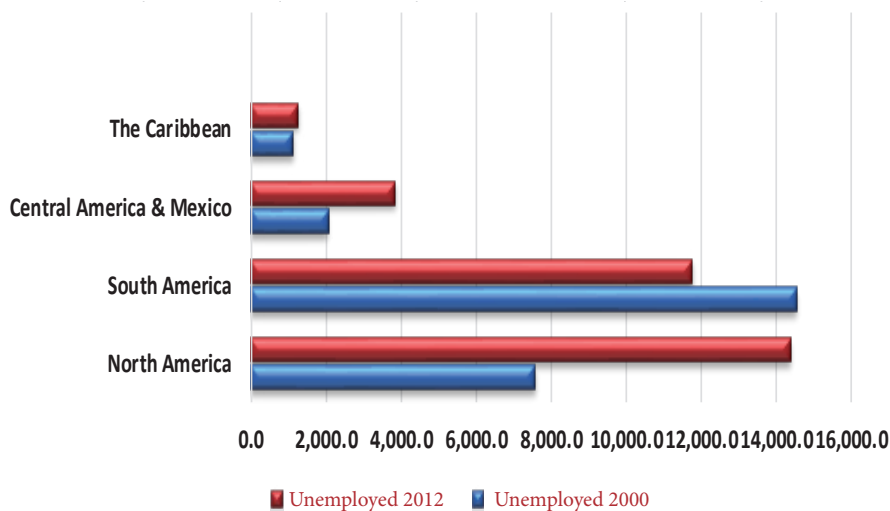
Productive and growth-oriented economies are needed to ensure that the population of young working-age workers are incorporated each year. These types of economies are also capable of providing jobs for older adults who use working are longer and generating well-paid, quality employment for individuals who are laid off due to technological advances. Additionally, the labor market is currently confronting problems such as the economic crisis which has had an impact on job creation. The recent series of economic crises have also had a direct effect on an individual’s capacity to generate and maintain jobs, in the case of young as well as adult workers (ILO, 2013).

The ILO has indicated that the labor market in Latin America and the Caribbean during 2014 was marked by the drops in economic growth and job creation rates. Urban employment rates dropped during the last two years and track at 56.2% during 2014. It is expected that the urban unemployment rate will rise from 6.1% in 2014 to 6.3% in 2015 (ILO, 2014a).

Additionally, ILO data indicates the 202 million individuals were unemployed in 2013, which represents an increase of 5 million vis-à-vis 2012. Should this trend continue, 215 million individuals would be unemployed by the year 2018 (ILO, 2014b).

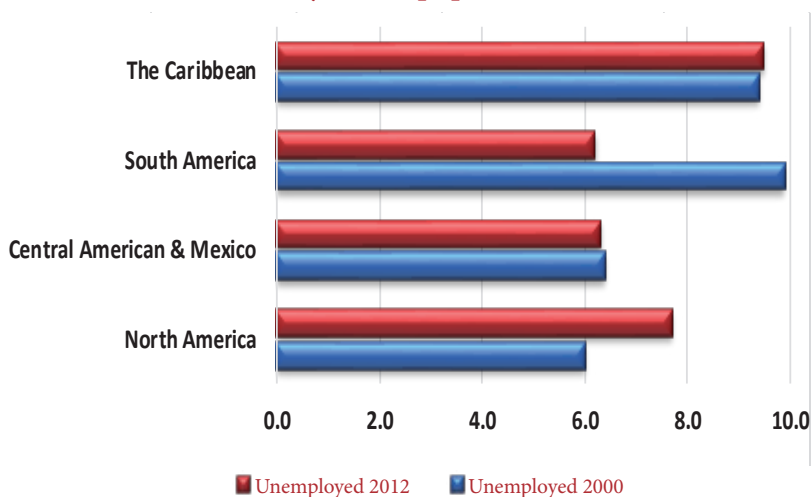
According to the ILO and ECLAC, the drop in labor participation rates observed in 2014 should not continue on the same scale during 2015, a factor which when combined with the drop in employment rates should cause an increase in open unemployment along the lines of levels seen during 2013 (ILO/CEPAL, 2015).

FIGURE 10. CISS unemployed, in thousands



Source: Inter-American Observatory of Social Protection with World Bank data.

FIGURE 11. CISS unemployed as percentage of economically-active population, in thousands



Source: Inter-American Observatory of Social Protection with World Bank data.

YOUTH EMPLOYMENT

Youth comprise one of the most vulnerable sectors within society in terms of unemployment. The ILO has indicated the importance of integrating young people into the workforce. During 2013-2014, approximately 74.5 million men and women under the age of 24 were unemployed, the international youth unemployment rate rose above 13%, or more than twice the general international unemployment rate (ILO, 2014b).

Working age youth confront a set of challenges which is very different from that faced by adults. They generally enter into the job market via low-quality work for which they are poorly paid. However, their participation is highly relevant whereas it is they who provide the base of the entire social security system in terms of pensions. This is why employment programs have been created which specifically target young adults. According to the ILO, “Young people are generally the first to lose their job positions in times of economic crisis and the last to obtain employment when the economy recovers... a situation which is worsened by the number of youth involved in poorly paid and low quality employment, with indefinite and insecure labor contracts, including the informal economy” (ILO, 2010).

According to United Nations data, as a result of the 2008-2009 crisis, the probability of young adults being unemployed was three times higher than that of adults (United Nations, 2012). In 2010, the adult unemployment rate was 4.5%, while the young adult rate was 12.6% (ILO, 2012), and many youth who are working, particularly in low and medium income nations, were underemployed (World Bank, 2012).

One of the causes of youth unemployment is the fact that the education on offer generally does not coincide with the needs of the labor market. This translates into firms not being able to hire trained, specialized and up-to-date workers to meet their. Additionally, no strategy for addressing this issue has been put forward by governments, institutions of higher learning and the private sector. As a result, young adults attempting to enter the job market are less likely to find a job position which lines up with their skill set.

The disconnect between supply and demand in the employment sector has resulted in many young adults being overqualified for many positions and forced to accept jobs far below their skill set (ILO, 2011); this is to say, they are underemployed. Although underemployment primarily affects young adults, adult workers also confront a similar disconnect and are often forced to take or maintain a lower paying job, a position which is not in line with their training and skill set. The alternative is unemployment.

This lack of job positions can lead to young people turning into professional students. This takes a toll on all of society, whereas they fail to generate income, pay income tax and contribute to the social security system. Similarly, the lack of jobs can result in large groups of young people who neither work nor study, thereby exacerbating their inability to enter the job market. The ILO calculates that nearly 25% of young adults between the ages of 15 and 29 currently find themselves in this situation (ILO, 2014b).

JOBS AND OLDER ADULTS

The demographic dynamic has served to increase life expectancy as a result of drops in the birth rate and advances in healthcare. Trends vary among nations and regions, however the aging rate of the majority of populations within the region is moderate to very high.

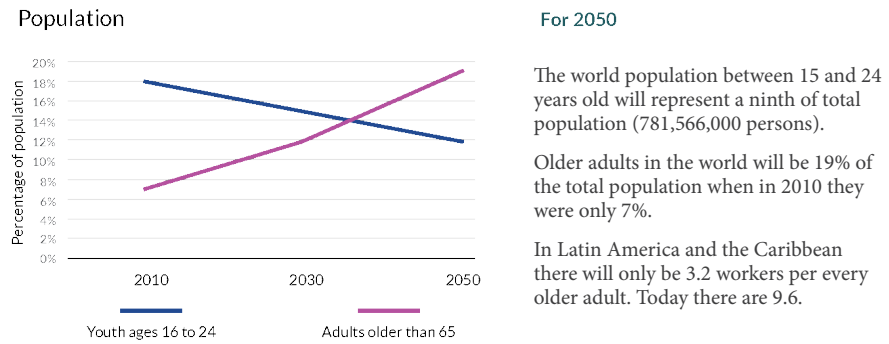
In nations where older adults do not have access to social protection, these individuals lack pensions and health care services. As a result, they are forced to continue working as long as they are physically possible. In nations where there is more access to pensions and retirements, the need to continue working is clearly reduced (ILO, 2009).

According to the ILO, the economic dependence of older adults has a high degree of correlation with the educational level of the individual in question: more learning translates into less dependence. Unfortunately, the opposite is also true and a lack of schooling translates into higher levels of economic dependence. In the majority of nations within the region, the illiteracy rate among older adults is above 15% and, in some cases, reaches 50% (ILO, 2009).

The ILO also indicates that close to two-thirds of dependent older adults earn less than minimum wage. The portion of the population over 60 is on track to increase from 8% in 2000, to 14.1% in 2025 and 22.6% by 2050, with women comprising a larger proportion of this cohort than their male counterparts (ILO, 2009).

It is therefore critical to provide older adults with this skill sets needed to enter or remain in the job market. Facilitating older adults' adaption to the new labor market parameters should be a major goal of Old Age Economics and should take into account Preemptive Economics in terms of its multidisciplinary, multi-entity and long-term approach.

FIGURA 12. Aging in Latin America and the Caribbean



Source: Inter-American Observatory of Social Protection of the CISS.

INFORMAL-SECTOR EMPLOYMENT

Informal-sector employment is a reality in the majority of the nations which comprise our region and the planet as a whole. According to the ILO, some nations have been able to maintain informality below 50%, while others track 70% and above (ILO, 2014b). According to IADB data, Latin America and the Caribbean currently run between 60 and 70% in terms of informality (Bosch, 2014). The ILO indicates that 130 million workers currently populate the informal sector, and this is true particularly among the most vulnerable in our societies: young people, women, migrants and the poor (ILO, 2013).

TABLE 8. Unemployment and informality in Latin America and the Caribbean



Source: Bosch, 2013 and Inter-American Observatory of Social Protection of the CISS.

According to the ILO, informalemployment involves workers whose employment relationship is not subject to national labor legislation, income tax, social security or other benefits related to formal sector employment, either in material or de facto terms. This means that, inter alia, they did not receive guarantees in terms of workplace safety and health, and more importantly they loose their social security benefits such as pensions, healthcare services or disability rights, to name a few.

Informality has a negative impact on the long-term sustainability of social security, especially where funded pension schemes are concerned. Formality, on the other hand, benefits individuals, government and society. However, it is difficult to make the shift from informal to formal sector economics in an automatic and rapid way. While this shift is accomplished, social protection measures are needed which focus on individuals working within the informal sector there in order to guarantee a minimum pension and basic healthcare services.

Recently, the IADB published a study on informal employment in Latin America and the Caribbean which indicated that one of the major causes of this issue is a lack of information regarding job openings, the high labor costs (salary and non-salaried) in relation to work productivity (costs represent on average 39% of worker production, 70% in some cases and even 100% in others), low workplace productivity, a lack of value being placed on social security benefits and lax enforcement. Another factor which contributes to informality is the inability to remain unemployed long enough to find formal sector work, whereas no unemployment insurance is available (IADB, 2015).

Public employment services, through labor mediation policies, have tools to address some of these problems and facilitate access to formal sector jobs. Through the provision of information on job openings and job training, they provide help first-time job seekers who are young adults and as well as older adults who seek to reinsert themselves into formal sector employment. However, the IADB feels that the use of these services within the region is nascent and that it currently lacks solid vocational advising services which would help young adults to make better decisions when choosing an occupation.

In order for these policies to be optimized it is paramount to coordinate them with other public policy measures (tax, budget, education, private sector, etc.) and involve stakeholders in the design and execution of same, to include employers and workers.

WORKPLACE SAFETY AND HEALTH: 21ST-CENTURY CHALLENGES

During the 20th century several regulations and strategies for the identification of workplace risks and occupational diseases were implemented in order to prevent their occurrence and ensure the health and safety of workers in the performance of their duties. But these measures only had impact within the formal sector where legislation guarantees a worker's right to receive wages, sick leave and disability leave for workplace accidents. The measures also ensured a laborer environment free of health-related risks.

According to the ILO, each year 2 million workers die due to workplace accidents or industrial diseases. It is estimated that another 160 million suffer from work-related diseases and that 270 million are involved in workplace accidents. The ILO estimates that, in economic terms, 4% of the planet's annual GDP is lost on workplace accidents and industrial diseases. These two issues result in costly early retirements, reduction in our skilled workforces, absenteeism and drops in national productivity rates.¹

The traditional notion of workplace health and safety, which entails avoiding workplace-related disease and accidents, needs to be expanded. Promoting a safe and healthy workplace is not limited to ensuring workers have the proper protective clothing on or measures designed to prevent injuries or falls. Non-communicable disease such as diabetes, cardiovascular disease, cancer and respiratory disease generate far more sick leave and productivity drops than those owing to occupational diseases or accidents in the workplace.

According to the WHO, Latin American productivity losses total five times what is spent on the treatment of these diseases (WHO b). To provide some context in terms of the productivity drops involved, US males with chronic disease worked 6.1% less hours than their healthy counterparts; the figure was 3.9% less among females. This clearly demonstrates that it is less expensive to prevent than treat non-communicable diseases, whereas failing to do so will signify a cost to every member of society (Bloom, 2011).

In 2000, diabetes alone caused diabetics to miss more than eight sick days per year which translates into more than 14 million sick days per year. Their healthy counterparts average 1.7 sick days per year (US Department of Health and Human Services, 2003). Another study estimated the indirect costs of diabetes in the US for 2012. It estimated that the productivity losses totaled \$69 billion, with sick days accounting for \$5 billion. Work-

¹ The ILO has performed several studies on the issue: International Labour Standards on Occupational Safety and Health.

place productivity losses due to diabetes totaled \$20.8 billion and disability due to diabetes totaled \$21.6 million. Lastly, productivity losses due to premature death were estimated at \$18.5 million (American Diabetes Association, 2013).

The scenario for cardiovascular disease is similar. In 2010, the international cost of cardiovascular disease was estimated to be \$863 billion, of which 45% was due to productivity losses resulting from disability, premature death or time lost due to illness. These production losses are alarming when one takes into account the \$2.1 billion lost due to chronic obstructive lung disease each year across the globe (Bloom, 2011).

Another issue related to occupational disease involves the fact that, in addition to the absenteeism resulting from workplace accidents and disease or non-communicable diseases, presenteeism implies its own set of preventable costs. Presenteeism is defined as reporting to work though ill or remaining in the workplace beyond the recommended amount of time in terms of the physical and mental health of workers (Simpson, 1998).² The concept of presenteeism was employed by economists to explain the losses experienced by organizations in relation to the invisible patterns that absenteeism failed to address. They discovered that presenteeism caused the same amounts of losses as absenteeism, and involved even higher levels of cost given the fact that in addition to impacting productivity it has an impact on the workforce environment and quality of life of the workers involved (Salazar, 2011).

The effects of presenteeism are intimately linked to a given worker's physical and mental health and, in consequence, their productivity level. Workplace accidents are more likely among individuals who have health problems or whose workday far exceeds accepted limits, due to the fact that their ability to concentrate, have a clear mind and remain attentive drops off drastically due to these two factors.

A 2012 study by the National Institute for Occupational Safety and Health (NIOSH) in the US demonstrated that the risk of suffering workplace accidents rose by 30% when an individual is ill (Asfaw, 2012). The ever present companions of presenteeism are chronic degenerative diseases which are often difficult to detect or treat by the worker, but which slowly cause their performance levels to drop over time. In terms of productivity, studies in the US have calculated that the dollar amount per job position averages approximately \$255 per year (Goetzel, 2004).

² Simpson defines presenteeism as the tendency to remain in the workplace longer than the time period necessary for the effective performance of job functions.

The pension challenge: dignified retirements

An enjoyable retirement is,
on average, the result of a life
well-lived.

Pythagoras

Pensions were consolidated in the 20th century with the aim to promote well-being among older adults. Regardless of whether the pension scheme is defined-benefit defined-contribution, savings are accrued during youth and adulthood through formal sector employment. The system is based on constant and sufficient income during the working life of individuals that allows them to save the amount necessary to maintain their standard of living into retirement.

