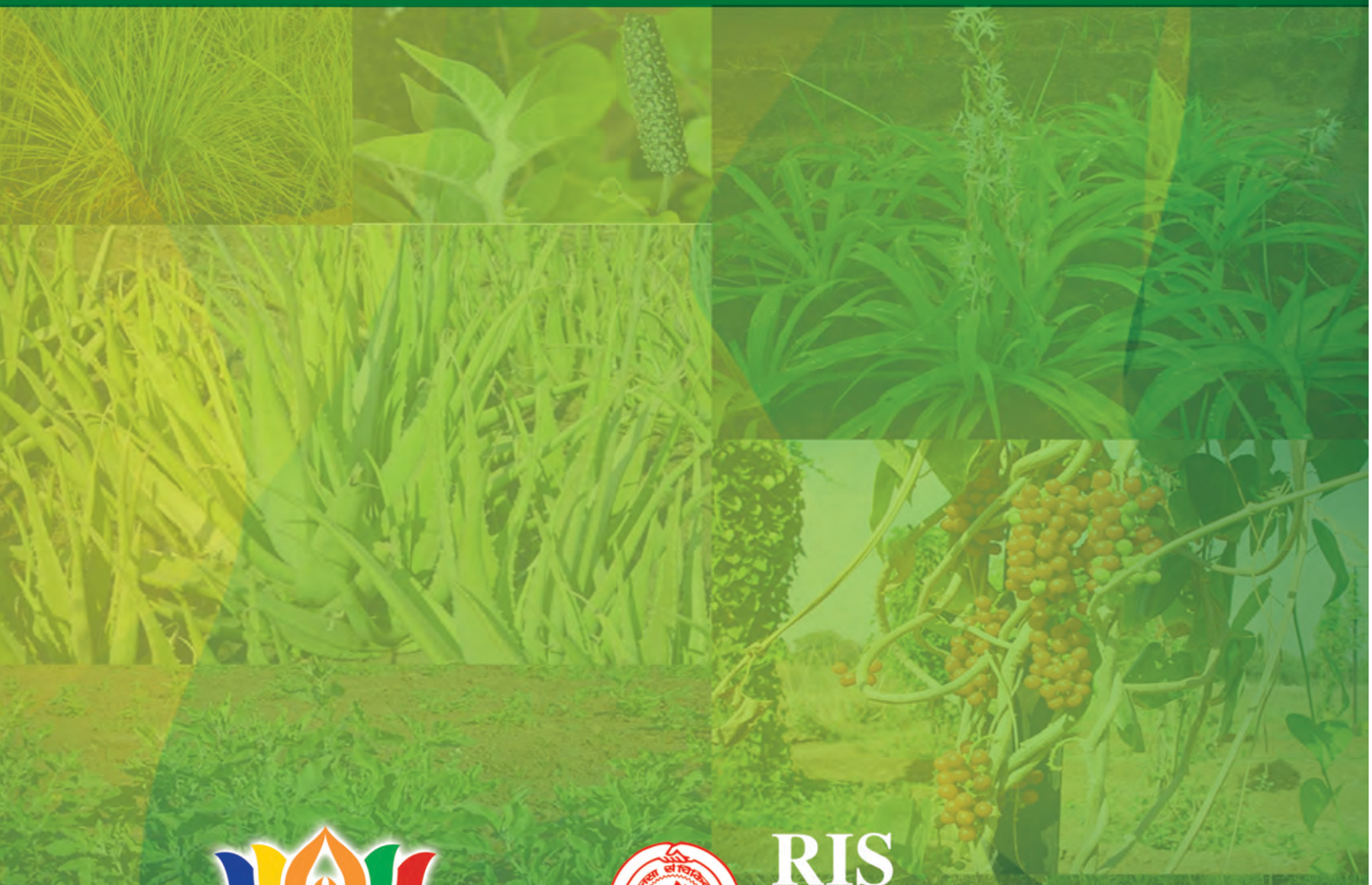
Health Nature and Quality of Life

Towards BRICS Wellness Index



BRICS INDIA 2016

RIS
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ISBN: 81-7122-120-3

Published in 2016 by:

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Core IV-B, Fourth Floor, India Habitat Centre
Lodhi Road, New Delhi-110 003, India
Ph.: +91-11-24682177-80, Fax: +91-11-24682173-74
E-mail: dgoffice@ris.org.in
Website: www.ris.org.in

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Preface

Prof. Sachin Chaturvedi
Director General, RIS

With the beginning of the century, BRICS economies emerged as five bright stars comprising major share in world GDP and world trade with almost 43 per cent share in global population. Impressive growth rates in the last decade in these economies set new heights for economic growth, however, in the process the inclusive development in these economies has also emerged as a major challenge. As a result, several social programmes were launched for ensuring equity and equal opportunity across different strata of society. Growing exclusion and depletion of resource base have raised several issues related to well-being of a large number of people across these and other fellow developing countries.

In light of this, the present Volume 'Health, Nature and Quality of Life: Towards BRICS Wellness Index' attempts to re-define the rationale that growth parameters have assumed in our development matrix. In this volume, RIS has tried to revisit the debate associated with income as a parameter of economic growth and has tried to reconcile it in light of contemporary commitments, particularly related to sustainable development goals. It is also pertinent to underline here that the contents of the present volume also carry forward the intensive research work that RIS initiated as far back as in 1992, while conducting the study on "Basic Needs Issues in Development: An Appraisal" by the research team led by Prof. V.R. Panchamukhi, the first Director General of RIS and comprising of Mr. G.A. Tadas and Prof. S.K. Mohanty. The Basic Needs Study had proposed an Aggregate Development Index (ADI) to cover aspects of productivity, structural changes, urbanisation, dependency rate of population, trade openness, energy consumption, etc.

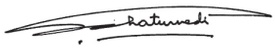
The time, for BRICS economies to take cognizance of wellness of their people in their domestic development strategies and capture that through adequate measurement of it, has come. We sincerely hope that the BRICS governments would take into account

the rising aspirations of their people, societies and various stakeholders to redefine the way we look at the process of economic growth and how best the economic strategies may also ensure protection of environment and ecological balance. The volume is also attempting to bring out relevance of traditional insights from the rich knowledge base of BRICS economies and their perspectives on this idea of 'one with nature' in the larger context of 'one world'. With reference to the issue of well-being, each BRICS nation has novel ideas which are presented in this volume, contributed by eminent scholars from these countries.

We hope the policymakers and researchers from BRICS and other countries would find it relevant to consider the idea of BRICS Wellness Index.

We are grateful to Ambassador Shyam Saran, Chairman, RIS for his guidance in this task. We should also place on record our gratitude to the Government of India's Ministry of External Affairs, Ministry of AYUSH, and Ministry of Statistics and Programme Implementation for their consistent support and participation in this effort; in particular to Mr. Amar Sinha, Secretary, Ministry of External Affairs; Prof. T.C.A. Anant, Secretary, Ministry of Statistics and Programme Implementation and Mr. Ajit M. Sharan, Secretary, Ministry of AYUSH for their continued support and encouragement.

I must also place on record the initiatives taken by Prof. T.C. James, Visiting Fellow, RIS in bringing out this publication with RIS Team and necessary guidance provided by Prof. Pulin Nayak, Member, Research Advisory Council of RIS and former Professor, Delhi School of Economics; Prof. Saikat Sinha Roy, Professor, Department of Economics, Jadavpur University; Prof. S.K. Mohanty and Prof. Ram Upendra Das of RIS. Dr. T.P. Rajandran, Dr. Sabyasachi Saha, Dr. Amit Kumar and Ms. Deepti Bhatia of RIS have also played a vital role in the preparation of this Report. Our publication team, led by Mr. Tish Malhotra and comprising of Mr. Sachin Singhal and Ms. Ruchi Verma, has also played an extremely important role in bringing out this volume in a short period of time.



Sachin Chaturvedi

Introduction

BRICS brings together five major emerging economies, comprising 43 per cent of the world population, having 37 per cent of the world GDP and 17 per cent share in the world trade. With strong economic performance in BRICS, the challenges of equity (in development) and sustainability (of the environment) have multiplied. Assessment of economic progress based on national income-based metrics poorly focusses on such dimensions. Growing inequalities and environmental degradation can potentially weaken and stall rapid economic progress. Early industrialised countries have accumulated wealth through such means of production that had negative ecological impact and has caused undue stress on the global environment, restricting options for newcomers to exploit standard production techniques in their process of catching-up. The consumption patterns encouraged and followed by many countries have also been unsustainable. The BRICS economies that support significant world population and have their share of development gaps have to chart a trajectory that is different from those followed till now so that all economic processes are seen in harmony with the nature and also creates enough opportunities for the welfare of the citizens.

However, the encouraging fact in the context of the BRICS is their cumulative wealth of traditional knowledge on human life and well-being that stresses on sustainable resource use and sees life within the canvas of nature and environment. It has been a long held perspective that degradation of the nature comes at the cost of human well-being. Health outcomes at the level of individual and the society are not mere functions of resources to gain access to adequate nutrition and medical treatment, but also the quality of natural habitat. A unified paradigm that looks at quality of life, covering aspects of access to material resources, opportunities, conditions of healthy living and environmental sustainability, defines the scope of wellness. With challenges of development and sustainability following aspirations of even deeper and robust economic progress it is imperative that BRICS countries explore a new paradigm of development.

This volume titled **Health, Nature and Quality of Life: Towards BRICS Wellness Index** ponders on two fundamental yet related questions in this regard. First, it explores the narrative on traditional knowledge, concept and philosophy of wellness in BRICS. It tries to redefine the contemporary relevance of such systems and attempts to connect them with modern economic processes for greater effectiveness and adoption as a strategy of development. Second, it proposes a new framework for wellness measurement in BRICS not only to guide policymaking but also

to gather a new following and momentum for integrated approaches to development at the level of citizens.

We bring together country perspectives from BRICS to elaborate on the concept and philosophy of wellness as perceived in the local contexts. Eminent experts in related fields from BRICS that include Bhushan Patwardhan, Helena Ribeiro, Maria da Penha Vasconcelos, Deisy Ventura, Ruijie Li, Yandong Zhao, Han Bing, Anita Karilio-Arkas, Rajen Govender, Rasigan Maharajh, Aquina Thulare and Yosuf Veriava have made valuable contributions in this volume. In India, the emphasis has been on maintaining the fine balance between human civilisation and environmental sustainability through integrative approaches to lifestyle to achieve this. Such a paradigm has definite lessons to offer for new approaches floated in Western contexts like sustainable consumption and production. China has traditionally followed similar ideals of 'nature and humanity'. As a point of departure, China has defined well-being, specifically subjective well-being as collective well-being. Brazil in accepting that the broad concept of wellness encompasses individual choices of lifestyle has strongly highlighted the importance of local contexts given its wide geographical expanse and cultural diversity. South Africa also highlights the criticality of preserving environmental ecosystems for sustainability of human race and in bridging gaps between healthy living and the lack of resources and opportunities for the same.

The Chapter on Biological Resource Base for Traditional Medicine by T P Rajendran focusses on the systems of traditional medicines in BRICS and elaborates the Indian context in terms of science and management aspects. The chapter discusses Indian perspectives on utilisation of medicinal and aromatic plants (MAPs); bioprospecting and sustainability of MAPs; medicinal plant and genetic stock management in India; MAP variety improvement in India; MAP management systems and associated agricultural practices; risks associated with botanical thearpeutics; herbal remedies for epizootic diseases; and zootherapy. The chapter concludes by providing a modern outlook to traditional medicine system and the connect with international conventions, protocols and agreements.

The Chapter on Traditional Medicine: Regulations, IPRs and Trade by T C James focuses on regulatory and market related aspects of traditional medicine in India. The chapter covers the role of traditional medicine in healthcare and wellness; importance of regulation and standards; specific regulatory frameworks in India; Intellectual Property Rights issues; patent and proprietary medicines; production and trade related aspects. On trade related aspects, the chapter covers trade classifications; trade barriers and concludes with future roadmaps and marketing strategies.

The measurement of wellness is captured in two chapters. The first Chapter on Measuring Well-being: A Survey of Literature and Initiatives by Amit Kumar, Sabyasachi Saha and Deepti Bhatia tracks the evolution of wellbeing measurement as a core economic indicator. The literature review narrates and comments on the inadequacy of income based measures of economic progress in reflecting individual well-being. This chapter also brings together organisational and country level efforts to institutionalise various frameworks for accounting the well-being of citizens as a true measure of economic progress. Special emphasis has been laid on the subjective well-being and sustainable development approaches. The conceptual synthesis of indicator frameworks and methodologies lead to the second chapter through which the volume proposes a wellness index for BRICS.

The Chapter on Framework for a BRICS Wellness Index by Sabyasachi Saha further elaborates the limitations of GDP based

measures of well-being and introduces the definitional parameters for wellness in the BRICS context drawing upon the concept and philosophy of wellness as understood and practiced in BRICS. This chapter also highlights the earlier efforts undertaken by RIS in developing meaningful development indicators as alternatives for the much popular Human Development Index. This chapter explains the rational and necessity of a BRICS Wellness Index covering several sub-indices such as aggregate material well-being index; human proficiency index; composite health index and sustainability index. The framework for possible indicators and the statistical methodology that can contribute to building up of this index remain the core of this chapter.

Ideas of Wellness in Brazil: A Concept under Deliberation

Helena Ribeiro*, Maria da Penha Vasconcelos and Deisy Ventura*

Since 1988, Brazil has developed a dynamic, complex health system (the Unified Health System – SUS), which is based on the principles of health as a citizen's right and the state's duty. In the face of the enormous challenges to potentially assist more than 200 million inhabitants, the SUS aims to provide comprehensive, universal preventive and curative care through decentralised management and provision of health services, and promotes community participation at all administrative levels (PAIM *et al.*, 2010). Brazilian legislation adopts a broad health concept, which comprises, besides preventing and tackling diseases, human wellness.

Nevertheless, besides facing enormous social and regional inequalities that mark Brazil, SUS suffers from chronicle underfinancing, aggravated from 2015 onwards due to the deep political and economic crisis the country is undergoing, which has entailed substantial budgetary cuts and has strengthened players who advocate for the partial privatisation of the system.

In this context, there is no doubt that, in Brazil, the concept of wellness constitutes an important sphere for ideological and political dispute. This is because the concept, philosophy or culture of wellness or wellbeing, as many other concepts, expresses different meanings. Avoiding the aim of having a consensual definition, it has been denominated as: culture; healthy lifestyle; body and soul equilibrium; proximity to nature; good sanitary conditions; and good and enough food, among others. However, the concept highlights a visual representation, and, in the media, some aspects related to wellness are presented as handsome persons in nice sceneries, practicing sports, with smiling faces, transmitting optimism.

In Western world, there is a desire to build a typology of behaviours, or physical circumstances, to all persons, on the meaning of physical and mental wellbeing. Usually, this desired lifestyle comprises consumer values, personal achievements, esthetic desires, and interactions with natural and nice landscapes surroundings.

The broad concept of wellness encompasses multiple meanings, from the individual feelings to solve personal or family problems, to the satisfaction from wealth and consumer goods accumulation as parameter of happiness and wellbeing.

In the sphere of external conditions, it seems easier to build consensus on the concept of wellness based on the physical, mental and spiritual equilibrium. Adequate sanitation, energy, water for human consumption;

* Professor, School of Public Health, Universidade de São Paulo, Brazil

mobility conditions; practices and access to culture, health services, education, public safety and social life; politically stable organisations, besides accessible justice are essential attributes to well-being of society.

However, the wellness concept is intimately related to subjective feelings and to the perceptions on the being and feeling the real world. It enables us to look on the other side of the coin of the *culture of wellness,* which is the *culture of malaise,* also produced at the contemporary world.

In this case, the wellbeing is relative, because the contradiction and the contrasts of different realities may cause suffering and despair, opening space for relevant questions. How a refugee feels in a context hostile to him/her? How to live without work, and no official help from government? How to live in a society where rules and values are built for white people, if you are not white? What are the feelings of a woman that lives in a violent society and has her body under power of others? How is it to live in an area under – religious, environmental, and racial – conflicts? How to live within terrorism?

The above mentioned issues are part of the daily life of populations in many countries, and continents, and closer to a culture of malaise than of wellness.

In the actual world context and under BRICS circumstances, it is necessary to think on the consequences of the financial crisis of 2008. One of them is the strengthening of neo-liberal policies, which predominate on thought and rationality of nowadays life style.

According to Dardot and Laval (2010) the neoliberalism defines the way of our existence, that is, the way we have to behave, to relate to others and to ourselves. The neoliberalism defines certain life norms in Westerns societies, and beyond them, in all societies that follow them in the way to modernity.

In spite of the differences among countries, continents and the sub-national cultures, the "road to modernity" referred by the authors, is the increase in social and wealth inequalities, breakdown of the States, deregulation of public policies and of social justice, and the increase in the number of persons that live in a culture of malaise. The massive use of medicines for depression, the increase of human mobility, in search of chances, of refugees from religious, environmental and work factors, of intolerance and terror, among others, are symptoms of this malaise.

Those are both sides of the same coin. Thus, a *culture of wellness centered on a philosophy of* individual success, of the equilibrium among the physical and the mental, brings to the debate the need to re-think social relations beyond personal desires and satisfactions. It is imperative to search inside oneself, and on the surroundings, the equilibrium among wellness and malaise, in this century.

Objective 3 of the Sustainable Development Goals, the post 2015 UN Agenda, is the guarantee of healthy lives and wellbeing at all ages. Thus, in order to achieve this goal, it is necessary to define what is wellbeing in the course of life. For this, countries around the world are discussing concepts of wellness and wellbeing. This is not an easy task due to the multiple meanings and perceptions of wellbeing.

In the Brazilian case, it is impossible to present a concept and a philosophy of wellness. A country with 8,500,00 square kilometers, from latitudes in the equatorial zone of the Northern hemisphere to the temperate zone of the Southern hemisphere, it presents a diversity of ecosystems as tropical rain forests, savannas of diverse density, native pastures, semi-arid shrubs, mangroves, beaches and a wide range of climates. In this diverse natural setting, a very diverse population lives in different ways. In spite of the homogenising trend on cultures due to globalisation, the very diverse origin of a population formed by waves of migration from different parts of the world, and the huge inequality in income distribution, turns it practically impossible to have a national concept of wellness and wellbeing.

However, some trends on the perceptions of wellbeing are: First, in a country characterised by an unequal distribution of sanitary

infrastructure and a high percentage of inadequate housing, on can point there can be no wellness feeling in an unsafe environment. In 2010, there were, in the country, 6,326 *favelas*, with 3.2 million inadequate houses (IBGE, 2011). These houses are located, most of the times, in risk areas, prone to floods or landslides. Besides, 1.5 per cent of urban population is not served by regular waste collection (2,552,868 people), mainly in *favelas*, and 6.8 per cent of urban population is not served with regular water. Besides those basic needs, essential to wellbeing, there are other essential factors of wellbeing among Brazilians.

Investigations carried on by the media, recently, indicated that the main concerns of people are: unemployment, ill-health, and corruption, indicating that these issues are present in the people's perceptions of wellness. On the other hand, among a high percentage of Brazilians, wellness is related to religion or spiritual values, and to following religious principles.

The family relationship and the family wellbeing are also strong factors for most Brazilians' wellness, and family traditional meals are very valued in the wellbeing culture of country's regions.

However, one could say that the international movement towards health promotion, and a culture of wellness based on healthy lifestyle and food, and of beauty based on physical activity, and on fashion, beauty products, and plastic surgeries, has a strong appeal to Brazilians, mainly those in larges cities and in coastal areas. Brazil is the world's second largest consumer market for beauty products and plastic surgeries indicating that external image is a very valued component of wellness. Some researchers have even recognised a fitness epidemics in Brazil, oriented not by public health precepts, but mainly for esthetic imperatives (Bastos *et al.*, 2013).

In sum, the debate on wellness has not only taken space in the debate on health, but also finds additional elements of complexity which deserve to be assessed more deeply.

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Traditional Medical Systems in the Wellness Strategy in Russia

A. Karilio-Arkas*

According to the experts of the World Health Organisation (WHO), "the global burden of non-infectious diseases constitutes a major public health threat that undermines social and economic development all over the world."[1]

According to the WHO prognosis, total number of deaths from non-infectious diseases will reach 55 million a year by 2030 unless appropriate measures are taken.

On a profound conviction of health professionals around the world, the situation can be corrected by using the tools and techniques of traditional medicine systems (TMS), which are evidence based and used for centuries and are without side effects, which is important for their use for health purposes.

Human Health for Human Capital

In the world, including in Russia, methods of TMS, based on scientific knowledge and experience of application, are effectively used for the prevention of diseases and improvement of health of the population. Traditional medicine systems also reduce the risk of infectious and non-infectious diseases, and reduce the cost of treatment in healthcare.

Wellness strategy, healthcare and economics are closely intertwined and a healthy population is of key importance for a nation's economy, because healthier people cut down the cost of healthcare. There are compelling arguments for human capital to contribute to economic growth (Chubarova, 2008).

According to Becker's theory of human capital, investments in human capital improve human performance, so individuals have an incentive to invest in themselves to safeguard and improve the health in order to increase future incomes (Becker, 1964).

Grossman (1972) was the first to propose the model of health demand using the human capital theory; people do not use medical services because they put high value on health itself, because they improve their health stock that can be used as productive resource. Cropper (1977) took into account all the constraints that disease can impose on the individual and studied differences in demand for preventive and medical care services as well as demand behaviour within the life. Based on the human capital theory, medical services are regarded in the light of their capacity-building in performance improvement. It is understood that good health allows the individual to fulfil their productive potential. On the other part, the original concept of capital is extended, as the individual becomes a capital vehicle, i.e. a vehicle of qualities (including health) which

* President Ayurveda Russia-India Association, Member of the Councils of Traditional Medicine, Ministry of health and the Committee on health protection, State Duma of the Russian Federation, Moscow

provide an opportunity to make a living. That's why health support expenses are regarded as investments. Payoff from health investments is usually determined through the individual's income.

According to researchers from some countries, health may have an effect on economic performances both at country level and at individual level in the developed countries (Bloom, *et al.* 2001). According to the human capital theory, the healthier individuals are more productive and get more income. Children who have better health and get better nutrition, usually do better at school, miss less school or leave school, so better health in their youth indirectly generate better productivity in the future.

After publication of the World Bank Report dealing with healthcare issues in 1993, health investment issue has become especially popular (World Bank, 1993). Early in the 21st century, Commission on Microeconomics and Health set up by WHO dramatise the economic importance of health investments. Health spending may be regarded as investments which raise economic payoffs (WHO, 2000a).

Health is regarded as one of the important determinants for economic growth and poverty reduction. Health is an integral component of everybody's welfare maximisation, it has an effect not only on economic expenditures for diseases and lost GDP, but also on comprehensive income in a great measure. How we live and, accordingly, how we work is not less important than the total number of years we have lived (Usher, 1973). This results in raising demand for medical services, people's interest in a healthy lifestyle, participation in the preventive measures and readiness to apply new technologies.

In modern allopathic medicine prevention exists at the level of early diagnosis, i.e. at a time when people are sick. Prevention priority is confirmed as the basic principle of public health. Budgetary allocated funds for the prevention of disease are significantly lower than the funds for treatment.

Traditional Medicine System in Russia

Traditional medicine system, for example, Ayurveda is the evidence based system of therapeutics with unique functional approach for the protection of human health and for the study, diagnostics and treatment of human diseases. All this is not merely people's medical practice, but an ancient science of gaining perfect health and active longevity. Ayurveda's predictive approach based on the knowledge of body constitution helps to solve serious problems of modern life such as delivery of health, viable healthy children, care of whom shall start from their conception. According to Ayurveda, future parents are recommended a certain lifestyle, day regimen, dietary pattern, time of year for purposes of conception. Based on the parents' constitution and the time of conception, Ayurvedic practitioner may forecast the constitution of zygote and give recommendations regarding protection of fetal health.

Constitutional characteristics allow a doctor to cope with non-communicable diseases and health complications due to that.

Preventive care is the major line of Ayurveda which takes 80 per cent of its attention. Healthy lifestyle recommended by Ayurveda, day regimen and seasonal regimen, dietetics are major Ayurvedic preventive measures to maintain and strengthen health, and prevent diseases.

Preventive interventions are characterised by substantially greater economic efficiency as compared to the therapeutic interventions. According to a study by Maciosek *et al.* (2006) return on each invested dollar was 3.48 on average, and the temporary disability was reduced by 25-30 per cent during 3.6 years of follow-up.

Chapman *et al.*'s 2007 systematic review announced typical reduction in health care costs of 26.5 per cent as a result of staff member health promotion programmes. His review covered 60 of the most scientifically exact studies, with typical 3.77 years of study.

Experience has shown that application of preventive Ayurvedic measures in Russia reduces risk for acute respiratory diseases by about 70 per cent.

Ayurveda lays special emphasises to the primary prevention measures: day regimen and dietetics. Compliance with the regimen within the day, i.e. the period which covers the time from rising to going to bed, according to Ayurveda, is most important for health aintenance. Even those types of regimens, which had been created thousands of years ago, didn't recede into the background in these latter days, however, some methods may be not acceptable in this age. In any case, it is essential to be guided by the spirit of that regimen which had been created in those far-off days, adapting the form to the present-day conditions.

Ayurveda believes that 70 per cent of diseases can be avoided and cured with proper nutrition which has an essential effect on health, and the body. In order to get the benefits of food it is essential to consider not only its composition, but also many other factors such as digestion strength, time and place of residence of the individual, mental health support, evaluation of six tastes, methods of product processing and correct combination of products. Unhealthy nutrition is considered to be one of the major factors of disease development.[2]

Ayurveda for Upkeep of Life

Raising the priority of disease prevention using Ayurvedic methods will allow the population to reach the highest health standards and to overcome obstacles to welfare. There will be a quantitative and qualitative improvement of health economics, social and economic development (Table 1).

Moscow Institute of Pediatrics and Pediatric Surgery of the Health Ministry of Russia gave a course of treatment using Ayurvedic system of therapeutics to 105 children with infantile cerebral palsy, bronchial asthma and gastroenterological pathology at the age of 3 to 16 years. As a result of Ayurvedic treatment of children with infantile cerebral palsy, apart from regression of classic clinical signs of the measles, improvement of baseline electroencephalogram and cerebral hemodynamics were also detected. This indicates a direct and positive effect of applied treatment on the element of cerebral regulation in the disease process. Subjective and objective responses of children with bronchial asthma and gastroenterological pathology to the treatment were also positive (Table 2). Moreover, no child showed any toxic or allergic reaction to the preparations used.[3]

Table 2: Response of chronic diseases to the Ayurverda treatment in Russia

Passed treatment	Passed treatment
Hypertensive disease	56%
Atherosclerosis	53%
Stroke complications	63%
Miocardial infarction complications	54%
Trifacial neuralgia	64%
Headache	85%
Obesity	30%
Chronic constipation	88%
Rheumatoid arthritis	88%
Bronchial asthma	78%
Allergic airway diseases	73%
Chronic bronchitis	71%
Chronic sinusitis	100%
Eczema	68%

Table 1: Economic Effect of Ayurveda Multifactorial Prevention Programme in Russia

	Costs per 1000 members ($)	Cost savings achieved through the maintenance of performance potential(per 1000 members, $)	Return on each $ invested in the prevention programme
Within 5 years	150,000	345,000	2.3
Within 10 years	210,000	1,218,000	5.8

Looking further ahead, WHO and its partners determined the necessity for creation of safe, effective and affordable paediatric medicinal products as a priority (World Health Assembly, 2007). Personalised approach to selection, safety and efficacy of Ayurvedic natural preparations would help in solving this problem.

The use of Ayurvedic psychology methods, administration of Ayurvedic psychotropic preparations without adverse effects improves cognitive abilities, corrects behaviour and boost health indicators of children and teenagers including young men of preinduction and service age, which in turn contributes to the prevention of drug addiction and alcohol dependence in this population group.

Based on the scientific knowledge of particularities of individual bodies, their relationships with environment, effects of seasons, meteorological conditions, healthy eating, Ayurveda makes it possible to take prophylactic measures and treatment, to keep the body healthy.

Health literacy plays a critical role in the wellness strategy. In Ayurveda, the health concept is within everybody's grasp and may be used to form individual responsibilities for health. It will improve the prevention of socially dangerous diseases such as drug addiction, sexually transmitted diseases, AIDS and ensure the reduction of communicable diseases rate and risks of exposition to unfavourable factors of medium.

The problems may be solved through reasonable integration of Ayurveda traditional medicine into the national healthcare systems. It is necessary to conduct research studies, develop ayurvedic preventive and remedial measures. In this regard WHO established the policy to promote security, efficacy and quality of applied traditional medicine systems through providing regulations and quality assurance standards to health administrations. WHO recommended the national systems to develop technical regulations and methodologies for research studies with respect to treatment schedules and products of Ayurveda during their production and therapeutic use.

In December 2015 Russia and India signed a ten-year plan for the development of interstate relations, and for the first time "the opening of Ayurvedic Centers in Russia" was spelled out.[4]

The Parliament and the Russian Ministry of Health established the Councils for the legal regulation of traditional medicine. Considering the introduction of a new specialty for Russian doctors from the two-year training in clinical internship. Recently Russia developed National Classification of Ayurvedi Practitioners (Table 3).

Russia introduced the new National Classification of occupations on 1 July 2015. It is harmonised with International Standard Classification of Occupations 2008. National Classification is aimed for conducting statistical surveys of population distribution by type of occupation, the organisation of statistical accounting in order to implement an effective employment policy and implementation of analytical studies.

In addition to the positive results of Ayurveda there is a dangerous trend too.

Table 3: The National Classification of Doctor of Ayurvedic Medicine

2	Main group	Specialists of high qualification Relevant higher education and scientific degree
22	Subgroup	Health professionals put into practice the scientific knowledge in the field of medicine, healthcare, dentistry, veterinary medicine, pharmacy and preventive healthcare
223	Small group	Highly skilled healers and practitioners of alternative and traditional medicine

With each passing day there is an increase in the number of pseudo-experts in the field of Ayurveda.

The lack of available information about the standards of education and access to medical practice in the field of Ayurveda medicine have allowed amateurs to give to Russian citizens services that do not meet their qualifications.

There is evidence of teaching of Ayurveda and issue of certificates in public universities of the Russian Federation by individuals who do not have any legal right nor the appropriate knowledge.

BRICS countries need to develop a common legal regulation and establishment of therapeutic, educational and pharmaceutical standards, rules of TMS experts and practitioners training for the safe use of remedies and methods of TMS in health improving system in these countries.

According to WHO experts, traditional medicine systems including Ayurveda, should have their own codification and regulation, be taught openly and consistently, and be used in clinical practice with due regard of and based on hundreds of years of experience (WHO, 2002).

The World Health Report 2000 highlights that "…traditional health knowledge should be recognised in the form and concepts of the traditional health system of specific country and not necessarily according to the Western model" (WHO, 2000b).

Endnotes

[1] Global Action Plan for the Prevention and Control of NCDs 2013-2020. 15–29 March 2013 Geneva, Switzerland.

[2] First All-Russian congress of Ayurveda. Congress materials, Moscow, 2013.

[3] ibid.

[4] Plan for strengthening of the Russian-Indian partnership within the next decade. New Delhi, 2015.

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Wellness, Health and Ayurveda

Bhushan Patwardhan*

Concept

The concept of health revolves around a few key words like well-being, wellness, and happiness. It seems to have its origin in the proto-Germanic word *hailitho* meaning "whole, uninjured, of good omen". An old Norse term *heill* means "healthy", and *hælan* means "to heal". Health also denotes prosperity, happiness, welfare, preservation, and safety. Often the terms *health and wellness* are used together in Western culture. In Oriental languages, a more profound and appropriate term for health used in Ayurveda is S*wasthya*.

In many cultures and traditions the proverb "health is wealth" is popular. For every individual, health is something very important and crucial for life and existence. Everyone hopes and aspires for health and wellness, naturally. Health is equilibrium, a balance, and a state of harmony. When we lose it, we know that it existed. It is easier to know illness, but very difficult to know wellness. Probably due to this, mostly health is described and discussed in relation to disease/illness/sickness.

Definitions

Ayurveda defines health in much broader perspective. A healthy state as per Ayurveda is an condition where the dynamic principles like *doshas, agni, dhatu,* and *mala* are in optimally natural balanced state. Health is actually a state of biological equilibrium or homeostasis finally leading to happiness and bliss at the levels of body, mind and spirit. This is much better description of wellness where holistic view is taken as against the idea where just absence of disease or illness is assumed to be state of health.

The WHO adopted definition of health in 1948 as: "A state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity." Leaders have raised several questions related to this definition. How can one define "a state of *complete* well-being?" How do we measure well-being? Actually, there is no reliable instrument to measure well-being. In the WHO's definition, dimensions of health are connected to the term *well-being*. What is a state of *well-being*? Indeed, it is very difficult to answer this question. A state of well-being is very difficult to measure. It is very subjective, consequential, judgmental, and qualitative. According to the principles of management, "what cannot be measured cannot be managed". Can we manage well-being? What is the meaning of a *state*, when we say a *state of well-being*?

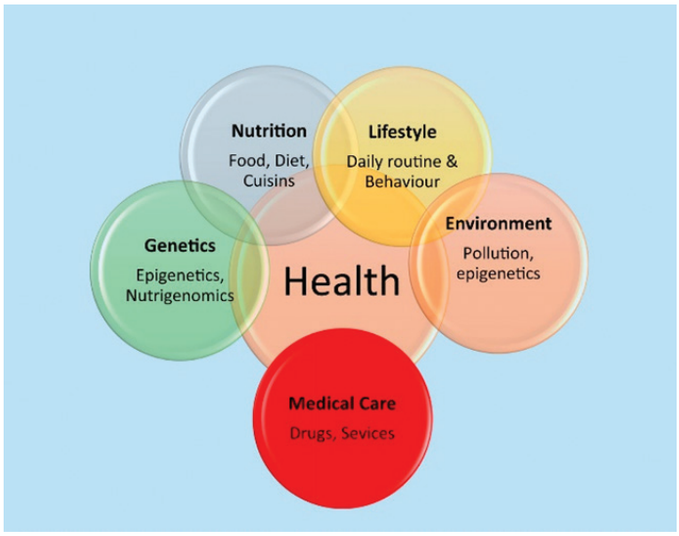
* Professor, Center for Complementary & Integrative Health, Interdisciplinary School of Health Sciences, Vaitribai Phule Pune University

Dimensions

There are four main determinants of health including: nutrition, environment, lifestyle and genetics. The fifth indirect determinant is medical care (Figure 1). There are seven prominent dimensions of health and wellness. These include social, emotional, spiritual, environmental, occupational, intellectual, and physical wellness. All these dimensions contribute to our quality of life (Figure 2).

- The physical dimension relates to the maintenance of a good quality of life, allowing the individual to perform daily activities without undue fatigue or physical stress, and the importance of adopting healthy habits like balanced diet, and exercise, while avoiding bad habits like tobacco, drugs and alcohol.
- The social dimension is about the ability to connect and relate to other people in positive relationships with family, friends, and colleagues.
- The emotional dimension is the ability to meeting challenges, and to understand own strengths and limitations, while respecting others and overcoming personal ego. It is the ability to acknowledge and share feelings of anger, fear, sadness, or stress, and hope, love, joy and happiness in a productive manner.

Figure 1: Determinants of Health



Source: Patwardhan ***et al.*** (2015).

Figure 2: Dimensions of Wellness

Source: Patwardhan ***et al.*** (2015).

- The environmental dimension is the ability to recognise our responsibility to preserve nature, and protect the ecosystem: air, water, land, forests, homes, and communities, and our planet, thus improving the standard of living, quality of life, and status of environment.
- The occupational dimension is about balancing work pressures, and job satisfaction, while making positive contributions to enterprise, organisations, and also to society.
- The intellectual dimension is the ability to keep an open mind to new ideas and experiences. The desire to learn new concepts, improve skills, and engaging in lifelong learning contribute to the intellectual dimension.
- Awareness of the spiritual dimension is a recent realisation, especially in the West; it is a quest to find our sense of purpose, and apprehend the meaning of life. It is about the ability to think beyond selfish motives, to establish peace and harmony, and to understand the importance of values, personal purpose, and a common purpose that binds humanity.

The dimensions of health and wellness now encompass individual or public health, and involve healthy environments, unpolluted rivers, healthy towns, healthy cities, healthy nations, and planetary health.

Well-being to Wellness

The concept of well-being seem to be now gradually transmuting into a broader concept of *wellness*, and is getting closer to the Ayurvedic concept of *Swasthya*. Well-being is about wellness. Wellness and well-being are not synonyms, but the differences are very subtle. Well-being as a concept involves total life experience, happiness, and prosperity. Wellness refers mainly to the individual feeling of one's body/mind/spirit. The concept of wellness is beyond physical health and fitness. Wellness involves improving quality of life at various levels (Figure 3). Wellness is considered an integration of states of physical, mental, social, and spiritual well-being. Because it is difficult to differentiate between these concepts, it is necessary to discuss the dimensions of health, well-being, and wellness together. The concept of wellness provides a conscious way of living for individuals and society to reach their fullest potential. However, the term *wellness* is generally used in myopic fashion in the limited context of spa, relaxation, and personal recreation.

The term *wellness* was first explained by Halbert L. Dunn, who was chief of the United

Figure 3: Factors influencing Quality of Life

Source: Patwardhan ***et al.*** (2015).

States' National Office of Vital Statistics. Dunn described a high level of wellness as "performance at full potential in accordance with individual age and makeup". He suggested that health dimensions range from high-level wellness to death. The concept of wellness has a spiritual and social context. Dunn suggests that to "know yourself" is the fundamental principle of wellness. In-depth knowledge of the outside world is possible only with the knowledge of one's inner self. The role of wisdom and maturity possessed by senior citizens, and successful people contribute to the wellness of society. He further explains the connection between biological nature, and the spirit of man as "creative expression". An expression of the self in search of universal truth provides inner satisfaction to humanity on an individual level. Core values like creative expression, trust, love, security, maturity, and altruism bring about wellness at a societal level. Dunn presents an optimistic vision that encompasses the wisdom of the East and West. He also admits the practical difficulties of his proposition, but suggests that dreaming in this direction can produce wellness for society.