In order to achieve this aim, social security designed schemes administered by the State and privately, which are financed by a collective fund based on intergenerational solidarity or via private savings. They performed the actuarial calculations necessary to determine how much a worker must contribute and during what period of time in order to achieve the standard of living during their retirement.

However, in the 21th century not all workers within the region will be able to survive on their pension during retirement. Many do not contribute to the social security program or do not have a sufficient number of contribution periods accrued. Others find that their pension is insufficient to meet their needs during 22 years of life after retirement, which is the projected regional average. During this time, three in four individuals will also battle a non-communicable disease which inhibits their ability to remain active and often involves extremely high-cost treatment.

These issues of low coverage and sustainability within pension systems are deep to two fundamental factors. On the one hand, the Americas are aging. Individuals over 65 now outnumber young people. The 74-year average life expectancy within the region means that pensions must cover between 15 to 22 years of retirement, regardless of whether they are fi-

nanced via individual accounts or a collective fund. Additionally, there are now fewer workers per retired older adults, a situation which severely complicates the challenges of maintaining a system based on intergenerational solidarity.

Another factor involves the high level of informal employment within Latin America and the Caribbean. This dynamic has resulted in over half of workers not contributing to a pension scheme and four in 10 adults failing to receive a pension in old-age (Bosch, 2014). As workers constantly shift between informal and formal sector employment, and between underemployment and unemployment, their ability to accrue necessary contribution periods is severely impeded. As they failed to approve the necessary retirement savings, they often end up with pensions that fail to cover their basic needs when they retire.

The fact that our planet has chosen to designate social security as a human right during the 21st century demands action from governments. States are now obligated to provide income to older adults, regardless of whether these individuals have accrued savings or not. Additionally, governments need to ensure proper stewardship of retirement funds in order to ensure the entire scheme remains sustainable and to ensure that national budgets are not placed at risk by same.

The economic scenario which many workers in the region will face implies finding paid work and labor markets which are increasingly difficult and by recurring to their families for support. This issue is exacerbated by the fact that many individuals opt for poor diets and lifestyle decisions which have left the regional health profile and fairly bad shape. This situation translates into less active older adults.

Pensions are a reflection of a nation's economics and demographics, and in consequence, subject to variances. If we are to maintain this legacy into the 21st century, we will need to fully comprehend the scope of the problems which we currently face, evaluate the measures we have already taken and adjust them as needed, in order to ensure older adults have longer, more healthy and financially-sustainable retirement.

OLD AGE, LOW COVERAGE, PENSION INSUFFICIENCY AND INFORMAL EMPLOYMENT

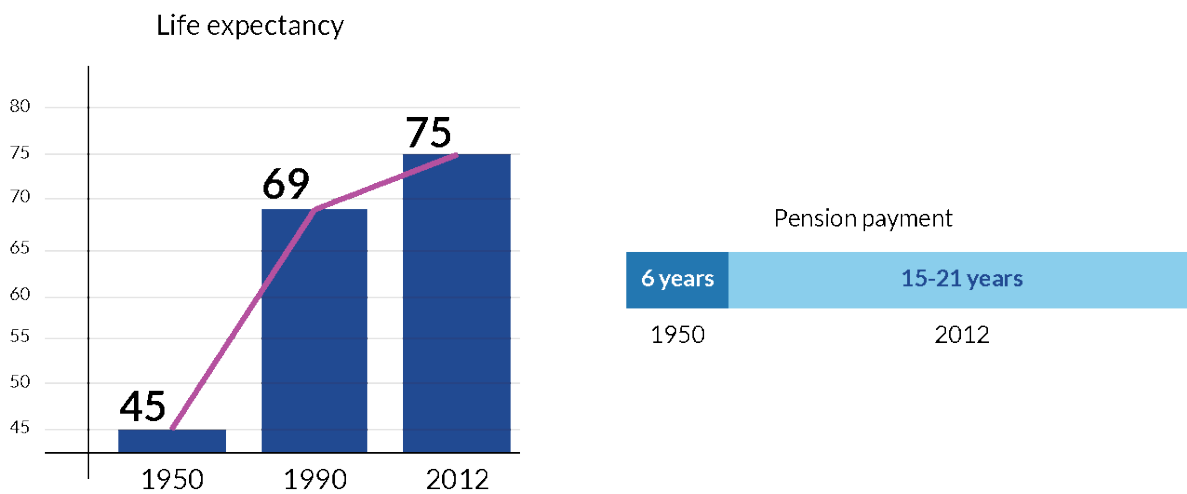
The world's population is aging. This much we know to be true. During the last 65 years, the planet has experienced major changes. The current population is 7.2 billion humans who have a life expectancy of between 60 and 86 years depending on their nationality and gender. Population aging im-

pacts ordinary life, economic growth, savings, investment, consumption, job markets, pensions, taxes, as well as the aid and solidarity exchanged between generations.

International bodies and experts agree that if the current aging of the population is on a scale unprecedented in human history. The increase in over-60 individuals has been accompanied by a concomitant drop in the number of children and adolescents resulting from lower birth rates. By 2050, the over-60 population will surpass the number of young adults on the planet; a dynamic which has been in place in Europe, Japan, the United States and Canada since 1998.

The proportion of older adults in 1950 comprised 8% of the world's population; by 2000, it had risen to 10%. However by the year 2050, current projections indicate that one in four individuals will be over 60, thus comprising 21% of the population and an astonishing 1:5 ratio (WHO, 2015).

FIGURE 13. Increase in life expectancy, 1950-2012



Source: Inter-American Observatory of Social Protection of the CISS.

Clearly, the region is aging rapidly. Currently, the oldest nation in the Americas is Canada. However, UN projections estimate that nations such as Cuba and Barbados are on track to surpass their northern counterpart (WHO, 2015).

Nations such as Mexico are also entering into a new phase of accelerated population aging. For example, 6% of its population was over 65 in 2010 and this figure is already up to 15% for 2016. To provide some context, the US required 69 years to achieve this same 9% increase; France took 115 years; and Brazil, 20 years.

Population aging normally coincides with a lower birth rate which, in turn, translates into fewer workers per over-60 individual. Within this CISS region, on average there are 2.3 economically active individuals per over-60 individual (CISS). However, aging is tracking on different slopes throughout the nations which comprise the Conference.

In Latin America and the Caribbean there were 9.6 working-age individuals per older adult as of 2010, a figure which is set to drop to 3.2 individuals by 2050. In Uruguay and Argentina, in 2000 there were 4.8 and 6.3 persons in working-age per older adult, and by 2050 there will be 4.0 and 5.1, respectively. In nations such as Brazil, Costa Rica, Ecuador, Mexico, Panama and the Dominican Republic in 2000 there were approximately 11 economically active individuals per older adults; the figure is set to drop to six young people per older adults over 60 by 2050 (Bosch, 2014).

In 1950, the retirement age was approximately 60 for men and 55 for women. It is important to note that the actuarial calculations and the cost of providing pensions and health services to a person who retires, and then lives 5 to 6 years, are completely different to situations involving individuals which live 15, 20 or 30 years following retirement. It is estimated that in the United States, for example, the pension system will be financially unviable by 2023 due to population aging and increases in the dependency rate.

However, living a longer life does not necessarily imply a healthier or better-lived life. For example, individuals with higher incomes have a better probability for living longer and more healthy lives. Conversely, individuals with less favorable conditions are likely to have less resources and poorer health.

Governments need to promote policies that permit older adults to live active, healthy and satisfying lives in a world in which the majority of the population live in cities, and inequality is a major issue, as well as old age, these two conditions are capable of breaking down family networks which in other times supported older adults facing adversity.

Inequality during an individual's life, in terms of education, income and access to technology, grow increasingly relevant as the person moves into old age. Advances in communications have the potential to help facilitate the entry of older adults into job positions in new sectors within the economy. However, these opportunities will only be available to individuals who possess the necessary knowledge, skill sets and financial flexibility to capitalize upon said job positions (WHO, 2015).

Additionally, one must take into account the fact that women are often caregivers for children and older adults. This activity limits their participa-

tion in the job market, a factor which in turn restricts their access to pensions and healthcare services. Also changes have been observed within the region in terms of increased numbers of employed women, this increase in female participation will necessarily entail a limited capacity on the part of these women and their families to provide care for the older-adult relatives (WHO, 2015). Clearly, public policies will be needed to help all involved in these instances.

In addition to aging and the complications this will cause for pension systems, only 45% of workers, on average, in Latin America and the Caribbean contribute to a pension (IADB/WB/OECD, 2015) and a little more than half of the region's older adults have a retirement fund, whereas they fail to contribute to a pension scheme while working. This severely reduced coverage in terms of both defined-benefit and defined-contribution pension schemes correlates directly to increases in the informal sector. There is a large degree of consensus within the international community with respect to lack of coverage being the primary challenge in Latin America and the Caribbean (IADB/WB/OECD, 2015).

The problem of coverage persists in spite of pension reforms being passed in the 1980s and the 1990s, which did serve to improve the sustainability of said schemes. Workers migrate in between formal sector and informal-sector employment, unemployment and underemployment, as well as between salaried positions and self-employment. Workers do not regularly contribute to pensions and when they do, the contribution level is low due to their salary. As a result, when these individuals reach retirement age they have failed to accumulate the required contribution periods or their pensions are simply insufficient to cover basic needs. Many pensions do not even exceed US\$10 per day (Bosch, 2015).

Due to differences in salaries between men and women, women often receive less and lower-quality pensions due to lower contributions and more exposure to the informal sector (Del Valle, 2014) and due to their longer life expectancy. According to data from the Inter-American Observatory of Social Protection, female labor participation tracks between 20 and 40% below their male counterparts and their active contribution to pension schemes is also 10% below that of men. On average, men receive pensions which are 7% higher than their female counterparts.

TABLE 9. Replacement rates for one and five wages within the CISS region

The highest average net replacement rate in the region for one wage: 59%



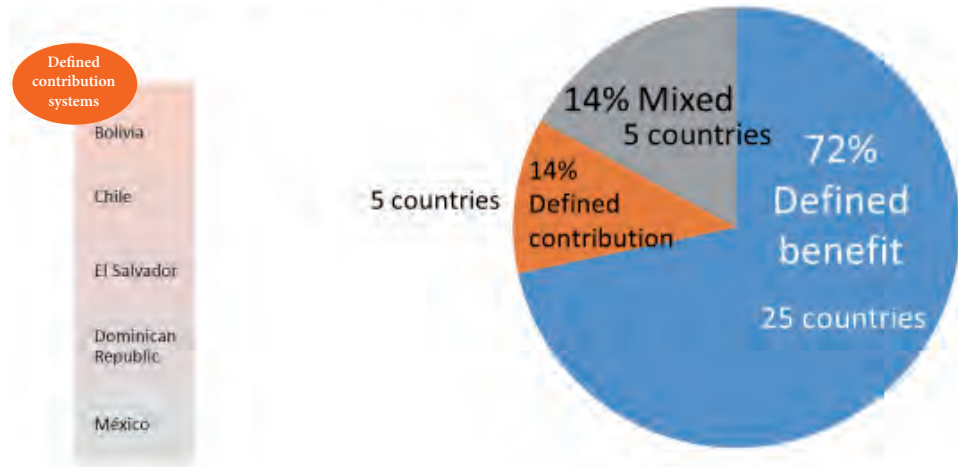
The average net replacement rate in the CISS region for 5 wages: 41%

Source: Inter-American Observatory of Social Protection of the CISS.

DIFFERENT STRATEGIES FOR ADDRESSING THE PENSION CHALLENGE

In response to the pension crisis, a variety of reform measures were launched during the 1980s and 1990s in the Americas. The initiatives were primarily focused on the sustainability of the schemes and national budgets. Many nations changed from defined-benefit to defined-contribution, and/or a mixture thereof.

TABLE 10. Pension systems in the Americas



Source: Inter-American Observatory of Social Protection of the CISS.

In the Americas, funded schemes, with benefits which are defined and administered by the State, coexist alongside individual capitalization sys-

tems, with defined contributions, private management and government oversight. In the case of individual retirement accounts, an individual selects the company and fund in which they wish to invest for their future retirement income.

Both defined benefit and defined contribution schemes have advantages and disadvantages. Both are subject to actuarial calculations through which optimal parameters are identified in terms of retirement age, contribution time, contribution rate and replacement rate in order to ensure individuals receive pensions which meet their needs. However, these calculations are subject to reality, and unfortunately reality is increasingly coming out ahead.

Another measure has involved increasing the retirement age in correlation to life expectancy. There are two examples of such measures. One involves the United States, wherein the retirement age will be increased from 66 to 67 years by 2027. Another involves Guatemala increasing its retirement age from 60 to 62 years after 2011.

A fully-integrated approach, which comprises more than actuarial calculations, must be utilized to address the pension paradigm. Issues such as informal labor and poor health must be taken into account even though they are not innately pension-related issues. This is because they do constitute barriers to pension system viability whereas they reduce an individual's ability to continue contributing throughout life and because they impede society's ability to increase retirement ages. As a result, society must determine whether the primary goal of pension systems is addressing poverty or creating wealth-redistribution mechanisms.

Regardless of the aim, accruing retirement savings is of paramount importance. Individuals who earn a living wage are more capable of saving for retirement and avoiding preventable costs such as health care costs on non-communicable disease. Throughout the Americas, a variety of initiatives have been launched which promote incentives for savings or provide educational programs on retirement savings. However, to date these measures have been somewhat limited in their purview. This is demonstrated by the current level of pension coverage.

The low pension coverage throughout the Americas has resulted in a search for alternative schemes which provide income to older adults and alleviate their economic distress. Social pensions have been established which involve a variety of age and income criteria throughout Latin America and the Caribbean. The pension amounts vary between 5% of per capita income to over 40%. The use of these types of schemes is definitely on the rise, and in some nations – especially within the Caribbean – they

A 40-50% contribution rate during a working life which extends 50 to 55 years?

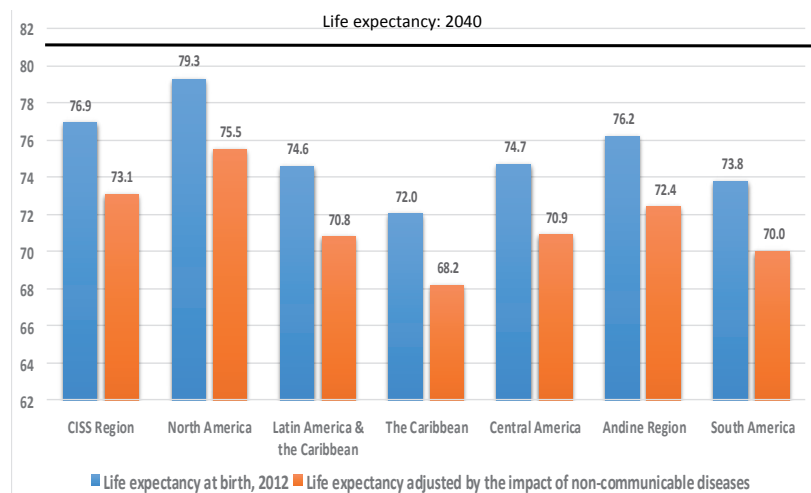
constitute a fundamentally important pillar of the pension system. Although social pensions helped provide income to individuals which are not enrolled in retirement saving schemes linked to formal sector employment, they have failed to fully solve the problem and constitute fiscal challenges to national budgets due to the issue of population aging (IADB/WB/OECD, 2015).

Another important option for providing income to older adults is housing. Home ownership during retirement reduces the economic demands that affect an individual's pension. In nations such as Canada, the USA and Brazil reverse mortgages allow older adults to convert their real estate equity into a monthly income, without the need to place their property up for sale or lose title thereto. This option can provide income to older adults, but requires government oversight to ensure that the reverse mortgage market operates putatively and to ensure that the homeowner receives the correct monthly amount given their property value (Costanzi, 2015).

There is consensus on the need to make progress in terms of integrated reform packages that ensure the sustainability of pensions and which guarantee income to older adults. In order to alleviate the economic load of old age, it is equally important to ensure the delivery of public and (affordable) private elder-care services.

It is also necessary to identify funding sources for pension systems, identify mechanisms which incentivize formal-sector growth and which improve efforts to regulate informality. However, there is a clear consensus on the need to tailor pension and employment policy to the demands of the new century and to explore hybrid solutions involving different funding schemes and types for the pension sector.

FIGURE 14. Life expectancy adjusted for non-communicable diseases



Source: Inter-American Observatory of Social Protection of the CISS.

UTILIZING PREEMPTIVE ECONOMICS TO ADDRESS 21ST-CENTURY PENSIONS

Pensions are a reflection of our economies and, as such, they are subject to regular adjustments vis-à-vis the nation's economic realities. As a result, it is paramount to ensure a frank and multi-disciplinary discussion is possible on the subject of retirement systems funding and sustainability as the issue relates to national budgets. It is equally imperative to find the way to achieve the necessary amounts of funds needed to provide pensions which ensure the dignified retirements for the older adults who have built our nations.

All pension systems demand a certain degree of public outlay. Clearly, retirement ages will need to be reviewed whereas we are all living longer lives. However, it is equally as important to ensure individuals are healthy enough to extend their working lives enough to cover increases in retirement ages. This is a significant challenge given the current panorama of noncommunicable prevalence rates which are the result of our poor nutritional choices and lack of exercise.

We need public policy that promotes more dynamic labor markets, improved access to loans, more public revenues, better return on investment and a culture of savings within our respective nations. It would be singularly ignoble to aspire to a 21st-century in which only the top-earning cohorts within society are able to arrive at old age in good health and with the ability to enjoy their retirement because they were instilled with the culture of savings and had enough education to ensure access to well-paying jobs. This is to say, a century in which everyone else would end up spending their retirement years impoverished and ill.

*Education for a world
in constant transformation*

Introducing into learning that which is not permitted to be taught, vis-à-vis the discourse of the Other, who sings the same old song in the newest and the oldest of lecture halls, is an undertaking which entails constant and guaranteed resistance. A singularly subversive enterprise.

Fernando Savater

There is general consensus on the role education plays in the modern world. On the one hand, it provides nations with the human resources needed to produce goods and services which are used in the national and international economy to generate economic growth. Additionally, education contributes to a higher standard of living for all who avail themselves of its benefits, whereas they possess this skill sets needed to access the best paid jobs in a given economy. However, a well-informed and well-educated society is also more capable of understanding the benefits of healthy lifestyle choices and the cost that poor decision-making entails. Better-informed societies are more creative and more tolerant. They also tend to fully comprehend the importance of respecting the planet we live on.

In recent years, we have witnessed constant changes which have modified almost every aspect of life. In the social aspect, we have seen the growth and increase of the middle classes thanks to a singularly positive economic cycle, as well as a rise in social movements advocating efficient, effective and transparent management of public resources. In many cases, technological changes in the cellular and social networks sectors had a major, if not fundamental, role in getting the message out.

A more educated society participates more in decision-making in the processes which impact their lives. This can include legislative debate on

increased access to high-quality foods, clean and safe public spaces, or in terms of taxes on products or foods which impact human health.

Education is an important tool for driving consumer consciousness and a culture of prevention. When individuals understand the impact of nutrition upon their health, the entire process by which effective public policy is put forth will be facilitated. A healthy population translates into economic data fits for our entire society, whereas public outlay on non-communicable disease and age-related diseases are reduced.

Prevention involves a wide spectrum of sectors within society. It involves regulations which address food labeling and process quality issues. It also comprises public safety, whereas safe spaces within our communities serve to combat sedentary lifestyles. Prevention's purview also involves fiscal issues whereas taxis can be used to incentivize the private sector to become involved in and, hopefully, employ their vast resources to lead prevention campaigns. Lastly, prevention also involves the education sector. Education can be used to trigger the involvement of parents, food-services providers, students at every level of our educational system, educators and the entire food sector.

This new world characterized by so many social, demographic, cultural and technological changes begs the following questions: What type of education will be capable of addressing the challenges of the 21st century? What existing tools might facilitate our addressing these challenges in the best way possible?

The complexity of modern day life, which has been impacted heavily by a less than favorable economic cycle, demands we design strategies and initiatives which employ multidisciplinary and multi-entity approaches which anticipate the risks that the new century will deliver to mankind. Education is one of the major pillars of Preemptive Economics. Throughout its various stages, from preschool through to lifelong learning, it serves to create individuals who are better suited to deal with this ever-changing world.

CURRENT STATE OF EDUCATIONAL AFFAIRS WITHIN THE CISS

During the first decade of the 21st century, the demand for commodities allowed many nations within the Americas to experience extremely high rates of economic growth. It was also an opportunity for them to allocate public resources to social protection programs, a measure which resulted in a clear reduction in the region's poverty levels (CEPAL, 2015c). The

Early-childhood initiatives are paramount to the success of any public policy which takes into account the principles of Preemptive Economics.

principle educational indicators within the region experienced a marked upturn. This situation is explained in the paragraphs which follow below.

According to UNESCO preschool enrollment increased from 54% to 74% during the period 1999-2012 within Latin America and the Caribbean. This indicator rose from 64% to 72% in Canada, and the United States experienced an increase from 59% to 74% for the same period of time (UNESCO, 2015a).¹

In terms of primary education, enrollment rose from 93% to 94% during the time period of 1999-2012. As a result, although universal enrollment has almost been achieved, a certain degree of plateauing has occurred. Currently, the number of children who are unenrolled in schooling in Latin America and the Caribbean total 3.8 million. The United States is a special case, whereas the number of children enrolled in homeschooling was doubled in recent years, causing a drop in enrollment from 97% to 93% for the years in question. For its part, Canada reached universal coverage as of 1999.

Children living in poverty continue confronting challenges in terms of completing primary education. In recent years, the majority of governments have launched education-based benefits initiatives² so families in poverty or extreme poverty ensure their children attend school. According to the CEPAL, 18 nations within the region that such initiatives underway as of 2011, with more than 25 million families (approximately 113 million individuals or 19% of the population) participating in the program at a cost of 0.4% of regional GDP (CEPAL, 2011).³

Other initiatives which several countries have put forward include school-food programs and programs in which foodstuffs are delivered for consumption at home. These programs have made significant contributions to reductions in malnutrition and failure to thrive. The United Nations World Food Program (WFP) estimates that failure to thrive is equivalent to the loss of four years of schooling (Ban Ki-moon, 2012). Although there is no conclusive evidence on the effect that these programs have, the data indicates that schooling and attendance rose and the need to repeat a grade level and dropouts decreased.

Advances in secondary education were significant for the period 1999-2012. The overall enrollment rate⁴ rose during the first cycle of secondary education from 95% to 98% and in the second cycle of secondary education⁵ from 63% to 76% during these years.

Illiteracy rates for individuals aged 15 to 24 years dropped from 6.9% in 1990 to 1.7% in 2015 throughout the region, although functional illiteracy remains an issue.

¹ The United Nations Statistics Division places Canada and the United States in the North America and Western Europe region. UNESCO stresses the importance of early childhood education due to the cognitive effects it has on people for the rest of their lives. This international organization also warns of the possibility that this school level may cause inequality between urban and rural areas, in addition to the prevalence of private schools over public.

² There is a great deal of debate on the subject of whether or not certain benefits should be conditioned upon certain behaviors such as school attendance and health checkups. The argument in favor of conditionality purports that families are conscience of the value of the benefit payments: education is important in costs money. It is also easier to garner political support for conditional programs. UNESCO (2015).

³ Nations include Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, and Uruguay.

⁴ The overall enrollment rate is a means to measure enrollment independent of age.

⁵ The second cycle of secondary education begins

between 15 and 16 years of age. The objective is to consolidate secondary education in preparation for higher learning or provide vocational training.

⁶ The Programme for International Student Assessment (PISA) is a triennial international survey which aims to evaluate education systems worldwide by testing the skills and knowledge of 15-year-old students. Three years is the time period needed for educational policy to take effect in a given nation. PISA reading ability consists of five levels. Level V (625 or above) involves students capable of using specialized knowledge, making critical evaluations and establishing hypotheses. Level IV (624-533) involves students interpreting meaning based on subtleties of language or critical evaluation of a text. Level III (552-481) involves linking distinct parts of the text and relating it to everyday knowledge. Level II (480-408) involves students responding to basic questions, identifying direct information, making simple inferences and utilizing some external knowledge to comprehend a text. Level I (407-335) involves students who are limited to identify a fragment of information, the main topic of a text and establishing a simple connection with everyday knowledge.

One would think that these indicators demonstrate a fair measure of progress on the issue of education within the region. The reality is altogether different and relates to the issue of quality and the limitations experienced by educational institutes within the region when endeavoring to inculcate the skill sets needed by young people for entry into the modern job market and access to decent and well-paid employment.

As indicated above, the private sector is faced with difficulties finding well-trained workers. According to the ECLAC, 36% of firms in Latin America face this issue. The international employment market experiences this issue at a rate of 21%, while OECD nations experience a 13% rate on average. It is clear that the region has an enormous challenge ahead of it in terms of training qualified workers (CEPAL, 2015c). This issue only serves to exacerbate the high levels of informality throughout the Americas.

As the Inter-American Observatory of Social Protection indicates, only 54% of the over-25 population has a maximum of nine years of schooling (CISS, 2015). Consequently, addressing this gap constitutes an important challenge.

This situation is related to the incompatibility between the skill sets delivered by educational assistance and the ever-changing requirements of the job market. Technical and professional curricula tend to be extremely specific, which results in skill sets becoming obsolete extremely fast. Educational systems also fail to facilitate the portability of skill sets or the certification of worker abilities as these individuals move between informal and formal-sector employment. The rigidity which characterizes current teaching also inhibits creative or divergent thinking, as well as the individual talents of students.

The level of educational quality is made patently clear by the performance of Latin America and Caribbean youth on the PISA⁶ exams in 2012. As compared with their OECD counterparts, the students had a gap of 2.4 years of secondary education (CEPAL, 2015c).

On the reading ability portion of the test students in the United States and Canada tested at level III on a scale of 1 to 5. Chile, Costa Rica, Mexico, Uruguay and Brazil tested at level II, while Colombia, Argentina and Peru came in at level I.

These statistics are especially worrying when one considers that they will only tend to reinforce the high levels of inequality throughout the region. The ECLAC puts it in more stark terms by stating that two individuals with the same innate capacity, but with access to two separate educational systems, due to the income levels of their parents, will end up at very different years on the Gini curve. Students from higher socioeco-

TABLE 11. PISA results, 2012

Country	Mathematics		Reading Ability		Science	
	Place	Points	Place	Points	Place	Points
China	1	613	1	580	1	570
Finland	12	519	5	545	6	524
Canada	13	518	10	525	11	516
United States	36	481	28	497	24	498
Chile	51	423	46	445	47	441
Mexico	53	413	55	415	52	424
Uruguay	55	409	54	416	54	411
Costa Rica	56	407	51	429	47	441
Brazil	58	391	59	405	55	410
Argentina	59	388	58	406	60	396
Colombia	62	376	60	399	57	403
Peru	65	368	65	373	65	n.d.

Source: Prepared by the editors with OECD data.

conomic-level families have access to educational facilities with better libraries, laboratories, IT resources and even sports facilities in which they can plant the seeds for healthier lives down the road.

A context in which inequality is very pervasive, in which a large portion of the population possesses very low educational levels and low paying, informal sector jobs, in which they lack access to health care or pensions and live in deteriorating urban or rural areas, has a huge impact on social cohesion and the domestic market. If one turns to physics, we can speak of the *gravitational pull or forces exerted by inequality*. This is to say, public policy needs to be put forth which can break the seemingly inpenetrable force which inequality currently exerts in society. Educational policy will need to provide the tools which an individual needs to escape the gravitational pull of poverty.

Given the current scenario within the region, governments, civil society, international bodies and stakeholder groups must put forth clearly-delineated strategies to address challenges and difficulties. Additionally, public policy and educational initiatives need to be reviewed with an eye to identify the best-suited mechanisms for addressing society's educational challenges.

FIGURE 15. Internet access adjusted for PISA results, per capita GDP and selected health care indicators within the CISS region



Source: Prepared by the editors, through the use data from Inter-American Observatory of Social Protection and PISA test results.

21ST CENTURY EDUCATION

The current levels of equality throughout the region, combined with the current educational paradigm's inability to provide a level playing field, seem to indicate a clear necessity for the restructuring of the means and ends of education. This new perspective on the role of education in society views education as being capable of addressing more than literacy and basic math skills. It views education as possessing the ability to provide the means for individuals to achieve increased equality, social equity and solidarity. To achieve this, the so-called soft skills which permit an individual to adapt to the job market will be needed. Additionally, people need to learn how to live active lives. This involves more than the simple production of goods and services. It includes ensuring students learn about the cultural intricacies of life, including respect and tolerance; factors which contribute to a nation's sustainable development (UNESCO, 2015b).

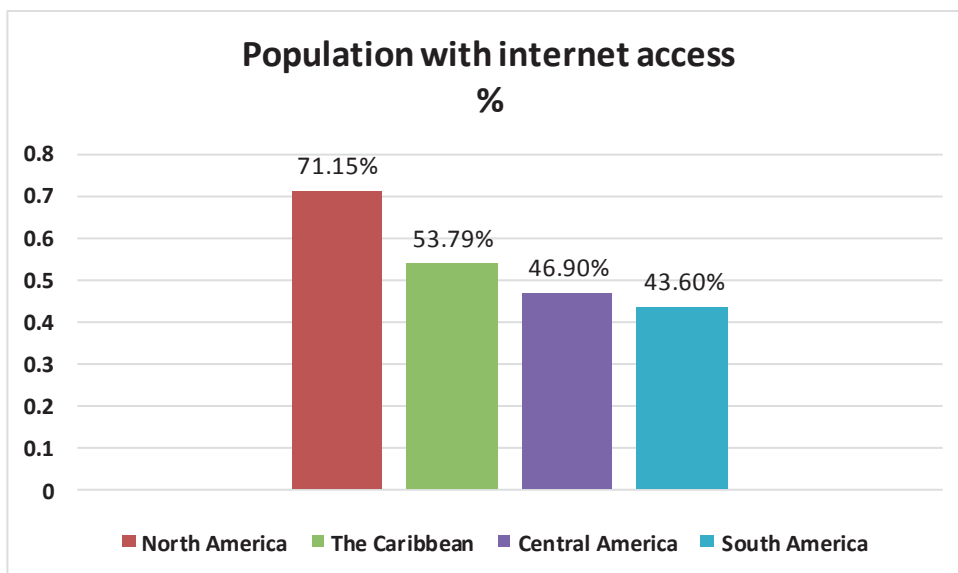
Which tools will help society achieve these ends? Based on international experience, three instruments are clear standouts: innovation, the use of new technologies and creativity.

NEW TECHNOLOGIES

An aspect of modern life is the appearance and rapid propagation of new IT and communication technologies, a sizable increase in Internet connectivity and increased access to mobile devices.

The Internet has transformed the way in which individuals access information and knowledge. It has modified in a significant way the manner in which people interact through social networks. Currently, it is estimated that 43% of the world's population uses the Internet (UTI and UNESCO, 2015). Where this CISS region is concerned, Internet access ranges between 71.15% in North America and 43.60% in South America.

FIGURE 16. Percentage of population with internet access, by region



Source: Inter-American Observatory of Social Protection of the CISS.

Digital connectivity provides a wide spectrum of benefits in terms of education, employment, health care, communication, commerce, leisure, well-being and productivity (The Boston Consulting Group, 2012).⁷ Technology contributes to the development of new thinking and creativity process, as well as the abilities and skill sets required and the modern labor market. The adaptation and integration of technology vis-à-vis the mechanisms of learning and teaching is an issue that many nations have begun to take into account.