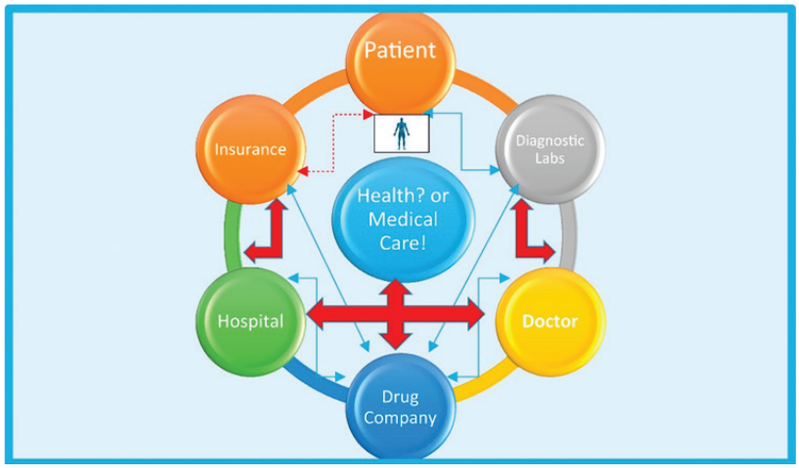
Applications

A few academic institutions are also actively involved in propagating the concept of wellness. The University of California, Riverside has a wellness program for its faculty, staff, and retired members. The program includes social, emotional, spiritual, environmental, occupational, and intellectual and physical wellness. The University of Pittsburg starts wellness orientation right from the student admission. Wellness related research, and its translation into national programs are very limited, despite having a sound, philosophical background. It is important to discuss the basics of health and wellness with a focus on preventive, protective and proactive approaches. An optimistic view is necessary while looking at health. The domination of a pessimistic view, with the lifelong dependence on disease treatments and drugs is leading to the medicalisation of society. As a result, people are trapped in the vicious circle of drugs, doctors, diagnostics, hospitals and insurance (Figure 4).

Role of Ayurveda and Yoga

Today's wellness programmes based on putative health benefits, along with commercial packages, dietary supplements, and exercise devices have many limitations. The commercialisation of wellness as a package seems like going on an exploitative path. Wellness is a very individual experience. To achieve a state of wellness, it is important to empower individual. With systematic efforts, and experience-based guidance from Ayurveda and Yoga it will be possible to achieve, maintain, and protect health and promote wellness (Patwardhan, *et al.* 2015).

Figure 4: Vicious Cycle of Medical Care



Source: Patwardhan ***et al.*** (2015).

While modern medicine provides objective tools for health assessment, Ayurveda and Yoga empower individuals with the knowledge, attitude, and behaviour for positive health and wellness. The concepts of health promotion in Yoga and Ayurveda are quite comprehensive. Ayurveda advocates for health promotion through advice on diet and lifestyle. This branch is known as *Swasthavritta*, which is an Ayurvedic pronouncement for healthy life. Any deviation from *Swasthavritta* may lead to an imbalance in *Doshas*, resulting in ill-health. The three fundamental bodily bio-elements or *doshas* are *Vata* (airy element), *Pitta* (fiery element or bile) and Kapha (watery element). The *Swasthavritta* incorporates advice pertaining to age, nutritional status, metabolic attributes, and individual tolerance and sensitivity in the context of environmental and seasonal variations. According to Ayurveda, the three *Doshas* undergo chrono-biological changes during the day and night cycle (Figure 5). The accompanying illustration of the Ayurvedic clock is very interesting. *Doshas* are also affected by the pattern of daily routine, foods habits, and behaviours. Ayurveda suggests matching daily food and behaviour in such a way that the balance is maintained between the three *Doshas* are maintained in the balanced state. For example, one should consume food when *Pitta Dosha* is at the highest peak, exercise when *Kapha* is increased, and rest when *Vata* is aggravated. If daily activities are not synchronised with *Dosha* levels, the result might be imbalance, and disease. Hence, the history of patient's diet and lifestyle is important for diagnosis. The treatment includes detailed advice on when to eat, and what to eat, and aims to harmonise

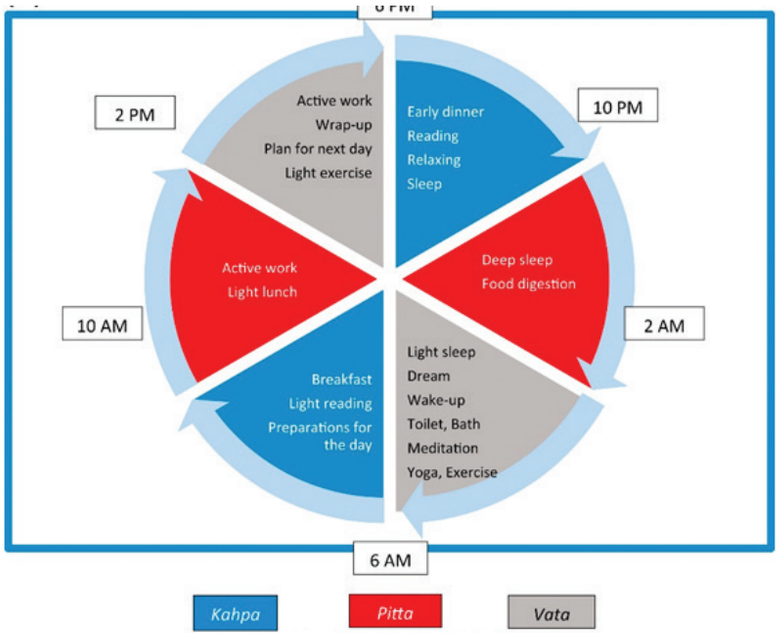
Figure 5: Dosha Influence on Dinacharya

a)

Daily routine as advised by Ayurveda (*Dinacharya*)

1. Wake up before sunrise
2. Clean face, mouth and eyes
3. Drink warm water
4. Bowel and Bladder Evacuation
5. Tooth, Tongue and Gum cleaning
6. Light oil massage and Bath
7. Use natural perfumes
8. Exercise, Yoga, Pranayama
9. Meditation
10. Breakfast
11. Work, Lunch, Work
12. Dinner with family before sunset
13. Light reading, socializing
14. Sleep

b)



Source: Patwardhan ***et al.*** (2015).

Doshas with the properties of diet and drugs. Sometimes a useful substance may be harmful if consumed at wrong time. For example, an asthmatic may be advised to drink medicated water at bedtime to avoid the aggravation of *Kapha* during the night.

Ayurveda advises specific changes in diet and lifestyle according to various seasons. This is known as *Ritucharya*. Specific interventions like *Panchakarma* are also advocated in particular seasons. The guidelines for daily routine, seasonal changes, and treatment regime are specific to *Dosha* changes, and aim to achieve a dynamic balance of the *Doshas*. A chrono-biology clock based on *Swasthavritta* from Ayurveda is very useful to plan various activities during the day and seasons for optimal output and health. These clocks are known as *Dinacharya* and *Ritucharya* that help to keep good health on predominance of dosha during the day and in each season, respectively.

In short, to move from disease to health, and from **I**llness to **We**llness, it is necessary to replace 'I' with 'We'. It is necessary to first protect *wellness* and then *illness* should be treated. Clearly, it is an active and participatory effort, which cannot be achieved in isolation. Health and wellness are something natural, but understanding perfect health state is very difficult. As against this an understanding of a perfect disease state or illness is fairly easy. Undoubtedly, present science understands diseases and illness better than health and wellness. To promote health and wellness rather than medicines, we need more emphasis on nutrition, diet, lifestyle, and behaviour modification. Ayurveda and Yoga propose a greater focus on mind, and the inner strength. Today, the importance of wellness, health promotion and disease prevention can no longer be overshadowed by disease treatment and therapeutics.

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Chinese View on Subjective Well-being: Traditions and Current Trends

Ruijie Li * and Yandong Zhao**

Introduction

Since the 1950s, well-being has become a hotly discussed topic of social scientists. Until now, there is no commonly-agreed conceptual definition of well-being. Andrews and Withey (1976) held the opinion that well-being should have two dimensions: perception and emotion. These two dimensions can be further categorised into positive emotions, negative emotions and the level of perception. The evaluation of well-being should be based on the level of satisfaction with life, and the intensity of both positive and negative emotions. Based on their theory, Diener (1984) defined subjective well-being as an experience which involves evaluation by individuals of their quality of life according to the standard they set for themselves, which contains three dimensions: positive emotions, negative emotions and the level of satisfaction with life. Subjective well-being is subjective, relatively stable and integrated.

Based on Chinese traditional culture, philosophy and morality, Chinese scholars defined subjective well-being as a subjective evaluation, which represents the individual's level of satisfaction and happiness with current living situation (Yang, 1980). Chinese people always set some external standards (such as knowledge, scholarship and moral performance) for the evaluation of well-being. One would experience the sense of well-being only when the pre-set standards are reached. However, these standards are usually set so high that it is really difficult for normal people to reach them. There are nine main sources for Chinese people's subjective well-being: fulfillment of self-esteem, harmonious relationship with friends and family, pursuit of wealth, achievements in work, contentment with life, living better than others, self-control and realisation of dreams, brief joy, and being healthy (Lu, 1997).

Characteristics of Chinese Traditional View of Subjective Well-being

Non-individual oriented well-being of harmony in the background of collectivism culture

Subjective well-being is not only a subjective evaluation from individuals, but also a reflection of the interactions between the individuals and the cultural value of their society. China is a collectivism-oriented country, whose culture places great emphasis

* Researcher, Institute of Science, Technology and Society,Chinese Academy of Science and Technology for Development,Beijing, P.R. China

** Professor and Director, Institute of Science, Technology and Society,Chinese Academy of Science and Technology for Development,Beijing, P.R. China

on collective opinions and sensations. As a result, Chinese people did not put as much emphasis on joy, happiness and personal emotions of individuals as those who lived in a background of individualism did (Gao, Zheng and Yan, 2010). In a collectivism-oriented country, the evaluation of individual well-being mainly focussed on emotional experience and external standards. In a culture of collectivism, however, individuals tend to feel stronger connection between the perception of cultural standards and satisfaction with life. Their interpersonal relationship will affect their well-being. There is a mutually-dependent relationship between the well-being of others and self, which means personal well-being can be realised through helping others. Therefore, in collectivism-oriented China, personal well-being is inevitably connected with others, family and the community. People tend to sacrifice their own desire and obey the collective orders. Traditional Chinese view of well-being included not only personal satisfaction of material desires, but also an inner peace obtained through the harmonious relationship with others, society and Nature. (Zhou, 2005). Chinese people pursue not only personal well-being, but also collective well-being. Social norms (as a reflection of collective values) have much stronger impact on the well-being of individuals in a collectivism-oriented background than personal happiness. Therefore, in reality, Chinese people tend to upgrade their well-being through obeying social norms and obtaining good interpersonal relationships with family and friends, especially building a happy family. To Chinese people, there are many paths to well-being, including thriving for personal achievements, building co-dependent and inter-tolerant relationships, and contributing to the society and the country.

Confucianism, Taoism and Buddhism are three main sources of Chinese traditional culture. They all agree that well-being is a state of harmony. Confucianism insists that harmonious interpersonal relationship equals well-being. Taoism views well-being as the harmony between oneself and the external environment, namely the nature and the universe. Buddhism focusses on each person's inner peace and harmony. In traditional Chinese culture, harmony is a very important factor of the concept of well-being. To Chinese people, harmonious interpersonal relationship is one of the main sources of well-being. Individual personal emotion is not highly evaluated in traditional Chinese culture. Sometimes it is even suppressed to some extent. Confucianism, Taoism and Buddhism all hold the opinion that well-being is a state of spiritual comfort and joy, of inner peace and harmony. The three schools also unanimously propose to pursue well-being through controlling and suppressing one's material desires.

Confucianism values both sensational happiness and rational happiness, the former originated from having a happy family with one's parents and siblings all around, whilst the later originated from spiritual pursuit of *ren* and *yi* (Confucianist benevolence and righteousness). Confucianism separates happiness into two levels: one level where happiness is derived from the satisfaction of basic needs in real life, and the other where rational happiness comes from being kind to others and contributing to society at large (Li, 2011). Buddhism also views that apart from entering nirvana by himself/herself, one should also help the others that were suffering to get into nirvana, because the real relief and well-being can only be obtained from *zhongyuan*, the connections you made with others. Buddhism promotes that even after one achieves Buddhist enlightenment, the person should spares no effort to help others achieve the same. Taoism suggests that happiness and unhappiness were mutually-dependent. Well-being is a dialectically balanced state. Happiness and unhappiness can be transformable. Therefore, people should not pursue extravagant joy, but focus on inner peace and harmonious relationship with the surroundings, and look beyond reality for happiness in nature.

Future-oriented Well-being

Most traditional Chinese culture values encourage people to have a positive and optimistic attitude towards the past and focus their concerns on the future. Therefore, the sense of well-being of Chinese people is highly future-oriented. Chinese hold the world-view of natural and become contented with the current situation; the social view of justice and altruism; and the personal view of being moderate and self-controllable. These three views are also the reflections of traditional cultures of Taoism, Buddhism and Confucianism respectively. The common characteristics of the three schools is the contempt of immediate joy and interests, and the high evaluation of long-term development and future gains. People should hold a positive attitude towards the past and focus on the future. By doing so, individuals can achieve great personal well-being eventually.

Influenced by traditional Chinese values, Chinese people who are searching for well-being believe in karma and natural laws, tend to sympathise with others and do their best to help others. They should be content with what in hand and always follow the natural orders, and should be tolerant, generous, forgetting about trivial losses. They should pay more attention to the development and future benefits of things. Only by doing so will they get to a higher level of well-being through inner peace and natural comfort. Usually, moderate people with self-control focus more on long-term goals and discipline themselves according to those goals. This future-oriented attitude will eventually lead to higher level of well-being.

Empirical studies on Well-being of Chinese people nowadays

Since 1980s, Chinese scholars have started empirical research on subjective well-being. In the begining, their main focus are the level of well-being is a subjective reflection of the real life, which is both a personal mental health of some specific groups, such as university students and aged people. Starting from the 21st Century, Chinese scholars have gradually realised that subject mental experience and a reflection of the ideal living conditions, needs and values that one feels when he / she is in a community. Therefore, they started to examine the Chinese people's subjective well-being on a more macroscopical level.

Since China's reform and opening-up in 1978, living condition of people has improved at large. Under the background of rapidly growing economy, scholars at home and abroad began to pay attention to the influence of the fast-growing economy on Chinese people's well-being. Foreign scholars have used different data bases to measure the trend of change of Chinese people's well-being. Some scholars compared the Gallup survey results in China from 1994 to 2005, and found that the proportion of people who are fairly or very satisfied with their life has dropped by 15 per cent, and the proportion of those who aren't very satisfied or very unsatisfied has increased. Meanwhile, the urban family income per capita has increased by 5.4 per cent, and the urban by 3.7 per cent (Kahneman, *et al.,* 2006). Easterlin and others examined Chinese people's trend of change of well-being or satisfaction with life based on the data of Gallup survey, Asia Barometer, and World Value Survey, etc. All the surveys show that Chinese people's degree of life satisfaction is dropping over time (Easterlin *et al.,* 2010). Based on data of World Value Survey, other researchers found that between 1990 and 2000, the material standard of living in China has improved enormously, but the degree of subjective well-being has been dropping rapidly. The proportion of Chinese people who consider themselves as "very happy" has dropped from 28 per cent in 1990 to 12 per cent in 2000. This finding was in contradiction to those of former studies, which believe that for the social group in a poor living condition, the increase of income should upgrade subjective well-being, rather than degrade it (Hilke *et al.,* 2008).

Wen *et al.* (2011) analysed the WVS data of China between 1990 and 2007, and found that in the past two decades, the subjective well-being of Chinese people is going on a degrading trend. Factors such as gender, age,

health, marriage, education and career all had impact on people's subjective well-being, whilst factors like relative income and social anomie had a stronger influence. Based on the same data, Lu and Zhang (2010) found a phenomena of "well-being paradox", namely the economy growth and people's level of subjective well-being are not developing in the same direction. The co-existence of the great improvement of Chinese people's living condition and the decrease of their subjective well-being became a unique phenomenon, which has challenged the existing explanations of well-being established by foreign scholars in the past 30 decades, including the famous "Easterlin Paradox."[1] This contradictory proposed new challenges to the study of well-being.

However, some recent studies on the well-being of Chinese people are not supporting the so-called "well-being paradox". When analyzing the data of Chinese General Social Survey (CGSS) from 2003 to 2010, Liu *et al.* (2012) discovered that the subjective well-being of Chinese people in these years is upgrading. The proportion of people who considered themselves as happy has increased from 37.3 per cent in 2003 to 72.6 per cent in 2010. Also based on CGSS data, Wang (2011) found that the impact of income gap in China on people's subject well-being shaped as a reversed "U" curve. The turning point is when the Gini coefficient reaches 0.4. When Gini coefficient is less than 0.4, the increase of income gap led to the increase of subjective well-being; when it is more than 0.4, degraded, the expand of income gap led to the decrease of well-being.

Endnote

[1] The Easterlin paradox is a key concept in happiness economics. It argued that while within a given country people with higher incomes were more likely to report being happy, this would not hold at a national level, creating an apparent paradox. Its reported data apparently showing that reported happiness was not significantly associated with per capita GDP, among developed nations(Easterlin, 1974).

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Wellness within China's Context

Han Bing*

It is very hard to find a word in Chinese that would precisely match the word 'wellness'. There are various explanations towards its exact meaning. Therefore, we take the plainest explanation in the English dictionary as 'very healthy' to give a brief introduction on Chinese approach towards the idea of wellness and the philosophical underpinnings therein.

Philosophical Foundation of Wellness in China

Speaking of wellness's root in Chinese philosophy, it may date back to the traditional 'Nature and Humanity' ideology, which is a unique perspective in Chinese traditional philosophy. Differing from the analytical pattern that most Westerners would follow, it is a specific manifestation of a comprehensive oriental pattern (Xianlin, 1993). 'Humanity' in the phrase 'Nature and Humanity' just means we people, humble and tiny. But the word 'Nature' has a much larger connotation. If we take Nature as the environment around human, then it can be described as the nature itself, the social environment and the environment as being human. Nature, stands for the natural environment, the society and human themselves. Therefore, there are three tiers in the 'Nature and Humanity' ideology. That is, the harmonisation between human and the natural environment, the society and themselves. The first tier, states that everything and phenomena in the natural environment are not isolated, they have an impact on each other in various ways. That is to say, human and nature form a harmonious whole, all men must take themselves as a part of the natural environment, and harness the environment on the basis of knowing, understanding and protecting the environment. The second tier calls for a harmonised society, which proposes peace is most precious. By pursuing interpersonal unity and cooperation, coordination between parties can be reached to create a society of great harmony. The third tier, holds that harmonisation for human themselves is the cornerstone for a healthy body. Traditional Chinese philosophy tells us that the state of health is a balance between body and soul. Physically, human body is an organic mechanism. Our daily bodily functions rely on organs work both independently and collaboratively, which requires the cooperation and constraint between organs. Only with a coordinate interior environment, can a body stay in a balanced status. At the same time, psychic fluctuation affects the health of the human body, when cheerful, the body reconciles to coordinate the function of organs; when depressed, the organs dysfunction, leading to body disorder. Therefore, people should aim for inner peace to achieve physical and psychic harmony and have a healthy life.

* Senior Research Fellow, Institute of World Economics and Politics,Chinese Academy of Social Sciences, Beijing, P.R.China

Traditional Chinese Medicine and Wellness

Traditional Chinese Medicine use 'Nature and Humanity' theory as the core philosophy to investigate human activity patterns. The first medical classic 'Huang Di Nei Jing' puts forward a set of theory and measures concerning the relationship between human and nature, forming a unique medicine theory of keeping healthy, which played an important role in ensuring the prosperity of the Chinese nation. 'Huang Di Nei Jing' clearly states that human and nature have the same root. People depend on nature to survive and subject to nature. The harmony between human and nature is a symbol of health. Health is smooth running blood, normal mental activity and adaption to outside cold temperature. During the struggle with disease and aging, the Chinese developed an ideology of preventive treatment of disease, which puts an emphasis on preventive measures. This is one of the most influential theories of the traditional Chinese medicine, which stands for the characteristic and essence of the traditional Chinese medicine. In addition, Chinese Medical theory advocates a preventive lifestyle consistent with seasons. In spring, a man should take precaution against the wind and cold; in hot summer against the heat; in autumn against the drought; in winter against the cold and wind, and pay attention to the harmony with the environment. Further, the medicinal therapies of acupuncture and moxibustion are used to both treat and prevent various illnesses in China, which are also based on the theory of 'Nature and Humanity'.

In short, Traditional Chinese Medicine starts from the 'Nature and Humanity' theory, recognising and understanding human health and disease through the relationship between human and nature as well as human and society, paying more attention on the role of the natural environment, and making it as the backbone of our etiology, diagnosis and disease prevention.

A Brief Introduction to China's Health Situation

As an important source and basic support of national economic and social development, 'wellness' is highly valued by Chinese government. Since its establishment, Chinese government has made constant attempts to build and improve the modern health system. In the past 60 years, the Chinese people's overall health has improved significantly. According to *China's Health Statistical Yearbook*, the average life expectancy increased from 35 years before 1949 to 74.8 years in 2010. For men it is 72.4 years and for women it is 77.4 years. The maternal mortality rate, decreased from 80 in 1991 to 21.7 in 2014 per 100,000 live births. Infant mortality rate, fell from 50.2 per cent in 1991 to 8.9 per cent in 2014. Currently, these three indicators are in the forefront in developing countries, narrowing the gap with developed countries.

In 2009, China launched a new round of medical and health system reform. The new reform aims at establishing and improving the basic healthcare system covering urban and rural residents, providing people with safe, effective, convenient and affordable medical and health services. It has already achieved some positive progress. It provides the world's most massive population with health insurance coverage. By 2014, China's national healthcare system improved gradually. Employee health insurance, medical insurance for urban residents and the new rural cooperative medical insurance, are the three basic insurances that have been able to stabilise at above 95 per cent, where medical insurance in China basically achieved full coverage. In March 2015, *the Guideline for the Planning of the National Medical and Health Service System (2015-2020)* (hereinafter referred to as the *Outline*) issued by the State Council showed that over a long period of development, China has established a medical and health service system that consists of urban and rural hospitals, primary healthcare institutions and professional public health agencies, etc. By the end of 2013, China had 974,400 health institutions and 9.79 million general practitioners. There were on average 4.55 hospital beds for every 1,000 people in China, 1.07 general practitioners for every 10,000 people and 2.05 nurses for every 1,000 people. China's tremendous achievements in

public health are closely related to the rapid development of social economy. Also, it confirms the steady growth of China's health service level.

Meanwhile, China still faces many challenges in the field of public health. For example, compared with rising economic and social level and people's growing demand for medical services, the total amount of medical resources is relatively less and the quality of current medical services remains to be improved. Again, the rapid growth of aging population have worsened related health problems and current service system cannot effectively battle against health issues such as high rising chronic rate.

To confront these challenges, the above Guideline declares to make basic medical needs a priority and tackle problems by replanning medical institutions across the country. The Guideline aims to ensure that by 2020 there are six hospital beds for every 1,000 people and two general practitioners for every 10,000 people in China. It underscored the principle of fairness with regard to hospital planning, so as to make health service more accessible. During the process, the government will play a role in policy-making, overall planning and supervising, to make sure the medical system benefits the public, while the market will decide the distribution of medical resources. The Guideline also encouraged the use of technology to boost healthcare services and the cooperation between health care and pension institutions.

In addition, China is currently promoting the 'Healthy China' construction plan. The *13th Five-Year Plan for Economic and Social Development of the People's Republic of China* (hereinafter referred to as the '*the 13th Five-Year Plan*') published in March 2016, put forward eight aspects concerning the construction of a healthier China, which include deepening medical and health system reformation; improving national healthcare system; strengthening the prevention and control of major diseases and basic public health services; strengthening maternal and child health as well as reproductive services; improving the medical service system; promoting Chinese medicine inheritance and development; developing a nationwide fitness campaign; and ensuring food and drug safety. At the same time, the 13th Five-Year Plan also made three requirements relating to improving the social insurance system, improving social assistance and supporting social welfare and charity to establish a more equal and more sustainable social security system.

In conclusion, the traditional 'Nature and Humanity' ideology in Chinese traditional philosophy is a unique perspective to understand the idea of wellness, which influences Chinese approach towards the idea of wellness. People's health is one of the key factors to a country's development in the future, without healthy residents there can be no all-round well-off society. Therefore, China is currently promoting 'Healthy China' construction plan to improve people's health.

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Wellness and Well-being Research in South Africa

Rajen Govender*, Rasigan Maharajh**, Aquina Thulare***, and Yosuf Veriava****

Introduction

Whilst it is generally recognised that all life on earth derives its nourishment from only six chemical elements (Carbon, Hydrogen, Nitrogen, Oxygen, Phosphorous and Sulphur), *Homo Sapiens Sapiens* are creators and victims of a *metabolic rift* whereby they have become separated from the natural cycle of life on its home-planet (Maharajh, 2015b). With at least 200,000 years of evolution, anatomically modern human beings are now estimated to comprise at least 7.3 billion individuals as at the middle of 2015 (UN, 2015a: 1). The total human population had increased by nearly 1 billion since 2003, and based on the current rate of growth estimated at 1.18 per cent per year approximately 83 million more people are added to the global population stock annually (ibid). This massive quantitative demographic expansion has not necessarily been accompanied by equivalent or commensurate qualitative improvement in the wellness and wellbeing of all of these people.

Despite considerable attention by key thinkers throughout history, the concept of wellbeing as an issue of focus for society and the state has only emerged in the past six decades, contributing in some measure to the formation of organisations such as the United Nations Development Programme (UNDP). Evidence from various UNDP and other studies raise significant alarms about declining rather than improving wellbeing globally (UN, 2013). Moreover, countries and regions have been shown to be disproportionately affected, with some experiencing some positive outcomes while others face significant negative outcomes. More recently, there is strong general consensus on the need to address wellness and wellbeing conceptually (definitional) and methodologically (measurement), to ensure proper indicators which serve to specify objectives and measure progress in attainment thereof (Stiglitz, Sen, and Fitoussi, 2009).

This paper comprises five sections. After this introduction, we discuss the concept and philosophy of wellness and wellbeing where we present a sample of some of the literature generated in South Africa and about the country that covers matters concerned with wellness and wellbeing. In the third section, we explore metrics for wellbeing. Specific attention is paid to the indicators currently in use and being developed in South Africa. The fourth section describes the country' new policy

* Senior Research Fellow: Centre for Social Science Research

**Professor Extraordinary: Centre for Research on Evaluation, Science

***Technical Specialist: Health Economics, Department of Health, RSA. and Technology, Stellenbosch University

****Chairperson of the Advisory Board of the Steve Biko Centre for Bioethics at the University of the Witwatersrand

orientation as contained in its latest Indigenous Knowledge Systems legislation, Traditional Medicines, and also provides an example of the emergent complexities of praxis. The fifth and concluding section draws together the materials and advances suggestions for increased collaboration amongst Brazil, Russia, India, China, and South Africa (BRICS) in advancing developmental perspectives for improving the wellness and wellbeing of all.

Concept and Philosophy of Wellness/Wellbeing

The territories now incorporated into the sovereign state of the Republic of South Africa comprises the oldest geophysical features in the world. The Barberton Greenstone belt is considered amongst the oldest and best exposed Archaean greenstone belts on Earth and is estimated to be approximately 3.5 billion years old. Archaeological, palaeontological, and paleoanthropological evidence suggests an extremely long period of hominid occupation and South Africa hosts a 'Cradle of Humankind' which is UNESCO World Heritage Sitein its Gauteng Province. Chirikure, Dandara and Segobye (2016) have explored innovations associated with Southern Africa's deep past from the earliest manifestation of human culture and show that "the earliest human use of tools dates back over 2.5 million years."

The Civil Society Forum of BRICS was convened in Moscow in the middle of 2015. This gathering issued a wide-ranging declaration that included as statement number 60, the following assertion: "We reaffirm the right of everyone, without any distinction to have the highest attainable standard of physical and mental health and a standard of living adequate for the health and well-being of himself and of his family" (BRICS, 2015). Whilst this took place, Deepak Chopra, a trained endocrinologist turned spiritual guru, visited South Africa for the fourth time and ran a series of discourse as components of his Future of Wellbeing tour. According to the journalist Luke Alfred (2015), Chopra believed that 'every nation has a kind of wellbeing threshold' and that "South Africa's was going down but is beginning to slowly go up". Chopra further argues that South Africans have reason to be alarmed and "(s)hould our wellbeing status climb beyond the point of no return, we will be in the desperate straits of the terminally ill – physical and mental illness going hand in hand. The fact that the minority are prospering doesn't speak well for the future" (Alfred, 2015).

A cursory search on Google Scholar reveals at least 20 academic articles published since 2015 with well-being and South Africa in their titles (all listed in the references). Whilst pioneering work in this field, such as the research conducted by Møller (1992) among black youth in South Africa sought to combine objective and subjective measures in assessing the impact of leisure satisfactions on quality of life. Accordingly, Møller was able to discern that "leisure might be one of the crucial factors which contribute to quality of life and give black youth confidence in coping with the future" (ibid: 348). Marié P. Wissing (2013) edited a volume comprising 28 chapters co-authored amongst at least 43 university-based researchers that work in the field of positive psychology to discuss the state of well-being research in South Africa. Patel *et al*. (2015) utilise structural equation modelling to analyse their data and found that cash transfers increase women's individual income, which is in turn is positively associated with increased financial independence, decision-making power over financial resources and decisions about children's well-being. Mulcahy and Kollamparambil (2016) utilise econometric tools to establish that the rural-urban migration in South Africa contributes to an approximate 8.3 per cent decrease in subjective well-being. Magerman (2015) studied differences in identity dimensions across different South African ethno-cultural groups and the association between identity and psychological well-being. Smit and Rugunanan (2015) conducted a comparative qualitative study in South Africa among Congolese, Burundian and Zimbabwean refugees that focussed on intrapersonal emotional ambivalence and how the emotional

well-being of refugees relates to their socio-economic context and more specifically their challenging life experiences. De la Sablonnière *et al.* (2015) conducted a comparative study between Mongolia and South Africa to determine that during times of profound social change, people's psychological well-being is related to their assessment of their path from the past to the future (temporal relative deprivation).

The quality of life for the world's human population remains combined and uneven. The United Nations defines poverty as being "… more than the lack of income and resources to ensure a sustainable livelihood. Its manifestations include hunger and malnutrition, limited access to education and other basic services, social discrimination and exclusion as well as participation in decision-making" (UN, 2015c). Paul Spicker (1998) argues that poverty can be identified as the lack of well-being. In this framing, well-being is regarded as a multi-faceted concept that encapsulates at least three dimensions: needs[1], interests[2], and wants.[3] Whilst it is widely acknowledged that the number of people living (sic) in extreme poverty (measured as number of people worldwide living on less than US$ 1.25 a day) has halved since 1990, it remains that approximately 836 million people or 12 per cent of the world's population may be classified to be in extreme poverty (UN: 2015b: 15). The reduction in the absolute number of people living in extreme poverty conforms to the first objective of the Millennium Development Goals (MDGs) and was apparently achieved a full five years before the target date in 2010 (ibid.).

The successor to the MDGs are the Sustainable Development Goals (SDGs), which comprises 17 goals, was adopted by the General Assembly in September 2015. The SDGs, as adopted, are however not legally binding on any of the subscribing countries even though they are expected to take ownership and establish a national framework for achieving all of the 17 goals. Thus, implementation and success will rely on countries' own sustainable development policies, plans and programmes. Countries are also expected to assume the primary responsibility for follow-up and review, at the national, regional and global levels, with regard to the progress made in implementing the Goals and targets over the time-frame of the programme (2015-2030). Goal one of the SDGs is to "(e)nd poverty in all its forms everywhere" (UN, 2015c: 2 and 15). Goal three of the SDGs explicitly seeks to "(e)nsure healthy lives and promote well-being for all at all ages" (ibid: 16).

Metrics of Wellness

Measures, indicators and studies of wellbeing in South Africa have assumed various forms, derived primarily from different originating academic disciplines, conceptual frameworks and methodological bases. The South African National Health and Nutrition Examination Survey (SANHANES), conducted by the Human Sciences Research Council (HSRC), examines the impact of communicable and non-communicable diseases on the general population, extending the work of the Demographic Health Survey as a measure of population wellbeing. The South African Stress and Health Survey (SASH), undertaken by a consortium of universities and institutes, assesses wellbeing by focussing on the prevalence and incidence of mental illness in the general population. Other studies have collected perceptual data to evaluate the wellbeing and quality of life of South Africans. The South African component of the World Values Survey includes measures of wellbeing and quality of life, as does the South African Social Attitudes Survey (SASAS). The SASAS is conducted regularly by the HSRC since 2003 and covers a range of self-reported issues and questions ranging from political participation to individual quality of life, and examines how these may be affected by changing societal conditions, political institutions and cultural values.

Additionally, various opinion polls designed to examine attitudes about political participation, democracy and governance also include some focus on wellbeing and quality of life. The Afrobarometer, a survey

of political attitudes conducted since 1999, includes measures of experiential poverty and household quality of life, as well as indicators of societal factors which may be deemed to impact and measure wellbeing, such as social cohesion and interpersonal trust. Similarly, the South African Reconciliation Barometer, a regular survey of attitudes on national reconciliation conducted since 2003 by the Institute for Justice and Reconciliation, includes measures of experiential poverty, household quality of life, and a range of societal factors which impact well-being wither positively or negatively, including national reconciliation, intolerance, ethnocentrism, social justice, past redress and social cohesion. In addition to these national probability surveys, there are various sub-national surveys which also provide some measurement of wellbeing, such as the household surveys conducted by various metropolitan municipalities to assess, inter alia, service delivery and residential quality of life.

Taken collectively, these surveys and various other studies using different methodologies indicate robust activity in the study and measurement of wellbeing in South Africa, and provide considerable evidence for analysis of wellbeing based on empirical, self-reported and perceptual data. Importantly, the disparate studies do not attempt to offer a holistic conceptualisation and definition of wellbeing, and instead provide definitions and foci based on their specific disciplinary location and orientation. The challenge remains to triangulate these different disciplinary perspectives and their data to offer a more complete account of wellbeing and wellness in the country.Beyond that, there remains the imperative to extend the knowledge derived from these studies into programmatic actions and interventions which contribute towards improved wellbeing at both the societal and individual levels.

Petrie and Tang (2014) test whether the health performance of the BRICS has kept in step with their economic development and acknowledge that "(i)provements in national income and global health technology could mask a lack of progress or even regression in the efficiency of a country's health-care system." Their review of the reductions in age- and sex-specific mortality in the BRICS between 1990 and 2011 led to the finding that the relative health performance of the five study countries differed markedly over the study period (ibid.: 398-407). More specifically, Petrie and Tang determined that "Brazil demonstrated fairly even improvement in relative health performance across the different age and sex subgroups that we assessed. India's improvement was more modest and more varied across the subgroups. South Africa and the Russian Federation exhibited large declines in health performance as well as large sex-specific inequalities in health. Although China's levels of avoidable mortality decreased in absolute terms, the level of improvement appeared low in the context of China's economic growth."

Mújica *et al.* (2014) note that despite the economic prosperity and general improvements in health seen since 1990, profound inequalities in health persist both within and between BRICS. They further find that "four of the BRICS countries showed increases in both income level and income inequality between 1990 and 2010. The exception was Brazil, where income inequality decreased over the same period. Between-country inequalities in level of education and access to sanitation remained mostly unchanged but the largest between-country difference in mean life expectancy increased, from 9 years in 1990 to 20 years in 2010" (ibid.: 405). Muntanera *et al.* (2015) criticise the "empiricist tradition of 'class as an individual attribute' equates class to an 'observation', precluding the investigation of unobservable social mechanisms." Muntanera and colleagues are able to demonstrate the "marginalisation of rich traditions of class theory in favour of the mainstream, individual-attribute approach, is consistent with the biological, psychological, and quantitative reductionism that characterises the methodological individualism of contemporary social science, and the reduction of social science to a technique, which has both reflected and affected cultural, political, and

economic processes in contemporary class relations" (ibid.).

Indigenous Knowledge Systems Policy and Praxis

On 17 February 2016, the cabinet of the government of South Africa approved the submission of the Protection, Promotion, Development and Management of Indigenous Knowledge Bill (IKS Bill) to Parliament. This legislative bill seeks to protect and promote the development and management of the country's indigenous knowledge systems, and makes provision for the establishment and functions of a national indigenous knowledge systems office, management of the rights of indigenous knowledge holders, establishment and functions of the advisory panel on indigenous knowledge systems. The IKS Bill affords access and conditions of access to the knowledge of indigenous and local communities, establishment of a national recordal system of indigenous knowledge systems, registration, accreditation and certification of indigenous practitioners, facilitation and co-ordination of indigenous knowledge based innovation. Cabinet also stressed that the IKS Bill would need to complement the Intellectual Property Laws Amendment Act, 2013 (Act 28 of 2013).

The preamble to the IKS Bill explicitly establishes that that the Republic of South Africa is a sovereign democratic state since 1994 and is committed and obliged to observe international treaties, covenants as well as international law. The IKS Bill then specifies that the Government of the Republic of South Africa is committed to the economic, cultural and social upliftment and well-being of its people, free of discrimination, and in that in the exercise of its sovereignty, South Africa has enacted and continues to enact legislation that underpins the protection, promotion and development of indigenous knowledge systems and indigenous knowledge because it recognises that "indigenous knowledge is a national asset and that it is therefore in the national interest to protect and promote Indigenous Knowledge Systems through law, policy and both public and private sector programmes" as it seeks "to encourage the use of indigenous knowledge in the development of novel, socially and economically applicable products and services; by accepting that indigenous innovation is a unique approach to social innovation that informs and underpins the work of indigenous communities."

The IKS Bill defines 'indigenous knowledge' as "knowledge which has been developed within an indigenous community[4] and has been assimilated into the cultural make-up or essential character of that community, and includes (a) knowledge of a scientific or technical nature; (b) knowledge of natural resources; and (c) indigenous cultural expressions"[5] (RSA, 2016: 5). The IKS Bill also establishes a legal person called an 'indigenous knowledge practitioner' as a person who is accredited and certified as an indigenous knowledge practitioner to render a service utilising indigenous knowledge which is distinct from a 'holder' which refers to the indigenous community from which indigenous knowledge originates. Unfortunately, the IKS Bill does not explicitly engage with the domain of Traditional Medicine.

Biological Resource Base for Traditional Medicine

Throughout human history, people have used various materials from nature to cure their illnesses and improve their health and traditional medicine is the preferred form of healthcare, and remains the most available and affordable form of therapy in many parts of the world. Traditional medicine (TM) features importantly in the lives of South Africans and is embedded in indigenous knowledge of communities, which in turn is entrenched in the cultural and spiritual lives of the people. TM forms connections within indigenous communities, and are cultural products and inheritances of various societies transmitted from one generation to the next, as well as vectors of knowledge that deserve protection from a socio-economic perspective. Historically, humanity has relied on the use of traditional natural pharmacopoeia consisting of wild plant and animal species to manage health related conditions. The use of TM

assures fulfilment of rights such as those of: access to health care; economic activity and job creation; protection of intellectual property belonging to indigenous communities that have used these for centuries; and cultural rights as they belong to and shape identities of communities (Mpinga, *et al.,* 2013).

The World Health Organisation (WHO) defines traditional or ethno-medicine as the sum total of knowledge, skills and practices that are based on theories, beliefs and experiences indigenous to the different cultures, whether explicable or not, incorporating plant , animal and/or mineral based medicines, spiritual therapies, manual techniques and exercises applied singularly or in combination for the maintenance of health as well as the prevention, diagnosis, improvement, or treatment of physical and mental illness (WHO, 2000a and 2002). It derives its genesis from traditional Chinese medicine, Indian *Ayurveda*, Arabic *Unani* medicine (Peltzer, 2009: 175), and other forms of indigenous medicines. According to Marques (1997), the WHO selected 252 essential chemicals for compounding of pharmaceutical ingredients and of these, 11.1 per cent were derived from plants and 8.7 per cent from animals. In China, traditional medicines comprise 30-50 per cent of total medicine consumption whilst in Europe and North America, more than 50 per cent of the population use alternative medicines.

Although plants and plant-derived materials make up the majority of ingredients used in most traditional medical systems globally, whole animals, animal parts, and animal-derived products (e.g., urine, fat, etc.) also constitute important elements of TM. Medicinal plants have been used for centuries, and numerous cultures still rely on indigenous medicinal plants for their primary healthcare needs. Zootherapy entails the use of animals and their products. Marques (1997) states that "all human culture which presents a structured medical system will utilise animals as medicines." Despite its prevalence in traditional medical practices worldwide, research on this phenomenon has often been neglected in comparison to medicinal plant research with little attention received on the subject from ethnobiologists and anthropologists. The phenomenon of zootherapy is marked both by a broad geographical distribution and very deep historical origins.

In modern societies, zootherapy constitutes an important alternative among many other known therapies practised worldwide. TM ingredients sourced from plants and animals called ethno-biological materials include plant substances or genetic cell-lines, are also increasingly being valued as raw materials in the bioprospecting of modern pharmaceutical compounds and herbal preparations.

Within the African context the rich ethnobotanical biodiversity has been matched with proliferation of medicinal plant use (Makunga, 2011). In the Southern African region, these include plants such as *Hoodia Gordonii*, *Hypoxis Herrocallidea* (African potato), *Pelargonium Sidoides* (African geranium), *Pranus Africanas* (red stinkwood), and *Sutherlandia Frutescens* (cancer bush). Traditional medicinal plants are used for health purposes and for religious and cultural ceremonies. *Pelargonium Sidoides* is used to manufacture commercially significant products such as Linctagon (South Africa), Umckaloabo (Europe), Kaloba (UK) or Umckan (Brazil).

South Africa holds close to 10 per cent of all species of birds, fish and plants documented in the world and include 6 per cent of recorded mammals and reptiles. It also holds more than 30,000 flowering species that account for almost 10 per cent of the world's higher plant species (Van Wyk and Gericke, 2000; Street and Prinsloo, 2013) and more than 3,000 species of plants are used for medicinal purposes. More than 80 per cent of South Africans regularly use traditional medicine as part of primary health care for prevention, curative, and palliative purposes due to its holistic approach and accessibility (Mander *et al,* 2008; Gavriilidis and Ostergren, 2012) especially in rural areas where there is limited access to allopathic healthcare services.

Evidence shows that there is one traditional healer for every 700 to 1200 users and 84 per cent of patients visiting primary healthcare facilities have a preference for traditional herbal medicines despite having access to conventional allopathic healthcare (Makunga, 2011).

Areas rich in biodiversity in South Africa are dispersed throughout the entire breadth of the country and consequently, a lot of interest has been shown in investigating the chemical composition of the plants by global and multinational corporations in pursuit of pharmacologically active ingredients (Street and Prinsloo, 2013) to manage clinical conditions such as diabetes, HIV and cancers and to commercialise these products without taking into account communities from where they are sourced. The full benefit to be derived by communities on the role and use of traditional medicines is impacted by various challenges. (Mpinga *et al*., 2013). These challenges, among others, include:

(i) International and Local Recognition

Lack of integration or ambiguous approaches to recognition of indigenous knowledge has impacted negatively on the rights of communities who have used this knowledge and practices for centuries. Integration of policies, priorities and resource allocation between allopathic and traditional medicine has been misaligned for some time globally. However, countries such as China integrated traditional health practices in the form of complementary and alternative medicine over a longer period of time (WHO, 2005)

The WHO officially declared the importance of traditional medicine for global health in 1978 during the Alma Ata declaration and has passed several declarations and resolutions encouraging member states to develop and adopt policies and regulations to promote traditional medicine within the health systems (WHO, 2001; WHO Afro, 2010). The WHO's strategy is designed to assist countries to develop national policies on evaluation and regulation of traditional medicines, establishing a strong evidence-base on safety, efficacy and quality of traditional medicines, ensuring availability and affordability, promoting therapeutic soundness and documentation of traditional medicines (Rautenbach, 2015: 11). Countries such as China, India, United Kingdom, Ghana and Mali have integrated traditional medicine into their healthcare systems (Gavriilidis and Ostergren, 2012).

According to the WHO African Regional Strategy, 80 per cent of the developing world's rural population depends on traditional medicines for its primary healthcare needs and the TM remains the preferred, affordable and most available form of healthcare in low income and most African countries (WHO, 2000). Plants have been used over millennia in the African continent and knowledge of these plants has been transmitted orally from one generation to the next. The WHO African Regional Strategy adopted by Heads of State and Governments of the Organisation of African Unity (OAU) in 2001 declared 2001-2010 as the decade of African Traditional Medicine with an action plan that aimed to integrate traditional medicine into national health systems by 2010, to improve regional and sub-regional collaboration and to take steps to protect traditional medicine domestically (Rautenbach, 2015:11). Documentation of African phytotherapeutic products used in traditional medicine lags behind China and India in terms of internationally recognised phytochemical standards.

Although the African National Congress's (ANC) National Health Plan had alluded to traditional medicine, it is only recently that national recognition of traditional medicine from the South African government has received some consideration (Gqaleni, *et al.*, 2007: 177). Traditional medicines are currently still not regulated in law and not included in the essential drug list and are not reimbursed for by medical schemes due to provisions of the Medical Scheme's Act prohibiting their reimbursement due to the unregistered status of traditiona health care practitioners (Gqaleni, *et al.*, 2007: 184).

Despite these limitations, South Africa

has been progressive in mainstreaming traditional health practices and implementing traditional medicine policies. The draft policy on African Traditional Medicines provides a framework for institutionalisation and regulation of African Traditional Medicine. To institutionalise TM, the National Department of Health committed to regulate the efficacy, safety and quality of traditional medicines; register and control marketed traditional medicines; and through the National Drug Policy- established in 2003, an independent National Reference Centre for African Traditional Medicines (NRCATM) under the coordination of the Council for Scientific and Industrial Research (CSIR).

The NRCATM is a multi-stakeholder forum consisting of government departments, non-governmental organisations, universities, research institutions and traditional healers. It was to be guided by the principles of: accessibility; environmental responsibility for conservation; protection of intellectual property of indigenous knowledge owners; international best practice; promotion of scientifically validated African traditional medicine; transparency; and dissemination of validated data. The question that must be addressed is as to whether these principles are applicable to benefit local communities or that they are tools for exploitation of indigenous knowledge and practices.

The National Department of Agriculture also regulates traditional medicines through the National Plant Genetic Resource Committee. Furthermore, the enactment of the Traditional Health Practitioners Act provided formal recognition to the nearly 250 000 traditional practitioners to ensure that their services are safe, efficient and of good quality. Traditional healers include Diviners (Izangoma); Herbalists (*Izinyanga);* Prophets / Faith healers; Traditional Surgeons *(Lingcibi);* and Traditional Birth Attendants (*Abazalisi)* (Gqaleni *et al*., 2007: 178)

(ii) Recognition for the Protection of Knowledge and Practices

Protection of indigenous knowledge and biodiversity have not gone far enough to protect the rights of communities from whom this knowledge and practices are derived from. The World Trade Organisation (WTO) and the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) do not recognise collective and community ownership of rights of plants, that are based on culture. Currently, there are no binding regulations from entities such as the World Intellectual Property Organisation to protect traditional knowledge and this has been left to the discretion of national authorities to elaborate on guidelines for this purpose (Mpinga *et al.,* 2013). Furthermore, the Convention on Biological diversity recognises genetic components and ignores the spiritual, psychological and mineral components of traditional knowledge and practices as per the definition of the WHO.

There have been calls from international agencies such as the WHO for indigenous knowledge systems such as traditional medicines to be more tightly regulated in pursuit of quality assurance of the products and to regulate efficacy and effectiveness as part of phyto-pharmaceutical vigilance. South Africa has done this through amendments to the Medicines and related Substance Act in 2009 where traditional medicines are required to be subjected to efficacy tests, and where standards are to be set to regulate these products and to gain insights into their chemical compositions.

Within the South African context, the Department of Science and Technology will be introducing the Bio-Economic Strategy Programme through the publication of the Protection, Promotion, Development and Management of IKS Bill of 2016 as stated in preceding sections. The weakness of the IKS Bill is that it fails to take a community-based approach for the protection of indigenous knowledge systems. It also fails to curb bio-prospecting for commercial value without benefiting local communities and this is a form of ethno-piracy.

Ethno-piracy is the commercial development of naturally occurring biological materials by a technologically advanced

country or commercial entity without fairly compensating local communities from which the ethno-biological material is originally discovered. Bio-prospecting a form of ethno-piracy where there is the exploration, extraction and screening of biological diversity and indigenous knowledge for commercial value. Bio-piracy or ethno-piracy is the exploration of and use of genetic and biological resources, and traditional knowledge without adequately compensating local communities or countries from which these resources are extracted especially by the multi-billion-dollar big pharma and the biotechnology industry, thus violating the cultural and beliefs as well as the socio-economic rights of communities and societies (Mpinga *et al.*, 2013).

(iii) Sustainability, Bio-prospecting and Bio-piracy

Sustainability is impacted by destruction of natural habitats such as with deforestation, economic activity and trade, and bio-prospecting and bio-piracy by national and multinational corporates are posing serious challenges to sustainability of indigenous knowledge systems as they relate to traditional medicines.

The global trade on zootherapeutic products amounting to billions of dollars annually (Kunan and Lawton, 1996) and including wild animal products such as hooves, tusks, bones, teeth, feathers, skins, fats, reptiles, ants, worms, mites, insects, fish-based products, and crustaceans (Costa-Neto, 2004) originating from countries such as China, Nigeria, Brazil, India, and Peru have also been a source of concern on the aspect of sustainability.

More than 700,000 tonnes of plant material are consumed annually. Their trade increased from US$ 150 million to US$ 320 million in 2013 (Wiersum *et al.*, 2006; Street and Prinsloo, 2013). Wiersum *et al.* (2006) assert that harvesting of these traditional medicinal plants has contributed to overexploitation of indigenous knowledge systems and of the biodiversity of geographical areas where these plants grow.

In terms of economic sustainability, traditional medicines in South Africa contribute to economic activity through trade which is estimated to be at R2.9 billion per year in 2006 and represent 5.6 per cent of the national health budget (Mpinga *et al.*, 2013). It is further estimated that more than 30 million South Africans from diverse socio-economic backgrounds consume 157g plant material per treatment, 750g of medicinal plants per annum and visit a traditional healer 4.8 times per annum (Mander, *et al.*, 2007). More than 20,000 tonnes of indigenous plant material were consumed in 2007 (Mander *et al.*, 2007). It is also estimated that more than 74 per cent of traditional medicine harvesters, street traders and traditional healers are women and in terms of job creation, the sector employs 133,000 individuals and especially women in rural areas with direct potential for income earning. The rich biodiversity in the world has also, however, been subjected to ecologically devastating deforestation thus impacting on sustainability issues such as is the case in Madagascar.

Some of the traditional medicinal plants that have been commercialised (Street and Prinsloo, 2013: 2-11) in pursuit of profitability include: (a) *Agathosma betulina* (Rutaceae) is also known as *Buchu* - a health tonic, diuretic and urinary antiseptic; (b) *Aloe ferox* (Asphodelaceae) commonly known as the Cape aloe and traditionally used as a laxative; (c) *Aspalathus linearis* (fabaceae) is a fynbos species known as Rooibos tea and is known worldwide for its antioxidant properties; (d) Harpagophytum procumbens (pediliaceae) is a weedy plant commonly known as devil's claws is used to treat rheumatism; (e) *Hypoxis hemerocallidea* (hypoxidaceae) or African potato and has various medicinal use; (f) *Merwilla nataliensis* (hycinthaceae) or traditionally known as *inguduza* with various medicinal uses; (g) *Pelargonium sidoides* (geraniaceae) also called *Umcakaloabo* is used to treat tuberculosis and diarrhoea; (h) *Sclerocarya birrea* (anacardiaceae) also known as *Marula* or tree of life is used to treat diarrhoea, rheumatism and insect bites; (i) *Siphonochilus aethiopicus* (zingiberaceae) is also known as

African/ wild ginger has been overexploited and is now extinct in parts of the country. It had previously been found to be toxic to the DNA; and (j) *Sutherlandia frutenscens* (fabaceae) or cancer bush is used for conditions such as backache, diabetes and stress.

The Civil Society Forum of the BRICS has argued in favour of the "achievement of access to safe and affordable medicines by ensuring adequate financing of health systems and the full use of the opportunities that gives the WTO Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). BRICS countries should assess the need to reform TRIPS basing on the needs of the world to ensure the needs of health care, as well as promote cooperation with each other for the exchange of technology for the expansion of local production of medicines, vaccines, diagnostics and medical devices for all the BRICS countries" (BRICS, 2015). Examples of us taking this seriously is emerging in various programmes and experiments within each of the BRICS countries. The Durban University of Technology (DUT) is pioneering a new flagship initiative called the Kenneth Gardens Wellness Centre as a community engagement project since 2011. This facility is a joint effort of DUT's departments of Homoeopathy, and Food and Nutrition; and is run as a weekly clinic in the low income housing estate. It combines allopathic and alternative health care services in the facility and is recognised as the only homoeopathy clinic existing within such a location in the country (Erwin *et al.,* 2014). Erwin *et al.* (2014) demonstrate that homoeopathy, like other CAM services, has a proper place in primary health care models. The services they provide are holistic, natural, affordable, and individualised. All of these attributes were recognised and appreciated by Kenneth Gardens' residents who made use of the homoeopathic clinic. In a plural healthcare facility there could be a robust exchange of knowledge and practice between allopathic and CAM healthcare providers. Marks and Erwin (2016) also show how the Kenneth Gardens Wellness Centre serves as an example of the co-production of knowledge and development which had need to respond to ongoing political interference and gatekeeping.

Conclusions

Within the BRICS at the recent bilateral discussions during the state visit to South Africa by the head of the Indian government, 14 new joint research projects in the area of Agriculture Biotechnology and Indigenous Knowledge Systems were finalised on 8 July 2016. As noted by Barbosa da Silva *et al.* (2014), "… the themes that form the backbone of BRICS cooperation are, in fact, a synthesis of the most important issues shaping progress globally. First, strengthened surveillance systems, as part of robust health and service management information systems, will be indispensable for managing services as well as for ensuring accountability and transparency in the health systems of the future. Second, medical technologies and health technologies for communicable diseases will determine not only much of the innovative potential of personal and population health services to improve the health of future generations, but also the cost of those services. Drug discovery and development is also responsible for another substantial part of the affordability and equity equations."

The Civil Society Forum of the BRICS has also demanded that we "… promote the achievement of equality of all groups of the population on the issue of access to health care and medicines by increasing public funding and provision of mainly public healthcare supply due to the creation and development of a universal, integrated and comprehensive health systems that can prevent and treat infectious diseases such as malaria, tuberculosis, HIV / AIDS and others, as well as to enhance the effectiveness of prevention and control of non-communicable diseases. Such systems should be accountable both to the state and to society. It is also necessary to take measures to address the problems caused by modern pandemic of virus, which spread rapidly across continents, to create a special development fund of public health in the New Development Bank, which was established by the BRICS countries" (BRICS, 2015).

We must, therefore, progressively respond to the warning by Muntanera *et al.* (2015) that "although [the] mainstream orientation to social class and health inequalities may appear innocuous or politically neutral, it in fact functions in the service of incremental, apolitical, technical changes that are ultimately system-justifying and status-quo-reproducing." This warning should alert the research scholars and public intellectuals of the BRICS to be more forthright in advocating a more radical and robust rupture with the neoliberal framings of wellness and well-being. The BRICS, as the political apparatus of 42 per cent of the world's population, must ultimately lead in the reconstruction and development of an alternative world order that advances beyond the fatalistic compulsions of capitalism and opens pathways to reconstructing and developing a better life for all. In advancing upon such a confident route, we are supported by the civil societies of our countries

Endnotes

1 Things which people must have.

2 Things which are good for people.

3 Things which people choose for themselves.

4 The IKS Bill defines 'indigenous community' to mean"any recognisable community of people developing from, or historically settled in, a geographic area or areas located within the borders of the Republic characterised by social, cultural and economic conditions which distinguish them from other sections of the national community, and who identify themselves and are recognised by other groups as a distinct collective" (RSA, 2016: 5)

5 'indigenous cultural expressions' are defined to mean expressions having cultural content developed within indigenous communities and assimilated into their cultural make-up or essential character, including but not limited to (a) phonetic or verbal expressions; (b) musical or sound expressions; (c) expressions by action; and (d) action tangible expressions" (RSA, 2016: 5)

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Biological Resource Base for Traditional Medicines

T. P. Rajendran*

Background

Traditional medicine (TM) is a comprehensive term used to refer both to systems such as Indian Ayurveda, Chinese traditional medicine, Arabic unani medicine, and to various forms of indigenous medicine systems. In those nations where allopathic medicine system becomes dominant mean of human health management, 'complementary' or 'non-conventional' medicines system are conoted for TM. TM has been of significance to show healing powers that are present in natural systems, having medicinal plants and or animal species. TM and biodiversity of the planet has long tradition of healing powers.

Traditional medicine or folk medicine is civilisational asset of humanity that has been transmitted over generations for practice as well as for alleviating the suffering of millions of people. Human sufferings due to various ailments that challenged the health and well-being of communities had been the concern for sustaining communities in the early civilisations. Traditional concepts of therapeutic solution to ailments arose from the age-old acquisition of knowledge out of keen observations in nature about the available natural remedies that can be employed for useful cure to common ailments. The branch of traditional medicine got stronger after many exponents in traditional medicine knowledge acquired over centuries codified and published their experience and gainful knowledge on the potential of traditional medicines from plants and animals.

Folklore came out of to be the crystalised knowledge-base of practitioners who are depended on the communities for their health management. In therapeutic systems with diverse medical problems of those times, folklore medicine system came to stay as both home remedies and practitioners' tool box. The folklore medicines in traditional 'cure' of human ailments originating from pathogenic, parasitic, digestive, systemic, and allergic reasons performed to the satisfaction of the patients and the practitioners. There seems to be seamless boundary between folklore and 'healing'. Healing of agonies – both physical and mental – became huge traditional knowledge (TK) repository that was entwined in the culture of human civilisation to develop pharmacological substances of animal origin has traditional knowledge that were perceived and valued from 19th century CE as well as r*asayana tantra* for anti-ageing, tissue strengthening, retentive intelligence, disease cure, etc.

Looking at natural resources and trying their usefulness in the cure of human ailments became the pharmacopeia of folk knowledge and professional medical systems

* Visiting Fellow, RIS

like Ayurvedic, Chinese, Arabic Unani and biomedicine from a host of leaves, herbs, roots, bark, animals and their parts, minerals, etc. In countries where the dominant healthcare system is based on allopathic medicine, or where TM has not been incorporated into the national health care system, TM is often termed "complementary", "alternative" or "non-conventional" medicine (WHO, 2002).

Traditional medicine (TM) refers to the knowledge, skills and practices based on the theories, beliefs and experiences indigenous to different cultures, used in the maintenance of health and in the prevention, diagnosis, improvement or treatment of physical and mental illness. Traditional medicine covers a wide variety of therapies and practices which vary from country to country and region to region. In some countries, it is referred to as "alternative" or "complementary" medicine (CAM). Traditional medicine has been used for thousands of years with great contributions made by practitioners to human health, particularly as primary health care providers at the community level. TM encompasses a large measure of therapies that are time-tested and have got integrated in the culture of human civilisations. Some nations call such remedies as 'alternative' or 'complementary' medicine. TM practitioners become the primary health care units at the community level. In the last century, TM system was rediscovered and widely popularised all across the world. The limitations of modern medicine in curative purpose were realised and accordingly relook into TM system commenced to make alternative and / or complementary medicine to earn faith of patients for better cure of their ailments. TM/CAM has maintained its popularity worldwide. Since the 1990s its use has surged in many developed and developing countries.

The global perspective of TM such as Mexican traditional medicine system, Columbian Amazon tropical forest, Africa and the Pacific exhaustively with descriptions of local traditions and practices; traditional Jewish medicines from biblical times to the present; North American conventional medicines along with traditional Chinese system, and India's Ayurveda or Sidha and Asian traditional systems have wide literature support (Kayne, 2010). The traditional knowledge (TK) associated with TM is the most valuable and significant monumentally historical contribution to our generation of mankind of modern world (Blakeney, 1999). Such pre-historic to modern transfer of TK based TM practices has enabled them to be rooted in our culture as well as social order. The reliance of communities on home remedies, traditional cure and tradional medicinal plants and associated therapeutic and pharmacological knowledge has been of high utility in both personal health management and in associated business and trade of such TM resources. The pharmacopoea associated with these biological resources has been appreciated and adopted into modern medicine systems such as allopathy/ homoeopathy systems of medicines too.

Plants and Animals as Bioresources

Human effort to identify cure for various ailments from both plants and animas in the surroundings did yield the treasure of knowledge that further led to the development of therapeutics and pharmacologically active substances. Such substances paved the way for elucidation of both phytochemistry and biochemistry of active principles that aided cure of various health maladies.

Plants and animals were identified with medicinal properties and were used as individual medicine or as component of various medicines to cure one or more ailments (Alves and Rosa, 2007). The identity of ailment throught the science of diagnosis provides the clue to prescribe the type of medicine that is fit for the patient. Generally the biological resources with therapeutic value and with medicinal entities and ingredients were identified based on extentive traditional knowledge that was passed on as folklore and folk medicine system.

Flora Resources

Plants are the basic source of therapeutic substances for preparing various potions and pills that are prescribed as per the condition of the patient and the associated

symptoms. Often there are designated and identified wild plant species that have been assigned medicinal value for a given botanical extract preparation in specified quantity. The associated traditional knowledge for these plants is also equally significant for home-remedies for ailments arising out of weather change, their preventive methods and knowledge of suitable foods.

The Annexure 1 provides the one instance that catalogues over 110 plants with description of knowledge related to their medicinal value. These global TK system-based flora are derivatives of pre-historic knowledge and are extensively under practise by various communities and TM practitioners, in respective countries.

Indian Perspective of utilisation of Medicial and Aromatic Plants (MAPs)

Indian ethnobotany has illustrated the use of flora-biodiversity that has been identified for various purposes as given in Table 1.

Table 1: Ethnic utilisation of Biodiversity of Medicine

Sr.No.	Purpose	Number of plants
1	Medicine	202
2	Veterinary	109
3	Fish poison	23
4	Pest control	51
5	Water purification	3
6	Wild edible plants	87
7	Fodder	65
8	Fuel	30
9	Hunting	3
10	Cultural / religious purpose	3

Source: Shankar (1994).

A sample survey of TM and folk medicines from flora in Southern India (Table 2) would provide glimpse of the rich traditional knowledge and its utilisation for human and animal health management.

The model relates to the development of the scientifically validated herbal drug, 'Jeevani', based lead provided by a tribal community. It is obtained from a plant species known as 'Arogyapacha' (*Trichopus zeylanicus* ssp. *travancoricus* Burkill. ex Narayanan), the plant that has TK with *Kanikaran* (*Kani*) tribes of kerala.

Table 2: Richness of Folk Medicines

Sr. No.	Plant species	Number of use
1	Centella asiatica	33
2	Pergularia daemia	23
3	Aristolochia indica	22
4	Ichnocerpu frutescens	22
5	Alistonia scholaris	19
6	Holarrhina antidysentrica	18
7	Trachispermum ammi	15
8	Hygrophyla auriculiculata	15
9	Trianthema portulacastrum	15
10	Semecarpus anacardium	15
11	Hemidesmus indicus	15
12	Catharhanthus roseus	14
13	Apama siliquosa	13
14	Costus speciosus	12
15	Justice gendarusa	11
16	Pergularia extense	10

Note: Examples of medicinal plants with ten or more reported uses in Southern India.

Source: Shankar (1994).

Ethnobotanical knowledge in Southern India of various flora with therapeutic properties and value for curing various ailments are enlisted in Annexure 2. The TM value of these medicinal plants as TK is tremendously useful for household remedies as well as for traditional cure of perceived common ailments. The common mass was highly benefitted with these home-remedies and could manage cure for ailments (Ignacimuthu *et al.*, 2006), as given in the Annexure 2.

Indian biodiversity of flora and fauna and traditional knowledge associated with that in curing various ailments are localised in various communities in the country (Shiva, 1994). TM practitioners called *Vaidyas, Sidhas and Hakims* utilise their knowledge for health management using flora, fauna and minerals alone or their combination in various parts of India and neighbouring countries. One such

community as an example is illustrative of how communities built up their capacity to address curative requirement of villagers. The folk knowledge of *Vaidus* of Karjat tribal block in Raigad district of Maharashtra utilise various extracts and oil of locally and seasonally available flora for various ailments including bone setting of fractures (Balasubramanian, 1994). Shankar (1994) narrates the ancient knowledge of utilisation of such resources vividly (Table 3). There are 4635 known ethnic communities and several tribal hamlets that have knowledge of over 70000 plants for their medicinal values.

Table 3: Community TM Systems and Herbal Use

Sr. No.	Community / TM Systems	Number of Plants
1	Madav koli tribals of Western Ghats	202 Sp. and 10 sp. for veterinary medicine
2	Vaidus tribals of Maharashtra	
3	Kani tribals of Kerala	
4	Unani TM system	342 sp.
5	Sidha TM system	328 sp.

Source: Shanksar (1994).

Ayurveda or the 'science of life' is the essence of harmony of mind, soul and body through various practices for living in harmony with the basic elements of nature. Health being defined by the harmony of these three *doshas* (*Vata, Pitha* and *Kapha*) increasingly depends on the lifestyle, food, treatment and medicines consumed by the patient. The science of Ayurveda has grown into toxicology, internal medicine, latro-chemistry, surgery, preventive and social medicine in addition to studies on physiology, pathology and eye and ENT.

India has 15 Agroclimatic zones and 17000-18000 species of flowering plants of which 6000-7000 are estimated to have medicinal usage in folk and documented systems of medicine, like Ayurveda, Siddha, Unani and Homoeopathy. About 960 species of medicinal plants are estimated to be in trade of which 178 species have annual consumption levels in excess of 100 metric tonnes.

The government has established the National Medicinal Plants Board (NMPB) to manage the medicinal plant production and utilisation in the country. It has the primary mandate of coordinating all matters relating to medicinal plants and support policies and programmes for growth of trade, export, conservation and cultivation. The Board is located in the Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy (AYUSH) of the Ministry of Health and Family Welfare. The recent global resurgence in traditional and alternative healthcare systems resulting in world herbal trade which stands at US$ 120 billion and is expected to reach US$ 7 trillion by 2050. India is interested to enlarge its presence in the trade of MAPs of global importance.

Medicinal plants are not only a major resource base for the traditional medicine and herbal industry, but also provide livelihood and health security to a large segment of Indian population. The National Medicinal Plants Board's funding to sustain about 115 medicinal gardens in all parts of the country is significant to sustain these MAPs. There is good compilation of information on various trees, herbs, shrubs and climber plants of medicinal importance maintained in 415 medicinal gardens available in the country.[1] "Herbs for all and Health for all" is an ideology that is pursued in various states to promote the sustenance of medicinal plants of every agro-ecology. NMPB funds 59 institutions across the country to sustain and preserve the MAPs of every climatic zone. It is important to note that the utilisation of various medicinal plants for AYUSH industry runs into several billion Indian Rupees including that for exports.

Indian Bioprospecting and Sustainability of MAPs

Due to the recognition of medicinal value of various flora available in the surroundings of human habitation, there has been consistent utilisation of these leading to overexploitation and sad extinction of certain species. Indian Council of Agricultural Research has established Directorate of

Medicinal and Aromatic Plants Research (DMAPR) at Anand, Gujarat to contribute for sustainable production of quality MAPs through development of new varieties, good agricultural practices, quality assessment methodologies and using frontier cutting edge technologies such as IT and biotechnology. The medicinal and aromatic plants (MAPs) are individually or collectively utilised in the preparation of various traditional medicines for taking up traditional cure of human ailments. Wellness has been attained by the utilisation of TK on these by judicious practice of utilising the medicinally important flora.

Medicinal Plant Genetic Stock Management in India

The DMAPR at Anand, Gujarat is doing research on plant genetic improvement through breeding for higher quality with better agronomic traits of the 26 varieties for 23 crop species that are commonly in demand for medicinal use (Table 4). They also maintain genetic stocks and 688 germplasm of 23 medicinal plant species at the Anand facility. These are used for crop improvement purpose after identifying and evaluating of the quantitiy of desirable active principles.

Table 4: Medicinal Plant Germplasm at DMAPR

Sr. No.	Medicinal plant germplasm	Number
1	Aswagandha	48
2	Geranium	6
3	Isabgol	47
4	Khasi kateri	7
5	Long pepper	64
6	Liquorice	5
7	Periwinkle	8
8	Valeriana	40
9	Vetiver	37
10	Guggal	50
11	Henbane	14
12	Kacholam	12
13	Mucuna	44
14	Safed musli	52
15	Aloe	72
16	Asparagus	9
17	Gentiana	12
18	Tinospora	12
19	Heracleum	10
20	Jasmine	109
21	Patchouli	7
22	Sylibum	10
23	Coleus	13
	Total	688

Source: ICAR-Directorate of Medicinal and Aromatic Plants Research, Anand, Gujarat; Plant Genetic Resource (PGR) Management at http://www.dmapr.org.in/Research/CropImprovement.html

Valuable genetic stocks (Table 5) of are maintained at various All India Coordinated Research Project (AICRP) centres and National Research Centre for Medicinal and Aromatic Plants. There are 830 germplasm of species of medicinal and aromatic plants in the gene bank of Directorate of Medicinal and Aromatic Plants research. The evaluation and characterisation of these accessions are in progress.

Table 5: Genetic Stocks of Medicinal and Aromatic Plants in ICAR System

Species Name	Number of Germplasm
Aloe spp.	55
Andrographis paniculata	60
Asparagus spp.	80
Cassia angustifolia	50
Chlorophytum borivilianum	54
Commiphora wightii	154
Cymbopogon martinii	07
Desmodium gangeticum	52
Gymnema sylvestre	43
Plantago ovata	84
Tinospora cordifolia	35
Urgenia spp.	12
Withania somnifera	140
Total	830

Source: ICAR-Directorate of Medicinal and Aromatic Plants Research, Anand, Gujarat; Plant Genetic Resource (PGR) Management at http://www.dmapr.org.in/Research/CropImprovement.html

MAP Variety Improvement in India

Multi-location evaluation trials conducted

under the All India Coordinated Research Project on Medicinal and Aromatic Plants have resulted in the identification and release of 25 new improved varieties of fourteen species of medicinal plants (Table 6).

CSIR- Institute of Medicinal and Aromatic Plants, Lucknow, Uttar Prdesh has been undertaking R&D on MAPs since 1959. It has been working on 48 MAPs and has released over 150 improved varieties of these. Genetic improvement work of *Artemisia annua, Sylibum marianam, Mentha species, Withania somnifera, Catharanthus roseus, Papaver somniferum, Vetiveria zizinoides and Rosa damacena* is noteworthy. The institute has developed seed quality standards and is testing those for MAPs.

Jawaharlal Nehru Tropical Botanical Garden, Thiruvanthapuram undertakes research on medicinally important flora available in Western Ghats of Kerala. While elucidating the active principles and their therapeutic value for curing diseases, there has been sensitivity for elucidation of pharmacological significance of the active principles from the various flora, present in the Western Ghats.

Medicinal Plant (MP) Management System in India

It has been understood that over 250 species of MPs that are highly used need the support of sustainable cultivation in such agro-ecologies that support the maximised yield of medicinal principles in them (Table 7). Plans to make this as ecologically sustainable practice so as to supply markets with the much needed medicinal plants for the preparation of pharmaceuticals for wellness management are to be financially supported by all countries so as to prevent over-exploitation of these medicinal plants.

The National Medicinal Plants Development Board has various schematic approach to develop MP farming in various parts of the country, where the relevant plant species are grown in appropriate agro-climatic conditions.

Agriculture for medicinal plant cultivation

Local communities and ethnic groups thus form one of the key pools of knowledge which is attractive to both international and national herbal medicinal development sectors. Interest of the traditional knowledge users and Ayurvedic herbal medicine producers in modern technologies is acknowledged by some actors interviewed for this study. Over time TK based herbal medicine development has benefitted from new technologies, particularly in yielding purer forms of active compounds. Thus, the requirement for technology transfer among traditional practitioners, producers and knowledge holders is high. Agricultural technology for production of plants is also, generally, poor or lacking, especially where sound production systems may help in increased yields and viable quality of the active principles in medicinal plants, and importantly reduce pressure on wild plants – thus contributing to conservation and sustainable use.

Similarly, the profound knowledge base may potentially be obtained by international actors via technology transfer (i.e. through benefit sharing agreements in India) – thus knowledge may be sought in both directions. The nature of the need and interest from both sides may well be the subject of technology transfer agreements.

Risks Associated with Botanical Therapeutics

The medicinal use of botanical extracts is plausible because they may contain pharmacologically-active chemicals (NTP, 2009; Swanepoel *et al.*, 2003; Luyckx *et al.*, 2004, 2005). However, extracts are not standardised for their biological activities; they may contain toxic quantities of heavy metals and may be adulterated with drugs. Although the adverse effects of folk remedies have not been studied in a systematic manner, data concerning their toxicity is mounting. For example, African folk remedies are a frequent cause of renal and hepatic damage. In one study, patients who were admitted to South African hospitals with

acute renal failure following the use of folk remedies had a 41 per cent mortality rate. It has been estimated that one-third of cases of acute renal failure in Africa are caused by folk medicines. Practitioners with inept knowledge about the pharmacological action of active ingredients shall not be permitted to practise TM. However, local quack medical practice happens silently in parallel to inadequately reaching government health programmes in villages in all developing countries.

Botanical remedies prepared from *Aristolochia* plants have been used throughout the world for many centuries. In the early 1990s, it was reported that herbal remedies made from these plants caused renal failure and malignancies of the urethral tract. These problems are caused by aristolochic acids, genotoxic mutagens that form covalent adducts with DNA. Despite well-publicised warnings, a decade later the Uganda Natural Chemotherapeutic and Research Laboratory announced a programme to evaluate the use of *Aristolochia elegans* for treatment of malaria (Cosyns, 2003; Debelle, 2008; NTP, 2009; Lai, 2010). Furthermore, in 2009 epidemiologists in China, Taiwan reported a dose-dependent relationship between the consumption of

Table 6: New High-yielding Varieties of Medicinal Plants, Released for Cultivation

Sr. No.	MAP species	Name of the improved variety	Year of release/ notification
1	Chlorophytum borivilianum (Safed musli)	JS405	2004
2	Cassia angustifolia (Senna)	Anand Late Selection	1989
3	Diascoria floribunda	FB(C)-1	1974
4	Diascoria floribunda	Arka Upakar	1980
5	Digitalis lanata (Foxglove)	D.76	1991
6	Glaucium flavum (Yellow Horned Poppy)	H47-3	1991
7	Glycyrrhiza glabra (Liquorice)	Haryana Mulhatti-1	1989
8	Hyoscyamus muticus (Egyptian Henbane)	HMI-80-1	-
9	Lepidium sativum (Cress)	GA-1	1998
10	Rauvolfia serpentina (Sarpagandha)	RI-1	-
11	Papaver somniferum (Opium poppy)	Jawahar Aphim 16	1984
12	Papaver somniferum (Opium poppy)	Kirtiman	1990
13	Papaver somniferum (Opium poppy)	Jawahar Aphim 16	1997
14	Papaver somniferum (Opium poppy)	Jawahar Aphim 16	1998
15	Papaver somniferum (Opium poppy)	Chetak Aphim	1994
16	Papaver somniferum (Opium poppy)	Trisna	-
17	Piper longum (Long pepper)	Viswam	1996
18	Plantago ovata (Isabgol)	Gujarat Isabgol- 1	1976
19	Plantago ovata (Isabgol)	Gujarat Isabgol- 2	1983
20	Plantago ovata (Isabgol)	Haryana Isabgol-5	1989
21	Plantago ovata (Isabgol)	Jawahar Isabgol-4	1996
22	Solanum laciniatum	NH 88-12	1991
23	Solanum viarum (Khasi Kateri)	Arka Sanjeevani	1989
24	Solanum viarum (Khasi Kateri)	Arka Mahima	1992
25	Withania somnifera (Aswagandha)	Jawahar Asgand-20	1989
26	Withania somnifera (Aswagandha)	Jawahar Asgand-134	1998

Source: ICAR-Directorate of Medicinal and Aromatic Plants Research, Anand, Gujarat; Plant Genetic Resource (PGR) Management at http://www.dmapr.org.in/Research/CropImprovement.html

herbal products containing aristolochic acids and urinary tract cancers. The ban in the United Kingdom of Great Britain and Northern Ireland on the import and sale of plants that may contain aristolochic acids is "another example of the government restricting consumers' choice" (Kayne, 2010).