An example of this can be seen in the following table and figure, in which the correlation between nations with high percentages of popula-

⁷ According to the McKinsey Global Institute, the Internet represents 3.4% of GDP in 13 nations (Germany, Brazil, Canada, China, South Korea, France, India, Italy, Japan, United Kingdom, United States, Russia and Sweden). More than half of this figure is the result of private consumption (online sales and advertising) and 30% of private investment on servers, software and communication equipment. The Internet economy is larger than international industrial sectors such as energy and agriculture. In the case of the Americas' G-20 member States, the Internet represents the following GDP percentages: US, 4.17%; Canada, 3.0%; Mexico, 2.5%; Brazil, 2.2% and Argentina, 2.0%.

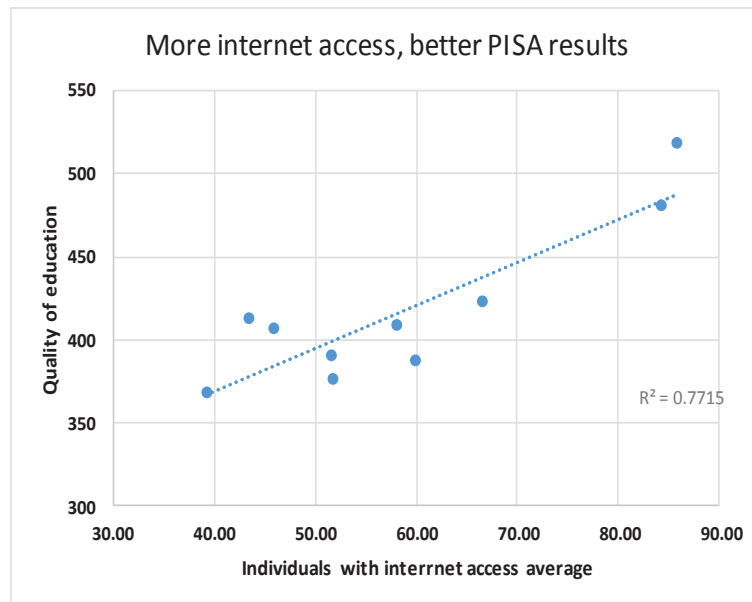
tion with access to Internet and better results on the PISA exams in terms of reading ability. Canada and the United States, for instance, have approximately 85% access to Internet and their students received fairly high results on the reading-ability portion of the exam.

TABLE 12. Percentage of population with Internet access vis-à-vis PISA test results

Countries of the Americas that participate in PISA	% internet user population	Quality of education (points)
Canada	85.80	518
United States	84.20	481
Chile	66.50	423
Mexico	43.46	413
Uruguay	58.10	409
Costa Rica	45.96	407
Brazil	51.60	391
Argentina	59.90	388
Colombia	51.70	376

Source: Prepared by the editors through the use of OECD and ITU data.

FIGURE 17. The importance of the Internet for a better performance in education in countries that participate in PISA



Source: Prepared by the editors with OECD and ITU data.

It is important to take into account that a significant digital gap exists within the region in terms of urban areas as opposed to rural. If this issue is not addressed in a timely fashion, it may inhibit economic development and serve to exacerbate inequality (UNESCO, 2015b). The lack of growth in the Internet and the proposal to do away with net neutrality (establish differentiated access charges) may serve to exacerbate this trend.

The role of the Internet has been recognized within the Americas through the 2011 Joint Declaration on Freedom of Expression and the Internet.⁸ United Nations promotes capitalizing upon the potential of new technologies in order to drive strategies for the achievement of the sustainable development goals in sectors such as education, healthcare and management of the environment.

Young people comprise the most informed generation which has ever lived in the Internet has had a great deal to do with this dynamic. However, alarms have been raised by certain individuals in terms of the rise in intolerance due to the anonymity provided by the the Internet. Education must assume the role of actively forging more tolerant, inclusive and respectful societies with regard to cultural diversity.

INNOVATION AND CREATIVITY

Innovation involves the creation and dissemination of new products, processes and methods in the productive systems of nations. It contributes to the creation of new businesses and jobs, even as it improves productivity. As a result, it is important engine of economic growth and development. Similarly, innovation facilitates a society's attempts to address social and international challenges, to include demographic shifts, the scarcity of resources and climate change. Innovative nations are more productive and resilient to external and internal problems, and much more adaptable change.

Governments have an important role to play in the promotion of an environment which is favorable to innovation, in terms of investing in innovation, and in overcoming the obstacles to innovative development (OECD, 2015).

Indicators which attest to the innovation level of an economy include the following: technological output (number of patents); technological resources (number of engineers involved in research and development, R&D); and those which indicate the preponderance of value added sectors involved in the generation and dissemination of innovations (such as those in the engineering sector) (CEPAL, 2015c).

Although the nations of Latin America and the Caribbean have increased their investment in R&D, the region remains far outstripped by

⁸ 6.a Giving effect to the right to freedom of expression imposes an obligation on States to promote universal access to the Internet. Access to the Internet is also necessary to promote respect for other rights, such as the rights to education, health care and work, the right to assembly and association, and the right to free elections.

the nations of the OECD. The average expenditure in Latin America on R&D is approximately 0.4% of GDP and is largely the purview of governments. The private sector participation is limited to approximately 25% of this figure due to conditions which limit the profitability of such investment (OECD/CEPAL/CAF, 2014). With regard to patents, the proportion is fairly low. Between 1990 and 1993 Latin American nations registered 0.3 patents per million inhabitants each year with the US Patent and Trademark Office. That figure rose to 0.9 for the period 2010-2013. The OECD figures for these two time periods was 50 and 132, respectively (CEPAL, 2015c).

The region needs to identify ways to overcome the conditions that are currently limiting its ability to develop its innovation capacity. Issues of fundamental importance include the following: driving high-quality education; developing soft skills in order to increase regional adaptability to the demands of the private sector; foment the creativity of individuals; provide an institutional climate which is more conducive to innovation.

The economy and traditional forms of production, characterized by a prevalence of the primary and secondary sectors, have experienced important transformations in structures which have given rise to the service sector. Rapid growth in the technology and Internet sector has served to drive the service sector and creativity has played a major role in this entire process. The challenge is skill development for new ways of working, such as telework, freelance work or work within IT-related sectors in which education and social security need to develop mechanisms to guarantee the inclusion of these individuals.

Creativity is the ability to create new significant forms. It is the capacity to generate new ideas or concepts or to associate existing ideas and concepts in order to offer innovative solutions (Florida, 2012). Throughout history creativity has been essential to lifestyles and work styles, but its role in the development of new technologies and conductivity which has given it a larger footprint in terms of being an instrument that has driven the economic growth of cities and nations. It is important to underline the fact that creativity is not the express purview of the IT and business sectors. It is a concept which lends itself to a variety of interpretations that involve lifestyle, healthy habits and respect for one's fellow human beings, the environment and society as a whole. Creativity is a limitless talent.

Creativity requires a means which drive critical thinking towards forming solutions for problems, cultural diversity and tolerance for differences which may include religious, gender, sexual or racial distinctions. In the Americas, there are many examples in which creativity has contributed to economic development with high levels of sustainability.

Housing as a framework for healthy living

Today our world faces a crisis: a crisis which, if its consequences are as grave as now seems, may not fully be resolved for another century. If the destructive forces in civilization gain ascendancy, our new urban culture will be stricken in every part. Our cities, blasted and deserted, will be cemeteries for the dead [...] But we may avert that fate: perhaps only in facing such a desperate challenge can the necessary creative forces be effectually welded together.

Lewis Mumford,
The Culture of Cities (1938)

In 1900, one in 10 humans lived in urban areas.¹ During the ensuing 100 years, societies underwent a radical transformation from primarily rural to primarily urban. This shift tends to consolidate in the medium term. According to the United Nations projections, three quarters of the earth's population will live in urban areas by 2050. The role of these CDs in the modern world is fairly self-explanatory. Whereas they occupied 2% of the Earth's surface they generate 70% of its economy, consume 60% of its energy, produce 70% of the greenhouse gases and 70% of the refuse (Habitat III, 2015). Cities have contributed to the economic, social and cultural development of nations, frequently improving the quality of life of their inhabitants through access to basic healthcare services, education, public transport and employment. However, they face major challenges such as increasing levels of poverty, informality and inequality. They also are combating increased demand for services and pressures to remain within budgetary parameters. Cities also are striving to design and implement public policy that guarantees environmental sustainability.

¹ There is no single, universally-accepted definition of urban area. As a result, the definition is strictly a national issue decided by each government. Many nations use a classification based on the size or characteristic of the developed area, while others utilize the presence of certain types of infrastructure or services. Still others utilize certain administrative aspects when labeling of community an urban center.

In order to efficiently address these challenges in urban centers, proper planning will need to occur. In Latin America and the Caribbean an important factor involves the lack of information regarding the effects of urban planning on health, well-being and opportunities for individuals. What is certain is that the wrong type of planning, or a total lack thereof, will severely limit the economic potential of cities and have a significant impact on the lives of the individuals who live in them (UN-Habitat, 2014).

Preemptive Economics has a great deal to offer city planners, whereas its principles include a multidisciplinary and multi-entity approach to empirically based optimization of resources. Additionally, it prioritizes long-term achievements over short-term gains. Preemptive economics involves generating public policy which is coordinated between the public and private sector stakeholders in order to create and strengthen the infrastructure and capacity of CDs to address urban growth and its concomitant impact on societal well-being. The risks looming on the horizon are significant but can be controlled or even reduced if decision-makers include aspects such as healthcare, employment, older adult needs and education in their housing public policy; these factors correlate to sustainable and lasting social well-being.

CURRENT SCENARIO IN CISS URBAN CENTERS

Within the CISS region, 80% of the population lives in urban centers. There are major differences, however, among our nations. In 2013, three nations had urbanization rates that surpass 90%: Uruguay at 93%; Argentina at 93%; and Chile at 89%. Four nations were within the 80% range; Brazil at 85%; the United States at 83%; Canada at 81%; and Mexico at 78%. On the other end of the spectrum, St. Lucia and Trinidad and Tobago had urbanization rates of 17% and 14%, respectively (World Bank, 2014).

Half of the urban population within the Americas is concentrated in large cities, which are defined as urban centers with more than 500,000 inhabitants. The growth of these cities has been fairly constant. In the case of Latin America and the Caribbean, there were 20 large cities in 1960. That figure rose to 123 in 2010 and by the year 2020 is set to be 140 (CEPAL/CAF/ILAS, 2014). North America has 97 cities which surpass the 500,000-inhabitants mark (Canada: 9; United States: 70).² It should be noted that the other half of the CISS region's inhabitants live in medium and small-scale cities (over 20,000 inhabitants), which indicates that there is a certain degree of territorial equilibrium with respect to large urban

² OECD statistics for metropolitan areas.

centers. In Latin America and the Caribbean, medium-scale cities tracked at 320 in 1950, a figure which had risen to nearly 2000 such cities at the turn of the 21st century (UN-Habitat, 2012).

The growth of large urban centers within the region was the result of population growth driven by high birth rates and increases in life expectancy. Additionally, there was a large shift of inhabitants from rural to urban areas. However, since the year 2000 a low urban growth rate has been detected for exactly the opposite reasons: a drop in birth rates and the migration of city dwellers to medium-scale cities. Should this trend continue, it may imply less pressure on urban centers to provide basic services. This dynamic, in addition to the current reduction in the demographic dividend in many nations within the Americas may be capitalized upon in order to focus efforts on improving quality of life in medium-scale centers, investing in urban infrastructure, public spaces and services, and in order to place more emphasis on an item which has begun to work its way on to agendas: Sustainability (UN-Habitat, 2012).

PUBLIC SERVICES AND THEIR IMPACT WITHIN URBAN CENTERS

Urban growth is determinant in terms of the quality of life, social inclusion and economic opportunities of the individuals who do well in cities. Urban growth within medium and low-income nations has outstripped governments' ability to provide basic services. For the purposes of the analysis contained within this chapter, we wish to focus on three basic services which have direct impact on the health and well-being of the population: housing, drinking water and sewage services.

Housing. In spite of advances in terms of decent housing rights, governments continue to face problems which impede their ability to guarantee proper housing to all members of society.³ According to year-2000 data, the region had 200 to 300 housing units per 1000 inhabitants. Although current figures are not available, the housing shortfall is estimated between 30-50%. Housing shortages are clearly a situation which needs to take top priority on national agendas. An analysis of the housing situation cannot be performed without taking into account the availability and quality of the concomitant public spaces. This is because public spaces provide a venue in which city dwellers can interact and hopefully participate in social, environmental and recreational activities as a community (UN-Habitat, 2012). Public spaces and social facilities are few and far between. Additionally, they are of fairly poor quality in deteriorated neigh-

³ Millennium Development Goal 7D: "Achieve, by 2020, a significant improvement in the lives of at least 100 million slum dwellers."

borhoods, which means that they serve to propagate inequity and inequality; and thus negatively impacting the well-being of the individuals who dwell within them.

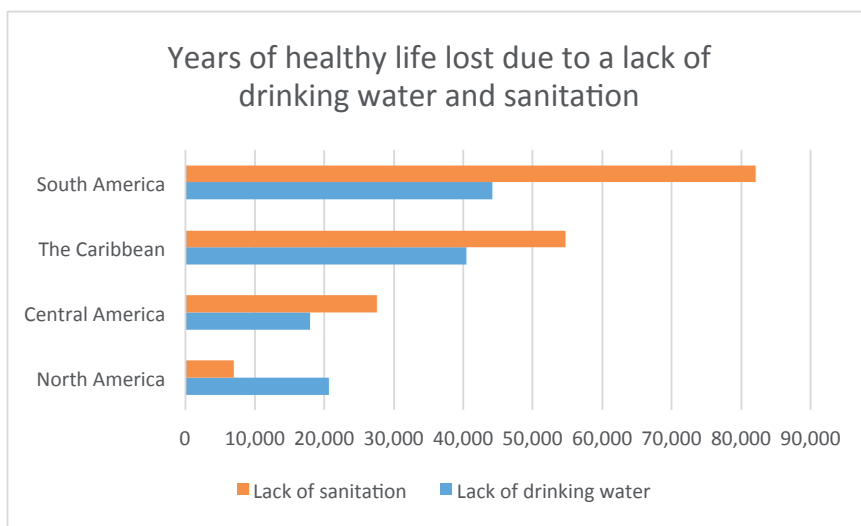
Drinking water. The nations of Latin America and the Caribbean achieved the Millennium Goals with regard to drinking water. 92% of the population in urban cities have plumbing. This figure rose to 97.5% if one includes other improved sources of water. However, these coverage statistics do not take into account service delivery, price or quality. In general, poor residents are still paying more for lower-quality water utilities which are often completely unreliable (UN-Habitat, 2012).

Sanitation. Sanitation is a pillar of public health policy and comprises a major part of any standard-of-living index. A lack of basic sanitation is clearly conducive to the propagation of diarrhea and infectious diseases, to include death. Advances in terms of sanitation in Latin America and Caribbean urban centers have been less impressive. Only 84% of population has access to proper sanitation. The situation is often better in large urban centers, but in general less than 20% of sewage water is treated before draining into the environment; a situation which is clearly extremely dangerous to the health and environment.

Clearly, much has been done in terms of improving basic housing, water and sanitation within the region, with the concomitant improvements in the quality of life and health of the populations involved. However, it is important to keep in mind that there are still major gaps between nations within the Americas in terms of service coverage.

These differences are made more manifest if one takes into account factors such as the incidence rates of diseases related to lack of drinking water or sanitation, or the years of healthy life lost to a lack of said services. The following figure shows that nations in South America have large losses in terms of years of healthy life due to a lack of key services. While North America has a lower incidence rate in terms of lack of sanitation services, the total years of healthy life lost due to a lack of drinking water is higher than in Central America.