Plants will continue to be a source for new therapeutic agents, but in view of their unregulated status, uncertain efficacy and potential toxicity, the risk/benefit ratio of herbals is unfavourable and their use as medicines should be discouraged. The practices of most herbalists and traditional healers are based on tradition. They have little familiarity with medical literature and they may, understandably, resent the intrusion of conventional medicine into their domain. In recent decades, many publications have emphasised the importance of educating conventional practitioners to interact sensitively with healers and patients from diverse cultures. However, those concerns have not been balanced, in this book or elsewhere, by recognising the need to protect patients from the hazards of folk remedies. The World Health Organisation shall engage at a common platform the governments in facilitating communication between biomedical scientists, public health authorities and traditional healers. It is to be a researchable issue if there is traditional knowledge for combination of botanical medicines that neutralise the adverse effects of certain plant extracts in various medicinal potions and preparations.

Herbal Remedies for Epizootic Diseases

Wamboga-Mugirya (2005) reported about the Ugandan tests of anti-malarial herbs. Many public and private health research funding to elucidate the medicinal properties of various herbal remedy for the cure of severe epizootic diseases such as malaria, filaria, encyphilitis, chikangunya, dengue, etc., are in progress all over the globe. The realisation about the utility of herbal remedies to thwart adverse effects of modern medicines also triggered such research towards achieving sustainable cure from herbal remedies. While the intellectual property for the novelty of inventions from such R&D is a matter for debate regarding making the knowledge commercialised,

Table 7: Rare Medicinal Plants

Rare (11)	Endemic (15)	Highly used (256)
Hydnocarpus macrocarpa	Mesua ferrea	Alpinia galangal
Syzygium travancorium	Coleus vettiveroides	Bacopa monnieri
Madhuca dipolstemon	Adhatoda beddomeri	Celestrus paniculata
Madhuca insignis	Myristica malabarica	Clerodendron serratum
Aerva wightii	Tragia bicolor	Decalepsis hamiltonii
Cydea fissicalyx	Erythrina variegate	Holoptella integrifolia
Glycosmis macrocarpa	Cinnamomum wightii	Holorrhena antidysentrica
Piper barberi	Cinnamomum macrocarpus	Mimosops elengi
Kingrodendron pinnatum	Lamprachaenium micriocephalum	Semecarpus anacardium
Ochreinauclea missious	Garcinia indica	Sysplocos racemose
	Elaeocarpus serratus	Dioscorea opposiifolia
	Pterocarpus santalinus	Embelia ribes
	Vateria indica	Flacourtia indica
	Achyranthus aspera	Terminalia arjuna
	Ampalocissus araneasa	Terminalia chebula

Note: Sample-survey of data available in Southern Indian literature.

Source: Shankar (1994).

there appears to be consensus on the need for making these remedies available to common people who suffer from such ailments due to vector build-up situations from unscientific urban development/town planning.

Zootherapy

Animals as a whole entity or their body parts have been used as medicinal resources for the treatment and relieve a myriad of illnesses and diseases in practically every human culture (Alves *et al.*, 2011; Costa-Neto, 2005). Although considered by many as superstition, the pertinence of traditional medicine based on animals cannot be denied since they have been methodically tested by pharmaceutical companies as sources of drugs to the modern medical science. Animal resources including their body parts as well as products there-from have been put to use for their medicinal value to relieve a variety of human ailments in folklore medicinal system. The pertinence and context of animal-based traditional medicine (TM) system have to be looked beyond superstition, occult and such other human approaches for curing ailments that prevailed in medieval era. Scientific understanding of the therapeutic value of some of these has been proven with the progress of modern science. Zootherapy came to be established and recognised today in human health management.

The zootherapy represents a strong evidence of the medicinal use of animal resources (Alves and Alves, 2011). Indeed, drug companies and agribusiness firms have been evaluating animals for decades without paying anything to the countries from where these genetic resources came. The use of animals' body parts as folk medicines is relevant because it implies additional pressure over critical wild populations. It is argued that many animal species have been overexploited as sources of medicines for the traditional trade. Additionally, animal populations have become depleted or endangered as a result of their use as experimental subjects or animal models. Research on zootherapy should be compatible with the welfare of the medicinal animals, and the use of their by-products should be done in a sustainable way. It is discussed that sustainability is now required as the guiding principle for biological conservation.

Pharmacological substances derived from fauna of the world have been traditionally reservoir of zootherapy knowledge. Sourcing potential drugs from animals and their products spins out wider discussions on conservation biology and sustainable use of the desired fauna or flora. Animal-derived remedies were used for treating various diseases. A single illness could be treated by various animal species (e.g., 215 animal species were used in the treatment of asthma and 95 in the treatment of rheumatism), and many species were prescribed for treating multiple illnesses, as in the case of the products obtained from the teju (*Tupinambis teguixin*) and the snake boa (*Boa constrictor*), which were indicated to treat 29 and 30 conditions, respectively. Interesting therapeutic actions are experienced by the TK on combinational knowledge of animal parts involved on method of preparation, dosage or parts put in the combination. The TK that there can be various animals that impart cure for the same zootherapeutic remedies is useful to adapt to the availability of all animals.

Pharmacological substances of animal origin (Table 8) from 19th century from ethnobiological material data (Blakeney, 1999) have been significantly utilsied in new pharmaceuticals.

Early 19th century onwards, many records on the medicinal use of Peruvian animals are available. Blood of the large alligator – Black Caiman – was used to treat epilepsy and stroke. The genus of ants – Pseudomynmex was made to bite at painful joints, or are crushed and used as analgesic to relieve aching tooth. Mexican communities of Sierra Madre mountain ranges believed that the more poisonous the animal is the more it is useful in treating poisoning. Sudanese traditional remedies for human ailments such as arthritis included external application of fresh dung of

Arabian camel. Chinese research on medicinal value of earthworms is known for over 400 years (Zhang *et al.,* 1992). Earthworms have antipyretic, antispasmodic, diuretic, antihypertensive, antiallergic, antiasthmatic, detoxic and spermaticidal effects. Zhang *et al.* (1992) narrated useful treatment procedures for curing eighty sorts of ailments using earthworm extracts and recommended specific study of its spermatocidal effects. Folk medicines of Brazil-Siribinha beach of Bahia state use several marine and estuarine animals (Costa-Neto and Marques, 2000). Li Schizhen's (1572) compendium of *Materia medica* provided comprehensive account of traditional Chinese pharmacological knowledge up to his times. Medicines from 39 animal resources: 62 per cent from fish, 13 per cent from crustaceans, 10 per cent from reptiles, 8 per cent echinoderms, 5 per centfrom molluscs and 2 per cent mammals are under use.

Andary *et al.* (1996) attempted to catalogue a number of useful biochemicals that have applications in pharma industry. Over 500 species of insects, mites, and spiders are used as medicines to cure both common and complicated ailments in Chhattisgarh, India (Oudhia, 1995). The pod borer *Helicoverpa armigera* (Hübner) alone or in combination with herbal drugs is used to treat more than 50 common diseases. Indeed, insect behaviour can help to discover useful compounds by leading an observer to an unusual chemical (Joyce 1991).

Insects have proven to be very important as sources of drugs for modern medicine since they have immunological, analgesic, antibacterial, diuretic, anesthetic, and anti-rheumatic properties (Costa-Neto and Olivira, 2010; Yamakawa, 1998). In fact, anti-microbial peptides were first discovered in insect larvae by Dr. Hans Boman of the Karolinska Institute (Diamond, 2001). Chemical screening applied to 14 insect species has confirmed the presence of proteins, terpenoids (triterpenoids and steroids, carotenoids, iridoids, tropolones), sugars, polyols and mucilages, saponins, polyphenolic glycosides, quinones, anthraquinone glycosides, cyanogenic glycosides, and alkaloids (Andary *et al.,* 1996). Chitosan, a compound derived from chitin, has been used as an anticoagulant and to lower serum cholesterol level, as well as to repair tissues, and even in the fabrication of contact lenses (Goodman, 1989).

Carté (1996) stresses that an increasing number of novel marine metabolites are reported in the literature every year, indicating that the marine environment is likely to continue to be a prolific source of new natural products for many years to come.

Jones (1998), when discussing the medically important toxins in the saliva of blood-sucking animals, points out that ''the wide variety of bioactive molecules apparently contained in the saliva of blood-sucking arthropods is of general clinical therapeutic interest.'' For example, an anticoagulant from tick saliva is being used to determine the nature of blood afflictions in clinical settings. And a tick salivary anticoagulant has also been explored as a model agent to prevent undesired blood clotting during open-heart surgery.

Combination of Herbal Medicine and Animals

The well-known and ancient Indian cure for asthma in Hyderabad by the 'Goud' family by making patients swallow small Murrel fish stuffed with herbal medicines every year on *Maargasirra Kartik* day for three years with 45 days of food restrictions each time is known to cure millions of people.

Failure of Traditional Medicines and Emergence of Alternative Medicine Systems

The regulatory measures will increasingly require the involvement of stakeholders, who must be made aware of the need for the conservation of the natural resource as a guarantee for its sustainable exploitation. Such involvement, besides contributing to the construction of direct conservation measures and of the proposition of feasible management options, perhaps could contribute to change the perception held by some that the demands

Table 8: Examples of Pharmacological Substances from Animals – Zootherapy Knowledge

Animal resource	Human ailment	Literature reference
Asian sulphur butterflies, (Catopsilia crocale Cram.1775) wing scales	Immunological, analagasic, antibacterial, diuretic, anti-rhuematic	Yamakawa (1998)
Taiwanese stag beetles (Allomyrina dichotomus [Linnaeus 1771]) legs	Anti-cancer drugs	Kunin and Lawton (1996)
Insect larvae, particularly maggots	Anti-microbial peptides for wound healing	Diamond (2001)
Insect chitin that has chitosan	Good anticoagulant or to lower serum cholesterol level, repairing of tissues and even for fabrication of contact lenses	Goodman (1989)
Oil from the red velvet mite (Trombidium grandissimum Koch 1867)	Paralysis and ability to increase the sexual desire	Oudhia (1995)
Bee venom - Tetrameric polypeptide, melittin	For the often-reported anti-arthritic and anti-inflammatory effects	Bisset (1991)
Venom of the scorpion Centruroides margaritatus - margatoxin blocks lymphocyte activation and the production of interleukin-2 by human T-lymphocytes	Useful in treatment of autoimmune diseases or in preventing the rejection of organ transplants	Bisset (1991)
Venoms of the solitary Wasps, Anoplius samariensis (Pallas 1771) Pseudagenia (Batozonellus) maculifrons Smith	Useful for the development of therapeutic agents of neurological disorders	Konno *et al.*, (1998)
The sponge Luffariella variabilis (Poléjaeff 1884) The sponge, Discoderma sp. (Faulkner 1992).	Produce large amounts of a chemical with anti-inflammatory activity known as monoalide. It was found that monoalide inhibits the action of an enzyme called phospholipase A2. The powerful immunosuppressive agent discodermolide .	
Species of Halichondria collected in Ishigaki Island, Japan.	Isolated a novel sterol sulfate named halistanol sulfate as an antimicrobial metabolite Important antitumor agents as halichondrin B and spongistatins/ altohyrtins	Fusetani (1996)
The fish, Eptatretus stouti (Lockington)	Cardiac stimulants	Finkil (1984)
Fish-Dasyastis Sabina (Lesuer)	Anti-tumor	Finkil (1984)
Fish-Taricha sp.	Analgeic	Finkil (1984)
Phyllomedusa biocolor (Boddaert) frogs in Brazil	Peptides extracted from scraped secretions used to treat seizure, depression, stroke, cognitive loss, etc.	

for regulation to protect endangered species represent a form of cultural imperialism (Bodekar and Kronenberg, 2002). In that same direction, informed participation of holders of traditional medical knowledge in consultation/decision processes may further foster much needed co-operation to ensure the equitable sharing of the benefits arising from the utilisation of traditional knowledge, innovations and practices. The ethnomedical herbalists and cult healers have been collecting bioresources from far off places in the absence of their restricted availability locally. So such herbal medicines are replaced by concoctions, dicoctions and tinctures that have less bioefficacy against the targeted ailment (Alves and Rosa, 2007). Their shelf life and the losing potency over storage reduce their medicinal value. Thus, the faith in the TM has waned out.

Curative Effects from Pets

Customs of keeping pest in human dwellings epitomised curative and palliative influence of those animals became strong traditional knowledge for deriving wellness. Co-therapies or agents for change by deploying animals have been shown to influence human life (Pentenero, 2001). Midgley (1997) elaborated the therapeutic influence of pet-keeping an elucidated the significance of this custom (DePrekel, 2002). Animal assisted mode of curing ailments is also in vogue to cure autism, Down's syndrome, rehabilitation of paralysis, etc.

Endangering the Medicinal Bioresources through Over-exploitation

The recent enhancement of utilisation of various flora and fauna resources for therapeutic and pharmacological innovations as well as for development of traditional medicines call for their sustainable use for such purposes so that there is sustained availability of these wild/natural resources for human wellness therapies. Dhillon (2014) provided detailed understanding on Indian traditional knowledge in respect of medicinal plants and Indian medicine systems. In the records on TK, he provided the details of Traditional Knowledge Digital Library (TKDL) in India.

A regular and widespread use of herbs throughout the world has increased serious concerns over their quality, safety and efficacy. In order to ensure that local communities sustain the medicinal bioresources and the TK thereon, one shall bring in incentives to these communities by re-defining access and benefit sharing formula based on the commercial outcome. Global concerns on overexploitation of biological resources for commercial production of medicines, potions, spagyrics, elixirs, tinctures, and other products for traditional curing of human and animal ailments have been attempted to be captured through various national legislations. So many Civil Society organisations such as *India's Endangered* 2016 have brought out the scenario of illegal trade and wanton harvesting of various medicinal plants from far-flung regions of the country.

The regulatory process towards securing and managing medicinally important bioresources and associated TK for benevolent purposes in various countries became predominant as compliance to Convention on Biological Diversity (CBD) since the beginning of this century.

Modern Outlook on TM System

It has been amply demonstrated from recent history of the pharmaceutical research and development that hinge investment to utilise the third-world biological resources are kept at stakes. Relevant international conventions on sharing of benefits towards the utilisation of biological resources and their associated traditional knowledge in manufacture of therapeutics for health management are in place. International trade agreements ensure respecting sovereign rights of nations who hold these resources. However, in practice, a number of violations emerge, compelling guarded position of the custodian nations and give strong response to unsavoury and unethical covert acess and utilisation for trade of wellness-products. The guarded position that the BRICS block may work for is

to integrate the bioresources and associated TK of each member nation so as to preserve their identity and enable utilisation within the principles of relevant Conventions, Protocols and Agreements.

Chaturvedi *et al.* (2014) provide scope for valuation of TM and knowledge thereon to provide intellectual property rights and similar legal rights for these. They also analysed the scope of TM in public health and the possibility for global cooperation for utilising TK based TM for common traditional cure of common ailments.

Endnote

[1] The web-link is http://www.herbalgardenindia.org/. The information on the list of trees, herbs, shrubs and climber species of MAPs is given in this web-link.

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Annexure 1

Plants of Medicinal Value

Sr. No.	Name of the plant	Medicinal Property
1	*Achillea millefolium*, Yarrow	To stop the flow of blood from wounds inflicted in battle. Micmac Indians drank it with warm milk to treat upper respiratory infections.
2	*Alcea rosea*, Hollyhock	Treatment of repiratory and inflammatory ailments and the roots are used to treat loss of appetite.
3	*Alchemilla vulgaris*, Lady's Mantle	Dried leaves were used to control diarrhoea and to stop bleeding.
4	*Allium cepa*, Onion	to lower blood sugar, serum cholesterol and blood pressure. Onion juice sweetened with sugar or honey is a traditional remedy for colds and coughs. Onions are rich in vitamins B-1, B-2 and Vitamin C.
5	*Allium sativum*, Garlic	To keep the body warm; to brighten the face; to kill intestinal parasites; to increase the volume of semen. In the Middle Ages, garlic was eaten daily as a protection against the bubonic plagues; to prevent infection; lowering blood pressure, blood sugar, serum cholesterol and serum triglycerides. It is effective in boosting the immune system. Garlic is a natural pesticide against mosquito larvae
6	*Allium schoenoprasum*, Chives	In traditional folk medicine Chives were eaten to treat and purge intestinal parasites, enhance the immune system, stimulate digestion, and treat anemia. Garlic and scallions, along with onions, leeks, chives, and shallots, are rich in flavonols, substances in plants that have been shown to have anti-tumor effects. New research from China confirms that eating vegetables from the allium group (allium is Latin for garlic) can reduce the risk of prostate cancer.
7	*Allium tuberosum*, Garlic Chives	In Chinese herbal medicine, Garlic Chives have been used to treat fatigue, control excessive bleeding, and as an antidote for ingested poisons. The leaves and bulbs are applied to insect bites, cuts, and wounds, while the seeds are used to treat kidney, liver, and digestive system problems.
8	*Althea officinalis*, True Marshmallow	It is a native of Asia that has been naturalised in America. Marshmallow syrup from the roots is used in treating coughs and irritated throats.
9	*Anchusa officinalis*, Bugloss	Preparations made from roots and/or stems have been used in modern folk medicine primarily as an expectorant (to raise phlegm) or as an emollient (a salve to sooth and soften the skin).
10	*Anethum graveolens*, 'Fernleaf', Dill	Dill is recorded as a medicinal plant for at least five thousand years in the writings of the Egyptians. Oil extracted from the seeds is made into potions and given to colicky babies. Adults take the preparation to relieve indigestion.
11	*Angelica archangelica*, Angelica	Though all parts of the plant are medicinal, preparations are made mainly from the roots. Its medicinal uses include relief from ingestion, flatulence and colic; improvements of peripheral arterial circulation, e.g. Buerger's disease; a tonic for bronchitis.
12	*Anthemis nobilis* a.k.a *Chamaemelum nobile*, Roman Chamomile	It is used for the relief of gastric distress. Its oil is applied on body to treat fevers.
13	*Antirrhinum majus*, Snapdragon	Preparations made from leaves and flowers are used to reduce fever and inflammation. In a poultice, it be applied to the body surface to treat burns, infections and hemorrhoids.
14	*Apium graveolens*, Celery	Essential oils have a sedative and anticonvulsant effect, and are used in the treatment of hypertension. Seeds are used to treat arthritis and urinary tract infections.

15	*Aquilegia canadensis*, Columbine	Preparations of this plant are used as an astringent, analgesic, and a diuretic. American Indians used crushed seeds to relieve headaches.
16	*Artemisia vulgaris*, Mugwort	It is a natural insect repellant of moths as well as a culinary herb used in flavouring foods such as poultry stuffing. It is alleged to have many medicinal properties from hastening and easing labour to producing sedation.
17	*Asarum europeaum*, European Ginger	In the past, it was used as an emetic, but it is obsolete because of toxicity. It is similar in use to *Asarum canadense* which was used by American Indians in the form of a root tea to treat respiratory, cardiac and "female" ailments. *Asarum canadense* contains aristocholic acid, an anti-tumor compound.
18	*Asclepius incarnata*, Butterfly Weed	It is used primarily in the treatment of respiratory disorders. Its uses are very similar to those of *Asclepias tuberosa*.
19	*Asclepias tuberosa*, Butterfly Weed or Pleurisy Root	This plant is native to North America. Omaha Indians ate the raw root to treat bronchitis and taught the pioneers to do the same. It is an expectorant; it promotes coughing that raises phlegm. It also contains cardiac glycosides and an estrogen-like substance. It is a component of Lydia E. Pinkham's Vegetable Compound (1875 to 1960) advertised for use in "womb trouble, sick headache, and nervous breakdowns".
20	*Asperula odorata*, Sweet Woodruff	It has anti-arthritic properties. Historically, it has been used to treat liver disorders. In Germany, it is an essential ingredient in May wine drunk as a "spring tonic". The fragrance of dry leaves gives linen closets a sweet aroma that keeps moths away.
21	*Baptisia australis*, Blue False Indigo	American Indians used root tea as an emetic (to produce vomiting) and as a laxative. Root poultices were used to reduce inflammation, and held in the mouth against an aching tooth.
22	*Baptisia tinctoria*, Wild Indigo	Preparations made from the roots and leaves were used by North American Indians (Mohicans and Penobscots) in poultices to treat bruises, snake bites and superficial lacerations. Such preparations have effective antiseptic properties.
23	*Borago officinalis*, Borage	For centuries it was thought to be a mood elevator when ingested as a tea or as leaves steeped in wine. There is some evidence that perparations made from seed oil have a use in soothing and relieving inflammations associated with respiratory disorders.
24	*Calamintha ascendens*, Mountain Balm	A preparation from this plant, calamint, stimulates sweating thereby loweing fever. It is also an expectorant and therefore a cough and cold remedy.
25	*Calendula officinalis*, Pot Marigold	Traditionally the flowers were used to impart a yellow color to cheese. Anti-inflammatory and antibiotic (bacteria, fungi and viruses) properties are responsible for the antiseptic healing effect when preparations of this plant are applied to skin wounds and burns. It can be used in the treatment of ringworm, cradle cap and athlete's foot.
26	*Catharanthus rosea a.k.a. Vinca rosea*, Madagascar Periwinkle	Madagascar Periwinkle contains seventy alkaloids and are medicinal. It is the source of the chemotherapeutic agents: Vincristine, Vinblastine, Vindesine, and Vinorelbine. Vincristine is used in the treatment of childhood leukemias and breast cancer. Vinblastine is used in the treatment of Hodgkin's Disease and choriocarcinoma.
27	*Chamomilla recutita* or Matricaria recutita, German Chamomile	Tea made from dried flowers is used to treat a large variety of ailments. In experiments, the essential oil is found to be anti-fungal, anti-allergenic and anti-inflammatory.
28	*Colchicum autumnale*, Autumn Crocus	Theophrastus (c.371-287 B.C.) noted it to be very toxic. In the fifth century (Byzantine Empire), it was used for the treatment of joint conditions. Colchicine is an alkaloid that relieves the joint pain and inflammation of gout.

29	*Convollaria majalis*, Lily-of-the-valley	A tea of flowers and leaves was used in treating heart disease. It contains cardiac glycosides similar to those of the digitalis plant family.
30	*Dianthus anatolicus*, Dianthus	These have been used in Chinese and European herbal medicine for a large number of disorders including cardiac, urinary, nervous and gastrointestinal. Preparations are made from the flowers, leaves and stems but not the roots. The flower preparations are markedly diuretic.
31	*Dictamnus albus*, Gas Plant	Dittany, a distillate of very volatile essential oils from the roots and flowers, is rarely used today. It is a diuretic, an anti-spasmodic (relaxes the muscles of the gastro-intestinal tract), an anti-helminthic (expels intestinal parasites), and a stimulant to the contraction of uterine muscle.
32	*Digitalis ambigua*, Perennial Foxglove	All species of the genus Digitalis contain cardiac glycosides in their roots, stems, leaves and blossoms. Cardiac glycosides are a group of chemical compounds that taken by mouth to slow the rate and regulate the rhythm of the heart beat as well as strengthen the heart muscle. All sources of the digitalis cardiac glycosides are, therefore, plant materials grown in cultivation specifically for medicinal purposes.
33	*Digitalis lanata*, Grecian Foxglove.	It is also called the wooly foxglove because of the texture of its leaves. It is a very important medicinal plant grown commercially for the cardiac glycoside digoxin. Lanoxin (digoxin) is used in the treatment of congestive heart failure alone or in combination with other drugs prescribed for the same purpose. Digoxin was first isolated from the other cardiac glycosides in 1930.
34	*Digitalis lutea*, Yellow Foxglove	Like all other foxgloves, it contains cardiac glycosides but they are in weak concentrations and are not extracted commercially for the treatment of chronic congestive heart failure.
35	*Digitalis purpurea*, Common Foxglove	In 1775, Dr. William Withering, an English physician, discovered the efficacy of ingesting ground dried leaves of *Digitalis purpurea* in the treatment of severe congestive heart failure. The pharmacological mechanisms of the cardiac glycosides in regulating the heart rate and rhythm and the strengthening of the heart muscle were discovered later.
36	*Echinacea purpurea* syn *E. angustifol*i, Purple Cone Flower	Preparations of this plant were used by the Plain Indians (Comanche and Sioux) for the treatment of upper respiratory infections, burns, snakebites, and cancers. The European settlers learned about these indications from the Indians. It has been demonstrated that plant extracts stimulate the immune system to combat bacterial and viral infections. It also possesses antibiotic properties.
37	*Foeniculum vulgare*, Fennel	It is a native of the Mediterranean. It is an antispasmodic that is used to relieve bloating. It is also a diuretic.
38	*Fragaria vesca*, Wild Strawberry	American Indians and Europeans found multiple medicinal uses for this plant. The leaves are mildly astringent so that they can be used as a gargle to treat sore throats. The leaves as well as the fruit are diuretic
39	*Geranium robertainum*, Herb-Robert	Tea made from the leaves has been used for the treatment of tuberculosis, malaria and other systemic infectious diseases. It has antibiotic, antiviral properties and contains antioxidants.
40	*Ginkgo biloba fastigiata,* Maidenhair tree	The ginkgo tree is the oldest living tree species with at least a 200 million year history. It was present in the time of the dinosaurs. Extracts from the leaves are used to improve memory and are used in the treatment of Alzheimer's disease. It is a blood thinner that may be used in cases of poor circulation. Presumed better circulation to the brain is thought to be the reason why it might improve memory and be a treatment for Alzheimer's disease. It is being tried for use in the treatment of glaucoma. The Chinese have used it in treating asthma and cerebral disorders for at least three thousand years.

41	*Hamamelis virginiana*, Witch-hazel	Native Americans taught the English settlers to make a decoction of witch-hazel bark, twigs, and leaves to use in cold or warm compresses to treat bruises, to use it as an eye wash, and to take it by mouth for the treatment of diarrhoea. Currently, it is used as a topical application for the treatment of eczema.
42	*Helianthus annuus*, Common Sunflower	A tea made from the leaves is an astringent, a diuretic, an expectorant and an agent to reduce fever. Crushed leaves are used in poultices to treat snake bites and spider bites.
43	*Helichyrsum italicum*, Curry	Essential oils distilled from flowers are used in aroma therapy. The antioxidant activity of carbon dioxide extracts are under investigation. Preparations are used as anticoagulant, anasthetic, antispasmodic agents and for their antiviral and anti-fungal properties.
44	*Hepatica acutiloba*, Sharp Lobed Hepatica	A member of the buttercup family, Hepatica was used by American Indians to make a tea for the treatment of liver and digestive ailments.
45	*Humulus lupulus*, Hops	It contains antiseptic, antibiotic and anti-spasmodic properties.
46	*Hypericum perforatum*, St. John's Wort	Extracts made from the blossoms have been used for centuries to treat mental disorders. American Indians treated tuberculosis, wounds and severe pain with a tea made from its flowers.
47	*Hyssopus officinalis*, Hyssop	The herb or its oil is used to treat respiratory ailments. In small amounts, it is added to salads, soups, sauces and meat dishes to aid digestion.
48	*Inula helenium*, Elecampane	The ancient Greeks and Romans used preparations made from this plant to treat upper respiratory infections and to aid digestion.
49	*Iris cristata*, Crested Dwarf Iris	American Indians used the roots in tea to treat hepatitis and in animal fat ointments to treat skin ulcers.
50	*Iris germanica*, German Flag	The root (orris) is included in cough remedies primarily and never used alone. Dried orris has the fragrance of violets; it is included in some potpourris. *Iris cristata* and Iris *versicolor* are also used in Indian Medicine for the relief of symptoms and the treatment of various disorders.
51	Laurus nobilis, Bay Leaf	Leaf preparations are used to treat upper digestive tract disorders.
52	*Lavendula officinalis* syn. *L. angustifolia,* English Lavender	In the Middle Ages, it was used alone or in combination with other herbs to treat insomnia, anxiety states, migraine headaches and depression. The fragrance is relaxing hence the dry blossoms were stuffed in pillows and given to agitated patients to produce sedation. The oil is strongly antiseptic and used to heal wounds.
53	*Levisticum officinale*, Lovage	Preparations made from the roots or leaves are used to treat edema, indigestion and to prevent the formation of kidney stones.
54	*Liatris spicata*, Gayfeather	American Indians used this plant for food as well as medicine. It was used as a cough syrup for the treatment of persistent coughs and urinary tract infections.
55	*Lycopersicon esculentum*, Tomato	Lycopene may be beneficial in the treatment of benign prostatic hypertrophy.
56	*Malva sylvestris*, Common Mallow	Pliny II, 1st Century A.D. wrote that tea made from the seeds and mixed with wine relieved nausea. In 16th century Italy, it was considered a cure-all. American Indians made poultices from the plant and applied them to sores, insect stings and swollen limbs to relieve pain. Taken internally, it may be useful in treating digestive and urinary tract infections because it contains a large amount of mucilage.
57	*Marrubium vulgare*, Horehound	Fresh or dried aerial parts of this plant are used to treat digestive and respiratory conditions. It is given for digestive complaints such as loss of appetite and indigestion. It is also used to treat the cough of chronic or acute bronchitis.
58	*Matricaria chamomilla,* German Chamomille	Essential oils distilled from dried flower heads are used topically for their antibiotic and antiseptic properties and internally for anti-inflammatory (gastritis), antiseptic, antispasmodic and sedative effects.
59	*Melissa officinalis*, Lemon Balm	Lemon balm was introduced into medicine by the Arabs for treatment of depression and anxiety. New research shows that its polyphenols can help significantly in the treatment of herpes simplex and zoster infections.

60	*Mentha piperita*, Peppermint	Peppermint came into general use in the medicine of Western Europe only about the middle of the eighteenth century. Preparations made from fresh or dried leaves or distilled essential oil are used to relieve mild headache, to relieve pain, to relieve bowel spasm, and to relieve chest congestion.
61	*Monarda didyma*, Bee Balm	The Oswego Indians made tea from the aromatic leaves and introduced this practice to the original settlers as a beverage. The Shakers thought that the tea was effective in treating upper respiratory infections. They prescribed it for young brides to stimulate the appetite and regulate menstruation. The early settlers steamed the plant and inhaled fumes to clear their sinuses. It contains thymol which is a pleasant aromatic substance used in dentistry as a preservative and a fungicide.
62	*Nepeta cataria*, Catnip	It is a mild sedative for the relief of insomnia. Chewing the leaves relieves toothaches. It lowers fever by increasing sweating because the evaporation of moisture from the skin is a cooling process. It is hallucinogenic in cats but not in humans.
63	*Nicotiana sylvestris*, Nicotiana	A member of a large family of Nicotianas whose leaves are used in making prepartions taken by mouth to induce vomiting and diarrhea, to relieve pain and to sedate. Preparations are used externally as a poultice in the treatment of joint swelling from arthritis, of skin diseases and of insect bites. Nicotine is a very effective biodegradable insecticide.
64	*Ocimum basilicum*, Sweet Basil	It is a native of India. Eating its leaves was prescribed by the first century Greek physician Dioscorides to relieve the pain of a scorpion's sting. The Ancient Romans used it to alleviate flatulence, counteract poisonings and to stimulate breast milk production. Applied externally, it is an insect repellant.
65	*Oenothera biennis*, Evening Primrose	American Indians had multiple uses for this plant. External application of the seed oil may be useful in the treatment of eczema and other allergic skin disorders. There is some evidence that internal consumption of the oil is beneficial in the treatment of eczema. Three to four grams of primrose oil per day may be beneficial in the treatment of premenstrual syndrome.
66	*Paeonia officinalis*, 'Mollis' Peony	A plant named after Paeon, physician to the Greek gods, by Theophrastus (372-c. 287 B.C.) For centuries, it has had a large place in classical antiquity as well as in ancient and modern Chinese medicine. In the time of Hippocrates, it was used to treat epilepsy. Dioscorides (40-90 A.D.) wrote that the root of the plant provokes menstruation and that it could be used to expel the placenta following childbirth. The root of herbaceous peonies has been used in Chinese medicine for 1500 years for menstrual disorders and to relieve the symptoms of menopause.
67	*Paeonia suffruticos* 'Renkaku', White Tree Peony	Root and bark preparations are used in Chinese medicine as an antiseptic, a liver tonic, for relief of menstrual cramps and in the treatment of female infertility. Bark and root preparations are under study for possible analgesic, antibacterial, anti-inflammatory and antipyretic medical uses.
68	*Papaver rhoeas*, Flanders Poppy or Corn Poppy	It is a native of Europe, North Africa and the temperate zones of Asia. Its latex contains substances very similar to the Opium Poppy but they are much milder in strength.

69	*Papaver somniferum*, Opium Poppy	It is a plant native to Turkey and Asia Minor with medicinal and recreational properties that have been known for more than six thousand years. By three thousand B.C., the Sumerians had named it the joy plant because consuming the dried milky sap of unripe pods caused euphoria. By three hundred B.C., opium (sun dried milky sap taken from unripe pods) was being used by Arabs, Greeks and Romans as a sedative, a pain reliever and a soporific (a substance to induce sleep). Opium can be lethal; Agrippina, the fifth wife of the Roman Emperor Claudius (10 B.C.-A.D. 54) mixed opium with wine to poison Claudius and his son after Claudius adopted her son, Nero, making it possible for Nero to ascend the throne. Opium has been the cause of international conflict: The Opium Wars of 1839-1842 and 1856-1860 between the United Kingdom and China. Morphine was isolated from opium in 1803 by a twenty-year old German pharmacist who named it after Morpheus, the god of dreams. Morphine is the most effective painkiller known to medicine; it has ten times the pain relieving potency of aspirin. Heroin, a synthetic derivative of morphine, has all the properties of morphine to a much more dangerous degree. Heroin and opium are illegal and forbidden to be used in the practice of medicine. Opium, referred to as "brown sugar" in the legal and illegal trade is so-called because of its appearance to brown sugar. Opium dissolved in sherry is laudanum. Paregoric is a camphorated tincture of opium. Opium contains approximately twenty eight natural organic compounds that collectively are called the "opiates". Five of the natural occurring opiates used in the practice of medicine are: morphine, codeine, thebaine, papaverine and noscapine. Synthetic derivatives of opiates (opioids) are created in the laboratory. They are: meperidene Demerol);diacetylmorpine (Heroin); Oxycodone (OxyContin): and Hydrocodone (Vicodin)
70	*Passiflora incarnata*, Passion Flower	The 16th Spanish explorers were enchanted by the beauty of the blossoms of this flowering vine and give it its name. American Indians used the flowers and dried fruits in making sedative preparations.
71	*Physalis alkekengi*, Chinese Lantern	Physalis is the Greek word for bladder. Preparations from the red berry in the pod were used in the past as a diuretic and for the treatment of kidney and bladder stones. These medicinal properties have not been scientifically confirmed. It has not been prescribed since the end of the seventeenth century.
72	*Podophyllium peltatum*, May Apple	Extracts of the dried rhizome are used as a topical agent for removing warts. The drug etoposide is synthesised from podophyllotoxin taken from the underground parts and taken internally to treat testicular cancer.
73	*Polemonium reptans*, Jacob's Ladder or Greek Valerian	American Indians used the root in preparations to treat skin conditions such as eczema, lung conditions such as pleurisy, and for abdominal complaints.
74	*Pulmonaria officinalis*, Lungwort	It is a native of Europe and the Caucasus. The plant is so called because the spotted leaves resemble lung tissue. It is used to treat chest ailments such as chronic bronchitis and asthma.
75	*Prunella vulgaris*, Self Heal	It has been shown to possess antibiotic and antiviral properties. It is used in the treatment of labial herpes (herpes simplex) and genital herpes.
76	*Rheum officinale*, English Rhubarb	Anthraquinones in the rhizomes (roots) are strong laxatives and antibiotic against *Staphylococcus aureus*.
77	*Ricinus cummunis* 'rubra', Castor Bean Plant	A native of East Africa that in some locations can grow as high as thirty feet. The seed capsules are red. The seeds are very poisonous. Oil extracted from the seeds is not poisonous and has been used as a laxative for about four thousand years.

78	*Rosa gallica officinalis*, Apothecary Rose	A native of Persia (Iran) that was described by the Ancient Greek poet Sappho as " the queen of flowers", this rose has had many uses over time. The Ancient Romans consumed the petals as food and marinated them in wine to use them as a cure for hangovers. Avicenna, a famous eleventh century Arab physician and philosopher living in Moslem Spain, prepared rose water from the petals that he used in treating his patients for a variety of ailments. Knights returning from the Crusades brought the plant to Europe. It was grown chiefly in monastic gardens for medicinal purposes. In the Middle Ages, the blossoms were used in aroma therapy for the treatment of depression. In the nineteenth century beginning in the time of Napoleon, French pharmacists grew them in pots at the entrances of their shops, hence the origin of the common name Apothecary Rose. French druggists dispensed preparations made from this rose to treat indigestion, sore throats and skin rashes.
79	*Rosa rugos*, Wrinkled Rose	This plant is indigenous to Asia; it gets its common English name, the wrinkled rose, from the appearance of its leaves. It has naturalised itself in the sand dunes of the New England seacoast. In China, the flowers are used to make tea to improve the circulation and to "soothe a restless fetus". Tea and Jelly made from the rose hips are a very rich source of Vitamin C. The rose hips of this plant have the highest natural concentration of Vitamin C of any other natural source of Vitamin C, including all of the citrus fruits. For the sufferer of scurvy, the Rosa rugosa is a medicinal plant; for the rest of us, it is a nutritional plant.
80	*Rosmarinus officinalis*, Rosemary	Rosemary is believed to stimulate cerebral circulation thereby improving concentration and memory. The oil of the flowering spikes is anti-fungal and anti-biotic. The leaves contain COX-2 inhibitors that inhibit tumor growth and have anti-HIV activity. Rosemary aids in the digestion of fats. Possible improvement in memory may be related to improving circulation to the brain. Rosemary, used in food flavoring, is also important to the perfume industry.
81	*Rudbechia hirta*, Black-Eye-Susan	American Indians used root tea to treat parasitic infestations such as pinworm. They used it externally to treat snake bits, superficial wounds and earaches.
82	*Ruta graveolens*, Rue	It is native to the Mediterranean that was used in Ancient Greece to stimulate menstrual bleeding and to induce abortion.
83	*Salix elaeagnos* syn. *Salix rosmarinifolia*, Rosemary Willow	In Ancient Greece, the bark of the white willow (Salix alba) was chewed to relieve the pain of gout and to reduce fever. In the fifth century B.C., Hippocrates, the father of modern medicine, prescribed ground willow bark to ease aches and pains. In the 1st century A.D. Dioscorides, a Greek physician in service to the Romans, wrote that the ingested bark and leaves of Salix alba reduce fever and relieve pain. For centuries, Europeans used tea made of the roots and leaves to lower fever and relieve aches. The Chickasaw Indians used tea made from the roots to relieve headache. In 1830, German researchers isolated salicin from the bark of the white willow tree and from other plants. Their research determined that ingested salicin becomes salicylic acid in the stomach, and that salicylic acid is responsible for the desired effects as well as undesirable toxic side effects that include gastrointestinal bleeding. In 1875 a derivative, acetylsalicylic acid, was synthesised from salicylic acid. Acetylsalicylic acid was discovered to have the properties of and to have many fewer side effects than salicylic acid. In 1899 acetylsalicylic acid appeared in powder form for the first time; 1915 was the first time that it appeared in pill form. A part of the terms of the peace treaty with Germany following World War I was the surrender of the patent and of the trade mark ASPIRIN for acetylsalicylic acid. Since then acetylsalicylic acid (abbreviated as ASA) has been universally known as aspirin. Aspirin is one of the most important and one of the cheapest drugs in the medical armamentarium for the treatment of human diseases, for the relief of pain, and as a blood thinner in the prevention of heart attacks and strokes caused by disease in the blood vessel walls.

84	*Salvia sclarea*, Clary Sage	The seeds were once commonly used to treat eye diseases therefore it is also know as clear eye. It has also been used for gastro-intestinal disorders such as indigestion and flatulence. It stimulates estrogen production so it is used as a remedy for menopausal complaints such as hot flashes.
85	*Salvia officinalis*, Sage	Sage has numerous traditional medicinal uses as an astringent, as an antiseptic, as a carminative and as an estrogenic.
86	*Sanguisorba officinalis*, Salad burnet	It grows in the wild from Maine to Minnesota and beyond. It is used to stop bleeding. American soldiers in the Revolutionary War drank tea made from the leaves before going into battle to prevent excessive bleeding if they were wounded. It is antibacterial. It is currently in use in Chinese herbal medicine to control bleeding and to stop vomiting.
87	*Scilla siberica*, Siberian Squill	Syrups and tinctures are used as emetics and cathartics as well as diuretics in the treatment of congestive heart failure. It is also used in expectorants to treat lung disorders.
88	*Sedum purpureum*, Live-forever	In the first century A.D., Pliny, the Roman naturalist, stated that the juice of this plant was good for treating wounds and fistulas. In more recent herbal medicine, it has been prescribed to be taken internally for the treatment of ulcers, lung disorders, and diarrhea; and externally it has been prescribed for slow healing ulcers.
89	*Sempervivum tectorum*, Hen-and-chicks or Houseleek	The Latin botanical name has an historical reference. Charlemagne (742-814 A.D.) recommended that his subjects plant these hardy prolific plants on the roof of their houses to ward off lightening and fire. The leaves contain tannins and mucilage that are soothing to skin. It is used in the treatment of burns, skin wounds and infections.
90	*Silphium perfoliatum*, Cup Plant	A perennial native prairie wildflower whose roots are used in an oral preparation to increase sweating, to reduce fever, to induce abortion and as an expectorant in the treatment of pulmonary diseases.
91	*Solidago canadensis*, Golden Rod	It is a valuable astringent remedy treating wounds and bleeding. Antioxidant and diuretic, goldenrod is a valuable remedy for urinary tract disorders. The plant contains saponins that are antifungal and act specifically against the Candida fungus, the cause of yeast infections and oral thrush. The herb can also be taken for sore throats, chronic nasal congestion, and diarrhoea. Due to its mild action, goldenrod is appropriate for treating gastroenteritis in children. It may be used as a mouthwash or douche for yeast infections.
92	*Stachys byzantina*, Lamb's Ears	Lamb's ears foliage bandages wounds and reputedly reduces the pain of bee stings.
93	*Stachys officinalis*, Betony	In ancient times wood betony had not fewer than 29 uses in treating physical diseases. In Europe, the aerial (above the ground) portions of the plant are harvested when the plant is in bloom and is used to treat almost any disease! It is a sedative. In addition, it has anti-diarrhea, anti-microbial and anti-inflammatory properties.
94	*Stylophorum diphyllum*, Calendine Poppy	It contains glaucine. Preparations are used in the treatment of insomnia, upper respiratory infections, and to reduce fever as well as in ointments for the treatment of burns and superficial abrasions. In veterinary medicine, ointments are used in the treatment of mastitis.
95	*Symphytum officinale*, Comfrey	Comfrey contains allantoin used in ointments for psoriasis and other skin problems. It has been known since Greek and Roman antiquity and used primarily externally as a poultice for surface wounds and to form a cast to hold broken bones immobile while they knit.
96	*Tanacetum parthenium* syn. *Chrysanthemum parthenium*, Feverfew	Feverfew is Elizabethan English and comes from febrifuge, an old medical term for a medicine that reduces fever. Feverfew is an effective remedy for migraine. Parthenolide appears to inhibit the release of the hormone serotonin that triggers migraine. It has also been shown to reduce fever, hence the name Feverfew.

97	*Tanacetum vulgare*, Tansy	The blossoms were used as insect repellents in bedding and scattered on bedroom floors and ward floors of hospitals in The Middle Ages. The leaves were used as a preservative in meats and food products.
98	*Taraxacum officinale*, Dandelion	Used primarily in Eastern European traditional medicine. It is used primarily as a diuretic but also taken internally to treat arthritis and gastro-intestinal disorders. It is applied externally to treat eczema and other skin conditions. It is eaten raw in "spring salads" and cooked as a vegetable when the plants are very young before flowering.
99	*Teucrium chamaedrys*, Germander	Native to Central Europe and harvested when in bloom for tonics to treat diarrhoea. It is also an astringent. It contains anti-microbial properties and has been shown to lower cholesterol levels.
100	*Thymus citriodorus*, Lemon Thyme	Used to make pediatric oral preparations that are tasty and sweet to relieve an "upset tummy". It is also in ointments and in "sleep pillows".
101	*Thymus vulgaris*, Thyme	It was used in the Middle Ages as a treatment of epilepsy and depression. In 1975, a German pharmacist discovered that the plant's essential oil, thymol, was a powerful disinfectant topically and an antibiotic/ antifungal agent when taken orally. It is an antispasmodic and an anti-tussive used effectively in cough syrups to raise sputum and relieve coughing.
102	*Tilia cordata* 'Greenspsire' Linden Tree	A deciduous tree that is native of Europe and Southwest Asia. Pale yellow flowers and lime colored bracts are made into a lime tea that may be consumed simply as a beverage or as a remedy for the relief of headaches, tension, and insomnia.
103	*Tropaelum majus*, Nasturtium	A native of Peru, it is a culinary as well as a medicinal herb that is used in Andean Indian herbal medicine. All parts of the plant posses an antibiotic and Vitamin C. Taken internally, it stimulates coughing and reduces phlegm production. Applied externally, it is antiseptic. Blossoms and leaves can be used in green salads for their high Vitamin C content.
104	*Vaccinium angustifolium* syn *V. myrtilloides*, Lowbush blueberry	The Chippewa Indians used the flowers to treat psychosis. The fruit contains anthocyanosides. These chemical compounds are very powerful antioxidants that are very effective in the prevention of heart disease and cancer.
105	*Valeriana officinalis*, Garden Heliotrope	Dioscorides, a Greek physician in service to the Romans, described its pharmaceutical properties. It was used in the Middle Ages for treating epilepsy. It is used now to relieve stress, to reduce anxiety and to induce sleep. It is a muscle relaxant and it lowers the blood pressure. Preparations of this plant have very low toxicity and are not addictive; they are made from the root of the plant.
106	*Verbascum thapsus*, Mullein	An infusion of leaves and flowers is used to treat sore throats and bronchitis. It reduces the formation of mucous and stimulates coughing to raise phlegm. It is also applied externally to heal wounds. In Germany, the flowers are steeped in olive oil, and the olive oil is then used to treat ear infections. A cotton plug soaked in olive oil is placed in the ear canal.
107	*Veronica officinalis*, Speedwell	In modern herbal medicine, speedwell tea, brewed from the dried flowering plant, sometimes serves as a cough remedy or as a lotion applied to the skin to speed wound healing and relieve itching.
108	*Viola tricolor*, Johnny-jump-up or Heartease	From this plant a bitter tea is made that is taken internally for lung disorders and is applied externally for skin diseases. The tea is an expectorant and a diuretic. Its other common name, Heartease, refers to a romantic notion that it provides comfort and consolation to separated lovers. In the nineteenth century, the juice of the plant constituted the main ingredient of love potions.
109	*Waldsteinia fragarioides*, Barren Strawberry	American Indians preparations of leaves, roots, and flowers to induce labor and to regulate menstruation as well as for the treatment of other disorders.

110	*Zingiber officinale*, Ginger	It is a native of tropical rain forests. It contains a powerful substance that is very effective in the treatment of motion sickness and nausea following surgery. It is also used as a digestive remedy; and as a circulation stimulant, it causes blood vessels to dilate.

Sources: Massachusetts Medical Society Gardens. Hortus Medicus: The Medicinal Herb Garden - Originator and Designer, Shirley MacIver, MD; http://www.piam.com/mms_garden/plants. *A practical guide for nutritional and traditional health care.* ©2002-2016 Herbs2000.com, based on the book – A Modern Herbal by Mrs Grieves, written in the early part of last century http://www.botanical.com

Disclaimer: This table presents a description of the medicinal uses of these plants. The intention is not to provide specific medical advice. You should consult your personal physician before taking any form of medication.

Annexure 2

Certain Therapeutic Indication and Associated Plants in Herbal Therapy in Southern India

Disease	Plant species – common (Tamil) name	Ethnomedicinal preparation
Asthma	*Solanum trilobatum* L. - *Thoodhuvalai* *Adhatoda zeylanica* Medicus - *Adathodai*	Juice of leaves is taken orally for seven days
Cold	*Adhatoda zeylanica* Medicus – *Adathodai* *Boswellia serrata* Roxb.Ex Colebr – *Kungilayam* *Plectranthus coleoides* Benth. – *Omavalli chedi* *Solanum trilobatum* L. – *Thoodhuvalai* *Terminalia chebula* Retz. – *Kadukkai maram* *Vitex negundo* L. – *Notchi*	Leaf paste is taken orally Powdered resin is sprayed on burning charcoal and the smoke is inhaled. Juice from leaf for internal consumption Juice from leaf drank for seven dyas or until cured early morning Powdered fruit mixed with water or goat's milk to be drank daily till cured Fresh leaves boiled in water and vapour inhaled
Cough	*Adhathoda zeylonica* Medicus. – *Adathodai* *Terminalia chebula* Retz. – *Kadukkai maram* *Vitex negundo* L. – *Notchi*	Oral intake of leaf powder in water Powdered fruit mixed with water or goat's milk to be drank daily till cured Fresh leaves boiled in water and vapour inhaled
Diabetes	*Andrograrphys lineata* Wallich ex. Nees. – *Siriyanangal* *Costus speciosus* (J.Koen) Smith – *Koshtam* *Gymnema sylvestre* (Retz.) R.Br.ex Roem. & Schult - *Sirukurinjan*	Leaf powder mixed with cow's/goat's milk for oral intake Leaf powder mixed with cow's milk for oral intake Leaf powder mixed with cow's milk for oral intake
Diarrhoea	*Cipadress bacciera* (Roth.) Miq. – *Pulippan chedi*	Oral intake of leaf paste mixed with a cup of water/milk
Dysentery	*Acalyypha fruticose* (Forsakal) *Chinni chedi*	Oral intake of leaf decoction
Eye infection	*Alangium solvifolium* (L.f.) Wangerin – *Alinji*	One or two drops of fruit juice is put in both eyes
Fever	*Adhathoda zeylonica* Medicus. – *Adathodai* *Hemidesmus indicus* H.f. – *Nannari* *Terminalia chebula* Retz. – *Kadukkai maram* *Vitex negundo* L.- *Notchi*	Oral intake of leaf decoction twice a day until cure Oral intake of decoction of whole plant Powdered fruit mixed with water or goat's milk to be drank daily till cured Fresh leaves boiled in water and vapour inhaled
Head ache	*Ceropogia candelabrum* L. – *Perum kodi* *Pergularia daema* (Fors.) Chiov. –*Veli paruthi* *Vitex negundo* L.- *Notchi*	Apply leaf paste on forehead Inhale vapour of boiling leaves in water Fresh leaves boiled in water and vapour inhaled twice a day
Heel cracks	*Asparagus racemosus*Wild.-*Thaneer vittan kilangu* *Drymaria cordata* (L.) Roem. & Schult. – *Kodi charai* *Rubia cordifolia* L. – *Kalutharupan chedi*	Topical application of the paste of tender and mature leaves before going to bed daily Leaf paste applied daily in the cracks till cured Root paste applied daily till cured
Jaundice	*Centella asiatica* (L.) – *Valalrai*	Oral intake of leaf juice with equal amount of goat's milk for seven days

Menorrhagia	*Hemidesmus indicus* H.f. – *Nannari*	Oral intake of root paste with water or cow's milk twice daily
Nervous disorders	*Bischofia javanica* Blume – *Romavrisksha pattai* *Blepharis maderasipatensis* – *Vettukaya pachilai* *Euphorbia antiquorum* L. –*Sathura kalli* *Gymnema sylvestre* (Retz.)R.Br.ex Roem. & Schult. *Phlebophyllus kunthianum* Nees. – *Kurinji chedi*	External application of the stem bark paste on the affected parts Leaf paste is mixed with the powdered black gram, crushed onion and white yolk of one egg and the mixture for external application over fractured bones. Skin application of stem latex for relief body pain Leaf paste for external application Fresh leaves and bark heated with gingely oil for extrenal application of paining body part.
Piles	*Gmelina arborea* Roxb. – *Perungilai /Kumila maram*	Oral intake of root bark juice
Pimples	*Acalypha paniculata* Miq.	Apply leaf paste once a day until cured
Poison bites	*Andrographis lineata* Wallich ex Nees. – *Syrianangai* *A. paniculata* (Burm.f.) Wallich ex Nees. – *Periyanarangai / Nilavembu* *Tylophora indica* (Burm.f.) Merr. – *Nangilai*	Apply leaf paste on bitten site by scorpion/snake Apply leaf paste on bitten site by scorpion/snake Leaf and root paste is mixed with equal amount of root paste of *Rawolfia serpentine* to be applied on the snake bite wound. Leaf juice alone for oral intake in case of snake bite.
Skin diseases	*Acalypha fruiticosa* Forskaal.-*Chinni chedi* *Anisochilus carnosus* (L.f.) Wallich. *Balanophora fungosa* (Fors and Fors.var *indica* –*Vaer chedi* *Clematis gauriana*Roxb.Ex.DC. – *Attumeesai chedi* *Exoecaria crenulata* L. – *Vellai thillai* *Mahonia leschenaultia* (Wight & Arn.) ex Gamble – *Mullu kadambu*	Topical application of leaf and root paste Topical application of leaf paste Whole plant paste is applied on infected skin Leaf paste topically applied on infected skin Stem paste applied on affected skin Powdered stem bark boiled in gingely oil and applied on affected skin.
Stomach ache	*Aclypha paniculata* Miq. – *Paruva thazhai* *Diascorea oppositifolia* L. v*ar.tomentosa*	Oral intake of leaf juice Oral intake of rhizome paste
Throat infection	*Acorus calamus* L - *Vasambu*. *Piper nigrum* L. - *Milagu*	Dry rhizome rubbed on stone with water and 1-2 drops of water paste for oral intake to children for clarity of speech.
To increase lactation	*Alstonia scholaris* (L.) R.Bt.	Powdered stem is mixed with water for oral intake for mothers
To increase resistanc power	*Alpinia calcarata* Rose. – *Arathi poo*	Dried rhizome is mixed with water and 2 drops of juice are given to children
To reduce fertility	*Carmona retusa* (Vahl) Masam. – *Kurangu vetthilai*	Leaf juice is internally for 3-4 months
Tooth ache	*Solanum erianthum* D.Don – *Malai sundai* *Solanum surattrense* Burm.f.-*Kandankathiri* *Toddalia asiatica* (L.) Lam	The ripe and unripe fruits are boiled with water and the vapour is inhaled once or twice a week for a week. Fresh and dried fruits are kept in fire and the smoke is orally inhaled. Powder of root and stem bark used as tooth powder.

To reduce delivery time pain	*Plectranthus coleoides* Benth. – *Omavalli chedi or Mudupattan* *Plectranthus hexapetulum* (Roth.) Sant. & Wagh – *Kari indu*	Leaf juice for oral intake for pregnant women Leaf decoction for oral intake by pregnant women
To stimulate appetite	*Asystasia gangetica* (L.) T.Anderson – *Valukai keerai*	Fresh leaves are cooked with cumin seed and onion for oral intake
To simulate hair growth	*Bischofia javanica* Blume. – *Romaviruksha pattai* *Plectranthus coleoides* Benth. – *Omavalli chedi* *Sida acuta* Burm.f.	Stem bark mixed with coconut oil to be applied on head Leaf juice is boiled in coconut oil to be applied on head Leaf paste mixed coconut oil to be applied on head for dandruff and strengthening of hair
Stupefy fish	*Catunaregum spinosa* (Thun.) Thiruvengadam – *Karangai maram* *Sapindus emarginata* Vahl. – *Poondi kottai*	Crushed unripe fruits are used Unripe fruits crushed and thrown in running / stagnant water
Menstrual disorders	*Andrographis paniculata* (Burn.f.) Wall. Ex Nees.	Leaf juice for oral intake during menstrual cycle to prevent excess bleeding.
Wounds	*Acacia caesia* (L.) Wild. – *Nanjupattai* *Acacia leucophloea* (Roxb.) Wild. – S*arayapattai maram* *Anisomeles malabarica* (L.) R.Br.Ex.Sims. – *Paei miratti* *Blepharis moderapatensis* (L.) Roth.-*Vettukaaya pachilai* *Clausena dentata* (Willd.) Roem. – *Anai thazhai* *Cryprolepis buchananii* (Wild.) – *Paalkodi / Karunkodi* *Plectranthus coleoides* Benth. – *Omavalli chedi* *Solanum nigrum* L. – *Mana thakkali* *Sonchus oleraceus* L. – *Kaalaadi pachilai*	Bark is ground with water and applied topically over the affected part. Bark is ground with water and applied topically over the affected part. Paste stem is mixed with coconut oil applied topically over the affected part. Leaf paste mixed with lime juice and applied on cuts Leaf paste mixed applied on cuts 5-10 drops of stem latex applied on the affected part. Leaf paste mixed applied on wounds till cure. Fresh leaf paste applied on wounds till cured Equal quantity of leaves of this plant with that of *Smilax zeylanica* for application on cuts till cured.

Source: Ignacimuthu *et al.* (2006). Available at: http://ethnobiomed.biomedcentral.com/articles/10.1186/1746-4269-2-25

Traditional Medicine Regulations, IPRs and Trade

T.C. James*

The concept of wellness is a holistic one that encompasses all aspects of a person's life and environment. Life based on sustainable exploitation of biological resources, protection of environment that nurtures clean air and safe drinking water and natural and person friendly medicines and food is the best way to wellness that encompasses mind and body. In the previous section the symbiotic relationship of human beings with the biological world and the ways to protect and maintain the same and the economic consequences thereon have been explored. In this section, we are exploring the traditional medicine scene, where products based on such resources are being used. The main focus of this section is on the status, issues and challenges of Traditional Medicine sector in India; incidental references are made to the situations in other BRICS countries so as to bring in larger BRICS perspective. In the discussion on trade, situational analysis of European Union and the United States of America has also been included.

Definition of the Term

The term 'Traditional Medicine' encompasses many medicinal streams such as folk medicine, aboriginal medicine, indigenous medicine, herbal medicine, and traditional systems of medicine like Indian Systems of Medicine (ISMs) and Chinese Systems of Medicine. The World Health Organisation (WHO) defines traditional medicine as:

> *The sum total of the knowledge, skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness* (WHO, 2000).

This definition includes all kinds of medical practices and medicines except that which is commonly referred to as 'modern medicine.'[1] It comprises both formal systems and informal treatment practices. There are both time-tested medicines, systems with scientific basis and also practices, which are based merely on hearsay. It would be necessary to separate the genuine 'Traditional Medicines' from the wide ranging folk practices that have no real scientific or experience base. The regulatory frameworks, which many countries have brought out, are essentially targeting on this aspect.

Traditional Medicine in India

Healthcare systems across BRICS countries have rich quotient of traditional medicine. All BRICS countries have their own national policies on Traditional Medicine (TM). Herbal and complementary medicines have also been covered in these policies. Countries like China and India have developed pharmacopoeia and prescribe Good Manufacturing Practices

* Visiting Fellow, RIS

for TM systems. Details of the approaches, policies and strategies of individual countries have been elaborated in Section I. In the following paragraphs, the status regarding regulations and Intellectual Property Rights (IPRs) and the challenges for global trade in traditional medicine are explored.

The formal indigenous system of health care in India dates back to more than five millennia BC. Diseases and remedies in a rudimentary form find mention in the ancient texts of *Rig Veda* and *Atharva Veda*. Later Ayurveda developed on very systematic lines and based on sound principles with the texts like *Charaka Samhita* and *Sushruta Samhita,* the latter is a treatise on surgery, developed around 2500 BC. Over the time, other systems also emerged and developed. Currently, the four major traditional systems of medicine in India are Ayurveda, Siddha, Unani and Yoga. In addition to these traditional systems, Tibetan Medicine also has many adherents in India. All the systems have developed through experimentation and personal experiences of practitioners over very long periods. They all treat man as part of the larger biological world. Ayurveda considers human being as a microcosm, which is a replica of the macrocosm (Chaturvedi *et al.,* 2014). The Siddha system of medicine emphasises on the patient, environment, habits, diet, appetite, etc. The Unani system has grown out of the fusion of traditional knowledge of ancient civilisations like those of Egypt, Arabia, Persia (Iran), China, Syria and India and it emphasises on the use of naturally occurring, mostly herbal, medicines. Yoga emphasises the primacy of the unity of mind and body for wellness. Naturopathy is a system of medicine that advocates harmonious living with constructive principles of Nature on physical, mental, moral and spiritual planes. It is a drugless therapy.

Bio-resources are extensively used in the three systems of Ayurveda, Siddha and Unani. The ancient text of *Charaka Samhita* lists 341 plants and plant products for use as medicines. *Bhava Prakasha* of Bhava Mishra, written around the year 1550 describes approximately 470 medicinal plants used in Ayurveda (Mukherjee, 2005). The three systems use formulations based on their pharmacopoeia; most of the formulations are multi-component mixtures.

India's National Health Policies from time to time have emphasised on the role of Indian systems of Medicine. The National Health Policy 1983 provided for phased integration of the indigenous and the modern systems. The National Health Policy 2002 stressed on the inherent advantages of the traditional systems because of, among others, the growing popularity of natural plant based products. A separate National Policy on Indian Systems of Medicine and Homoeopathy (ISM&H) was announced in 2002 itself. Its objectives included promotion of good health through preventive, promotive, mitigating and curative intervention through ISM&H, improvement of quality of teachers and clinicians, affordable, safe and efficacious services and drugs, facilitation of availability of raw drugs, integration of AYUSH systems with the National Health Programmes, and validation of the drugs and therapies.

A separate Ministry at the central government level looks after all the Indian Systems of Medicine (ISMs). The name of the Ministry, viz. AYUSH is an acronym for Ayurveda, Yoga & Naturopathy, Unani, Siddha, and Homoeopathy. The vision of the Ministry is "to position AYUSH systems as the preferred systems of living and practice for attaining a healthy India."[2]

There are central councils for research in each of the systems. These are the Central Councils for Research in (1) Ayurvedic Sciences, (2) Unani Medicine (3) Yoga and Naturopathy, and (4) Siddha. There are large numbers of practitioners of the systems. The medical education in these systems are done through educational institutions established on modern pedagogical principles, the first one being the Central Council of Indian Medicine (CCIM) established in 1970 which later spawned the separate councils referred to above. There are separate medical colleges for the systems. The Government of India

has also set up separate Pharmacopoeia Committees for Ayurveda, Siddha, and Unani. Pharmacopoeias on Ayurveda, Siddha and Unani based on modern scientific principles have been developed and updated from time to time.

India is one of the few countries that had introduced regulatory systems for TM quite early. It had national laws and regulations on TM from 1940 onwards which were updated a number of times. The apex statutory regulatory bodies are the Central Councils. Manufacturing regulatory requirements are to follow the relevant pharmacopoeia and adhere to Good Manufacturing Practice (GMP) rules as for conventional pharmaceuticals.

The country also has a large AYUSH healthcare and education sector. There are 3155 AYUSH hospitals with bed capacity of 56,613 as on 1 April, 2012. In addition, there are 23,855 dispensaries.[3] The number of registered practitioners under these systems is 14,50,721. There are 304 colleges, of which 73 have PG facilities, for imparting formal education in the three systems. The total admission capacity of these institutions is 15,345. They conduct medicine and surgery courses. There are 53 research institutes under the ISM Central Research Councils.[4]

The AYUSH/ISM industry is also quite large. There are 10,088 manufacturing units as of 1 April 2010, which was 7,728 units only in 2002[5], thus showing an impressive rate of growth even in the 21st century. The turn over of the herbal sector[6] exports amounted to Rs. 807 crore in 2004-05. During that year the imports in the sector were worth Rs. 173.16 crore.[7] With the spread of India diaspora in other countries, the demand for ISMs has grown in those countries.

Role of TM in Healthcare/Wellness

The role of TM in wellness care has been well recognised by various authorities and international organisations. WHO recognises that TM has a long history of use in health maintenance and disease prevention and treatment, particularly of chronic diseases (WHO, 2013). These systems have been especially effective in reaching out to the vulnerable sections of society in rural areas because of their local/regional centeredness. WHO estimates that traditional birth attendants assist more than 2/3rd births in developing countries (Vasisht and Kumar, 2002). Traditional practitioners of bone setting are common and popular in villages. Hill (2011)observes that when it comes to mental well-being traditional medicines have an important role in that the TM practices are rooted in the traditional cultures and are more amenable to the people as they avoid conflict situations. They have also been generally more affordable than the modern medicine. The following are considered the advantages of TM, though with qualifiers: availability and proximity, affordability, familiarity and cultural acceptability, effective treatment of particular disorders, holistic and person-centred approach, and protection of biodiversity (UNESCO, 2013).

Internationally also the role of TM in wellness has been well recognised. The Beijing Declaration adopted by the WHO Congress on TM in 2008 recognising the role of TM and need to promote safe and effective use of the same in national healthcare, called on Member States to take steps to integrate Traditional Medicine into national health systems (See Box 1).

The International Bioethics Committee of UNESCO in its report on traditional medicine systems and their ethical implications in 2013 also observed that this system of knowledge, skills and practices is supposed to help "improve health outcomes, including physical, mental and social wellbeing." (Emphasis added.)

Traditional Medicine and Medicinal Plants

Most of the traditional system formulations are based on plants. There are varying estimates of the plants being used in these systems. For example, 10000-11250 plants are believed to be used in China; India is estimated to use around 7500 plants. A large number of these plant species are used in the folk medicine and the number in the classical and regulated systems

are less (Hegde, 2000). The knowledge about the therapeutic properties of plants available in TM texts and oral knowledge provide valuable leads to the development of new drugs by modern pharmaceutical industry. This results in great saving since otherwise the researchers would have to spend much more time and resources in finding out the active ingredients that help curing specific illnesses. A case in point is Artemisinin for Malaria which was developed on the basis of knowledge available in Traditional Chinese Medicine texts.

Regulations and Standards

During the last couple of decades, there appears to be a renewed interest in traditional medicines, particularly herbal products, globally, may be due to various reasons such as a perceived feeling that they do not have any side effects, that they are natural ways of curing ills of the body and the mind to achieve total wellness or that they are cost effective. Increasing awareness in the West about the systems might also have contributed to such interest. Consequently, issues of "safety and efficacy, as well as the quality control, of traditional medicine and complementary and alternative medicines have become important concerns for both health authorities and the public" (WHO, 2005). Maintenance of safety and quality of the products requires regulations and standards. Many countries have dubbed all traditional medicines under the category of herbal medicines. In order to take stock of the status of such regulations, World Health Organisation (WHO) had initiated a process in 1994. It had addressed 191 countries for information relating to regulations of traditional medicines in those countries. However it received responses from 52 countries only (WHO 2005). Later, in 2001, it repeated the process with Global Survey questionnaire and this time received responses from 141 countries reflecting growing interest in TM. Some of the findings of the Survey are as below:

- Forty-five countries have national policies on Traditional Medicine
- In the decade preceding the Survey,

Box 1: The Beijing Declaration on Traditional Medicine 2008 (excerpts)

- The knowledge of traditional medicines, treatments and practices should be respected, preserved, promoted and communicated widely and appropriately based on the circumstances in each country;
- Governments have a responsibility for the health of their people and should formulate national policies, regulations and standards, as part of comprehensive national health systems to ensure appropriate, safe and effective use of traditional medicine;
- Recognising the progress of many governments to date in integrating traditional medicine into their national health system, we call on those who have not yet done so to take action;
- Traditional medicine should be further developed based on research and innovation in line with the "Global Strategy and Plan of Action on Public Health, Innovation and Intellectual Property" adopted at the 61st World Health Assembly in 2008.
- Governments, international organisations and other stakeholders should collaborate in implementing the global strategy and plan of action;
- Governments should establish systems for the qualification, accreditation or licensing of traditional medicine practitioners. Traditional medicine practitioners should upgrade their knowledge and skills based on national requirements; and
- The communication between conventional and traditional medicine providers should be strengthened and appropriate training programmes be established for health professionals, medical students and relevant researchers.

there has been a steady increase in the number of countries which brought forth a national policy on TM.

- Fifty-four countries have national laws or regulations on TM.
- Forty countries have national programmes on TM.
- Seventy-five countries have national offices for TM.
- Fifty-eight countries have national research institutes on TM.

This shows that quite a good number of countries are now recognising TM as an integral part of healthcare and bringing out rules and regulations on the same.

There are 92 countries that have laws or regulations on 'herbal medicines'. WHO had defined 'herbal medicine' as "plant-derived material or preparations with therapeutic or other human health benefits, which contain either raw or processed ingredients from one or more plants." Since the qualifier 'traditional' has not been employed herbal medicines, as per this definition, may include modern uses of plant-based material whereas traditional medicines, as defined by WHO, are those that have been in existence for a long time. In fact, most TM formulations may fall within the scope of herbal medicines, being plant based and used for therapeutic benefits. Herbal products are produced and used in many countries that do not have any established traditional medicine system. Herbal medicine category also includes dietary supplements, health food, functional food and other products (WHO, 2005). These differences in the approaches to herbal medicine and traditional medicine have to be kept in mind, while discussing the concept of 'wellness', development of 'indicators' of wellness and the trade and commerce restrictions and barriers on TM. In the USA and Europe, herbal medicines form a major chunk of over the counter drugs. In Germany, the pharmaceutical companies sell almost one third of all non-prescription drugs as herbal medicines (Vasisht and Kumar, 2002).

In the case of manufacture of herbal medicine, 73 countries follow the same rules of good manufacturing practice (GMP) as for conventional pharmaceuticals; some 30 have special GMP rules and 28 have no requirements. However, in the matter of regulatory requirements for safety of herbal medicines, 57 countries only followed the same requirements as for conventional pharmaceuticals, but 82 have special requirements. As in the case of manufacturing requirement, in this also 28 countries have no requirements. In the matter of special requirements for safety, in 66 countries the regulatory requirement is that of traditional use without demonstrated side effects whereas in 53 countries reference to documented scientific research on similar products is required. Fifty-nine countries have post-marketing surveillance system for herbal medicines and 53 have established national systems to monitor adverse effects relating to herbal medicine. Also, as per the WHO Survey, 85 countries have a registration system for herbal medicines whereas 53 do not have any registration requirement. Herbal medicines are generally over the counter medicines (OTC) in 101 countries. In 70 countries there are no restrictions. However, in 48 countries, herbal medicines are sold through pharmacies as prescription medicines. Generally, TM does not find a place in the list of national essential drugs in most countries. However, herbal medicines are included in the list by 22 countries.

Regulations in India

The Drugs and Cosmetics (D&C) Act, 1940[8], the Drugs and Cosmetics Rules, 1945 and the Drugs (Control) Act, 1950[9] contain the drug regulations of India. They prescribe the legal requirements for manufacture, import and sale of medicines in Ayurveda, Siddha and Unani systems, among others. They relate to regulating the quality, safety and efficacy of the medicines.

The D&C Act gives an inclusive definition of Ayurvedic, Siddha and Unani medicine stating: "all medicines intended for internal or external use for or in diagnosis, treatment,

mitigation or prevention of disease or disorder in human beings or animals, and manufactured exclusively in accordance with the formulae described in, the authoritative books of Ayurvedic, Siddha and Unani Tibb Systems of medicine."[10]

The D&C Act has very specific provisions regarding quality, standards, branding and regulations of manufacture. The Act provides for an Ayurvedic, Siddha and Unani Drugs Technical Advisory Board to advise the Central and State Governments on technical matters on the drugs in these systems[11]. Directorate General of Health Services (DGHS) is the ex-officio Chairman of the Board**.** It also provides for an Ayurvedic, Siddha and Unani Consultative Committee to advise the governments and a Technical Advisory Board to bring uniformity in the matter of administration of the Act throughout the country.[12]

It defines misbranded, adulterated and spurious drugs.[13] Labelling has to be in the prescribed manner. Any kind of colouring, labelling, or other concealment of damage as well as any false or misleading claim labelling is misbranding. Adulterated drugs include any drug, which consists of any filthy, putrid or decomposed substance or any drug prepared, packed or stored under insanitary conditions. Even if the container contains any poisonous or deleterious substance it will be considered as adulterated. Using a colour not prescribed in the pharmacopoeia is adulteration. Mixing of any substance that reduces the quality of the drug is also adulteration. Spurious drugs include, among others, selling a drug under a name of another drug, deceptive imitation of another drug and the label bearing the name of a fictitious company as the manufacturer.

The Act also prohibits manufacture for sale of ISM medicines except in accordance with the prescribed standards.[14] This includes any misbranded, adulterated or spurious drug. In the case of patent or proprietary medicine[15], the true list of ingredients has to be displayed on the container. Manufacture, sale and distribution of any drug against the licence conditions also are prohibited. Under the D&C Act, the Central Government has also the power to prohibit in public interest the manufacture, sale, etc., of any ISM medicine, which does not have the therapeutic value claimed for the same. The Act also empowers the central and state governments to appoint analysts as well as inspectors for ISM drugs. [16]

Manufacture for sale or for distribution in contravention of the provisions of the Act is "punishable with imprisonment for a term which may extend to one year and with fine which shall not be less than twenty thousand rupees or three times the value of the drugs confiscated, whichever is more."[17] In the case of spurious drugs, the term of imprisonment may extend to three years.[18] In the case of subsequent offences, the punishment shall not be less than two years and may extend up to six years with fine of not less than Rs. 100,000 or three times the value of the drugs confiscated, whichever is more.[19]

The Drugs and Cosmetics Rules, 1945 lay down the details, that include, among others, standards such as of strength, quality and purity.[20] The manufacturing units have to comply with Good Manufacturing Practice (GMP). Approximately 5500 units have complied with GMP.

There are also very specific provisions in the Rules regarding labelling, packing and limit of alcohol in Ayurvedic (including Siddha) or Unani drugs.[21] The label should display the true list of all the ingredients used in the manufacture of the preparation together with quantity of each of the ingredients incorporated therein and a reference to the method of preparation thereof as detailed in the standard text and *Adikarana*, as are prescribed in the authoritative books. In the case of drugs for export, labels and packages or containers may be adopted to meet the specific requirements of the law of the country to which the said drug is to be exported, but the following particulars are to appear in conspicuous position on the container in which the drug is packed and on every other covering in which that container is packed, namely: (a) name of the Ayurvedic, Siddha and Unani drug (single or

compound formulations); (b) the name and address of the manufacturer and the number of the licence under which the drug has been manufactured; (c) batch or lot number; (d) date of manufacture, along with the date for "Best for use before"; (e) main ingredients, if required by the importing country; and (f) the words "for export."[22] Expiry dates have to be prominently stated on the labels/containers of drugs.[23]

Intellectual Property Rights (IPRs)

Intellectual Property Rights are statutorily provided market tools that provide exclusivity to the owner, enabling him to reap benefits of a kind of regulated and mostly time bound monopoly control over production and supply of the product /good/process over which the intangible rights apply. However, the most potent of these rights, viz. patent, accrues only to those products or processes which satisfy the norms of novelty, inventiveness and industrial application (utility) and provided by governments to incentivise innovation and public disclosure of the invention. These are very strict criteria as the patent examiner scans all published material anywhere in the world and data on products in the markets, while examining applications for grant of a patent to ascertain its novelty. The applicant has to demonstrate that the claimed innovation contains an inventive step, which would not have ordinarily occurred to a person skilled in the art. The Indian Patents Act contains a special qualifier on this that:

> *"the mere discovery of a new form of a known substance which does not result in the enhancement of the known efficacy of that substance or the mere discovery of any new property or new use for a known substance or of the mere use of a known process, machine or apparatus unless such known process results in a new product or employs at least one new reactant."*[24]

TM products generally may not be eligible for patent protection, being already existing products. However, new innovations in the field can get patent protection if they satisfy the above-referred criteria, as per the law of the land where such an application is made.

During the period from 1972 to 2004, Indian Patents Act did not provide for product patents in pharmaceuticals and food items, but only process patents. Therefore, ISM products also could obtain process patents only during that period. Consequent on amendment to the Patents Act 1970 in 2005, both product and process patents are granted for all pharmaceutical inventions including those in the ISM sector. During the last 10 years, however, less than 50 patents were granted for the ISMs, of which the majority went to Ayurveda.[25] The total number of applications in these systems during this period was 209. These are either new formulations or new processes, failing which no patent could have been granted, whether as an ISM or as an allopathic drug, since the patent law provides that "an invention which in effect, is traditional knowledge or which is an aggregation or duplication of known properties of traditionally known component or components" is not patentable.[26] This provision, of course, ensures that a traditional medicine formula or the knowledge that is there in the ISM texts is not patented under any system as a new one. In fact, even folk medicine knowledge also stands protected because one of the grounds for pre-grant representation against the grant of a patent and also for post-grant opposition to a granted patent is that the invention so far as claimed in any claim of the complete specification is anticipated having regard to the knowledge, oral or otherwise, available within any local or indigenous community in India or elsewhere.[27]

The scope of this provision is so wide that it encompasses oral knowledge and also knowledge anywhere in the world. This is significant in that large quanta of folk medicine are in the form of oral knowledge and this provision ensures against its misappropriation.