FIGURE 18. Years of healthy life lost due to a lack of drinking water and sanitation



Source: Inter-American Observatory of Social Protection of the CISS.

URBAN CENTERS AND RISK FORECASTS

Disorganized urban growth correlates to the recent pandemics. This is due, in large part, to cities' inability to provide basic healthcare services to a highly-concentrated population which expands into areas in a highly disorderly and extremely fast fashion. Informal settlements which lack drinking water, drainage, electricity and basic health services are particularly susceptible to infectious disease. As a result, urban development has become a major public-health risk factor to every nation in the world.

In 2014, the ebola virus began to ravage rapidly-urbanized cities in Africa due to migratory dynamics. There is a great deal of evidence indicating that contagious disease propagates much more rapidly in high-density urban centers. In the Congo, 83% of the humans infected by a tuberculosis outbreak in 2012 lived in urban centers experiencing high rates of growth. Similarly, the 2009 H1N1 outbreak in Mexico City required radical measures to achieve containment.

Epidemics are not the exclusive purview of the healthcare sector. They are a reality that public policy needs to address from a highly-coordinated standpoint in which a variety of top government officials working in urban development, employment, finance, education, healthcare, immigration and national security, inter alia, work together on policy formation. The recent outbreaks make it clear that multinational efforts are needed to achieve a common end: social well-being.

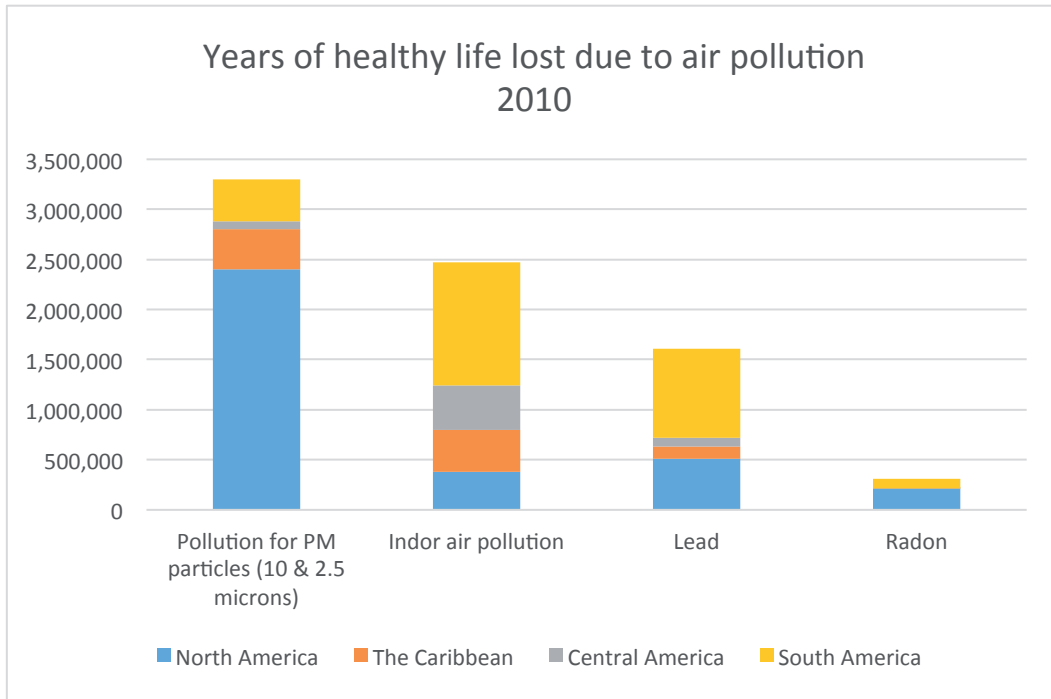
Whereas it is true that this is primarily a governmental undertaking, the private sector and civil society must be involved in the planning of preemptive strategies. This includes the moment in which first-response measures are taken to respond to a pandemic, especially in terms of timely access to pharmaceuticals and healthcare services; time is clearly of the essence in the initial stages. This type of coordinating the planning will pay major dividends in terms of the economic well-being and peace of mind of every single member of society.

URBAN SUSTAINABILITY

Urban population growth and the increase in lifestyles and consumption and production patterns among the middle class have had a negative effect on the environment. Air quality in large urban centers is frighteningly poor. Many cities suffer from the presence of small particulates in their air which have major impacts on the health of their inhabitants and can even correlate to increases in cardiovascular and respiratory conditions, which clearly impact morbidity and mortality rates.

It is estimated that Latin America and the Caribbean contribute along the lines of 12% in terms of greenhouse gas emissions, a fairly moderate level vis-à-vis the rest of the world (UN-Habitat, 2012). Urban centers within the Americas traditionally concentrated a large number of industries. Currently, a lack of urban planning and public policy which prioritizes automobile use over investment in public transport has severely impacted the quality of life levels among the region's citydwellers. The following figure demonstrates that North America is the region most affected by particulate pollution within the region, due to its high level of industrialization. Similarly, the figure demonstrates that South American nations face a major challenge in terms of air pollution control at the residential level due to the use of coal and wood.

FIGURE 19. Years of healthy life lost due to air pollution



Source: Inter-American Observatory of Social Protection of the CISS.

The urban growth index determines social, political, cultural and environmental trends across the planet. As a result, sustainable urbanization is one of the greatest challenges facing the planet in the 21st century.

*Preemptive Economics public-policy
recommendations for social protection*

As indicated throughout the text of this report, the current social protection scenario is complex and involves a wide spectrum of challenges. This is due to the fact that universal well-being is not feasible unless we perform a significant course correction. Should society refuse to rethink its penchant for traditional policies, models and attitudes, progress will never be made. We lack the resources to cover the risks associated with non-communicable diseases and current population-aging projections.

Everyone, as an international community, wants universal health care and pension coverage. Unfortunately, we lack the resources, governments have been unable to increase revenues and old age is becoming a huge public outlay. Even the strongest economies within the hemisphere are facing major social protection challenges which necessitate structural changes and the modernization of the model which has become a problem for every member of our respective societies. If we are to achieve productive and active older adults which make major contributions to society, we will need to drive preemptive policy which begins during childhood and runs through the entire lifecycle of individuals. In this manner, society will leverage the full potential of Old-Age Economics. The preemptive paradigm tracks individuals through the entire lifecycle via a systemic approach.

Public policy must prepare individuals, families in societies to adapt to the entire spectrum of transformations which occur in life, such as changes in career patterns and work conditions, the appearance of new types of social risks, population aging and climate change.

The fight against inequality and the lack of opportunities in life should begin at birth, if not before, in order to avoid the inevitable ramifications for social security systems. Pension policy must address infants because the well-being of future pensioners depends upon the life opportunities that children have today.

The principles of Preemptive Economics involve anticipating risks facing modern societies in order to put forth optimized, multi-entity public policy solutions which are based on evidence and which prioritize long-term goals in terms of social investment.

In light of the foregoing, the *optimizing* of the processes by which public resources are utilized, together with cost effectiveness analyses (CEA), comprises the fundamental core of Preemptive Economics, whereas prevention is extremely relevant when societies endeavor to minimize their economic, political and social costs.

The *multi-entity and multidisciplinary* nature of Preemptive Economics allows societies to leverage the distinctive areas of specialization, as it allows them to simultaneously capitalize upon the full spectrum of disciplines within the fields of technology and science in pursuit of a single aim: social protection.

An *evidence-based approach* allows stakeholders to ascertain the true degree of suitability of a given public policy which has been implemented during recent times through the use of reliable impact-analysis methods. This strategy also allows policymakers to learn from best practices, thereby avoiding outlays on the costs one normally associates with poorly-implemented initiatives.

By introducing public policies which prioritize *long-term* objectives, nations are able to design the budgetary and fiscal structures vis-à-vis aims which comprise more than short-term gains, which are notoriously subject to national and regional political dynamics. Additionally, short-term planning almost never provides an opportunity to reap all the potential benefits of a given initiative or to fully analyze results. Long-term initiatives and policy, on the other hand, have the potential to create incentives specifically directed at the issues of health and productivity; sectors which require one or more generations to fully ascertain impact. We must not accede to the usual societal pressure for immediate results.

Although Preemptive Economics was born out of the need to address rising health care costs related to chronic degenerative diseases, it now comprises the entire social protection sphere in which prevention has been identified as the best way to address our lack of ability to cover current – and more troubling still – the future costs of such conditions. Its multidisciplinary and multi-entity systemic approach allows us to more objectively analyze our challenges from a variety of angles, and thereby use the full spectrum of economic, demographic, political and environmental perspectives, inter alia.

Clearly, this is not a novel approach. Prevention has always paid enormous dividends in terms of avoiding costs and exacerbating existing problems. Today, however, it also provides an ideal opportunity to exchange knowledge and experiences within the Americas.

The following paragraphs include recommendations designed to support policymakers and stakeholders within the Americas in their pursuit of solutions for the healthcare, employment, pensions, education and housing sectors. These recommendations are based on analyses and studies performed by a wide spectrum of international bodies and subject matter experts, and fully employ the principles of Preemptive Economics. Certain aspects of the policy recommendations still require further action or recommendations, but the list comprises what might be termed watershed policy in terms of Preemptive Economics.

HEALTHCARE

The Preemptive Economics proposal considers the lifecycle, from birth to old age, in its foundations. In this context, health plays a significant role in order for individuals to have a full and healthy life, including active aging. A health approach based on prevention is paramount considering the new epidemiologic realities and the rise of noncommunicable diseases, which are avoidable in most cases.

- Prioritize the health of individuals throughout the entire lifecycle when formulating public policy, with a particular focus on providing access to quality health care services and disease prevention.
- In terms of non-communicable disease, utilize carrot and stick policies to de incentivize the consumption of foods which are high in sugar, salt and fat through the use of initiatives similar to those used for controlling the issues of access and advertising in the tobacco and alcohol sectors, in addition to price increases via taxes.
- Explore tax programs designed to increase revenues by targeting these types of foods, and in order to incentivize good decision-making in terms of non-communicable disease prevention, and promote universal access to healthy nutritional options.
- Design prevention programs such as labeling which is easy to read for processed foods, the regulation of advertising directed at minors and the promotion of physical activity.
- Take into account international recommendations and best practices in terms of nutrition.

- Create programs which provide healthy school food options to children, particularly in low income communities.
- Incorporate the formation of healthy eating habits as part of school curricula by teaching students the importance of respecting themselves and the environment.
- Involve leading officials from, inter alia, the healthcare, education, agricultural and social development sectors, in the design and implementation of policies which prioritize the preemptive paradigm which systematically accompanies an individual throughout the entire lifecycle.

EMPLOYMENT

The economies within the Americas require public policies that drive better paid jobs in higher productivity sectors, in order to improve the quality of life of working age individuals, including older adults. In order to access this type of jobs individuals will require good health and the skill sets required by employers. The workplace can also contribute greatly to the inculcation of healthy habits.

- In order to drive formal sector employment, promote employment insertion and job stability through training programs.
- Develop policies designed to facilitate the entry of young people into their first job and to help older adults we insert themselves, through the use of employer tax incentives.
- Facilitate access to credit with an eye to reducing informality.
- Promote programs, which facilitate permanent communication between labor market actors and secondary and tertiary education providers, in order to ensure education is in sync with labor market requirements and the needs of young workers.
- Leverage IT resources to expand access and facilitate communication between those who offer and/or require employment or services.
- Create programs which match employment supply and demand that address first-time employment for young workers and older-adult reinsertion into the job market, as well as lifelong learning programs which provide skills development.
- Design strategies and initiatives to prevent noncommunicable disease that involve the direct participation of workers, employers, governments, institutions and organizations within society

in order to drive productivity and reduce absenteeism and presenteeism.

- Facilitate the existence of healthy workplace environments and access to healthy foods and drinking water as a means to reduce the consumption of ultraprocessed food and sugary drinks.
- Remain abreast of the latest developments in the field of workplace safety and health, especially as they relate to non-communicable disease prevention and regardless of whether or not they fall within the express purview of the workplace; their impact will be felt regardless.
- Facilitate older-adult access to the job market.

PENSIONS

Successful aging is a result of lifestyle decision-making driven by preemptive public-policy which helps individuals avoid preventable risk factors. Pension schemes must guarantee a dignified retirement income for all older adults within society. Regardless of the legal retirement age, an active and productive older-adult population will contribute to the sustainability of pension systems.

- Put forth strategies designed to modernize and increase the efficiency of existing pension schemes, such as creating incentives for workers and employers to formalize work relationships, increase productivity and investment in training.
- Financial education beginning early in life is fundamental to the existence of efficient pension schemes.
- Make sure social pension systems are sustainable by promoting sound public finances.
- Promote periodic actuarial reviews which help systems adjust to better address the realities of modern life.
- Design clear and transparent pension schemes which are resistant to political pressures.
- Explore different types of pension schemes and mixtures thereof, as well as alternative funding sources and management structures. The reverse mortgage case study should be closely analyzed, in this regard.
- Take into account that pension plans must cover worker needs during their entire retirement. One possible solution may be foregoing pensions which provide lifelong income. Evaluate the

relevance of programmed retirement in order to help individuals avoid the destabilization of their finances during old age.

EDUCATION

Social security should make us consider the need to introduce new education models. This may include the insertion of social protection concepts into academic curricula. A singularly practicable alternative may include defining what the pillars of new education should be through the multi-entity and multidisciplinary platform of Preemptive Economics:

1. An intervention mechanism should be incorporated to address girls and boys under three. Such an initiative should include areas which are fundamental to an individual as they enter the new economic, demographic and epidemiological realities of the 21st century.
2. Introduce respect to the environment in the curricula to foster a sustainable outlook that promotes preservation of non-renewable resources.
3. Introduce respect for others in the curricula, whereas the realities of the modern labor market prioritizes social groups who are conscious and respectful of diverse city in terms of gender, race, nationality, creed, and sexual preference, inter alia.
4. Introduce self-respect in the curricula, in order to promote individuals, capacity for good decision-making in terms of lifestyle habits and nutrition, in order to sculpture a more healthy and productive new generation of human beings.
 - Promote the participation of governmental, academic and private sector actors in the design of life-long learning programs, to include technical as well as universal studies.
 - Provide learning opportunities and skill certifications to workers previously unable to receive formal education, but who possess a fair degree of work experience and empirical knowledge.
 - Ensure that, from an early age, health and good eating habits are incorporated into educational programs. Issues focused on building a population which develops physically and arrives to old age as healthy, active and self-sufficient older adults.

- Formulate public policy designed to ensure schools are healthy, free of foods high in sugar, fat and salt, which have access to water fountains and secure facilities for exercise and sporting pursuits.

HOUSING

Urban planning requires public policy which addresses the needs of populations in rapid growth, and addresses future risks related to climate change.

- Prioritize the establishment, renovation and improvement of public spaces, parks and urban infrastructure in order to contribute to improvements in individuals' quality of life.
- Design and implement policies for the creation of proper infrastructure for bicycles and sufficiently wide sidewalks and adapted to all types of pedestrians in order to promote physical activity.
- Promote more efficient transport systems.
- Provide increased support for sanitation policies in order to expand coverage and decrease the incidence rates of communicable disease.
- Explore the introduction of differentiated costs for water consumption, which are pegged to income, as well as carrot and stick measures for responsible water use.
- Provide cities with technical advising to help them bring order to human settlements which have dangerous or disorderly aspects.
- Fortify coordination between government entities and private sectors and civil society in order to achieve sustainable development.
- Promote healthy eating patterns through the production of natural food products produced locally in order to avoid the consumption of ultra-processed foods which increased incidence rates of non-communicable diseases related to overweight and obesity. Linking school food programs to the local agricultural sector can generate direct economic benefits and benefit the entire community.