Misappropriation of Indian Traditional Medicine Knowledge

The background of such an explicit provision is the attempted patenting of Indian Traditional Knowledge, particularly in the area of TM, in

Table 1: Patent Office-wise break up of patent applications rejected or withdrawn or claims amended or not pursued on the basis of TKDL evidence

Sr. No.	Patent Office	No. of Cases
1.	European Patent Office (EPO)	130
2.	United States Patent and Trademark Office (USPTO)	25
3.	Controller General of Patents Designs and Trademarks (CGPDTM), India	20
4.	Canadian Intellectual Property Office (CIPO)	37
5.	IP Australia (AIPO)	4
6.	United Kingdom Patent & Trademark Office (UKPTO)	3
	Total	219

certain countries. A case in point is that of the patenting of the wound healing properties of turmeric (*Curcuma longa*) by two scientists of Indian origin in the United States (US) in the year 1994. Although extant knowledge is not patentable since the essential criterion of novelty will disqualify the same as an invention, where the Patent Office, which grants the patent, fails to find out the same, the application gets granted. The case generated much discussion and debate in India since it was a knowledge available in the ancient Ayurvedic texts. The Council of Scientific and Industrial Research (CSIR) challenged the grant of the patent before the US Patent and Trademark Office (USPTO) and proved that it was an existing knowledge, available in ancient Ayurvedic texts like *Charaka Samhita* and *Shushtruta Samhita* and not a mere hearsay. On the basis of the documentary evidence, the USPTO revoked the patent. There have also been many other instances of patents granted on Indian Traditional Medicinal knowledge in different countries.

Patent Offices normally do their search for prior art (state of knowledge on the date of first patent application anywhere in the world) of any invention in published documents and databases. TM knowledge is not available in books and databases in most modern languages. This was posing a major problem for the Patent Examiner since the prior art available in TM is not easily ascertainable from the databases that he has access to ordinarily for a search to find out the novelty of a claim made in an application for the grant of a new patent. In order to remedy this situation, India developed the Traditional Knowledge Digital Library (TKDL). This documentation overcomes the language and format barrier by scientifically converting and structuring the available content of the ancient texts on Indian Systems of Medicine(ISM) into five international languages, viz. English, French, German, Japanese and Spanish. It also uses an innovative classification system for the traditional knowledge, which has classified the Indian Traditional Medicine systems into approximately 25,000 subgroups. The library contains information about 2.9 lakhs (0.29 million) medicinal formulations from 359 books of Indian systems of medicine. This database, access to which is offered free to patent offices, enables the Patent Examiner to use modern Information Technology devices to do a prior art search in Indian Traditional Medicine systems. During the period from 2009 to 2014, on the basis of the information available in the TKDL, 219 patent applications have been rejected by the patent office or the claims withdrawn or amended or not pursued by the applicant. The TKDL website presents the patent office wise break-up[28] on this (see Table 1).

While misappropriation of traditional medical knowledge is not approved, the law does not prohibit grant of patents for medicines on further research into that knowledge, provided the inventions, whether product or process, are new and innovative (James, 2016). In the Indian Patent office alone, 609 applications, of which 86 by

foreign entities, were filed for grant of patents for products, processes, formulations, compositions and processes in the field of Ayurvedic medicine, medicinal plants and herbal based formulations, as of 31 March 2013. Out of these applications, 26 patents have been granted to foreign entities and 93 patents to Indian entities.[29] A sample list of thirty patents on Ayurvedic medicines or herbal extracts is presented in Annexure 1.

Table 2 presents the status of patent applications and grants in the three systems of Ayurveda, Siddha and Unani (excluding other herbal formulations):

Table 2: Patent Applications in Indian Systems of Medicine

System	Number of Applications published	Number of patents granted
Ayurveda	185	36
Siddha	07	07
Unani	17	03

Source: http://ipindiaservices.gov.in/publicsearch/. (Accessed on 20 April 2015.)

Patent or Proprietary Medicines

The Drugs and Cosmetics Act, 1940 has a separate category of medicines that is different from classical medicines under the ISMs classified as 'Patent or Proprietary Medicine'. It refers to new formulations, that is, formulations not described in the authoritative texts or inherited through parental route.[30] Both patent medicine and proprietary medicine are treated equally, though they could be distinct and not necessarily having the characteristics of both. However, the industry has been using the combined expression 'patent and proprietary medicine' thereby creating confusion regarding the ISMs, which are patented under the Patents Act, and those recognised under the D&C Act. A 'Patent' Ayurvedic medicament under the D&C Act could be "one where all the ingredients find mention in the authoritative textbooks on Ayurveda, though the formula for preparation of the medicament is not in accordance with the formula given in those textbooks."[31] A proprietary medicine is "a medical compound whose formula and often mode of manufacture are owned by an individual or corporation under a trademark or patent."[32] Another definition of proprietary medicine is more explicit: "a remedy whose formula is owned exclusively by the manufacturer and which is marketed usually under a name registered as a trademark."[33] The basic ingredients of the patent and proprietary medicines are available in the ancient texts and have been in existence for centuries. Naturally, these products are comparable to the generics in Allopathy. For example, Chywanprash is a very old recipe. There is hardly any difference in the claimed ingredients of Chywanprash manufactured by different companies though there could be minor variations in the process of manufacture and the quantum of certain ingredients, particularly the non-medicinal ones. Each manufacturer may claim his own product as genuine and different from those of other manufacturers. But many companies claim their products as proprietary or patent medicines by opting for separate trademarks or brand names.

Patent or Proprietary Medicines are registered by State ISM Licensing Authorities. Some of them are even classical formulations but with prefixes like *Brihat* (large), *Maha* (big), *Laghu* (minor), *Cheriya* (small), *Valiya* (big), etc., giving an impression that they are distinct from what is mentioned in the texts. The Department of AYUSH, through an office order on 26 August 2008, permitted continued use of Proprietary Drug tag for such formulations, which were registered, and in use for more than thirty years before the publication of the Ayurveda/Unani Formulary of India. It also permitted registration of a classical product as a branded proprietary ISM product "provided the formula is as per the classical texts or the Ayurveda or Unani Formulary of India and the classical name is not distorted in any manner."[34]

The list of 'patent and proprietary medicines' covers a wide range of categories from medicine to cosmetics and even shaving creams. A Google search showed 1273 in Patent

and Proprietary Ayurveda products with the break-up presented in Table 3.

Table 3: Patent and Proprietary Medicines

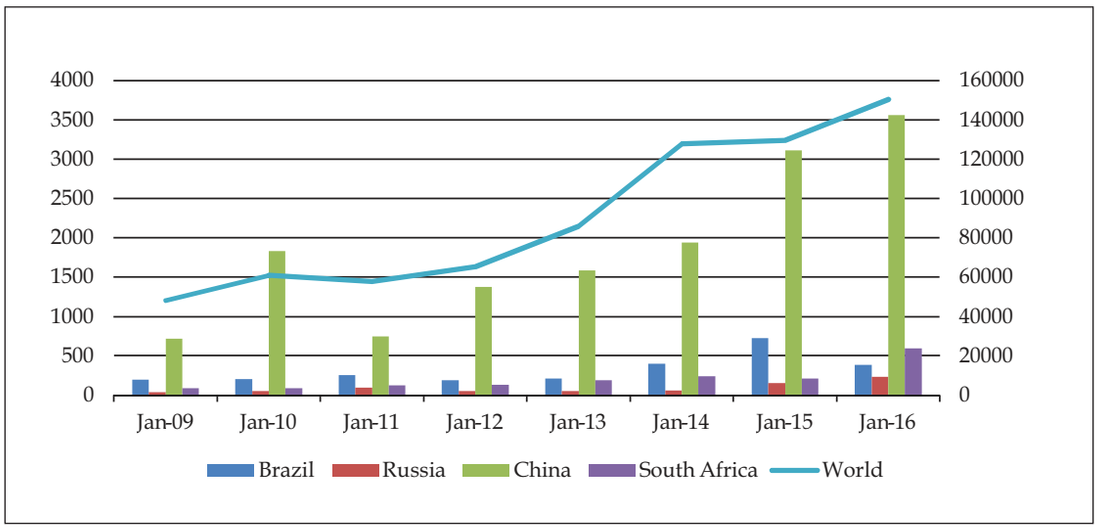
Category	Number
Herbal Medicine	569
Health care supplement	232
Healthcare supplies	152
Sex products	125
Immune & Anti-fatigue	48
Beauty products	18
Plant Extract	43
Other drugs	100
Total (Some products appear in more than one category, hence the difference in the total)	1287

Production and Trade

Sale of medicinal plants is taken as a fair indication of the production and trade in medicinal formulations, medicinal plants being the resource base. India has approximately 15,000 medicinal plants of which about 6000-7000 plants are used in Indian Systems of Medicine; 960 of these have been recorded in trade and 178 are traded in high volume, in quantities exceeding 100 Metric Tonne (MT), per year, according to the Ministry of AYUSH. A study by EXIM Bank had estimated the sales of medicinal plants at Rs. 300 crore in 1996-97. But these medicinal plants could also be used for preparation of crude drugs and extracts also used as raw material by the pharmaceutical industry. It has been estimated that about 880 medicinal plants are involved in Indian trade. Of these, 42 species are imported and 48 species are exported (Sen and Chakraborty, 2015).

Indian exports of 'Traditional Medicine' generally comprise three categories: the first one is the medicinal plants and herbs as such, the second one, saps and extracts and the third one, formulations. The first category generally include raw materials without any value addition and one does not know how the products end up, whether in medicinal preparations or in some other form. In some cases they may be used as such, for example, as spices in food preparations, but mostly end up in industrial use. A major item in this category is Isabgol (psyllium husk and seeds). The second category comprises herbal juices and vegetable saps. This involves some value addition. The third one is supposed to be the real traditional medicine export. From India mostly Ayurvedic and Unani preparations are exported. But the large exports are in the categories of vegetable saps and extracts and raw plants. In all categories the major export

Figure 1: India's Exports of Raw Products and Extracts of Medicinal Plants



Notes: Value in Rs. Lakh (1 lakh = 100,000). The values for world are on secondary axis.

Source: Data obtained from India Trades

destination within BRICS is China, possibly because China is using the plants and herbs for manufacture of TCMs (see Figure 1).

However, in the matter of medicaments of the Ayurvedic system, the major export destination has been Russia, in value terms, as may be seen from Figure 2.

In the matter of exports of medicaments falling under bio-chemic system, there was an unprecedented and never repeated jump in the case of Brazil in 2009 (reported in January 2010), the reasons for which could not be ascertained but most probably due to availability of required raw material in a country in a particular year. In other years, Brazil was the least favourite among the four countries, with China and Russia leading the imports from India.

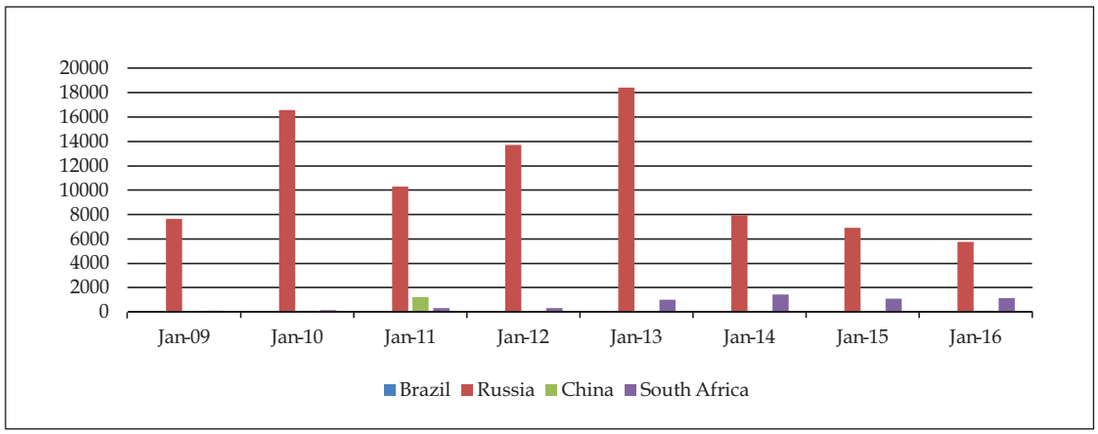
India's imports of raw products and extracts saw a major jump so far as China was concerned in 2012, but fell to the normal quantities in later years (Figure 3).

The tables at Annexes 2 to 6 provide the country-specific import and export of traditional medicinal products (including raw products and extracts of medicinal plants) data between India and other BRICS countries.

Trade Classifications

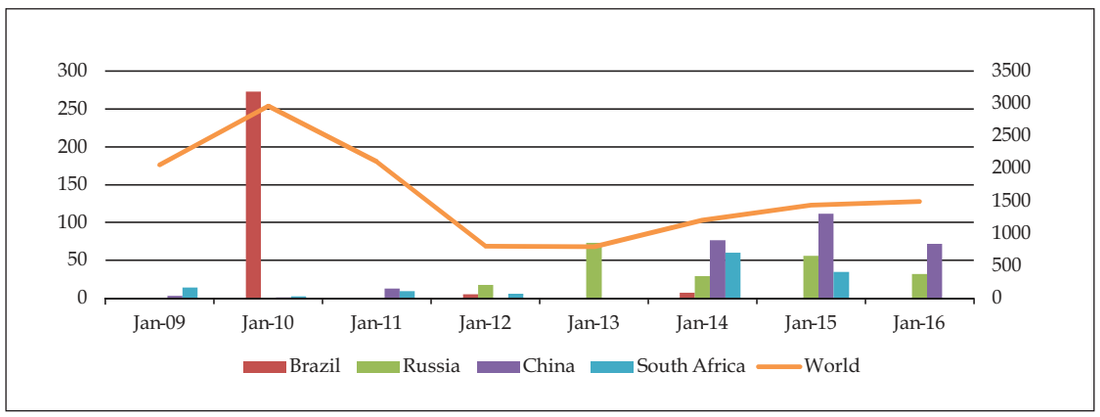
Trade classifications for TM remain a major bottleneck in trade data. The four digit and six digit HS code classifications have global acceptance but they do not provide targeted data on traditional medicine exports and imports. HS code 1211 relates to botanical drugs but includes plants and plant parts used in perfumery, pharmacy or for insecticidal, fungicidal or other similar purposes. In the

Figure 2: India's Exports of Medicaments of Ayurvedic System



Source: Data obtained from India Trades

Figure 3: India's Exports of Medicaments of Bio-chemic System



Notes: Value in Rs. Lakh (1 lakh = 100,000). The values for world are on secondary axis.

Source: Data obtained from India Trades

sub-categories they refer to certain commonly traded commodities such as Liquorice roots (1211.10), Ginseng roots (1211.20), etc. Even within these formats, there is no universal availability of trade data on traditional medicine products. India has been following an eight-digit classification model, which includes traditional medicine systems such as Ayurveda, Siddha and Unani besides bio-chemical compositions and others.[35] The issue starts with evolving comprehensive classification codes for biological resources, including plants and their parts, since the trade in raw materials is both as whole plants and as parts of a plant, and many of them are traditional medicines in themselves. Research and Information System for Developing Countries (RIS) had done an exercise to evolve such a code for 421 biological resources of India for the National Biodiversity Authority of India, the statutory body under the Biological Diversity Act regulating access to biological resources of the country.[36] This exercise has to be carried forward and comprehensive classification codes made for all Traditional Medicine products internationally to ensure that sufficient and reliable data becomes available.

Trade Barriers

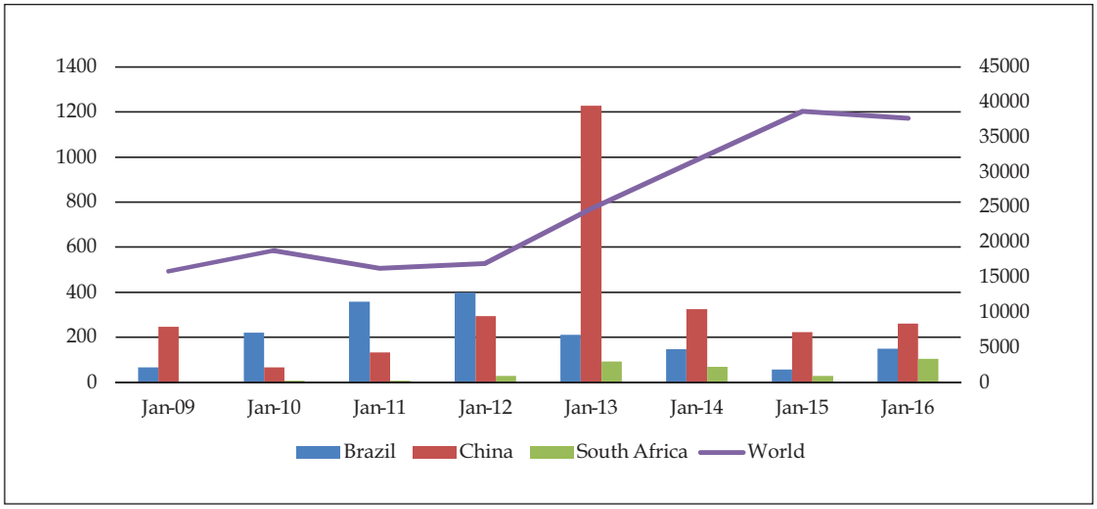
European Union (EU) and the United States of America (USA) are the major markets for trade in traditional medicine products outside BRICS. In herbal products they have a market share of 41 per cent and 20 per cent, respectively (Deshpande, 2015.) Hence the regulations in these two trade zones are material to any consideration of international trade barriers.

European Union

Europe regulates herbal medicinal products under the European Directive 2001/83/EC. The European Union Directive 2004/24/EC on traditional herbal medicinal products amended the provisions of the 2001 Directive to provide for a simplified regulatory approval process for herbal products. This Directive has added the following categories in the definitional article: traditional herbal medicinal product, herbal medicinal product, herbal substances, and herbal preparations. The Directive has provided for the establishment of a Committee for Herbal Medicinal Products (HMPC).

Traditional herbal medicinal products are those, which have indications exclusively appropriate to traditional herbal medicinal

Figure 4: India's Imports of Raw Products and Extracts of Medicinal Plants



Notes: Value in Rs. Lakh (1 lakh = 100,000). The values for world are on secondary axis.

Source: Data obtained from India Trades

products. They are intended and designed for use without the supervision of a medical practitioner, are exclusively for administration in accordance with a specified strength and posology, are oral, external and/or inhalation preparations. In order to obtain the registration the data on the traditional use of the medicinal product are sufficient: "in particular the product proves not to be harmful in the specified conditions of use and the pharmacological effects or efficacy of the medicinal product are plausible on the basis of long-standing use and experience." [Article 16a 1.(e)]. The applicant must demonstrate that the product has been in medicinal use throughout for a period of at least 30 years of which at least 15 years within the EU. Applicant is required to produce bibliographic review of safety data together with an expert report as to evidence of traditional use and safety.[37] This is a clause, which effectively debars all traditional medicine products, which have not already entered EU and have not been there for at least 15 years. It also prevents new medicinal formulations, though made according to the established pharmacopoeia from entering the European market unless they get registered under the conventional medical products, fulfilment of the conditions for that will be very difficult for these products, as their basis is different from that of modern medicine.

As to quality, the normal quality requirements applicable to licensed medicines will apply. That would require compliance with GMP. There would also be the requirement of holding a manufacturer's licence, a wholesale dealer's licence or a wholesale dealer's import licence, where appropriate. While there is nothing exceptional about this requirement, it is likely to pose major problems for small and medium enterprises in the developing countries who want to export to EU.

As per the Directive the *Traditional herbal medicinal products* may contain herbal materials. The presence in herbal medicinal product of vitamins or minerals for the safety of which there is well-documented evidences will not prevent registration eligibility. However, the minerals included in the products can only have an ancillary action to that of the herbal active ingredient. As per the definition the use of isolated commonly used herbal substances such as thymol, cineol, menthol, etc., may not be admissible. The scope of the Directive needs to be enlarged to include these to ensure smooth trade.

Herbal medicinal products are medicinal products exclusively containing as active ingredients one or more herbal substances or one or more herbal preparations, or one or more such herbal substances in combination with one or more such herbal preparations.

Herbal substances are mainly whole or cut plants, plant parts, algae, fungi, lichen in an unprocessed, usually dried, form, but sometimes fresh. Certain exudates that have not been subjected to a specific treatment are also considered to be herbal substances. Herbal substance definition excludes substances of animal or mineral origin such as pollen, propolis, or clarified butter (*ghee*) which is a typical constituent of many Ayurvedic preparations, medicinal clays and gypsum used in making soyabean curd.

Herbal preparations are those preparation obtained by subjecting herbal substances to treatments such as extraction, distillation, expression, fractionation, purification, concentration or fermentation. These include comminuted or powdered herbal substances, tinctures, extracts, essential oils, expressed juices and processed exudates. Since the definition of herbal substances exclude all substances of animal or mineral origin, without any quantity limit many Ayurvedic and Siddha medicinal preparations may not fill the bill.

Although, in 2004 the regulations simplified the registration procedure there are still many regulatory barriers, particularly since the ISM products may not be able to get the registration for reasons stated above and also below. Some of the ISM products may contain mineral components or animal products or herbal constituents, which will debar them from registration as traditional herbal medicinal products. The requirement for registration is that the products are to

be taken without supervision by a medical practitioner. Most ISM drugs are to be used under the supervision of a medical practitioner of that branch.

United States

The US is using the term complementary and alternative medicine (CAM).[38] The National Centre for Complementary and Alternative Medicine (NCCAM) defines CAM as "a group of diverse medical and health care systems, practices, and products that are not presently considered to be part of conventional medicine." Complementary medicine is used together with convention medicine, whereas alternative medicine is used in place of conventional medicine. CAM therapies include biologically based practices, energy therapies, manipulative and body-based methods, and mind-body medicine. Biologically based practices include, but are not limited to, botanicals, animal-derived extracts, vitamins, minerals, fatty acids, amino acids, proteins, prebiotics and probiotics, whole diets, and functional foods. Botanical products, depending on the circumstances may be regulated as drugs, cosmetics, dietary supplements, or foods. As per Public Health Services (PHS) Act, "no person shall introduce or deliver for introduction into interstate commerce any biological product"[39] unless that product has, among others, an effective licence. While biological product is "a virus, therapeutic serum, toxin, antitoxin, vaccine that are applicable to the prevention, treatment, or cure of a disease, some biologically based practices could involve the use of biological products and will be governed by the PHS Act. Dietary Supplements are not regulated as strictly as drugs so far as efficacy and safety testing or marketing claims, since they are classified as foods. However, on those products no claims are to be made to diagnose, treat, cure, or prevent disease. The Dietary Supplement Health and Education Act (DSHEA) of 1994, has made marketing of dietary supplements as dietary supplements easier than earlier. However, enforcement of good manufacturing practices with respect to the identity, potency, cleanliness, and stability of these products may come under the purview of US Food and Drug Administration (Ventola, 2010). The US was the first country to introduce GMP regulations covering herbal medicines through the Drug Amendments of 1962.[40]

In 2007, FDA issued mandatory current good manufacturing practices (cGMP) for dietary supplement manufacturers and distributors.[41] The cGMP required all entities that manufacture, package, label, or hold dietary supplements to establish and follow cGMP to ensure the quality and safety of finished products which followed the basic principle of cGMP. Issues may also come up with regard to traditional medicines containing plants such as garlic, ginger, ginseng, etc., on account of drug interactions. Exporters of traditional medicine products to the US will have to follow these rules and guidelines. It would be in their trade interests to go for standardisation of herbal drug products and cGMPs to ensure access to the US market. In certain cases, where there is a new botanical drug, it will be considered a new chemical entity and will have to obtain FDA approval as a new drug with all valid data including clinical trial data.

Most of the developed countries prefer to have standardisation of herbal drugs, as to quality, efficacy and safety. Many of the exporters to those countries face issues on these grounds,[42] but adaptation to the changed conditions will have to be made since responsible governments will have to reassure their people that marketing permissions are given only for medicines, drugs or food items which are safe for human or even animal consumption. This, as such, may not pose a problem for TM products but they will have to follow the same protocol as in the case of any new drug in the allopathic category.

Future Roadmap

The future scenario will have to take into account the prospects and the issues and challenges ahead. Focus will have to be on addressing the concerns of non-traditional communities about the safety, quality and

effectiveness of the systems. Many of these concerns emerge as trade barriers.

Issues and Challenges[43]

Traditional Medicine's future is very bright with increasing number of people accepting the same globally as they recourse to an integrated approach to healthcare and wellness by selectively using both TM and modern biomedicine. This is particularly so since biomedicine has also its limitations and fails to provide desirable relief in certain diseases and circumstances. Traditional Medicines are generally without any adverse side effects. But, with growth of scientific culture all across, in order to build up convictions, among both ordinary people and authorities, it is necessary to develop internationally acceptable quality control standards by countries who have rich heritages of Traditional Medicines. This would become possible with enactment of proper internationally acceptable regulations in the major manufacturing countries such as China and India. They need to distinguish between Herbal Medicines and Traditional Medicines and within TM between the different systems as the practices and procedures will vary from system to system.

The global herbal market is projected to grow to $ 5 trillion by 2050. The goods for trade include medicinal formulations, medicinal and aromatic plants, plant material extracts, plant materials, spices, herbs and cosmetics and dietary supplements. This throws open wide opportunities for countries with vast biological resources such as Brazil, Russia, India, South Africa and China.

'Herbals' in Indian exports have a very low share in the total pharmaceutical exports. It was a mere 1.34 per cent in 2009-10 and its CAGR during the years 2007-08, 2008-09 and 2009-10 was 10.19 per cent only compared to 21.27 per cent for modern medicine formulations and 16.98 per cent for bulk drugs during the same period (GoI, 2011). Most of the Traditional Medicines would have been exported as herbals. In addition many modern products also would have found place under 'Herbals'. That would mean the export of Indian Traditional Medicine is not a significant proportion of India's pharmaceutical exports.

If traditional medicine systems have to emerge as alternative or complementary to conventional systems, it will have to be put on an even keel with the conventional system in human resource and infrastructure. In order for this, it should ensure availability of qualified practitioners, researchers and regulators of TM. For this, more educational and research institutions will have to be established. At the same time, mutual recognition of degrees, practices and pharmacopoeia among BRICS countries will boost the TM sector, both as an industry and as a wellness system. Harmonisation of regulations of TM formulations within BRICS will also be an impetus to the general acceptance of TM worldwide and development of global regulations.

With industrialisation and wide spread use of insecticides and pesticides, the quality and purity of raw materials, viz. plants and plant parts, used in TM formulations is emerging as an issue that may affect the quality of the medicines. Not being laboratory created or industrially produced synthetic chemicals, maintaining the same quality in Traditional Medicine formulations with raw natural or semi-processed natural ingredients is a challenge in itself.

An issue in the raw material sector is the shortage of genuine and uncontaminated herbs and plants that go into the making of the medicinal formulations. This can be met only by incentivising farmers to grow more medicinal plants, may be on a commercial scale. A study in South Africa pointed out the need for coordinated government support to incentivise the farming of rooibos.[44] Based on objective assessments of future requirements of various herbs and plants for Traditional Medicine formulations, co-ordinated national planning by governments or industrial or agricultural associations, for advance planting of such biological resources is needed to protect the TM industry from vicissitudes in the supply of raw materials. Assurance of

regular availability of medicines is a must for the growth of the sector.

Creation of reliable and comprehensive statistical databases on raw materials is a *sine qua non* for the TM formulation industry. It will also be a boost to the agricultural sector. Drug master files and national dossiers on each plant need to be developed to convince the world that Traditional Medicines are not mere hearsays but proper and time-tested systems.

The major difficulties in regulating herbal medicines identified in the WHO Survey are to some extent applicable to the TM sector as a whole. These include lack of research data, lack of appropriate mechanisms for control of herbal medicine, lack of education and training and lack of expertise within the national health authorities and control agencies. These are issues that are amenable to solutions with adequate governmental or regulatory interventions. Legislative and executive initiatives are required. Educational and research institutions will also have to be strengthened.

In order to get wider acceptance globally for TM, countries like India should first integrate their own TM systems such as Ayurveda into the main stream. It also is advantageous to the people of the country: "It tenders reciprocal advantages to each system, improves the knowledge of general health care, increases the number and quality of practitioners, endorses the dissemination of primary health care knowledge, and is also helpful in providing basic health care to people in all parts of society" (Sen and Chakraborty, 2015).

Marketing Strategies

Traditional Medicine manufacturers and traders will have to adjust to current regulations and standards in all countries. This includes ensuring quality and safety standards for products, processes and practices. GMP certification is increasingly becoming a necessity. Proper documentation, certification of quality and standard analysis, etc., are required increasingly. Along with such measures, they also need to press for international trade classifications that recognise different medicines in different systems, raw materials, etc. separately.

Standardisation faces many hurdles on account of difficulties in identification of plants, genetic variability, variations in growing conditions, diversity in harvesting procedures and processing of extracts, and lack of information about active pharmacologic principles (Kumar *et al.,* 2016). But with the development of proper database these issues can be successfully addressed.

In order to satisfy quality concerns, clinical trials using modern technology are also required to obtain marketing approvals as medicines in countries, which are not countries of origin of such traditional medicine. However, new and separate protocols for such trials will have to be developed since current ones are essentially for synthetic chemical or biomedicines. As the Traditional Medicines are mostly proven therapies through long usages and without serious adverse side effects, though no clinical trials had been done in the past, the risks for volunteers are much less than in the conventional pharmaceutical sector.

The current Intellectual Property Right system caters to the needs of the conventional pharmaceutical industry and is more suited to them. The possibilities of development of a *sui generis* system that addresses the complexities and peculiarities of Traditional Medicines are to be explored so that the TM formulation sector is protected from misappropriation and unregulated exploitation. Traditional Medicine systems are not to be treated as stagnant ones but as dynamic ones. Such a system should protect the Traditional Knowledge and encourage genuine innovations in this sector, as different from mere tinkering. It will also provide a level playing field for this, by and large fledgling industry at global level.

As a trade strategy, the priority will have to be on those items that have less difficulty in getting registration and marketing approvals in other countries. This will help in establishing market presence and once that is achieved, spread and penetration will be easier.

Conclusion

So far as BRICS Members are concerned, the second meeting of the Health Ministers in New Delhi on 11 January 2013, acknowledged the value and importance of Traditional Medicine. The Ministers had urged all to encourage use of Traditional Medicine in all spheres of health.[44] Developing countries with limited resources could significantly improve healthcare means at their disposal by exploring the scope of the traditional systems of medicine (Deshpande, 2015), which are cost effective compared to the modern medicinal system. The Traditional Medicine's general approach is to aim at comprehensive and wholesome wellness of the patient by removing the infirmities in the individual system caused by the impact of environment, food and habits. To achieve that, the medicinal formulations industry, including the raw material sector, has to be developed and sustainable access and trade in the products have to be encouraged. While ensuring quality and standard, the regulations have to take into account the differences and distinctions with conventional health care sector and the peculiarities of the Traditional Medicine systems. The BRICS countries can take the lead in this since as a group they are rich in both Traditional Medicine and biological resources.

Endnotes

1 Homoeopathy may not fall under the definition of Traditional Medicine since that is not indigenous to cultures.

2 Ministry of AYUSH Annual Report 2014-15. P. 1.

3 https://data.gov.in.

4 http://www.indianmedicine.nic.in/

5 CERPA Report, p.3.

6 This would include apart from TMs, medicinal plants and herbs and other raw materials.

7 ibid.

8 23 of 1940. The Act has been amended a number of times, the last one being of 2008.

9 26 of 1950.

10 S.3 (a) of D&C Act.

11 S.33C of D&C Act.

12 S.33D of D&C Act.

13 S.33E, 33EE, and 33EEA of D&C Act..

14 S.33EEC of D&C Act.

15 See Patent or Proprietary Medicines (p.39).

16 S.33F and S.33G of D&C Act.

17 S.33I (1)a of D&C Act.

18 S.33(1)b of D&C Act.

19 S.33J of D&C Act.

20 Rule 111

21 Part XVII

22 Rule 161A

23 GSR 764(E) dt. 15.10.2009.

24 Section 3(d) of the Patents Act, 1970.

25 http://ipindiaservices.gov.in/publicsearch/

26 Section 3(p) of the Patents Act, 1970.

27 Section 25 (1) (k) and 25 (2) (k) *ibid*.

28 http://www.tkdl.res.in/tkdl/langdefault/common/Abouttkdl.asp?GL=Eng

29 http://pib.nic.in/newsite/PrintRelease.aspx?relid=98021

30 Section 3(h) of the Drugs and Cosmetics Act, 1940 amended in 1982.

31 M/S Naturalle Health Products, Hyderabad vs. Collector of Central Excise, SC 2003

32 The American Heritage Medical Dictionary

33 http://medical-dictionary.thefreedictionary.com/proprietary+medicine

34 Department of AYUSH Office Order No. K.11024/7/2002-DCC(AYUSH) dated 26 August, 2008.

35 ITC is an 8 digit product classification code used in India only which is a modification of 6 digit HS code (also known as HTS Harmonized Tariff Schedule) used all over world.

36 Dr. S. K. Mohanty, Member, Expert Committee on Normally Traded Commodities and Professor, RIS had submitted the Report to the National Biodiversity Authority in April 2015.

35 MHRAM advisory available at http://webarchive.nationalarchives.gov.

37 https://nccih.nih.gov/health/integrative-health

38 Section 351 (a)(1) of the PHS Act [42 U.S.C. 262 (a)(1)]

39 He *et al.* (2015).

40 FDA. Guidance for Industry: Current Good Manufacturing Practice in Manufacturing, Packaging, Labelling, or Holding Operations for Dietary Supplements; Small Entity Compliance Guide; 2010.

41 https://www.tga.gov.au/product-recall/pan-pharmaceuticals-limited-regulatory-action-product-recall-information

42 Some of the suggestions in this section are based on the discussions in an informal consultation organised by RIS in preparation to the BRICS Wellness forum in which many prominent AYUSH industry people and academics

participated. We are especially thankful to the suggestions made by Dr. R B Puranik, Dr. D C Katyar, Dr. Ashok Pandey, Dr.Vaidya Vinod and Dr Ramanathan.

[43] Research Study to Identify Needs, Opportunities and Challenges of Small and Medium Enterprises in the Traditional Medicine Sector – Final Report . p.19.