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Appendix
Preemptive Economics: Risk Factors
Inter-American Observatory of Social Protection

In its second edition, the Inter-American Observatory of Social Protection (IAOSP) focuses on Preemptive Economics risk factors.

Preemptive Economics is designed to improve individual well-being. As a result, it seeks to address preventable factors which are, by their very nature, avoidable.

The Inter-American Observatory of Social Protection presents scientific evidence on factors related to demographics, economics, human development and health which are determined in terms of the CISS region and sub-regions.

The risk factors included in the Preemptive Economics Risk Factors include:

1. Dietary risk factors
2. Physiological risk factors (metabolic syndrome)
3. Tobacco use
4. Alcohol and drug use
5. Air pollution
6. Water pollution and lack of sanitation
7. Physical inactivity
8. Injuries

Data on the leading Causes, years of healthy life lost the impact of principal preventable risks, as well as principal risk factors and Causes by age group are included.

The Preemptive Economics Risk Factors data was collected from the World Bank database, the Human Development Index and the WHO's *Global Burden of Disease* and *World Health Statistics*.

This appendix provides an opportunity to review data aggregated by the following CISS regions and subregions:

1. CISS Region
2. North America Sub-Region
3. Latin America and the Caribbean Sub-Region
4. Caribbean Sub-Region
5. Central America Sub-Region
6. Andean Sub-Region
7. South American Sub-Region

The data aggregated by nation is available on the CISS Web portal:
www.ciss.net.

**IAOSP-CISS
PREEMPTIVE ECONOMICS RISK FACTORS
CISS REGION¹**

Demographic indicators, 2013

Total population	965.15 million inhabitants
Life expectancy at birth (LEB)	76.9 years
Health life expectancy at birth (HLEB) ²	66.7 years (10.2 years less than life expectancy at birth)
Median age	32.6 years
Life expectancy for over-60 year population	22 years
Over-60 years population	14.1% (136.27 million inhabitants)

Macroeconomic indicators, 2013

Per capita GDP for PPA	\$32,823.10
Per capita GDP-PPP outlay on healthcare	\$4,826.20
Total outlay on healthcare, % of GDP	10.7%
<i>Public outlay on healthcare</i>	6.1%
<i>Private outlay on healthcare</i>	2.1%
<i>Others outlays on healthcare</i>	2.5%

Human development indicators, 2013

Human Development Index	0.830
HDI adjusted for inequality (HDI-I)	0.663
Gini coefficient, 2012	46.6 (Optimal: below 39.0)

Causes, 2012

Communicable diseases	15.9%
Non-communicable diseases	72.7%
Injuries	11.4%

¹ The CISS region includes information available from Latin America, the Caribbean, Canada and the United States.

² Healthy life expectancy at birth is the average equivalent number of years of full health that a newborn could expect to live, were they to pass through life subject to the age-specific death rates and ill-health rates of a given period.

Main Causes, 2010

Causes	Deaths	Percentage
1. Ischemic heart disease	1,085,962	30.9%
2. Stroke	514,200	14.6%
3. Lower respiratory infection	297,860	8.5%
4. Diabetes	287,048	8.2%
5. Forces of nature	261,355	7.4%
6. Partner violence	183,317	5.2%
7. Chronic obstructive pulmonary disease (COPD)	182,692	5.2%
8. Chronic Kidney disease	175,300	5.0%
9. Injuries	173,709	4.9%
10. Others outlays on healthcare diseases	352,856	10.0%
Total 10 main Causes	3,514,299	100.0%

Impact of risks factors

Factor	1990	2010	Growth rate	% for 2010
Disability adjusted life years (DALY)	157,568,780	175,444,295	11.3%	100.0%
<i>Years lived with disability (YLD)</i>	23,184,998	37,695,919	62.6%	21.5%
<i>Years of life lost (YLL)</i>	134,383,782	137,748,376	2.5%	78.5%
<i>Deaths</i>	5,501,733	6,814,642	23.9%	

Impact of leading preventable risks

Disability adjusted life years of risks factor (%) 2010		Increase in deaths to risk factors: 2010 vs 1990	
1. <i>Physiological risks</i>	35%	1. Injuries	64%
2. <i>Dietary risks</i>	16%	• <i>Road injuries</i>	88%
3. <i>Injuries</i>	8%	• <i>Interpersonal violence</i>	43%
4. <i>Physical inactivity</i>	6%	2. Physiological risks	22%
5. <i>Smoking</i>	6%	• <i>High body-mass index</i>	61%
6. <i>Occupational risk</i>	3%	• <i>High blood glucose levels</i>	29%
7. <i>Other risks</i>	26%	• <i>Low bone mineral density</i>	9%
Total	100%	3. Dietary risks	7%

Disability adjusted life years, 2013

	Risks factors	Causes
<i>Children under 5 years</i>	1. <i>Childhood and maternal malnutrition</i>	1. <i>Neonatal disorders</i>
	2. <i>Alcohol and drug use</i>	2. <i>Other non-communicable diseases</i>
	3. <i>Low glomerular filtration rate</i>	3. <i>Unintentional injuries</i>
	4. <i>Sexual abuse and violence</i>	4. <i>Diarrhea/LRI/other</i>
	5. <i>Air pollution</i>	5. <i>Transport injuries</i>
	6. <i>High fasting plasma glucose</i>	6. <i>Diabetes</i>
	7. <i>Unsafe water, sanitation, and handwashing</i>	7. <i>Neoplasms</i>
	8. <i>Smoking</i>	8. <i>War & disaster</i>
		9. <i>Nutritional deficiencies</i>

<i>5 to 14 years of age</i>	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. Alcohol and drug use 2. High fasting plasma glucose 3. Low glomerular filtration rate 4. Sexual abuse and violence 5. Air pollution 6. Unsafe water, sanitation, and handwashing 7. High systolic blood pressure 8. Childhood and maternal malnutrition 	<ol style="list-style-type: none"> 1. Transport injuries 2. Neoplasms 3. Unintentional injuries 4. Self-harm & violence 5. Other non-communicable 6. Diabetes 7. Diarrhea/LRI/other 8. War & disaster
<i>15 to 49 years of age</i>	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. Alcohol and drug use 2. Dietary risks 3. High body-mass index 4. Smoking 5. High systolic blood pressure 6. High total cholesterol 7. High fasting plasma glucose 8. Sexual abuse and violence 	<ol style="list-style-type: none"> 1. Neoplasms 2. Self-harm & violence 3. Cardiovascular diseases 4. Transport injuries 5. Mental & substance use 6. Diabetes 7. Unintentional injuries 8. War & disaster
<i>50 to 69 years of age</i>	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. Smoking 2. Dietary risks 3. High body-mass index 4. High systolic blood pressure 5. Alcohol and drug use 6. High fasting plasma glucose 7. High total cholesterol 	<ol style="list-style-type: none"> 1. Neoplasms 2. Cardiovascular diseases 3. Diabetes 4. Chronic respiratory 5. Cirrhosis 6. Neurological disorders 7. Self-harm & violence 8. Diarrhea/LRI/other 9. War & disaster
<i>70 years of age and over</i>	<i>Risks factors</i>	<i>Causes deaths</i>
	<ol style="list-style-type: none"> 1. Dietary risks 2. High systolic blood pressure 3. Smoking 4. High body-mass index 5. High fasting plasma glucose 6. High total cholesterol 7. Low glomerular filtration rate 	<ol style="list-style-type: none"> 1. Cardiovascular diseases 2. Neoplasms 3. Neurological disorders 4. Chronic respiratory 5. Diabetes 6. Diarrhea/LRI/other 7. Unintentional injuries 8. Digestive diseases

**IAOSP-CISS
PREEMPTIVE ECONOMICS RISK FACTORS
NORTH AMERICA SUB-REGION³**

Demographic indicators, 2013

Total population	355.23 million inhabitants
Life expectancy at birth (LEB)	79.3 years
Health life expectancy at birth (HLEB) ⁴	69.3 years (10 years less than life expectancy at birth)
Median age	37.3 years
Life expectancy for over-60 year population	24.8 years
Over-60 years population	20% (71.39 million inhabitants)

Macroeconomic indicators, 2013

Per capita GDP for PPA	\$51,995
Per capita GDP-PPP outlay on healthcare	\$8,712
Total outlay on healthcare, % of GDP	13.9%
<i>Public outlay on healthcare</i>	7.8%
<i>Private outlay on healthcare</i>	1.8%
<i>Others outlays on healthcare</i>	4.3%

Human development indicators, 2013

Human Development Index	0.913
HDI adjusted for inequality (HDI-I)	0.755
Gini coefficient, 2012	40.0 (Optimal: below 39.0)

Causes, 2012

Communicable diseases	6.3%
Non-communicable diseases	85.1%
Injuries	8.6%

³ The North America subregion includes information available on Canada and the United States.

⁴ Healthy life expectancy at birth is the average number of years a person possesses as life expectancy with “complete health”, to include the years of life lived in complete health less than years lived in illness and/or injury.

Main Causes, 2010

Causes	Deaths	Percentage
1. Ischemic heart disease	619,299	35.9%
2. Stroke	191,463	11.1%
3. Lung cancer	182,692	10.6%
4. Alzheimer's disease	175,300	10.2%
5. Chronic obstructive pulmonary disease (COPD)	167,552	9.7%
6. Diabetes	94,934	5.5%
7. Lower respiratory infection	93,871	5.4%
8. Colorectal cancer	72,887	4.2%
9. Cardiovascular diseases	61,313	3.6%
10. Others outlays on healthcare diseases	65,936	3.8%
Total 10 main Causes	1,725,247	100.0%

Impact of risks factors

Factor	1990	2010	Growth rate	% to 2010
Disability adjusted life years (DALY)	63,198,530	68,108,003	7.8%	100.0%
<i>Years lived with disability (YLD)</i>	9,995,813	15,732,484	57.4%	23.1%
<i>Years of life lost (YLL)</i>	53,202,717	52,375,519	-1.6%	76.9%
<i>Deaths</i>	3,016,640	3,180,196	5.4%	

Impact of leading preventable risks

Disability adjusted life year of risks factor (%) 2010	Increase in deaths to risk factors: 2010 vs 1990
1. <i>Physiological risks</i> 37%	1. Unimproved water and sanitation 703%
2. <i>Dietary risks</i> 18%	• <i>Unimproved water</i> 699%
3. <i>Physical inactivity</i> 7%	• <i>Sanitation</i> 457%
4. <i>Smoking</i> 3%	2. Alcohol and drug use 32%
5. <i>Injuries</i> 2%	• <i>Alcohol use</i> 17%
6. <i>Occupational risks</i> 2%	• <i>Drug use</i> 167%
7. <i>Other risks</i> 31%	
Total 100%	

Disability adjusted life years, 2013

Children under 5 years	Risks factors	Causes
	1. <i>Childhood and maternal malnutrition</i> 2. <i>Alcohol and drug use</i> 3. <i>Low glomerular filtration rate</i> 4. <i>Sexual abuse and violence</i> 5. <i>Air pollution</i> 6. <i>High fasting plasma glucose</i> 7. <i>Unsafe water, sanitation, and handwashing</i>	1. <i>Neonatal disorders</i> 2. <i>Other non-communicable</i> 3. <i>Unintentional injuries</i> 4. <i>Diarrhea/LRI/other</i> 5. <i>Transport injuries</i> 6. <i>Diabetes</i> 7. <i>Neoplasms</i>

5 to 14 years of age	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. Alcohol and drug use 2. High fasting plasma glucose 3. Low glomerular filtration rate 4. Sexual abuse and violence 5. Air pollution 6. Unsafe water, sanitation, and handwashing 7. High systolic blood pressure 	<ol style="list-style-type: none"> 1. Transport injuries 2. Neoplasms 3. Unintentional injuries 4. Self-harm & violence 5. Other non-communicable 6. Diabetes 7. Diarrhea/LRI/other
15 to 49 years of age	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. Alcohol and drug use 2. Dietary risks 3. High body-mass index 4. Smoking 5. High systolic blood pressure 6. High total cholesterol 7. High fasting plasma glucose 	<ol style="list-style-type: none"> 1. Neoplasms 2. Self-harm & violence 3. Cardiovascular diseases 4. Transport injuries 5. Mental & substance use 6. Diabetes 7. Unintentional injuries
50 to 69 years of age	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. Smoking 2. Dietary risks 3. High body-mass index 4. High systolic blood pressure 5. Alcohol and drug use 6. High fasting plasma glucose 7. High total cholesterol 	<ol style="list-style-type: none"> 1. Neoplasms 2. Cardiovascular diseases 3. Diabetes 4. Chronic respiratory 5. Cirrhosis 6. Neurological disorders 7. Self-harm & violence
70 years of age and over	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. Dietary risks 2. High systolic blood pressure 3. Smoking 4. High body-mass index 5. High fasting plasma glucose 6. High total cholesterol 7. Low glomerular filtration rate 	<ol style="list-style-type: none"> 1. Cardiovascular diseases 2. Neoplasms 3. Neurological disorders 4. Chronic respiratory 5. Diabetes 6. Diarrhea/LRI/other 7. Unintentional injuries

**IAOSP-CISS
PREEMPTIVE ECONOMICS RISK FACTORS
LATIN AMERICA AND THE CARIBBEAN SUB-REGION⁵**

Demographic indicators, 2013

Total population	609.92 million inhabitants
Life expectancy at birth (LEB)	74.6 years
Health life expectancy at birth (HLEB) ⁶	64.2 years (10.4 years less than life expectancy at birth)
Median age	27.9 years
Life expectancy for over-60 year population	21.3 years
Over-60 years population	10.6% (64.87 million inhabitants)

Macroeconomic indicators, 2013

Per capita GDP for PPA	\$13,651.30
Per capita GDP-PPP outlay on healthcare	\$940.50
Total outlay on healthcare, % of GDP	7.4%
<i>Public outlay on healthcare</i>	4.4%
<i>Private outlay on healthcare</i>	2.4%
<i>Others outlays on healthcare</i>	0.6%

Human development indicators, 2013

Human Development Index	0,747
HDI adjusted for inequality (HDI-I)	0,571
Gini coefficient, 2012	53.3 (Optimal: below 39.0)

Causes, 2012

Communicable diseases	14.7%
Non-communicable diseases	73.9%
Injuries	11.4%

⁵ World Bank classification.

⁶ Healthy life expectancy at birth is the average number of years a person possesses as life expectancy with “complete health”, to include the years of life lived in complete health less than years lived in illness and/or injury.

Main Causes, 2010

Causes	Deaths	Percentage
1. Ischemic heart disease	466,663	24.1%
2. Stroke	322,737	16.6%
3. Lower respiratory infection	193,177	10.0%
4. Diabetes	166,421	8.6%
5. Forces of nature	183,317	9.5%
6. Partner violence	149,502	7.7%
7. Chronic obstructive pulmonary disease (COPD)	130,308	6.7%
8. Chronic Kidney disease	113,381	5.8%
9. Road injury	109,561	5.7%
10. Cirrhosis	103,487	5.3%
Total 10 main Causes	1,938,554	100.0

Impact of risks factors

Factor	1990	2010	Growth rate	% for 2010
Disability adjusted life years (DALY)	94,370,250	107,336,292	13.7%	100.0%
<i>Years lived with disability (YLD)</i>	13,189,185	21,963,435	66.5%	20.5%
<i>Years of life lost (YLL)</i>	81,181,065	85,372,857	5.2%	79.5%
<i>Deaths</i>	2,485,093	3,634,446	46.2%	

Impact of leading preventable risks

Disability adjusted life year of risks factor (%) 2010		Increase of deaths 2010 vs 1990 to risks factors	
1. <i>Physiological risks</i>	32%	1. Physiological risks	73%
2. <i>Dietary risks</i>	14%	• <i>High body-mass index</i>	140%
3. <i>Injuries</i>	13%	• <i>High fasting plasma glucose</i>	101%
4. <i>Alcohol and drug use</i>	12%	2. Alcohol and drug use	55%
5. <i>Smoking</i>	8%	• <i>Alcohol use</i>	53%
6. <i>Physical inactivity</i>	5%	• <i>Drug use</i>	83%
7. <i>Occupational risks</i>	4%	3. Injuries	40%
8. <i>Other risks</i>	12%	• <i>Road injury</i>	40%
Total	100%	• <i>Interpersonal violence</i>	40%

Disability adjusted life years, 2013

Children under 5 years	Risks factors	Causes
	<ol style="list-style-type: none"> Childhood and maternal malnutrition Unsafe water, sanitation, and handwashing Air pollution Sexual abuse and violence Smoking Low glomerular filtration rate Alcohol and drug use 	<ol style="list-style-type: none"> Neonatal disorders Diarrhea/LRI/other Other non-communicable War & disaster Unintentional injuries Nutritional deficiencies Diabetes

5 to 14 years of age	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. <i>Unsafe water, sanitation, and handwashing</i> 2. <i>Alcohol and drug use</i> 3. <i>Low glomerular filtration rate</i> 4. <i>Air pollution</i> 5. <i>Sexual abuse and violence</i> 6. <i>High fasting plasma glucose</i> 7. <i>Childhood and maternal malnutrition</i> 	<ol style="list-style-type: none"> 1. <i>War & disaster</i> 2. <i>Transport injuries</i> 3. <i>Unintentional injuries</i> 4. <i>Diarrhea/LRI/other</i> 5. <i>Neoplasms</i> 6. <i>Self-harm & violence</i> 7. <i>Other non-communicable</i>
15 to 49 years of age	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. <i>Alcohol and drug use</i> 2. <i>Dietary risks</i> 3. <i>High body-mass index</i> 4. <i>High systolic blood pressure</i> 5. <i>Smoking</i> 6. <i>Sexual abuse and violence</i> 7. <i>High fasting plasma glucose</i> 	<ol style="list-style-type: none"> 1. <i>Self-harm & violence</i> 2. <i>War & disaster</i> 3. <i>Cardiovascular diseases</i> 4. <i>Neoplasms</i> 5. <i>Transport injuries</i> 6. <i>Unintentional injuries</i> 7. <i>Diabetes</i>
50 to 69 years of age	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. <i>Dietary risks</i> 2. <i>High systolic blood pressure</i> 3. <i>High body-mass index</i> 4. <i>Smoking</i> 5. <i>High fasting plasma glucose</i> 6. <i>Alcohol and drug use</i> 7. <i>High total cholesterol</i> 	<ol style="list-style-type: none"> 1. <i>Cardiovascular diseases</i> 2. <i>Neoplasms</i> 3. <i>Diabetes</i> 4. <i>Cirrhosis</i> 5. <i>Chronic respiratory</i> 6. <i>Diarrhea/LRI/other</i> 7. <i>War & disaster</i>
70 years of age and over	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. <i>Dietary risks</i> 2. <i>High systolic blood pressure</i> 3. <i>High fasting plasma glucose</i> 4. <i>High body-mass index</i> 5. <i>Smoking</i> 6. <i>Low glomerular filtration rate</i> 7. <i>High total cholesterol</i> 	<ol style="list-style-type: none"> 1. <i>Cardiovascular diseases</i> 2. <i>Neoplasms</i> 3. <i>Diabetes</i> 4. <i>Chronic respiratory</i> 5. <i>Diarrhea/LRI/other</i> 6. <i>Neurological disorders</i> 7. <i>Digestive diseases</i>

**IAOSP-CISS
PREEMPTIVE ECONOMICS RISK FACTORS
CARIBBEAN SUB-REGION⁷**

Demographic indicators, 2013

Total population	34.88 million inhabitants
Life expectancy at birth (LEB)	72 years
Health life expectancy at birth (HLEB) ⁸	60.6 years (11.4 years less than life expectancy at birth)
Median age	29.8 years
Life expectancy for over-60 year population	19.3 years
Over-60 years population	5.8% (2.02 million inhabitants)

Macroeconomic indicators, 2013

Per capita GDP for PPA	\$12,653.70
Per capita GDP-PPP outlay on healthcare	\$933.10
Total outlay on healthcare, % of GDP	6.0%
<i>Public outlay on healthcare</i>	3.4%
<i>Private outlay on healthcare</i>	1.8%
<i>Others outlays on healthcare</i>	0.8%

Human development indicators, 2013

Human Development Index	0,674
HDI adjusted for inequality (HDI-I) ⁹	0,498
Gini Coefficient, 2012 ¹⁰	53.2 (Optimal: below 39.0) ¹¹

Causes, 2012

Communicable diseases	17.9%
Non-communicable diseases	72.9%
Injuries	9.2%

⁷ Caribbean sub-region includes information available from the following nations: Antigua and Barbuda, Barbados, Belize, Cuba, Dominica, Grenada, Haiti, Dominican Republic, St. Vincent and the Grenadines, St. Lucia and Trinidad and Tobago.

⁸ Healthy life expectancy at birth is the average number of years a person possesses as life expectancy with “complete health”, to include the years of life lived in complete health less than years lived in illness and/or injury.

⁹ Calculated with information from: Bahamas, Haiti and Dominican Republic.

¹⁰ Calculated with information from: Bahamas, Haiti and Dominican Republic.

¹¹ Simple average of the CISS region.

Main Causes, 2010

Causes	Deaths	Percentage
1. Forces of nature	67,124	43.1%
2. Ischemic heart disease	26,901	17.3%
3. Stroke	23,834	15.3%
4. Diabetes	10,389	6.7%
5. Lower respiratory infections	8,935	5.7%
6. Hypertensive health disease	5,088	3.3%
7. Breast cancer	3,610	2.3%
8. HIV/AIDS	3,395	2.2%
9. Alzheimer's disease	3,369	2.2%
10. Diarrheal /LRI/other	2,919	1.9%
Total 10 main causes	155,564	100%

Impact of risks factors

Concept	1990	2010	Growth rate	% for 2010
Disability adjusted life years (DALY)	7,883,981	8,167,991	3.6%	100%
<i>Years lived with disability (YLD)</i>	1,091,640	1,659,117	52.0%	20.3%
<i>Years of life lost (YLL)</i>	6,792,341	6,508,874	-4.1%	79.7%
<i>Deaths</i>	211,398	293,486	38.8%	

Impact of leading preventable risks

Disability adjusted life year of risks factor (%) 2010	Development of deaths 2010 vs 1990 to risks factors
1. <i>Physiological risks</i> 34%	1. Physiological risks 55%
2. <i>Dietary risks</i> 16%	• <i>High body-mass index</i> 126%
3. <i>Smoking</i> 9%	• <i>High fasting plasma glucose</i> 67%
4. <i>Injuries</i> 8%	• <i>Low bone mineral density</i> 50%
5. <i>Physical inactivity</i> 6%	2. Injuries 33%
6. <i>Occupational risks</i> 2%	• <i>Road injury</i> 3%
7. <i>Other risks</i> 25%	• <i>Interpersonal violence</i> 100%
Total 100%	3. Dietary risks 33%

Disability adjusted life years, 2013

	Risks factors	Causes
<i>Children under 5 years</i>	1. <i>Childhood and maternal malnutrition</i>	1. <i>Neonatal disorder</i>
	2. <i>Unsafe water, sanitation, and handwashing</i>	2. <i>Diarrhea/LRI/other</i>
	3. <i>Unsafe sex</i>	3. <i>Other non-communicable</i>
	4. <i>Air pollution</i>	4. <i>Nutritional deficiencies</i>
	5. <i>Low glomerular filtration rate</i>	5. <i>Group 1</i>
	6. <i>Alcohol and drug use</i>	6. <i>Unintentional injuries</i>
	7. <i>Smoking</i>	7. <i>Cardiovascular diseases</i>
	8. <i>High fasting plasma glucose</i>	8. <i>Diabetes</i>
	9. <i>High systolic blood pressure</i>	9. <i>Neoplasms</i>
	10. <i>Other environmental risks</i>	10. <i>Transport injuries</i>

5 to 14 years of age	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. <i>Childhood and maternal malnutrition</i> 2. <i>Unsafe water, sanitation, and handwashing</i> 3. <i>Low glomerular filtration rate</i> 4. <i>High fasting plasma glucose</i> 5. <i>Alcohol and drug use</i> 6. <i>Unsafe sex</i> 7. <i>Air pollution</i> 8. <i>High systolic blood pressure</i> 9. <i>Sexual abuse and violence</i> 10. <i>Other environmental risks</i> 	<ol style="list-style-type: none"> 1. <i>Nutritional deficiencies</i> 2. <i>Mental & substance use</i> 3. <i>Other non-communicable</i> 4. <i>Diarrhea/LRI/other</i> 5. <i>Diabetes</i> 6. <i>Unintentional injuries</i> 7. <i>Transport injuries</i> 8. <i>HIV/AIDS</i> 9. <i>NTDs & malaria</i> 10. <i>Neurological disorders</i>
15 to 49 years of age	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. <i>Sexual abuse and violence</i> 2. <i>Alcohol and drug use</i> 3. <i>Dietary risks</i> 4. <i>High body-mass index</i> 5. <i>High systolic blood pressure</i> 6. <i>High fasting plasma glucose</i> 7. <i>Smoking</i> 8. <i>Occupational risks</i> 9. <i>Childhood and maternal malnutrition</i> 10. <i>Air pollution</i> 	<ol style="list-style-type: none"> 1. <i>Mental & substance use</i> 2. <i>HIV/AIDS</i> 3. <i>Cardiovascular diseases</i> 4. <i>Diabetes</i> 5. <i>Other non-communicable</i> 6. <i>Self-harm & violence</i> 7. <i>Musculoskeletal disorders</i> 8. <i>Neoplasms</i> 9. <i>Transport injuries</i> 10. <i>Unintentional injuries</i>
50 to 69 years of age	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. <i>Dietary risks</i> 2. <i>High systolic blood pressure</i> 3. <i>High body-mass index</i> 4. <i>High fasting plasma glucose</i> 5. <i>Smoking</i> 6. <i>Low physical activity</i> 7. <i>Air pollution</i> 8. <i>High total cholesterol</i> 9. <i>Alcohol and drug use</i> 10. <i>Low glomerular filtration rate</i> 	<ol style="list-style-type: none"> 1. <i>Cardiovascular diseases</i> 2. <i>Neoplasms</i> 3. <i>Diabetes</i> 4. <i>Other non-communicable</i> 5. <i>Musculoskeletal disorders</i> 6. <i>Mental & substance use</i> 7. <i>Chronic respiratory</i> 8. <i>Diarrhea/LRI/other</i> 9. <i>Neurological disorders</i> 10. <i>Unintentional injuries</i>
70 years of age and over	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. <i>High systolic blood pressure</i> 2. <i>Dietary risks</i> 3. <i>High body-mass index</i> 4. <i>High fasting plasma glucose</i> 5. <i>Smoking</i> 6. <i>Low glomerular filtration rate</i> 7. <i>Low physical activity</i> 8. <i>Air pollution</i> 9. <i>Alcohol and drug use</i> 10. <i>High total cholesterol</i> 	<ol style="list-style-type: none"> 1. <i>Cardiovascular diseases</i> 2. <i>Neoplasms</i> 3. <i>Diabetes</i> 4. <i>Other non-communicable</i> 5. <i>Neurological disorders</i> 6. <i>Diarrhea/LRI/other</i> 7. <i>Chronic respiratory</i> 8. <i>Musculoskeletal disorders</i> 9. <i>Unintentional injuries</i> 10. <i>Digestive diseases</i>

**IAOSP-CISS
PREEMPTIVE ECONOMICS RISK FACTORS
CENTRAL AMERICA SUB-REGION¹²**

Demographic indicators, 2013

Total population	167.05 million inhabitants
Life expectancy at birth (LEB)	74.7 years
Health life expectancy at birth (HLEB) ¹³	65.1 years (9.6 years less than life expectancy at birth)
Median age	25.9 years
Life expectancy for over-60 year population	21.2 years
Over-60 years population	9% (14.85 million inhabitants)

Macroeconomic indicators, 2013

Per capita GDP	\$14,202.50
Per capita GDP-PPP outlay on healthcare	\$933.00
Total outlay on healthcare	7.5%
<i>Public outlay on health care</i>	4.4%
<i>Private outlay on healthcare</i>	2.7%
<i>Others outlays on healthcare</i>	0.4%

Human development indicators, 2013

Human Development Index	0,729
HDI Adjusted for inequqlity (HDI-I)	0,553
Gini Coefficient, 2012	48.5 (Optimal: below 39.0) ¹⁴

Causes, 2012

Communicable diseases	15.5%
Non-communicable diseases	71.0%
Injuries	13.5%

¹² Central American sub-region includes information available from: Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua and Panama.

¹³ Healthy life expectancy at birth is the average number of years a person possesses as life expectancy with “complete health”, to include the years of life lived in complete health less than years lived in illness and/or injury.

¹⁴ Simple average of the CISS region.

Main Causes, 2010

Cause	Deaths	Percentage
1. Ischemic heart disease	100,694	20.9%
2. Diabetes	64,912	13.5%
3. Chronic kidney disease	50,908	10.6%
4. Stroke	48,624	10.1%
5. Cirrhosis	42,070	8.7%
6. Lower respiratory infections	41,779	8.7%
7. Interpersonal violence	37,368	7.8%
8. Chronic obstructive pulmonary disease (COPD)	28,195	5.9%
9. Road injury	23,668	4.9%
10. Other diseases	42,944	8.9%
Total 10 main Causes	481,162	100%

Impact of risks

Concept	1990	2010	Growth rate	% for 2010
Disability adjusted life years (DALY)	22,545,281	26,716,612	18.5%	100%
<i>Years lived with Disability (YLD)</i>	2,970,770	5,119,202	72.3%	19.2%
<i>Years of life lost (YLL)</i>	19,574,511	21,597,410	10.3%	80.8%
<i>Deaths</i>	522,515	870,390	66.6%	

Impact of leading preventable risks

Disability adjusted life years of risks factor (%) 2010		Development of deaths 2010 vs 1990 to risks factors	
1. <i>Physiological risks</i>	34%	1. <i>Physiological risks</i>	111%
2. <i>Injuries</i>	16%	• <i>High body-mass index</i>	179%
3. <i>Dietary risks</i>	13%	• <i>High fasting plasma glucose</i>	127%
4. <i>Smoking</i>	6%	• <i>Low bone mineral density</i>	102%
5. <i>Physical inactivity</i>	5%	2. <i>Dietary risks</i>	76%
6. <i>Occupational risks</i>	3%	3. <i>Alcohol and drug use</i>	43%
7. <i>Other risks</i>	23%	• <i>Alcohol use</i>	41%
		• <i>Drug use</i>	101%
Total	100%		

Disability adjusted life years, 2013

	Risks factors	Causes
<i>Children under 5 years</i>	1. <i>Childhood and maternal malnutrition</i>	1. <i>Neonatal disorders</i>
	2. <i>Unsafe water, sanitation, and handwashing</i>	2. <i>Other non-communicable</i>
	3. <i>Air pollution</i>	3. <i>Diarrhea/LRI/other</i>
	4. <i>Unsafe sex</i>	4. <i>Unintentional injuries</i>
	5. <i>Low glomerular filtration rate</i>	5. <i>Nutritional deficiencies</i>
	6. <i>Smoking</i>	6. <i>Diabetes</i>
	7. <i>Alcohol and drug use</i>	7. <i>Neoplasms</i>
	8. <i>High fasting plasma glucose</i>	8. <i>Chronic respiratory</i>
	9. <i>Hig systolic blood pressure</i>	9. <i>Transport injuries</i>
	10. <i>Other environmental risks</i>	