[44] http://brics.itamarty.gov.br/category-english/21-documents/171-meeting-of-brics-health-ministers

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Annexure 1

Patents on Ayurvedic Medicines/Herbal Extracts

Patent No.	Title	Main herbs
155/ MUM/2008	Herbal extract and Ayurvedic composition for the treatment of diabetics	Momordica Charantia
1734/ KOL/2007	A process for preparing an Ayurvedic medicament effective against leukaemia and carcinoma of lung and intestine	Lime, Asafoetida, and black jeera.
1938/ DEL/2006	A process for preparation of Ayurvedic composition for treatment of hepatic disorder	Kaghzinimbu (Lemon) [Citrus medica (aurantifolia), Sarjika [salsola kali, linn., fagonia cretica, linn, Barilla] and Varat (Kapard) Cypraea moneta
1623/ MUM/2006	An Ayurvedic composition for oral consumption in treatment of heart diseases and hypertension	Arjuna Terminalia Arguna, Ajamoda-Apiumgraveolens, Punarnava - Boehaaria diffusa , Rason-Allium sativum, Shigrusal - Morringa Oleifera, Draksha - Vitisnnifera, Pimpli - Piper longum, Guduchi - Tinospora eardifolia, and Triphala – Triphala
228/ CHE/2006	A process for the preparation of Ayurvedic dia tooth powder/paste	azadirachta indica, menthol, thymol,camphor and, gall nut
3207/ DEL/2005	An Ayurvedic composition for joining fractured bone and as anti-inflammatory and process for preparation thereof	Cissus Quadrangularis, Pterocarpus Marsupium heartwood, Buffalo/ Cow Milk, and Chenopodium Murale (kurund)
726// CHE/2005	An Ayurvedic medicine for curing viral hepatitis and the like diseases.	Luffa Aegyptiaca , Luffa Aegyptica, Luffa Cylindrica or Aluffa Acutangula or Luffa Operculata and seeds of Cuminum Cyminum
313/ CHE/2005	A unique combination of Ayurvedic compounds for correcting a rare form of mullerian dysgenesis	Asoka, Asana and Bylaw, Shorea robulsta Gaertn, Pinus roxburghii Sargent, Cyperus rotundus Linn., Sida rhombifolia, Cyperus rotundus Linn., Gmelina asiatica Linn., Nardostachys jatamansi DC, Randia dumetorum Lirm., Kaemferia galanga Linn., Teramnus labialis Spreng., Phaseolus trilobus Ait., Inula racemoses Hook F, Cinnamomum zeylanicum, Syzygium aromaticura Merr., Parmelia (Sange jaranath), Crocus sativus Linn., Cinnamomum camphora
146/ MUM/2005	An Ayurvedic herbal hair oil composition and preparation thereof	Jatamasi(jatamashi Nardostachys), amla, bramhi(Gratiola), bhrunjraj (Thistles) eclipta alba, nagamothra (cyperus rotundus), kapurkachari, (Hedy chim spicatum), and kavath (feronia elephantum)
31/ MUM/2005	An Ayurvedic herbal composition for treatment of Cancer/skin diseases and process of making thereof	Murraya paniculate (Bhutkati), Latana Camara (ghanera or Tantani), Terminalia (Kinjal) Todalia asiatica (Jangli-Mich) , Chawat or (Dhundari) and teak wood
2352/ DEL/2004	An Ayurvedic composition useful for the treatment of migraine.	Psidium guava and Eucalyptus Camel dulensis
1145/ MUM/2004	A process for preparation of Ayurvedic anti-snake venom capable of administering orally or intravenous	Jasminum sambac, Erythina Indica, Eugenia Jambolana and Mangifera Indica

611/ MUM/2004	A process to prepare a novel Ayurvedic composition and the composition resulting there from.	terminalia arjuna bark, hemedesmus indica root, mangifera indica bark, moringe oelifera bark, murraya koengil leaf, piper longum fruit, boerhawia diffusa root, achyranthes aspera root, rauwolfia serpentia root, coconut oil, sunflower oil, kaju oil, groundnut oil, linseed oil(refined), sesame oil
553/ KOL/2003	A process for preparing nutrient fortified Ayurvedic sweets like sandesh and rosogolla containing at least one herb.	Tulsi (Osimum sanctum) leaves Pudina (Mentha arvensis) leaves, Coriander (Coriandrum sativum) leaves Tender mago (Mangifera indica) leaves, Stone apple (bael - Aegle marmelos) leaves, Spinach (Spinacia oleracia), Carrot (Daucus carota) Beet root, Cucumber, Kulekhara (Asteracantha Longifolia Nees), Shushni (Marsilea quadrifolia Linn) Karipata, Ashawagandha (Winthania. sommifera), Guduchi (Tinespora cordifolia), Amla (Embica officinalis), Shilajeet (Black bitumen or mineral pitch), Suvam bhasm (incinerated gold), Mandookpami (Bacopa Monieri) Mulethi (Glycirrhiza glabra), Shankkapushpi (Convolvulus Plenricaulis) Vijaysara (Pterocaspus marsupium), - Katuka (Picrosshiza kurco) Vidang (Abies Webiana), Bakuchi (Psorylia corylifolia) Bhallatak (Semecarpur anacardium) Brahmi (Centella asiatica), Arjun bark (Terminalia arjuna) Ashok bark (Saraca indica), Bael leaf (Aegle marmelos), Clove fruit (Lavang, Myrtus ceryophyllus) Dalchini bark (Cinnamomum zeylanicum) Elaichi fruit (Elettaria cardamoum) Ginger rhizome (Zingber officinale), Grape seeds (Citrus paradissi), Gorgon nuts, Walnuts, Almonds, Cashew nuts, Ground nuts, Hing (Feaula asafoetida), Orange peel, Jatamanshi (Nardostchyajatamanshi) - Extracts from skin of Lemon & Grape fruit, Jayphal fruit (Myristica fragrans), Liquorice (Glycyrrhiza glabra), Cucumber seeds, Tea leaves , Spirulina, Dates, Lemon grass, mango, papaya, lichi, pineapple, guava, banana, apple, fig, coconut milk cream, roseberry, etc.
1048/ MUM/2003	Ayurvedic immuno modulator composition for treatment of Acquired Immuno Deficiency Syndrome	Guduchi or Giloe (cordifolium), Panash or Kathal (jack fruit),Tulsi or Krishna Tulsi (Holy Basil), Kuda or Kutaja (Kurchi) Bhui Amla or Bahu Patra (Gooseberry), Gingko Biloba Shilajeet or SilaRas (Asphaltam), Karavella or Karela (bitter gourd)
1049/ MUM/2003	Ayurvedic antiretroviral composition for treatment of Acquired Immuno Deficiency Syndrome	Guduchi (Tinospora Cordifolia), Panash (Atrocarpus Integrifolia), Tulsi (Occimum Sanctum), Kuda (Holarrhena antidyscentrica), and Bhui Amla (Phylanthus Niruri)
717/ DEL/2003	A process of preparing said synergistic herbal Ayurvedic ointment for the treatment of analgesic, rheumatoid arthritis, backache, spondilitis, sprains, joint pains, headache, cold, inflammations and muscular pain	Cinnamom Camphora, Mentha Arvensis, Comiphora Mukul (Gulggulu), Eucalyptus, Syzygium Aromaticum and Gultheria fragrantissima, and Comiphora Mukul (Gulggulu)
459/ MUM/2003	Process for preparation of skin care composition by combining micro-nutrients with Ayurvedic substances	Haridra, Rakt Chandan, Manjistha and Kumari and Almond Oil and Coconut Oil
461/ MUM/2003	Process for preparation of skin care composition by combining micro-nutrients with Ayurvedic substances	Haridra, Rakt Chandan, Manjistha and Kumari and Almond Oil and Coconut Oil
460/ MUM/2003	Process for preparation of skin care composition	Haridra, Rakt Chandan, Manjistha and Kumari and Almond Oil and Coconut Oil

462/ MUM/2003	Process for preparation of skin care composition by combining micro-nutrients with Ayurvedic substances	Haridra, Rakt Chandan, Manjistha and Kumari and Almond Oil and Coconut Oil
457/ MUM/2003	Process for preparation of skin care composition by combining. Micro-nutrients with Ayurvedic substances	Haridra, Rakt Chandan, Manjistha and Kumari and Almond Oil and Coconut Oil
458/ MUM/2003	Process for preparation of skin care composition by combining. Micro-nutrients with Ayurvedic substances	Haridra, Rakt Chandan, Manjistha and Kumari and Almond Oil and Coconut Oil
22/ MUM/2003	A process of preparing an Ayurvedic composition for treatment of cold, pain, cough, etc.	Poppy, Cowith, Hycosxix orsiodiasis, Salvia plebia,Nutmeg, Mace, Clove, and Cardamom
731/ DEL/2002	A process for preparation of an Ayurvedic medicinal composition which is useful in the treatment of uterus tumour	Vemonia Cinerea, Berberis aristata, Prunus Cerasoides, Curcuma Longa, Mishri, Asparagus acenosus, Withania Somnifera, Acacia catechu, Panicum miliare, Ptero carpus santalimus, ghee, Rubia cardifolia, Aglaia roxburghiana, Dried grapefruit (Dakh), Glycryrrhiza glabra, Desmodium gangaticum, Apium graveoleus, Nelumbo nucifera (root), Monordica cochin chinensis, KsheerKakoli, Trifala, Litsea polyantha, Milk extract, Jivak, Rishmak, Solanum Verbascifolium, Spha eranthus ndicus, and Maha meda
56/BOM/1998	A process for the preparation of an immuno modulator from the Ayurvedic medicinal plant, gulvel (tinospora sp)	Gulvel (tinospora sp)
667/ BOM/1997	Oral herbal Ayurvedic composition for treatment of Psoriasis	Matricaria Chamomilla and Piper Nigrum (Only seeds)
668/ BOM/1997	Herbal Ayurvedic composition for treatment of Psoriasis	Psoralia - Coryliforlia (only Seeds), Santalum Album Linn, Cassia occidentals (roots), Matricaria chamomilla (whole plant)
423/ BOM/1997	An improved process for manufacture of the extract obtained from Ayurvedic medicinal plant, guddchi	Guddchi
1471/ DEL/1996	An Ayurvedic eye drop composition for treatment of various eye diseases particularly in improving eye-sight by the flatting of the cornea and interior surface of the lens	Apamarg (Achyranthus asperd), Punarnawa (Boerrhavia diffusd), Plash (Butea onosperma), Fitkari (Alum), Tuth (Copper Sulphate), Peppermint (Mentha pipretd), Taknamal (Borax), Yashad (Zinc Sulphate)

Annexure 2

India's Exports in Traditional Medicine to BRICS Countries

Partner Country	Commodity	2008	2009	2010	2011	2012	2013	2014	2015
Brazil	Medicaments of Ayurvedic system	39.07	20.36	4.37		10.1	87.8		
	Medicaments of Siddha system							0.14	
	Medicaments of bio-chemic system		272.84	0.32	5.53	0.16	7.65	0.07	
	Raw products, Extracts of medicinal plants	194.87	205.62	255.9	189.41	213.17	403.02	728.98	383.2
Russia	Medicaments of Ayurvedic system	7636.55	16558.9	10278.22	13717.76	18400.03	7942.28	6932.96	5768.27
	Medicaments of Unani system		156.8						
	Medicaments of bio-chemic system				17.86	73.46	29.48	55.82	32.32
	Raw products, Extracts of medicinal plants	41.86	51.61	95.7	53	54.44	63.33	156.71	237.58
China	Medicaments of Ayurvedic system	12.15	129.19	1214.81	54.18	15.64		19.93	123.29
	Medicaments of siddha system				8.86				
	Medicaments of bio-chemic system	3.31	1.33	13.2			76.79	111.64	71.71
	Raw products, Extracts of medicinal plants	720.81	1829.49	747.39	1375.18	1585.44	1938.6	3115.66	3563.1
South Africa	Medicaments of Ayurvedic system	116.9	179.94	336.37	320.2	1026.32	1442.76	1091.66	1125.28
	Medicaments of Unani system	1.31	4.54	3.82	4.42	5.99	5.93	6.13	4.19
	Medicaments of siddha system				2.08			0.04	
	Medicaments of bio-chemic system	14.19	2.63	9.16	5.69		59.92	34.63	
	Raw products, Extracts of medicinal plants	86.31	92.77	126.55	131.2	188.65	238.36	211.97	592.63
Total		8867.33	19506.02	13085.81	15885.37	21573.4	12295.92	12466.34	11901.57

Note: Export Value in Rs. Lakhs.

Source: India Trades.

Annexure 3

India's Imports in Traditional Medicine from BRICS Countries

Partner Country	Commodity	2008	2009	2010	2011	2012	2013	2014	2015
Brazil	Raw products, Extracts of medicinal plants	65.21	220.27	358.57	398.33	210.48	146.87	57.61	149.94
Russia	Medicaments of Ayurvedic system					160.53			
	Medicaments of siddha system					61.51			
	Raw products, Extracts of medicinal plants					11.75			
China	Medicaments of siddha system						3.75	3.6	0.95
	Medicaments of bio-chemic system			0.59	2.46				
	Medicaments of homoeopathic system	4.7	6.16		218.54	328.01	2.43		
	Raw products, Extracts of medicinal plants	245.7	66.84	133.42	294.32	1226.87	325.46	222.16	260.28
South Africa	Raw products, Extracts of medicinal plants	2.48	6.33	7.91	28.5	92.06	67.89	28	103.9
Total		318.09	299.6	500.49	942.15	2091.21	546.4	311.37	515.07

Note: Import Value in Rs. Lakhs.

Source: India Trades.

Annexure 4

India's Exports in Traditional Medicine to the rest of the World

Importer	Commodity	2008	2009	2010	2011	2012	2013	2014	2015
World									
	Medicaments of Ayurvedic system	32143.85	55150.38	67202.48	70045.33	80817.48	84977.47	88084.26	70314.86
	Medicaments of Unani system	113.26	543.45	43.02	121.47	5091.4	908.61	7391.6	67.63
	Medicaments of siddha system	41.52	11.78	43.34	131.2	75.85	1157.39	206.1	99.35
	Medicaments of bio-chemic system	2051.01	2955.76	2097.8	802.82	792.74	1202.01	1431.21	1488.78
	Raw products, Extracts of medicinal plants	48117.47	60998.28	57884.25	65294.45	85892.29	127906.6	129663.5	150338.7
	Total	82467.11	119659.7	127270.9	136395.3	172669.8	216152.1	226776.7	222309.3

Note: Export Value in Rs. Lakhs.

Source: India Trades.

Annexure 5

India's Exports to BRICS and the World in TM (Quantity in Metric Tons)

To	2012	2013	2014	2015
BRICS	5,002.28	4,915.60	5,931.46	6,403.95
World	80,920.54	92,777.39	86,764.10	99,199.17
Share of BRICS (%)	6.18	5.30	6.84	6.46

Source: India Trades.

Annexure 6

India's Imports from BRICS and the World in TM (Quantity in Metric Tonnes)

From	2012	2013	2014	2015
BRICS	2,463.11	502.87	315.60	498.00
World	35,929.38	34,681.58	47,385.25	46,440.56
Share of BRICS (%)	6.86	1.45	0.67	1.07

Source: India Trades.

Measuring Well-Being: A Survey of Literature and Initiatives

Amit Kumar*, Sabyasachi Saha** and Deepti Bhatia***

Introduction

Since its launch as a measurement tool, Gross Domestic Product (GDP) has attracted major debates on its relevance for measuring well-being. GDP was initially developed in the USA in the 1930s and 1940s when the world was into major economic recessionary trend owing to two world wars and the Great Depression. GDP estimates were used by the US government to justify policies and budgets aimed at bringing the country out of the intense depression (Costanza *et al.,* 2009). The conceptualised use of GDP was further strengthened as a result of Bretton Woods Conference and later through Washington Consensus. Thus, it became the *sine qua non* for a measure of national economic well-being, albeit the fact that it was never designed to refer to well-being. In 1934 itself, Simon Kuznets, the chief architect of the USA national accounting system and GDP, cautioned against equating GDP growth with economic or social well-being (Kuznets, 1934). Nevertheless, the use (or misuse) of GDP as an indicator for gauging state of well-being and development has been continued ever since. However, in recent times, the shortcomings of GDP as a measure of well-being have become even more striking owing to rising income inequalities, rapidly evolving technologies, demographic strife and shifts, and the urgent need to reduce pressure on the physical environment (Stiglitz, Sen and Fitoussi, 2009; Blanke, 2016).

In a classic paper, Easterlin (1974) examined the relationship between economic growth and happiness, based on a survey of 19 developed and developing countries, and argued that the pursuit of happiness and the pursuit of money were not similar. He highlighted the 'happiness-income' paradox or famously called 'Easterlin Paradox' which held that economic growth in nations did not buy greater happiness for the average citizen. The similar conclusion had been arrived by Duncan (1975), Smith (1979) and Campbell (1981). In fact, Campbell (1981) pointed out that the movements in happiness sometimes occurred in direct opposition to what one would have expected based on economic trends. What is surprising is to note that most of the 'happiness-income' paradox, still holds true (Easterlin *et al.,* 2012; Easterlin, 2016), which clearly vindicates that the role of money is very limited in assuring people's happiness.

The 1970s and 1980s were also a time when economists conceptualised the social interaction processes to understand economic phenomenon in general and poverty and inequality in particular. This period also witnessed the emergence of different

* Research Associate, RIS; **Assistant Professor, RIS; ***Research Assistant, RIS

approaches to go beyond GDP to perceive and measure well-being. Objective measures to complement GDP by including social and environmental information (Conceicao and Bandura, 2008) and adjusting GDP by monetising different aspects that are not counted in the GDP measurement, such as social and environmental factors (McGillivray, 2007) were the two major thoughts. The third approach was to replace GDP by constructing composite measures that would capture the multidimensionality of well-being (Conceicao and Bandura, 2008). One of the first attempts of this sort, was made by David Moris, when he developed Physical Quality of Life Index (PQLI) in mid-1970s. This index was comprised of infant mortality, life expectancy and adult literacy (McGillivray, 2007; Stanton, 2007; Summer, 2006). Subsequently, Human Development Index (HDI), a well-known measure in this direction, was propounded by economists, Mahbub ul Haq and Amartya Sen in 1990 to measure nation's achievement in three dimensions, viz. long and healthy life; knowledge; and decent standard of living. However, it is perceived to be far from being a perfect measure of welfare and well-being (UNDP, 2007; Kanbur, 2003).

Another approach to measure multidimensional well-being has been through Subjective well-being (SWB) measures which included self-reported happiness and life satisfaction (Easterlin 2004). Frey and Stutzer (2002) and Layard (2007) argued that happiness research can illuminate economic theory by adding new knowledge and this sort of research is also useful to challenge the existing views, such as that non-economic variable have no impact on self-reported satisfaction. Based on the surveys, Easterlin (2014) cited well-being experiences of people in countries such as USA, China and Costa Rica, to highlight the stark disparity between subjective well-being and GDP. He found that in the USA and China, GDP per capita had increased over a period of time; however, the level of subjective well-being declined. While even when the Cost Rica's per capita GDP is a quarter of that in the USA, the Cost Rican population is as much happy or happier than Americans.

Alesina, Di Tella and MacCulloch (2001) found evidence that inequality is negatively related to happiness. Similar observation was made by Graham and Pettinato (2002) when they found in their research done in 17 Latin American countries and Russia that relative income differences have important effect on how individual assess their well-being.

On the effect of health on well-being, Brickman, Coates and Jannoff-Bulman (1978) and Easterlin (2004) argued that adverse health changes have a lasting negative impact on happiness. However, Deaton (2008) cautioned about the element of subjectivity on using health satisfaction measures as indicators in international comparisons. On the role of well-being measurement, Alkire (2015) stressed that any well-being measure should be generated not only to satisfy curiosity but also and perhaps primarily to guide policy and for this an adequate well-being measure must be easy to understand, technically solid, operationally viable and easily replicable.

Finally, given the wide-ranging variations and approaches and the associated limitations, the time is ripe to embark on a new round of consensus-building to re-envision the new framework for measurement of well-being with confidence on realism and amenability for effective measurement.

Further ahead in this chapter, we present various key approaches and conceptual frameworks including methodologies, surveys and initiatives that have been undertaken for measuring well-being at the national and international level.

Key Approaches and Conceptual Frameworks

Traditional Thoughts in India and China

In the practice of traditional system of individual wellness, the philosophy of ailments says that the ailments are a result of imbalance in the whole body with nature. Cure

of these using medicines is based on harmony between physical, mental, emotional, spiritual and environmental factors (DeSilva, 2009). In Asia, there are formalised traditions/systems having theoretical frameworks. There are several traditional practices with a range of emotional and wellness therapeutic approach such as Chinese medicinal system, Indian Ayurvedic and Siddha systems, Unani system, traditional Vietnamese medicine (DeSilva, 2009). Most of these therapies utilise the healing power of nature for better balance of mind and body. In these regions, though 'well-being' was never used as a phrase, well-being meant being in a state of harmony with nature and body as an integral part of framework.

Ayurveda is an ancient medical science, which was developed in India thousands of years ago. Ayur means 'life' and Veda means 'science'. As per Ayurveda, a healthy state is a condition in which *Doshas, Agni, Dhatu* and *Mala* are in balance. Ayurveda insists on happiness at all levels of body, mind and spirit to be a powerfully performing individual. Ayurveda also offers personalised advice on nutrition and lifestyle according to age of the individual and seasonal variations (Patwardhan *et al.,* 2015). Yoga originated around five thousand years ago in ancient India. It is a holistic way of life that integrates physical, mental and spiritual practices and unites the body, mind and soul. Yoga offers several physical, physiological and mental ways for harmonised relaxation, health promotion and disease prevention (Patwardhan *et al.,* 2015).

The traditional Chinese culture is also centuries old. The three main sources of Chinese traditional culture are Confucianism, Taoism and Buddhism. Confucianism asserts that harmonious interpersonal relationships equal well-being. Taoism emphasises on living in harmony with nature. Buddhism focusses on maintaining the inner peace and harmony among all.

In the absence of materialistic achievements too, happiness of mind and soul is attainable through satisfaction that is perpetuated out of mental balance on satiation for the given time – part of life. Satiation of each individual of a community is non-comparable with that of other members and hence there is no competition for acquiring additional resources. This puts the natural resources in balance with actual needs of the communities. 'Greed' and 'need' are perfectly defined to align with

Box 1: Government Ministerial Set-up Related to Happiness

Countries that have established government ministry/departments of happiness are as follows:

- **Bhutan:** Article 9 of the Constitution of the Kingdom of Bhutan says, "the State shall strive to promote those conditions that will enable the successful pursuit of Gross National Happiness". Thus, all the 10 Ministries work in bringing the goal of Gross National Happiness closer to reality.
- **Venezuela:** A new Vice Ministry of Supreme Social Happiness was created in 2013 to coordinate all the "mission" programmes created by the late President Hugo Chavez to alleviate poverty.
- **United Arab Emirates (UAE):** A Minister of State for Happiness was inducted in 2016 to align and drive government policy to create social good and satisfaction.
- **India:** In India, the state of Madhya Pradesh has set up a 'Happiness Department' in 2016 in order to identify and define parameters that make people happy. It coordinates among various departments, recommends policy changes and formulates an action plan to "increase the level of happiness and satisfaction" among the people of the state.

Source: Compiled by authors.

harmonious co-existence in aspiring for and striving for overall community development.

Material Well-being as an expression of Well-defined Capabilities

Income inequalities suggest only a particular nature of the deprivation. Joseph Stiglitz in his remarks at the fourth OECD World Forum suggested that more important than income inequality per se, is the increasing inequality of opportunity that is occurring in many countries. Measuring inequality in opportunities may be difficult but can be tracked through linkages between educational attainment and socio-economic conditions of the previous generation. However, it would be wrong to assume that high income economies have achieved greater equality in terms of opportunities. The opportunities of a child in the United States are more dependent on the income and education of the parents than in any other advanced countries for which there are data. Therefore, income based measure of development or inequality might be inadequate to capture subtle information about opportunities available with individuals to excel which ultimately results in sustained well-being at the personal level. Social sector policies expanding scope of opportunities for all taking into account issues of affordability and access are crucial. To inform such policies we need appropriate indicators of well-being beyond income considerations.

Amartya Sen through his seminal research has highlighted the social and political difficulties resulting in deprivations that extend beyond income inequalities. However, access to material resources has been considered key to realising several of the other life goals. Sen (1994) highlights the following to elaborate the idea that income needs and level of deprivations are different at the level of the individual.

> *"Income or resources are no more than 'means' to the freedom to lead an acceptable life, and deprivation can arise from other sources as well. A person with a disease that requires expensive treatment (such as kidney condition) may be more economically deprived than another person who is 'poorer' on terms of income, but who does not have a comparable illness. A person with disability has special needs, and thus requires more resources to escape a poor life. The case of the pregnant women is quite different – this is the exercise of a special ability rather than the existence of a disability – but she too has extra needs related to the act of procreation."*

Sen has famously suggested to assess poverty as deprivation of some elementary capabilities. But application of 'capability approach' is dependent on critical questions like the conceptual reach and depth and its feasibility determined through informational requirements. Poverty line only allows person independent picture of income gaps. Ideally, measurement of well-being should, therefore, address maximum interpersonal differences in characteristics. The actual conceptualisation of the capability approach acknowledges interpersonal variations in the functional relation between resources and achievements which in words of Sen refers to freedom that allows achievement. The baseline of course is that every person may need the same set of primary goods/ resources to pursue their diverse ends. The welfare economic approaches of arriving at indicators of availability of resources indicating material well-being may be compromised because of their disregard for the real problem of conversion of resources into personal capabilities (Granaglia, 1994).

Challenges have been highlighted in terms possibility of extracting true information about individual's conversion capabilities and the incentive for the individual to do so. Sen argues that the search for an approach that would be informationally sensitive and undemanding is unlikely to be successful. It is ultimately a question of going as far as we can in meeting the intellectual necessity of information sensitivity. For simple cases like income related deprivations conditions like illness, homelessness and undernourishment crudely indicate individual well-being or the lack of it. It is not sufficient to capture

individual differences only and should be extended to inter-group differences for a variety of reasons based on several identity factors. Nevertheless, it is reasonable to start with information on distribution of incomes and wealth. The generalisation would be restrictive given multiple choices of conversion of resources to capabilities and achievements. The most important policy development since the idea of capability and well-being took shape as the Stiglitz-Sen-Fitoussi report commissioned by the then French President Nicholas Sarkozy.

Scope of Subjective Well-being for Interpersonal Comparisons

Even as most parameters dealing with income and its distribution fail to capture interpersonal differences in characteristics leading to variety of outcomes and possibility, subjective analysis of individual conditions are not easy. Yet there has been a gradual development in the understanding and methodology to scientifically approach this problem and derive key lessons. Subjective Well-being (SWB) in most simplest of the terms tries to capture quality of life and how people experience life. As highlighted in the 4th World OECD Forum Report, originally limited to academic research and measured through small scale non-official surveys, these measures have recently started to be collected by an increasing number of statistical offices, a drive which has led to OECD efforts to develop framework for increasing comparability of existing data and to encourage more counties to undertake similar collections.

The key challenge has been to identify the objective function. The conceptualisation of individual satisfaction derived from material and social conditions needs further extension to include aptitude, ability and willingness to achieve individually determined thresholds conditional upon personal choices. There are increasing claims that even though well-being judgements are relative, meaningful comparisons may not be out of place. In that case anaylsis directed at qualifying and ranking individual well-beings should definitely lead to customised and tailored policy interventions to achieve robust developmental and sustainability outcomes perceptible at the level of individuals. Nevertheless, in this scheme of things there are dangers of getting preoccupied with individual characteristics, perceptions and choices putting aside externalities of natural habitat that is undergoing constant change due to deepening of material civilization. Layard (2005) points towards pollution as a negative externality due to increased manufacturing activity and at the same time lack of family stability from greater geographic mobility.

The range of concerns leading to both societal, political and policy urge to get closer to reality in terms of measuring well-being and satisfaction at the individual level draws upon complexities of modern economic systems marked with inequities of various forms. Such inequities are harmful since it restricts a large number of individuals from accessing means towards adequate support in terms of health, life skills, safe living conditions and personal rights, among others for labour-leisure choices. For example, Oswald (1997) points out that job satisfaction in the USA and UK remained at stagnant levels despite increase in incomes between 1970 and 1990. However, these results tend to vary greatly with level of economic development and hence deprivations may be more frequent in developing country conditions. We have already highlighted that the domain of subjective well-being tries to capture individual characteristics. With differences in cultural, historical and psychological contexts, investigators own lineage might bias the outcomes.

The last decade has seen a spontaneous growth of multi-disciplinary analysis of what we can say subjective well-being. Prominent among them is the class of studies undertaken by E Diener and colleagues. These studies have tried to dispel the reservations that earlier analysts had about cross-national comparisons of well-being. It is important to facilitate adequate comparisons the data collected must conform to longitudinal properties and should lend itself to dynamic comparisons across parameters.

As elaborated in Tov and Au (Chapter 35),

Diener (1984) suggests that SWB refers to the myriad ways in which people experience and evaluate their own lives positively. Kilpatrick and Cantril (1960) offered an early measure of a self-anchoring 10-point scale, where people were studied not only on the basis of their current situations and circumstances but also their perceptions about better or worse situations. In later studies individual perceptions have been clustered primarily around family, job and health.

In the series of studies by Diener (Diener, 1984; Diener *et al.,* 1999) two distinctions in the nature of parameters have been drawn. The cognitive components include overall judgements of life satisfaction as well as more specific domains of satisfaction (e.g. satisfaction with working life, economic situation, health and so on.), whereas the affective components consist of positive and negative emotions.

Tov and Au (2014) also point out that global measures require an overall assessment of well-being generalised over one's life (such as overall happiness). In contrast, narrow measures might focus specific areas of life (e.g. job satisfaction). There are also momentary measures that ask the people to report their current feelings and moods, and time inclusive (or retrospective) measures that ask people how they felt over a certain period of time. They emphasise that cognitive well-being can be assessed at a global level or at a more specific, time inclusive level. However, affective well-being can only be measured in an overall sense or with reference to specific periods. Some of the cross-national surveys include World Database Happiness (WDH). The WDH is a well updated compendium of well-being scores for over 160 societies based on surveys from 1946 to the present. Other examples are Eurobarometer, World Values Survey (WVS) and the Gallup World Poll as well as smaller national studies.

Sustainable Development Approach

The concept of sustainable development, a widely acknowledged subject of development thinking since the 1980s (WCED, 1987; Repetto, 1986; Redclift, 19987; Turner, 1988), encompasses issues relating to conservation of natural resources; improving the quality of environment by arresting alarming trends in deforestation, soil erosion, green-house effects, maintaining ecological balance. Sustainable development approach, which received exposition with the Report of World Commission on Environment and Development (1987), is defined as a situation in which the development vector - of desirable social objectives, like increase in real per capita income, improvement in health and nutritional status, growth in educational target; access to resources; a fair distribution of income; increases in basic freedoms – does not decrease over time (WCED, 1987). In fact constancy of the stock of natural resources and environmental quality is assumed to be a necessary condition for sustainable development through the accent to maintain essential ecological processes and life systems in nature, preserving genetic diversity and ensuring sustainable utilisation of species and ecosystems (IUCN, WCR, 1980). Sustainable development as a goal rejects policies and practices that support current living standards by depleting the productive base including the natural resources and that leaves future generations with poorer prospects and greater risks (Repetto, 1986). It is viewed that sustainable development based on the notion of conserving natural capital stock is consistent with justice in respect of socially disadvantaged; justice between generations (Rawls, 1972); justice to nature, aversion to risk arising from our ignorance about the nature of interactions environment, economy and society.

There have been attempts to estimate damage caused to the environment, to construct representative environmental indicators, and to include these in the national income accounting (Repetto *et al.,* 1989). Suggestions came forth to price environmental resources with a view to protect these from further extinction (OECD, 1989; Dasgupta, 1990). Hamilton and Lutz (1996) argued that since the Gross National Product (GNP) only measured the sum total of economic

production on the basis of transaction in the market place; it masked the depletion of natural resources and presented an incomplete picture of the costs imposed by the polluting by-products of economic activity. Towards addressing this inadequacy of GNP, they advocated for Green National Accounts. Thus, the environmental issues came to the forefront of development thinking. It was generally held that poverty is one of the major causes of environmental degradation in the developing world because of the imperative of immediate survival. With environmental deterioration the prospects for future livelihoods decrease, entailing environment-poverty trap (Pearce, Barbier and Markandya, 1990; UNDP, 1990). Any plan of action for improving environment must, therefore, include programme for reducing poverty in the developing world. The problem of environmental degradation has been even more alarming in developed countries. Heavy industrialistion, uncontrolled growth of cities, advanced agriculture making intensive use of land are said to have added to the problem of ecological imbalance. There has been a fast depletion of natural resources making the system unsustainable in the long-run. There are views that there may be some minimum stock of natural resources below which no nation should go if it is to avoid major disruption (Pearce, Barbier, and Markandya, 1990).

The foregoing discussion reinforces the argument that development should be viewed as an integrated phenomenon. In this context achieving higher growth, greater employment generation, creation of a sustainable production structure and a just distributional system, provision of basic needs of life to the masses, facilitating proper development of human capabilities and creating wide range of choices for people for livelihood, protecting environment from further degradation; economy in the use of natural resources keeping in view the interests of future generations, all assume importance to appropriately balance them keeping in view the nature of complementarity and competitiveness/substitutability. It is important to examine the nature of interrelationships among these aspects of development for any effective policy-making.

In recent approaches, material and emotional conditions of well-being have further been justifiably extended, primarily at the macro level to incorporate sustainability parameters. The Millennium Ecosystem Assessment (MEA), a premier UN initiative involving more than 1300 experts worldwide, suggested that about 60 per cent of the ecosystem services are getting degraded and used unsustainably. As highlighted in Thompson *et al* (2014) according to the Ecological Footprint (Wackernagel and Rees, 1996), global levels of resource use became unsustainable around the mid-1980s and have steadily become more so over the past decades (Simmons, 2009). The Environmental Sustainability Index (ESI) was published between 1999 to 2005 by Yale University's Center for Environmental Law and Policy in collaboration with Columbia University's Center for International Earth Science Information Network (CIESIN), and the World Economic Forum. ESI was developed to evaluate environmental sustainability relative to the paths of other countries.

Thompson *et al.* (2014) elaborate that there could be three pathways in which individual well-being may be related to the environment. Transparent pathways are those in which the relationship between environmental sustainability and well-being is direct and immediate. Semitransparent pathways are those in which a direct relationship is mediated by environmentally relevant rules and behaviour. The opaque pathways are those in which relationship exists but is wholly or largely indirect.

Transparent pathways could include local environment conditions as well as wider environmental conditions suggesting overuse of natural resources available with particular geographical limits. Semi-transparent pathways include individual choice of lifestyle (fuel guzzling modes of transport as opposed to generating negative externalities. Finally opaque pathways may include excessive materialism and consequent impacts. Such considerations of course lead us

to a framework of sustainable consumption and production.

The UN Millennium Development Goals (2000-2015) primarily attempted to reduce material underdevelopment. Sustainable use of natural resources was addressed through focus on renewable energy. However, the newly introduced UN Sustainable Development Goals (2016-2030) with significant ownership by all member countries goes much beyond underdevelopment and deprivations to mandate rigorous implementation of sustainable measures across all economic pathways. Apart from expanding capacities for renewable energies and sustainable use of natural resources through preserving habitat and ecosystem, the new agenda of sustainable development has stressed on sustainable consumption and production as indispensable stepping stone for future growth paradigms.

Conceptual Synthesis of Well-being Measurement

Measurement of Well-being: Country Level Initiatives

(i) Stiglitz-Sen-Fitoussi Report (2009) by France

In 2008, a Commission on the Measurement of Economic Performance and Social Progress was set up by Nicolas Sarkozy to identify the limitations of GDP as an indicator in measuring economic and social progress. The Commission was headed by Joseph Stiglitz, Amartya Sen and Jean-Paul Fitoussi. The Report by Stiglitz-Sen-Fitoussi published in 2009 focusses on assessing the current well-being and its sustainability in the future. The current well-being depends upon economic resources such as income and non-economic aspects such as a person's capability, feelings and the environment he lives in. Sustainability of these levels of well-being depend on whether these natural, human and physical resources are passed on to future generations.

The report emphasises that well-being is multi-dimensional encompassing the following dimensions: (i) Material living standards (income, consumption and wealth); (ii) Health; (iii) Education; (iv) Personal activities including work; (v) Political voice and governance; (vi) Social connections and relationships; (vii) Environment (present and future conditions); and (viii) Insecurity, of an economic as well as a physical nature.

The report has made significant contributions in terms of endorsing some of the mortality and morbidity related indicators. The indicators are listed in Table 1.

Table 1: Health Indicators

Domain	Indicators
Mortality	i) Life expectancy at birth ii) Standardised mortality rates iii) Median life expectancy
Morbidity	i) Anthropometric Measures ii) Disease specific information iii) General measures of self-reported health iv) Vignettes v) Specific measures of self-reported health vi) Activities of daily living and instrumental activities of daily living

Source: Report by the Commission on the Measurement of Economic Performance and Social Progress

Measures like Disability-Adjusted Life Year (DALY), Disability-Free Life Expectancy (DLFE) and Health-Adjusted Life Expectancy (HALE) calculate the average number of years of life spent in good health, after adjusting for years lived with some form of illness or disability.

The report also focusses on the importance of subjective well-being, though no specific indicator to capture this has been proposed. The report refers to Diener (1984) to suggest that subjective well-being comprises three aspects: (i) Life satisfaction, (ii) Presence of positive feelings or affect, and (iii) Absence of negative feelings or affect.

The most comprehensive treatment to the role of environmental conditions in affecting the wellness paradigm has been made by the Stiglitz-Sen-Fitoussi Report (2009) on the Measurement of Economic

Performance and Social Progress. They argued that the environmental conditions affect the quality of life of people living today in very immediate ways. First, they affect human health, both directly (through air and water pollutions, hazardous substances and noise) and indirectly (through climate change, transformations in the carbon and the water cycles, biodiversity loss and natural disasters that affect the health of ecosystems).

Secondly, people benefit from environmental services, such as access to clean water and nature, and their rights in this field (including rights to access environmental information) have been increasingly recognised. Thirdly, people value environmental amenities, and these valuations affect their actual choices (e.g. of where to live). Lastly, environmental conditions may lead to climatic variations and natural disasters, such as drought and flooding, which damage both the property and the lives of the affected populations. However, they also expressed that measuring the effects of environmental conditions on people's lives is very complex. An array of indicators proposed in the Report for measuring environment induced wellness is as follows:

- the number of premature deaths from exposure to air pollution, in particular from particulate pollution;
- the share of the population lacking access to water services, in particular water supply and sanitation;
- the share of the population without access to nature, with a focus on daily proximity and appropriate mapping;
- the share of the population exposed to daytime noise above 65dBA levels, in particular noise in dwellings, to be collected through appropriate surveys and mapping;
- information on the damage (both insured and non-insured) incurred due to environmental disasters, such as floods and droughts;
- measures and assessment tools for emerging environmental issues (*e.g.* endocrine disruptors, pesticides, non-ionising electromagnetic radiation) and their longer-term effects on quality of life (QoL) (*e.g.* from hazardous substances, climate change, biodiversity degradation, resource depletion);
- methods for valuing people's environmental choices (*e.g.* hedonic prices, valuation of externalities and of the services provided by ecosystems) and for supporting economic decisions related to the environment and QoL (costs of inaction, environment-related jobs; energy and material intensities); and finally,
- surveys of people's own feelings and evaluations of the environmental conditions of their country and neighborhood.

Bhutan

In 1972, Gross National Happiness (GNH) was coined by the Fourth King of Bhutan Jigme Singye Wangchuck. He highlighted the fact that "Gross National Happiness is more important than Gross Domestic Product". Since the time Bhutan introduced the Gross National Happiness index to capture well-being, many countries across the world started to develop happiness indicators (Oxford Handbook of Happiness, 2014).

The GNH emphasises on the importance of material well-being along with enjoyment of sufficient well-being from community culture, governance, knowledge & wisdom, health, spirituality & psychological welfare, a balanced use of time, and harmony with the environment (CBSR, 2015). Bhutan has a strong commitment towards environmental conservation, which is reflected from its high forest coverage; it has 72.5 per cent forest coverage with more than half of its total land area designated as protected areas. This positive state has further directed Bhutan to pursue being a green economy. Focussing on environment conservation has led Bhutan to adopt new technologies to reduce emission from vehicles. Electric cars were introduced in Bhutan in 2014.

The GNH index measures psychological well-being using four indicators, viz. evaluative life satisfaction, positive and negative emotions

and spirituality. The GNH Index does not solely focus on subjective happiness as it fails to capture altruism or care for environment. The conceptual framework of GNH Index is based on four pillars: political, economic, cultural and environmental, and on nine domains of GNH which are:

i. **Psychological well-being:** The quality of life is measured by various indicators including spirituality, life satisfaction, and affective reactions to life events such as positive and negative emotions.

ii. **Health:** Includes a healthy human body and a healthy mind. It covers conditions of the human body and mind including physical and mental states. A healthy life is essential for a person to function without undue fatigue or physical stress.

iii. **Time use:** Analyses the nature of time spent on work, leisure, care and sleep. It highlights the importance of maintaining a harmonious work life balance.

iv. **Education:** Includes formal and informal education, and assesses each person's wider knowledge, values, and skills.

v. **Cultural diversity and resilience:** Shows the diversity and strength of traditions including festivals, norms, and the creative arts.

vi. **Community vitality:** Studies relationships and interaction within communities, and among family and friends. It also covers practices like volunteering.

vii. **Good Governance:** Evaluates how people perceive governmental functions and evaluate public service delivery. It explores people's level of participation in elections and government decisions, and their assessment of various rights and freedoms.

viii. **Ecological diversity and resilience:** Tracks people's perceptions and evaluations of environmental conditions in their neighbourhood, and their eco-friendly behaviours. It also covers hazards like fires or earthquakes.

ix. **Living standards:** This domain refers to the level of material comfort as measured by income, conditions of financial security, housing and asset ownership.

Each domain is equally weighted and if a person has sufficiency in at least two thirds, he/she is considered 'happy' in terms of the GNH Index. According to 2015, GNH Survey, farmers had the lowest GNH. This was lower than the GNH of the unemployed. The domains and the indicators with their respective weights are listed in the Table A1 in Annexure.

The GNH Index in 2015 was 0.756, which was a significant increase from 0.743 in 2010. In 2015, 91.2 per cent of Bhutanese were narrowly, extensively, or deeply happy. 8.4 per cent were deeply happy. Bhutan aims to achieve all Bhutanese to be extensively or deeply happy. In 2015, Bhutanese also reported a higher number of healthy days in a month than in 2010.