5 to 14 years of age	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. <i>Childhood and maternal malnutrition</i> 2. <i>Unsafe water, sanitation, and handwashing</i> 3. <i>Low glomerular filtration rate</i> 4. <i>High fasting plasma glucose</i> 5. <i>Alcohol and drug use</i> 6. <i>High systolic blood pressure</i> 7. <i>Air pollution</i> 8. <i>Sexual abuse and violence</i> 9. <i>Other environmental risks</i> 10. <i>Unsafe risks</i> 	<ol style="list-style-type: none"> 1. <i>Mental & substance use</i> 2. <i>Nutritional deficiencies</i> 3. <i>Other non-communicable</i> 4. <i>Diarrhea/LRI/other</i> 5. <i>Diabetes</i> 6. <i>Unintentional injuries</i> 7. <i>Transport injuries</i> 8. <i>Neoplasms</i> 9. <i>Neurological disorders</i> 10. <i>Chronic respiratory</i>
15 to 49 years of age	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. <i>Alcohol and drug use</i> 2. <i>High body-mass index</i> 3. <i>Dietary risks</i> 4. <i>High fasting plasma glucose</i> 5. <i>Occupational risks</i> 6. <i>High systolic blood pressure</i> 7. <i>Low glomerular filtration rate</i> 8. <i>Unsafe sex</i> 9. <i>Smoking</i> 10. <i>Sexual abuse and violence</i> 	<ol style="list-style-type: none"> 1. <i>Mental & substance use</i> 2. <i>Self-harm & violence</i> 3. <i>Musculoskeletal disorders</i> 4. <i>Diabetes</i> 5. <i>Other non-communicable</i> 6. <i>Transport injuries</i> 7. <i>Neoplasms</i> 8. <i>Cardiovascular diseases</i> 9. <i>Neurological disorders</i> 10. <i>Unintentional injuries</i>
50 to 69 years of age	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. <i>Dietary risks</i> 2. <i>High body-mass index</i> 3. <i>High fasting plasma glucose</i> 4. <i>High systolic blood pressure</i> 5. <i>Low glomerular filtration rate</i> 6. <i>Smoking</i> 7. <i>Alcohol and drug use</i> 8. <i>High total cholesterol</i> 9. <i>Low physical activity</i> 10. <i>Air pollution</i> 	<ol style="list-style-type: none"> 1. <i>Diabetes</i> 2. <i>Cardiovascular diseases</i> 3. <i>Neoplasms</i> 4. <i>Musculoskeletal disorders</i> 5. <i>Mental & substance use</i> 6. <i>Other non-communicable</i> 7. <i>Chronic respiratory</i> 8. <i>Cirrhosis</i> 9. <i>Neurological disorders</i> 10. <i>Transport injuries</i>
70 years of age and over	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. <i>Dietary risks</i> 2. <i>High systolic blood pressure</i> 3. <i>High fasting plasma glucose</i> 4. <i>High body-mass index</i> 5. <i>Low glomerular filtration rate</i> 6. <i>Smoking</i> 7. <i>Air pollution</i> 8. <i>High total cholesterol</i> 9. <i>Low physical activity</i> 10. <i>Alcohol and drug use</i> 	<ol style="list-style-type: none"> 1. <i>Cardiovascular diseases</i> 2. <i>Diabetes</i> 3. <i>Neoplasms</i> 4. <i>Other non-communicable</i> 5. <i>Chronic respiratory</i> 6. <i>Neurological disorders</i> 7. <i>Musculoskeletal disorders</i> 8. <i>Diarrhea/LRI/other</i> 9. <i>Digestive diseases</i> 10. <i>Mental & substance use</i>

**IAOSP-CISS
PREEMPTIVE ECONOMICS RISK FACTORS
ANDEAN SUB-REGION¹⁵**

Demographic indicators, 2013

Total population	105.10 million inhabitants
Life expectancy at birth (LEB)	76.2 years
Health life expectancy at birth (HLEB) ¹⁶	65.9 years (10.3 years less than life expectancy at birth)
Median age	26.8 years
Life expectancy for over-60 year population	23 years
Over-60 years population	9.4% (9.88 million inhabitants)

Macroeconomic indicators, 2013

Per capita GDP	\$11,360.00
Per capita GDP-PPP outlay on healthcare	\$723.00
Total outlay on healthcare	6.3%
<i>Public outlay on health care</i>	4.2%
<i>Private outlay on healthcare</i>	1.8%
<i>Others outlays on healthcare</i>	0.3%

Human development indicators, 2013

Human Development Index	0,713
HDI Adjusted for inequality (HDI-I)	0,531
Gini Coefficient, 2012	52.6 (Optimal: below 39.0)

Causes, 2012

Communicable diseases	19.0%
Non-communicable diseases	69.0%
Injuries	12.0%

Main Causes, 2010

Causes	Deaths	Percentage
1. Ischemic heart disease	58,939	22.9%
2. Lower respiratory infections	38,531	15.0%
3. Stroke	35,121	13.6%
4. Interpersonal violence	23,929	9.3%
5. Road injury	16,963	6.6%
6. Chronic obstructive pulmonary disease (COPD)	15,531	6.0%
7. Diabetes	14,480	5.6%
8. Stomach cancer	13,179	5.1%
9. HIV/AIDS	9,784	3.8%
10. Other diseases	30,854	11.9%
Total 10 main Causes	257,311	100.0%

¹⁵ Andean sub-region includes information available from: Bolivia, Colombia, Ecuador and Peru.

¹⁶ Healthy life expectancy at birth is the average number of years a person possesses as life expectancy with “complete health”, to include the years of life lived in complete health less than years lived in illness and/or injury.

Impact of risks factors

Concept	1990	2010	Growth rate	% for 2010
Disability adjusted life years (DALY)	15,751,895	14,116,869	-10.4%	100%
<i>Years lived with Disability (YLD)</i>	2,045,447	3,482,691	70.3%	24.7%
<i>Years of life lost (YLL)</i>	13,706,448	10,634,178	-22.4%	75.3%
<i>Deaths</i>	374,072	424,879	13.6%	

Impact of leading preventable risks

Disability adjusts life year of risks factor (%) 2010		Increase in deaths due to risk factors: 2010 vs 1990	
1. Physiological risks	24%	1. Alcohol and drug use	82%
2. Dietary risks	11%	• Alcohol use	75%
3. Injuries	11%	• Drug use	147%
4. Smoking	6%	2. Physiological risks	52%
5. Physical inactivity	4%	• High body-mass index	108%
6. Occupational risks	4%	• Low bone mineral density	49%
7. Other risks	40%	• High systolic blood pressure	45%
Total	100%	3. Injuries	36%

Disability adjusted life years, 2013

	Risks factors	Causes
<i>Children under 5 years</i>	1. Child and maternal malnutrition	1. Neonatal disorders
	2. Unsafe water, sanitation, and handwashing	2. Diarrhea/LRI/other
	3. Air pollution	3. Other non-communicable
	4. Unsafe sex	4. Unintentional injuries
	5. Low glomerular filtration rate	5. Nutritional deficiencies
	6. Smoking	6. Transport injuries
	7. Alcohol y drug use	7. Diabetes
	8. High fasting plasma glucose	8. Other group I
<i>5 to 14 years of age</i>	1. Child and maternal malnutrition	1. Mental & substance use
	2. Unsafe water, sanitation, and handwashing	2. Dietary deficiencies
	3. Low glomerular filtration rate	3. Other non-communicable
	4. Alcohol y drug use	4. Diarrhea/LRI/other
	5. High systolic blood pressure l	5. Unintentional injuries
	6. Air pollution	6. Transport injuries
	7. High fasting plasma glucose	7. Neurological disorders
	8. Unsafe sex	8. Diabetes
	9. Other environmental risks	9. Chronic respiratory
	10. Sexual abuse and violence	10. Neoplasms

15 to 49 years of age	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. Alcohol y drug use 2. Dietary risks 3. High body-mass index 4. Occupational risks 5. High systolic blood pressure 6. High fasting plasma glucose 7. Unsafe sex 8. Low glomerular filtration rate 9. Sexual abuse and violence 10. Smoking 	<ol style="list-style-type: none"> 1. Mental & substance use 2. Musculoskeletal disorders 3. Other non-communicable 4. Transport injuries 5. Unintentional injuries 6. Self-harm & violence 7. Neoplasms 8. Cardiovascular diseases 9. Neurological disorders 10. Diabetes
50 to 69 years of age	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. Dietary risks 2. High body-mass index 3. High systolic blood pressure 4. High fasting plasma glucose 5. Alcohol y drug use 6. Smoking 7. Low glomerular filtration rate 8. Air pollution 9. High total cholesterol 10. Occupational risks 	<ol style="list-style-type: none"> 1. Neoplasms 2. Cardiovascular diseases 3. Musculoskeletal disorders 4. Diabetes 5. Mental & substance use 6. Other non-communicable 7. Chronic respiratory 8. Cirrhosis 9. Diarrhea/LRI/other 10. Neurological disorders
70 years of age and over	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. Dietary risks 2. High systolic blood pressure 3. High body-mass index 4. High fasting plasma glucose 5. Low glomerular filtration rate 6. Smoking 7. Air pollution 8. Low physical activity 9. Alcohol y drug use 10. High total cholesterol 	<ol style="list-style-type: none"> 1. Cardiovascular diseases 2. Neoplasms 3. Diarrhea/LRI/other 4. Other non-communicable 5. Diabetes 6. Chronic respiratory 7. Musculoskeletal disorders 8. Neurological disorders 9. War & disaster 10. Unintentional injuries

**IAOSP-CISS
PREEMPTIVE ECONOMICS RISK FACTORS
SOUTH AMERICAN SUB-REGION¹⁷**

Demographic indicators, 2013

Total population	269.637 million inhabitants
Life expectancy at birth (LEB)	73.8 years
Health life expectancy at birth (HLEB) ¹⁸	65.5 years (8.3 years less than life expectancy at birth)
Median age	30.2 years
Life expectancy for over-60 year population	22.1 years
Over-60 years population	11.8% (31.915 million inhabitants)

Macroeconomic indicators, 2013

Per capita GDP	\$16,074.00
Per capita GDP-PPP outlay on healthcare	\$1,492.00
Total outlay on healthcare	8.5%
<i>Public outlay on health care</i>	4.6%
<i>Private outlay on healthcare</i>	2.7%
<i>Others outlays on healthcare</i>	1.2%

Human development indicators, 2013

Human Development Index	0,756
HDI Adjusted for inequality (HDI-I)	0,570
Gini Coefficient, 2012	51.2 (Optimal: below 39.0)

Causes, 2012

Communicable diseases	11.0%
Non-communicable diseases	77.2%
Injuries	11.8%

¹⁷ South America sub-region includes information available from: Argentina, Brazil, Chile, Paraguay y Uruguay.

¹⁸ Healthy life expectancy at birth is the average number of years a person possesses as life expectancy with “complete health”, to include the years of life lived in complete health less than years lived in illness and/or injury.

Main Causes, 2010

Causes	Deaths	Percentage
1. Stroke	187,851	21.9%
2. Ischemic heart disease	172,696	20.1%
3. Lower respiratory infections	94,437	11.0%
4. Chronic obstructive pulmonary disease (COPD)	70,704	8.2%
5. Diabetes	69,098	8.1%
6. Interpersonal violence	61,630	7.2%
7. Road injury	45,232	5.3%
8. Hypertensive health disease	43,775	5.1%
9. Chronic kidney disease	36,586	4.3%
10. Other diseases	76,164	8.8%
Total 10 Main Causes	858,173	100.0%

Impact of risks factors

Concept	1990	2010	Growth rate	% for 2010
Disability adjusted life years (DALY)	44,650,280	52,409,974	17.4%	100.0%
<i>Years lived with Disability (YLD)</i>	7,009,420	10,634,505	51.7%	20.3%
<i>Years of life lost (YLL)</i>	37,640,860	41,775,469	11.0%	79.7%
<i>Deaths</i>	1,293,094	1,855,799	43.5%	

Impact of leading preventable risks

Disability adjusted life year of risks factor (%) 2010		Increase in deaths due risk factors: 2010 vs 1990	
1. <i>Physiological risks</i>	38%	1. Injuries	47%
2. <i>Dietary risks</i>	17%	• <i>Road injury</i>	7.3%
3. <i>Smoking</i>	13%	• <i>Interpersonal violence</i>	23%
4. <i>Physical inactivity</i>	6%	2. Physiological risks	23%
5. <i>Injuries</i>	7%	• <i>High body-mass index</i>	67%
6. <i>Occupational risks</i>	4%	• <i>High fasting plasma glucose</i>	31%
7. <i>Other risks</i>	15%	• <i>Low bone mineral density</i>	17%
Total	100%		

Disability adjusted life years, 2013

Children under 5 years	Risks factors	Causes
	<ol style="list-style-type: none"> 1. <i>Child and maternal malnutrition</i> 2. <i>Unsafe water, sanitation, and handwashing</i> 3. <i>Low glomerular filtration rate</i> 4. <i>Unsafe sex</i> 5. <i>Smoking</i> 6. <i>Air pollution</i> 7. <i>Alcohol and drug use</i> 8. <i>High fasting plasma glucose</i> 9. <i>High systolic blood pressure</i> 10. <i>Other environmental risks</i> 	<ol style="list-style-type: none"> 1. <i>Neonatal disorders</i> 2. <i>Other non-communicable</i> 3. <i>Diarrhea/LRI/other</i> 4. <i>Unintentional injuries</i> 5. <i>Diabetes</i> 6. <i>Nutritional deficiencies</i> 7. <i>Neoplasms</i> 8. <i>Transport injuries</i> 9. <i>Cardiovascular diseases</i> 10. <i>Neurological disorders</i>

5 to 14 years of age	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. Child and maternal malnutrition 2. Low glomerular filtration rate 3. Alcohol and drug use 4. High fasting plasma glucose 5. Unsafe water, sanitation, and handwashing 6. High systolic blood pressure 7. Sexual abuse and violence 8. Unsafe sex 9. Air pollution 10. Smoking 	<ol style="list-style-type: none"> 1. Mental & substance use 2. Other non-communicable 3. Nutritional deficiencies 4. Chronic respiratory 5. Diabetes 6. Unintentional injuries 7. Neoplasms 8. Transport injuries 9. Neurological disorders 10. Neonatal disorders
15 to 49 years of age	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. Alcohol and drug use 2. High body-mass index 3. Dietary risks 4. Smoking 5. High systolic blood pressure 6. Occupational risks 7. High fasting plasma glucose 8. Unsafe sex 9. Low glomerular filtration rate 10. Sexual abuse and violence 	<ol style="list-style-type: none"> 1. Mental & substance use 2. Musculoskeletal disorders 3. Other non-communicable 4. Neoplasms 5. Self-harm & violence 6. Transport injuries 7. Cardiovascular diseases 8. Diabetes 9. Unintentional injuries 10. Neurological disorders
50 to 69 years of age	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. Smoking 2. Dietary risks 3. High body-mass index 4. High systolic blood pressure 5. Alcohol and drug use 6. High fasting plasma glucose 7. High total cholesterol 8. Low glomerular filtration rate 9. Low physical activity 10. Occupational risks 	<ol style="list-style-type: none"> 1. Neoplasms 2. Cardiovascular diseases 3. Musculoskeletal disorders 4. Diabetes 5. Chronic respiratory 6. Mental & substance use 7. Other non-communicable 8. Cirrhosis 9. Unintentional injuries 10. Neurological disorders
70 years of age and over	<i>Risks factors</i>	<i>Causes</i>
	<ol style="list-style-type: none"> 1. High systolic blood pressure 2. Dietary risks 3. Smoking 4. High body-mass index 5. High fasting plasma glucose 6. Low glomerular filtration rate 7. Alcohol and drug use 8. High total cholesterol 9. Low physical activity 10. Air pollution 	<ol style="list-style-type: none"> 1. Cardiovascular diseases 2. Neoplasms 3. Chronic respiratory 4. Neurological disorders 5. Diabetes 6. Other non-communicable 7. Diarrhea/LRI/other 8. Musculoskeletal disorders 9. Unintentional injuries 10. Digestive diseases



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