Canada

The development of Canadian Index of Well-being (CIW) was motivated by the Atkinson Charitable Foundation in 1999. In a workshop conducted by the Atkinson Charitable Foundation they asked the experts on social indicators research the following question "What would it take to create a tool to measure the well-being of Canadians?"

In 2011, the first national report on CIW was launched which highlighted the fact that between 1994 and 2008 Canada showed robust economic growth but increases in the well-being of Canadians were not nearly comparable. Over the fifteen-year period, GDP had grown almost four times more than the well-being.

The CIW transformed core Canadian values into thematic domains. The CIW is based on eight domains, each domain further includes eight indicators with a total of 64 indicators. The domains of CIW are: (i) Community Vitality, (ii) Democratic Engagement, (iii) Education, (iv) Environment, (v) Healthy Populations, (vi) Leisure and Culture, (vii) Living Standards, and (viii) Time Use.

As inequality is rising worldwide, the gap between people at the top and bottom is also growing in Canada. Increasing inequality leads to unbalanced societies which are often shown to have worse health and well-being outcomes for its citizens. For instance, perceived health is an indicator of health in CIW. Perceived Health means a person's health in general – absence of disease or injury, physical, mental and social well-being. In 2010, 60.1 per cent of the Canadians (age 12 & older) assessed their health as 'very good' or 'excellent'.

China

A recent report jointly published by CASTED and FAFO (2014) in China on measuring sustainable development in China includes theoretical and methodological background of the sustainable well-being index that includes indicators on environment and health. In this report, on environmental sustainability four themes have been mentioned viz. sustainable resource consumption, environmental pollution, environmental status and global environmental impact. The indicators within each theme are listed in Table A2 in Annexure. The report also mentions the health based themes and indicators, which are listed in Table A3 in Annexure.

China has also developed a basic framework of medical and health services for low-income population (Yan and Qunhong, 2014). The framework is illustrated in Figure 1.

Organisation for Economic Cooperation and Development (OECD)

The OECD has promoted the idea of well-being and its measurement since the first OECD World Forum held in Palermo in 2004. A key initiative by OECD on *Measuring the Progress of Societies* commenced in 2007 at the Istanbul World Forum. Subsequently, OECD organised World Forum in Busan in 2009 and in New Delhi in 2012. The OECD framework for well-being indicators is based on the material living

Table 2: OECD Indicators used to measure Well-being

Domain	Dimensions	Indicators
Material Conditions	Income and Wealth	Household net adjusted disposable income per person
		Household financial net wealth per person
	Jobs and Earnings	Employment Rate
		Long-term Unemployment
	Housing	Number of rooms per person
		Dwellings with basic facilities
Quality of Life	Health Status	Life-expectancy at birth
		Self – reported health status
	Work and Life	Employees working very long hours
		Time devoted to leisure and personal care
		Employment rate of women with children
	Education and Skills	Educational Attainment
		Students' cognitive skills
	Social Connections	Contacts with others
		Social network support
	Civic Engagement and Governance	Voter Turn-out
		Consultation on rule-making
	Environmental Quality	Air pollution
	Personal Security	Intentional Homicides
		Self- reported victimisation
	Subjective Well-being	Life satisfaction

Source: Compendium of OECD Well-being Indicators, 2011.

conditions, quality of life and sustainability of the socio-economic and natural systems (OECD, 2012). These domains include several dimensions to capture well-being. The dimenstions are:

Material Living Conditions: (i) Income and Wealth; (ii) Jobs and Earnings; and (iii) Housing.

Quality of Life: (i) Health Status; (ii) Work and Life Balance; (iii) Education and Skills; (iv) Civic Engagement and Governance; (v) Social Connections; (vi) Environmental Quality; (vii) Personal Security; and (viii) Subjective Well-Being.

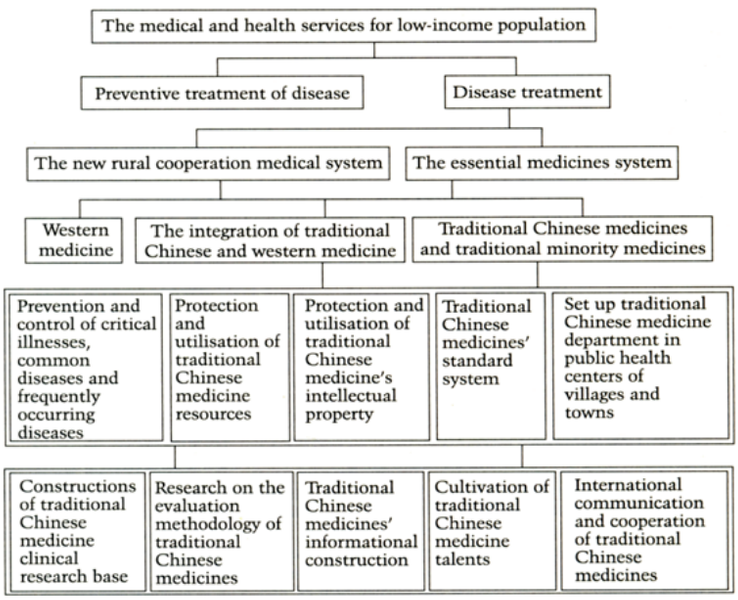
Sustainability of Well-being over time: Preserving for types of sources for future generation: (i) Natural Capital; (ii) Economic Capital; (iii) Human Capital; and (iv) Social Capital.

These domains further include various indicators used to measure well-being in various countries listed in Table 2.

In 2011, *Better Life Initiative* was launched at OECD's 50th Birth anniversary. It is a comprehensive representation of internationally comparable indicators of well-being. It features eleven dimensions of well-being covered by 22 headline indicators and 33 additional indicators. The data is available for 36 OECD and partner countries. The key features of the OECD include focussing on people, concentrating on outcomes, distribution of well-being among population groups and considering both subjective and objective aspects of well-being (OECD, 2013).

OECD (2011) had come out with a Compendium of OECD Well-being Indicators in which under the quality of life section, environmental quality has been mentioned as a crucial factor in ensuring quality of life and well-being. In its report, *How's Life? 2015: Measuring Well-Being*, it stated that living in an environment that is free from dangerous pollutants, hazards and noise contributes to individual physical and mental health. However, only two factors i.e. of air pollution and access to clean and safe water have been provided for. Air pollution is to be measured in terms of concentration of fine particles (PM10), and concentration of ground-level ozone, sulphur dioxide (SO_2) and nitrogen

Figure 1: China's Basic Framework of Medical and Health Services for Low-Income Population



Source: Liu Yan and Wu Qunhong (2014), The Living Tree.

dioxide (NO_2). Access to clean and safe water is to be captured through people's subjective satisfaction with the quality of local water.

In 2012, fourth OECD World Forum was held in New Delhi on "Measuring Well-Being for Development and Policy Making". Key initiatives where significant progress has been achieved were discussed at the Forum. These include:

Material Conditions: OECD's work on developing guidelines for the measurement of household wealth and the need to integrate income inequality in household national accounts.

Quality of Life: OECD's guidelines on measuring subjective well-being, classifications to be used in time-use surveys and recommendations to develop common metrics for non-fatal health outcomes by various UN Groups.

Sustainability: UN standard for a System of Economic and Environmental Accounting(SEEA) and the proposed indicators by the UNECE/OECD/Eurostat Taskforce.

OECD's latest report *How's Life? 2015: Measuring Well-Being* focusses on measuring well-being at a regional level.

In 2007, the European Commission, European Club of Rome, OECD and WWF organised Beyond GDP conference to explore various ways to improve the measurement of well-being and progress. European Commission President Jose highlighted in his opening speech how GDP was being adopted around the world to measure economic performance. He stated that "GDP is an indicator of economic market activity. It was not intended to be an accurate measure of well-being".

Office of National Statistics (ONS), UK

ONS (2011) has developed an approach for measuring subjective well-being by weighing the determinants along three broad approaches that have been identified when measuring subjective well-being viz. 'evaluative', 'experience', and 'eudemonic'. Questions are grouped according to type of subjective well-being measure (evaluative, experience and eudemonic) and depending on the level of detail that they provide and how they could relate to different purposes of public policy (such as overall monitoring, policy formulation and policy appraisal).

The evaluative approach requires respondents to make an information appraisal or cognitive reflection of their life. Respondents can be asked to provide an assessment of their overall life satisfaction or certain aspects of their life such as satisfaction with their health, job, relationships.

Experience (or affect) measures aim to provide an assessment of the emotional quality of an individual's experience in terms of the frequency, intensity and type of affect or emotion at any given moment, for example, happiness, sadness, anxiety or excitement. This can be collected via diary based methods such as the Day Reconstruction Method (DRM) and the Experience Sampling Method (ESM) where respondents report feelings at different times of the day while carrying out different activities. It is also possible for this information to be collected via more general social survey by asking respondents questions about their feelings over a short reference period. Experience measures can pick up both positive emotions, such as happiness, joy or contentment, and negative ones, such as anxiety, worry, pain, or anger.

The eudemonic approach is based on the theory that people have underlying psychological needs for their lives to have meaning, to have a sense of control over their lives and to have connections with other people. This approach to subjective well-being is also sometimes described as the 'functioning' or 'psychological' approach to well-being. Eudemonic measures look to capture a range of factors that can be considered important, but are not necessarily reflected in evaluative or experience measures and can include autonomy, control, competence, engagement,

Table 3 : Well-being Indicators in Selected Surveys

Domain	Item	US General Social Survey	German socio-economic panel	British panel survey	European social survey	European quality of life survey	World Values survey
Material Well-being	Standard of living				X	X	
	Financial situation	X					X
	Housing		X	X		X	
	Personal income		X	X			
Health	Health		X	X		X	
Productivity	Work (housework)	X	X	X	X	X	X
Security	Social security		X				
Intimacy	Family life	X	X		X	X	X
	Friends				X		
	Husband/wife/ partner			X			
Community	Social life			X		X	
	Education					X	
	Voluntary work		X		X		
Spirituality/ Religion	Religion				X		
Other	Free time		X				
	Life so far				X		
	Politics				X		
	Work-life balance				X		
	Leisure time			X	X		
	Child care		X				

Source: Samman (2007), Psychological and Subjective Wellbeing.

good personal relationships, a sense of meaning, purpose and achievement.

Well-being Indicators Used in Surveys: A Comparison

A study conducted by Samman (2007) on comparable well-being indicators reveals the domains and items covered in various household surveys on perceived satisfaction or happiness. Various surveys and their indicators are listed in Table 3, providing a comprehensive framework to compare well-being indicators across surveys.

A summarised Table depicting various well-being measurement initiatives undertaken by some of the countries can be found in Annexure (Table A4).

Popular Indices on Well-being

In 2007, a survey was conducted by GlobeScan in Brazil, Russia, India, Canada, Australia, France, Germany, Great Britain, Italy and Kenya. Around 1,000 respondents were asked about their views and preferences on whether: (i) Their government should measure national progress through money-based indicators as economic progress is crucial for the country or (ii) Environment, Health and other social indicators are as important as economic indicators and should be used to measure national progress.

Developed countries like Italy and France showed strong support for 'beyond GDP' measures, as around 85 per cent of the respondents showed support for non-economic indicators such as health and environment. In developing countries, around 70 per cent of the respondents of India and Kenya showed support for non-economic indicators, but a significant minority of 28 per cent still had a firm belief in economic indicators alone (GlobeScan, 2007). In Brazil, 69 per cent of the respondents supported broader growth indicators but 22 per cent of the respondents still supported economic indicators. Interestingly, 75 per cent of the respondents in Russia showed support for social indicators, health and environment.

The recent report on '*Five headline indicators of national success*' by New Economics Foundation - NEF, a think tank in UK focusses on Good jobs, Well-being, Environment, Fairness and Health to measure national progress. It provides a clearer picture of how UK is performing.

We discuss, here some of the popular methodologies and surveys on well-being:

Gallup Survey

The Gallup World Poll (GWP) was started in 2006 annually around the world. It asks individuals for their judgements on various topics, like economics, religion, migration, and well-being and produces Thriving, Struggling, and Suffering indexes to measure respondents' thoughts of where they stand now and in the future. Gallup processes life satisfaction by asking respondents to rate their present and future lives on a "ladder" scale with steps numbered from 0 to 10, based on the Cantril Self-Anchoring Striving Scale, where "0" indicates the worst possible life and "10" the best possible life.

Results are generated through face-to-face and telephonic interviews with roughly 1,000 adults, aged 15 and older. Samples are probability based and nationally representative of the resident population, with some exceptions. Random Digit Dial telephone surveys, including landline and cell phone samples, are used where telephone coverage represents at least 80 per cent of the population or is the usual survey methodology whereas an area frame design is used for face-to-face interviewing in Central and Eastern Europe, and in the developing world.

Gallup uses post-stratification weighting by gender, age and education level as a final step in the preparation of each countries data.

Data weighting ensures a nationally representative sample for each economy. The margin of error is calculated around a proportion at the 95 per cent confidence level. Other errors that can affect survey validity include measurement errors associated with the questionnaire.

Happy Planet Index

The Happy Planet Index focusses on measuring sustainable well-being, that is, how do the nations fare in achieving a long happy and sustainable life for its citizens. Western countries with a high GDP do not rank highly on the Happy Planet Index. The Happy Planet Index combines four elements to demonstrate how efficiently different countries are using environmental resources to lead happy lives (NEF, 2016). These elements are combined together to calculate the HPI score. The four elements are:

1. **Well-being**: The satisfaction of the citizens of a country with overall life is calculated on a scale from zero to ten. The data is collected as a part of the Gallup World Poll.
2. **Life Expectancy**: The average number of years an infant born in a country is expected to live. The data is collected by United Nations.
3. **Inequality of Outcomes**: The inequalities within the citizens of a country in terms of the happiness they feel and the number of years they live a healthy life. The calculations are based on the data of each country's life expectancy and well-being.
4. **Ecological Footprint**: The average impact that a citizen of a country places on the environment, in terms of the average amount of land needed, per head of population, to sustain a typical country's consumption patterns. It is a measure of consumption and not production. Ecological Footprint is expressed using a standardised unit: global hectares.

The Happiness Planet Index (HPI) is calculated as:

$$HPI \approx \frac{(LE \times EW) \times IO}{EF}$$

where,

LE = Life expectancy

EW = Experienced well-being

IO = Inequality of outcomes

EF = Ecological Footprint

The Happy Planet Index scores over other happiness indicators as it captures the inequalities in terms of living a happy and healthy life and imposes a penalty on countries in the form of ecological footprint. According to the Happy Planet Index 2016, Costa Rica ranked first for the third time. The people in Costa Rica experience a happy, healthy and longer life than other countries due to its low ecological footprint. Among BRICS countries, Brazil was ranked 23rd, India was ranked 50th, China was ranked 72nd, Russia was ranked 116th and South Africa stood at 128th and ranked lowest amongst the BRICS countries.

Social Progress Index

The Social Progress Index (SPI) measures and assesses various facets of economic and social performance through the following methodological choices: (i) Non-economic dimensions of state performance, (ii) Evaluation approach based on outcome indicators, rather than input measures, (iii) All-inclusive framework consisting of three major dimensions of social progress, each of which is the sum of four equally weighted elements, and (iv) Calculation of each element as the weighted sum of a series of measures, with the weights determined through principal component analysis.

The SPI indicators consist of three basic foundations, the basic human needs, foundations of well-being and opportunity. The indicators for these domains are listed in Table 4.

Table 4: The SPI Indicators

Basic Human Needs	Foundations of Well-being	Opportunity
Nutrition and Basic Medical Care • Undernourishment • Depth of food deficit • Maternal mortality rate • Child mortality rate • Deaths from infectious diseases	**Access to Basic Knowledge** • Adult literacy rate • Primary school enrollment • Lower secondary school enrollment • Upper secondary school enrollment • Gender parity in secondary enrollment	**Personal Rights** • Political rights • Freedom of speech • Freedom of assembly /association • Freedom of movement • Private property rights
Water and Sanitation • Access to piped water • Rural access to improved water source • Access to improved sanitation facilities	**Access to Information and Communications** • Mobile telephone subscriptions • Internet users • Press Freedom Index	**Personal Freedom** and **Choice** • Freedom over life choices • Freedom of religion • Early marriage • Satisfied demand for contraception • Corruption
Shelter • Availability of affordable housing • Access to electricity • Quality of electricity supply • Household air pollution attributable deaths	**Health and Wellness** • Life expectancy at 60 • Premature deaths from non-communicable diseases • Obesity rate • Suicide rate	**Tolerance and Inclusion** • Tolerance for immigrants • Tolerance for homosexuals • Discrimination and violence against minorities • Religious tolerance • Community safety net
Personal Safety • Homicide rate • Level of violent crime • Perceived criminality • Political terror • Traffic deaths	**Environmental Quality** • Outdoor air pollution attributable deaths • Wastewater treatment • Greenhouse gas emissions • Biodiversity and habitat	**Access to Advanced Education** • Years of tertiary schooling • Women's average years in school • Inequality in the attainment of education • Globally ranked universities • Percentage of tertiary students enrolled in globally ranked universities

Source: SPI-2016-Methodological-Report.pdf

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Annexure

Table A1: Indicators used in calculation of Gross National Happiness Index

Domain	Indicators	Indicator weight
Psychological Well-being	Life Satisfaction	1/3
	Positive emotion	1/6
	Negative emotion	1/6
	Spirituality	1/3
Health	Self-reported health status	1/10
	Number of healthy days	3/10
	Disability	3/10
	Mental Health	3/10
Time use	Work	½
	Sleep	½
Education	Literacy	3/10
	Schooling	3/10
	Knowledge	1/5
	Value	1/5
Cultural Diversity & resilience	*Zorig chusum skills* (Artisian skills)	3/10
	Cultural Participation	3/10
	Speak native language	1/5
	Driglam Namzha (code of conduct)	1/5
Good Governance	Political Participation	2/5
	Services	2/5
	Governance performance	1/10
	Fundamental rights	1/10
Community vitality	Donation (time & money)	3/10
	Safety	3/10
	Community relationship	1/5
	Family	1/5
Ecological diversity & resilience	Wildlife damage	2/5
	Urban issues	2/5
	Responsibility to environment	1/10
	Ecological issues	1/10
Living standard	Income	1/3
	Assets	1/3
	Housing	1/3

Source: Bhutan's 2015 Gross National Happiness Index, Centre for Bhutan Studies & GNH Research.

Table A2: Environment based Indicators

Theme	Indicators
Sustainable resource consumption	Total unclean energy consumption (10,000 tonnes)
	Proportion of ecological food production by total food production (percentage of total food production)
	Water consumption deficiency (m3/person)
Environmental pollution	Total Chemical Oxygen Demand (COD) discharge (10,000 tonnes)
	Total SO2 discharge (10,000 tonnes)
	PM10 discharge concentration (mg/m^3 per day)
	Lead discharge in industrial waste water (tonne)
	Outdoor air pollution attributable deaths in urban cities with 100,000 or more habitants.
	Total CO2 discharge (10,000 tonnes per year)
Environmental status	Heavily polluted seawater in coastal areas (% of total coastal area)
	Heavily polluted fresh water (% of total fresh water area)
	Perceptions of pollution problems
	Forest coverage (% of total landmass)
Global environmental impact	Ecological footprint
	Contribution of China to the global genuine saving from import

Source: CASTED and FAFO (2014).

Table A3: Health Indicators

Theme	Indicators
Health Status	Prevalence of Non-Communicable Diseases (% of population)
	Average Life expectancy (year)
	Self-rated health status
Health risks	Per capita daily alcohol consumption (kg)
	Per capita daily tobacco consumption
	Obesity (% of adult population)

Source: CASTED and FAFO (2014).

Table A4: Well-Being Measurement Initiatives in Some Countries

Sl. No.	Country	Initiative	Description	Framework/ Factors Taken Under Consideration
1	Bhutan	*Gross National Happiness (GNH)*	GNH seeks to achieve a harmonious balance between the material and non-material needs of Bhutan's society, consistent with the sustainable use of the natural environment. GNH simple premise is that happiness is ultimately what every individual wants from his life, so it must be the purpose of government to create the conditions needed to achieve that goal.	Four Pillars, Nine domains and 126 Indicators *4 Pillars are:* • Good Governance • Sustainable Socio-economic Development • Preservation and Promotion of Culture • Environmental Conservation ***9 Domains are***: • Psychological Well-being • Standard of Living • Good Governance • Health • Education • Community Vitality • Cultural Diversity and Resilience • Time Use • Ecological Diversity and Resilience
2.	The Philippines	*Philippines National Strategy for the Development of Statistics (NSDS)*	Subjective quality of life surveys	More important well-being factors found: • Family • Health • Religion
3.	China	*No initiative at national level yet. But taken initiative at Province level (Guangdong)*	Guangdong Well-being Index	Comprises 10 indicators
4.	Canada	*Canadian Index of Well-being (CIW)*	Canada's well-being work is led by civil society and supported by a community of distinguished Canadian and international researchers, practitioners, policy experts, community groups and well-being advocates – in consultation with government. Crucially, it was conceived and implemented entirely by citizens and Citizen-based organisations.	Comprises 8 Domains and 64 Indicators *8 Domains are:* • Community Vitality • Democratic Engagement • Education • Environment • Healthy Populations • Leisure and Culture • Living Standards • Time Use

5.	Australia	*Measures of Australia's Progress (MAP)*	Australian well-being framework aimed, above all, to reflect the views of the Australian people. The model for the production of progress measures was based on the notion that, in order to know if we are progressing, we need to know the aspirations of the Australian people, which could then be mapped to indicators describing their most important features. The resulting matrix would allow for examining the relationships and tradeoffs between aspirations and progress.	Comprises three Domains and 17 Elements *3 Domains are:* • Society (health, • education-training, work, crime, family-community, social cohesion and democracy-governance-citizenship), • Economy (national income, national wealth, household • economic well-being, housing and productivity) • Environment (biodiversity, land, inland waters, oceansestuaries, • atmosphere and waste).
6.	Italy	*BES* Initiative for Equitable and Sustainable Well-being	The *BES* initiative delivered a dashboard of indicators providing a shared view of the progress of Italian society.	The dashboard is being built on a deliberative process based on three components: first, a Steering Committee with 33 stakeholders (entrepreneurs, unions, NGO networks, women, consumers, environmental organisations), to identify domains and agree on a final list of indicators; second, a Scientific Commission of 80 experts from academic and research institutions, to identify the best indicators from each domain; third, public consultations through a national survey, blog and regional meetings. Next steps in the BES initiative will include: further discussion on the dashboard of indicators at local level; a first report on well-being in Italy: analysis of well-being and equity; definition of composite indicators for each domain or sub-domain; and definition of a set of indicators in order to assess sustainability.
7.	Mexico	*Well-being Measurement Initiative*	National Statistical Office of Mexico (INEGI) working on new surveys	Three steps taken are: The first has been to promote discussions on the subject through seminars and conferences organised with other partners. The second has been to integrate existing well-being statistics in a specific subsection of the INEGI website, and developing new measures where these were lacking: this has taken the form of including new questions on subjective well-being in a range of existing surveys (household income and expenditure survey, time use survey, consumer Confidence and public perception survey). The third has been to promote the use of the new set of well-being Indicators.

8.	Morocco	*Well-being Measurement Initiative*	Well-being Survey based on interactive approach	Survey had three components: • First, the population was asked what mattered to them (with results showing that the most important dimensions are housing, income, employment, health, education, culturaland spiritual life, and leisure); • Second, for each of these dimensions, more detailed questions were asked to • determine the precise meaning of the initial responses (with questions about satisfaction for each domain and life satisfaction in general also included); • Third, through repeated surveys, people's satisfaction in each domain will be observed to assess the impact of policy changes.
9.	France	*Well-being Measurement Initiative*	French Statistic Office (INSEE) Multi-Modal Survey on Quality of Life	Initial results from the survey show That weak social links, financial constraints and stress have the strongest relationship with perceived well-being, closely followed by health problems, housing issues and insecurity. Results also show that income does not play directly on well-being, but through the consumer goods that people can buy. For employed people, survey results Show that psycho-social risks lead to low perceived well-being.
10.	UK	*Subjective Well-being Measurement Initiative*	Office of National Statistics (ONS)	Developed a framework for measuring subjective well-being; based on recommendations made by Dolan, Layard and Metcalfe and OECD framework. In this, the questions are grouped according to type of subjective well-being measure (evaluative, experience and eudemonic) and depending on the level of detail that they provide and how they could relate to different purposes of public policy.
11.	Germany	*Well-being Measurement Initiative*	*Government established Parliamentary Commissions to discuss development of a framework for well-being measurement*	Initiative launched following the release of star Stiglitz-Sen-Fitoussi Commission Report 2009
12.	Finland	*Well-being Measurement Initiative*	*Government established Parliamentary Commissions to discuss development of a framework for well-being measurement*	Initiative launched following the release of star Stiglitz-Sen-Fitoussi Commission Report 2009
13.	Japan	*Well-being Measurement Initiative*	*Government conducting Expert Roundtables to discuss development of a framework for well-being measurement*	Initiative launched following the release of star Stiglitz-Sen-Fitoussi Commission Report 2009
14.	Spain	*Well-being Measurement Initiative*	*Government conducting Expert Roundtables to discuss development of a framework for well-being measurement*	Initiative launched following the release of star Stiglitz-Sen-Fitoussi Commission Report 2009

Source: Compiled by authors.

Framework for a BRICS Wellness Index

Sabyasachi Saha*

The Idea of Wellness

Approaches on well-being measurements highlighted in the previous chapter broadly focus on identifying gaps and variations in incomes and resources at disposal of individuals for meaningful assessment of material satisfaction. Secondly, given dissimilar psychological orientations of individuals and experience of life linked to material resources, social (or family) conditions and habitat, well-being measures have attempted to extract individual information of perceptions and transform them into metrics to suggest levels of subjective well-being at the national and societal levels. However, intricacies of human life functional on material living and conditional choices can only be partially captured. Nevertheless, it would be important to acknowledge the centrality of human health and environmental ecosystems for sustainability of well-being beyond present generations. The current levels of actual and perceptive well-being could be misleading from an intergenerational point of view. Hence, it is crucial that we identify parameters that can help us in defining contours of well-being from an intergenerational perspective. The idea of wellness should place foremost priority to sustainability of the environment and vitality of human health.

Achievement of health (in totality) may act as a fourth pillar beyond national income, poverty and inequality to measure the level of wellness. The concept of wellness dates back to 1948 when World Health Organisation (WHO) defined health as a "state of complete physical, mental, and social well-being and not merely the absence of disease and infirmity" (WHO, 1948). We understand, wealth and health contribute to individual wellness. We can measure both of these to some extent. But these are supported through individual characteristics of happiness like job satisfaction, freedom (beyond political freedom in many cases) and capability to transform resources towards enduring capacities like education and skills for the individual and the family. As highlighted by Sen (1994) statistical impossibilities and challenges would nevertheless constrain our information set. But we can safely institutionalise health-based measure as a key indicator for wellness. However, health outcomes at individual and society levels are not mere functions of resources to gain access to adequate nutrition and medical treatment, but also the quality of natural habitat. Challenges of fast deteriorating environment are well known. But comprehensive accounting of environmental challenges related to human health alongside

* Assistant Professor, RIS

health-based measures (inputs, outcomes and institutions) can give us a robust framework for measuring national 'wellness'.

The key information requirements to capture health-based well-being cover illness and morbidity in the realms of disease profile, community health (for example of tribal and vulnerable communities), history and vulnerability of pandemics in the regional contexts, water and vector borne diseases, age specific disease profile, diversity of ethnic characters and diseases. This class of information may be available with most countries in some form with greater sophistication for mature statistical systems and in cases where statistics is well informed of academic research and policy objectives. However, taking clue from both capability and subjective well-being traditions one safely arrives at conditions that lead to availability, knowledge and access of preventive as well as curative healthcare. Preventive health care often includes resources, knowledge and access to traditional knowledge systems that are often environmentally embedded given their historic understanding of close association between man and nature. Modern medicines, more importantly vaccines to treat otherwise deadly forms of illness have come to rescue mankind. However, preventive healthcare may include use of traditional health systems and wisdom on lifestyle that might be effective in supplementing modern approaches.

Finally, the modern age healthcare modalities that include clinical and pathological investigations, administration of drugs and providing adequate often life saving support in specialised environments like hospitals all constitute curative healthcare. Again, both questions of availability and access are central to emphasising on well-being of individuals. We understand that this may need information on medical services that include health coverage, government expenditure on health, out of pocket expenditure on health, reach of specialty hospitals, ambulances, data on road accidents, access to medicine (particularly life saving drugs) as well as information on institutionalised traditional healthcare systems wherever they exist.

Basic Needs and Human Development Approaches to Well-being

(This section exclusively draws upon earlier RIS work in this area: RIS Mimeo 1992.)

The 1970s witnessed intensive discussions and research relating to development strategies especially focussing on issues related to basic needs. The UN International Development Strategy for the decade of the Seventies adopted a resolution calling for a more equitable distribution of income and wealth, substantial increases in employment, better nutrition and housing on an urgent basis (General Assembly Resolution 2626 (XXV), 1970), which was further supplemented by the conclusions of Seventh Special Session General Assembly. The Internatioanl Labour Organisation and World Bank also emphasised the need to have employment and anti-poverty oriented strategies (ILO, 1970, 71, 72 and 73; and Chenery *et al.*, 1974). The call for New International Economic Order (NIEO) in 1974 stressed restructuring of the world economy in favour of the developing countries, and Lima Declaration (UNIDO, 1975) came out with a resolution that by the year 2000 the share of less developed countries in world manufacturing should rise to atleast 25 per cent from 7 per cent in 1973. The Tripartite World conference on 'Employment, Income Distribution and Social Progress, and the International Division of Labour,' adopted a resolution which called for inclusion of 'satisfaction of an absolute level of basic needs' as an explicit goal in the national development plans (ILO, 1976). The World Bank also joined the 'movement' when it said that one of the major goals of the international community should be to meet the basic human needs of the absolute poor by the end of the century (see Streeten and Haq, 1977). The World Health Assembly later in 1979 called for health for all by the year 2000.

Basic needs strategy considered development as an integrated phenomenon following a benign cycle model wherein the dynamics of production and employment demand structures (called sectoral articulation) are supposed to be compatible with consumption and income distribution patterns (social articulation) with the ultimate objective of reducing inequalities and allowing for the basic needs satisfaction for all population groups (Morawetz, 1974; Vos 1988a). In such an approach industrialisation strategy would stress on basic consumer goods production, and considerations about the capital goods requirements, import substitution and export promotion would ensure adequate supplies of basic needs.

The problem of poverty alleviation began to receive due attention with the renewed thinking on anti-poverty oriented strategy of development. It was felt that anti-poverty strategy should be treated as an explicit objective of development, and that development strategy must be consciously structured to achieve this objective. The importance of providing basic amenities of life like food, housing, education, health, safe drinking water to the masses was emphasised (ILO, 1976). The concept of 'basic needs strategy' emerged, which emphasised not only the income and income distribution aspects, but also the type of goods and services that the system should produce. This strategy was meant to redistribute wealth, assets and output, mainly through the allocation of productive resources in favour of poverty groups and the satisfaction of their basic needs.

It was recognised that the role of higher growth cannot be undermined if strategy has to be sustainable in the long-run. At that juncture, it was noted that in many countries minimum income and standards of living for the poor cannot be achieved, without some acceleration of present rates of growth accompanied by a number of measures aimed at changing the pattern of growth and the use of productive resources by the various income groups (ILO, 1976). Even the developing countries aspirations for higher level of industrialisation (Lima Target) and the initiative for New International Economic Order (NIEO) are considered to be supportive of the basic needs approach of development (Singh, 1979; Van der Hoeven, 1980). Basic needs approach in fact assumes that output, employment and income distribution trade-off should be minimised within the context of a more integrated and balanced industrial strategy, not merely securing growth targets but also reconciling growth, employment, income and basic needs objectives (Morawetz, 1974; Bhalla, 1975; ILO, 1976; Van der Hoeven, 1980, 1988; Baron and van Ginneken, 1982; Stewart, 1985).

The human development approach, on the other hand, considers people as the real source of wealth and stresses on the formation of human capabilities in the first place. This approach envisages bringing together the production and distribution of commodities, and the expansion and use of human capabilities and the range of choices available to people. The human development strategy presumes that development of human beings should be the main target of economic development as they are the end by themselves. Their requirements (which, of course, varies from one individual to the other) are spread over a multiple score of choices which can be broadly identified as achieving better standard of living, getting access to knowledge, and improving health conditions with a view to expand longevity. Human choices, however, do not end here, rather they include other non-material choices like human rights, political independence, etc. This strategy seeks for the widening of these choices of individuals to maximise their welfare.

It was emphasised that development process should create a healthy environment in which each individual can exploit his/her potential and have an opportunity to lead a productive life in accordance with his/her needs and capabilities. The human development strategy considers choices like desire to live a long and healthy life, to acquire knowledge, and to have access to resources

needed for a decent standard of living as very important because many other opportunities remain inaccessible if these choices of people are not fulfilled.

The Human Development Report (UNDP, 1990) by taking a large sample of 130 countries for the year 1987, concluded that a country need not have an impressive per capita GNP to attain a fairly respectable level of human development. Citing the case of Sri Lanka, it was observed that the county has made considerable progress in achieving higher level of human development in the form of increased life expectancy at birth and adult literacy within a small per capita income of US$ 400. On the other hand, countries like Brazil and Saudi Arabia with per capita income of US$ 2020 and US$ 6200, respectively, have not yet reached the level of progress in human development as observed in the case of Sri Lanka.

The ideal situation could be fairly higher level of GNP growth with reasonable equitable distribution of income, which could further guide the country to a higher level of sustainable human development. South Korea demonstrated that both growth and equity can be attained simultaneously and that it has provided enough impetus to satisfy minimum social needs. It is persistently argued that growth is a sufficient condition but not a necessary condition to achieve higher level of human development. A country may fail to reach the target of improved human development even with higher economic growth if its income distribution is highly skewed and if social expenditures are low or disproportionately distributed among different portfolios.

In the absence of a desired level of income distribution and economic growth, human development can be improved by reorienting the pattern of public expenditure. For instance, Sri Lanka witnessed low economic growth and more equitable distribution of income, whereas Botswana and Malaysia experienced high economic growth and low level of social justice but both the sets of countries could manage to attain higher level of human development through well-guided public policies and expenditures. However, these policies can be implemented for a short- and medium-term to tackle the human development problems, but for the sustenance of these efforts in the long run, economic growth is considered to be extremely crucial.

RIS undertook rigorous studies to improve the Basic Needs Index and developed an Aggregate Development Index (ADI) to capture wider dimensions over the Human Development Index (HDI) to cover aspects of productivity, structural changes, urbanisation, dependency rates of the population, trade openness, energy consumption etc. The ranking of the countries tended to differ depending upon whether one defined development in terms of per capita GNP, HDI or ADI. As between HDI and ADI, many changes in the relative ranking position were noticed in the case of developing countries belonging to the African and Asian regions. The relative position of countries like India, Republic of Korea, Liberia, Mauritania, Singapore, Tunisia, improved considerably when basis of ranking of countries was changed from HDI to ADI. In the case of countries like El Salvador, Ethiopia, Lesotho, Nigeria, Rwanda, Sudan, on the other hand, there was considerable deterioration in their relative ranking position. With regard to other countries, changes in the ranking position were, however, marginal. It may be noted that the relative ranking position of the developed countries was also found to be changing with the change in the criterion of development.

Proposal for a BRICS Wellness Index

In the previous chapter we have commented on the conceptual journey on achieving holistic understanding of well-being beyond the principal economic parameter i.e. income (Box on the next page offers further insights). Statistical indicators like GDP are crucial for designing policies and assessing the economic progress of a country. GDP is an imperfect measure of economic well-being and societal progress, as it does not capture interpersonal variations in the

Box: Limitations of GDP as an Indicator of National Progress

The Rise and Fall of the GDP

By Jon Gertner

May 13, 2010, The New York Times Magazine

(selected paragraphs)

Whatever you may think progress looks like — a rebounding stock market, a new house, a good raise — the governments of the world have long held the view that only one statistic, the measure of gross domestic product, can really show whether things seem to be getting better or getting worse. GDP is an index of a country's entire economic output — a tally of, among many other things, manufacturers' shipments, farmers' harvests, retail sales and construction spending. It's a figure that compresses the immensity of a national economy into a single data point of surpassing density. The conventional feeling about GDP is that the more it grows, the better a country and its citizens are doing.

For decades, academics and gadflies have been critical of the measure, suggesting that it is an inaccurate and misleading gauge of prosperity. What has changed more recently is that GDP has been actively challenged by a variety of world leaders, especially in Europe, as well as by a number of international groups, like the Organisation for Economic Cooperation and Development. The GDP, according to arguments I heard from economists as far afield as Italy, France and Canada, has not only failed to capture the well-being of a 21st-century society but has also skewed global political objectives toward the single-minded pursuit of economic growth.

In the U.S., one challenge to the GDP is coming not from a single new index, or even a dozen new measures, but from several hundred new measures — accessible free online for anyone to see, all updated regularly. Such a system of national measurements, known as State of the USA, will go live online this summer. Its arrival comes at an opportune moment, but it has been a long time in the works. In 2003, a government official named Chris Hoenig was working at the U.S. Government Accountability Office, the investigative arm of Congress, and running a group that was researching ways to evaluate national progress. Since 2007, when the project became independent and took the name State of the USA, Hoenig has been guided by the advice of the National Academy of Sciences, an all-star board from the academic and business worlds and a number of former leaders of federal statistical agencies. Some of the country's elite philanthropies — including the Hewlett, MacArthur and Rockefeller foundations — have provided grants to help get the project started.

Those involved with the self-defined indicators movement, as well as supporters around the world who would like to dethrone GDP — argue that achieving a sustainable economy, and a sustainable society, may prove impossible without new ways to evaluate national progress. Left unanswered, however, is the question of which indicators are the most suitable replacements for, or most suitable enhancements to, GDP Should they measure educational attainment or employment? Should they account for carbon emissions or happiness?

Most criticisms of GDP since then have tended to fall into two distinct camps. The first group maintains that GDP itself needs to be fixed. High-GDP Man and Low-GDP Man have to become one, in effect. This might entail, for starters, placing an economic value on work done in the home, like housekeeping and child care. Activities that are currently unaccounted for, like cooking dinner at your own stove, could also be treated the same as activities that are now factored into GDP, like food prepared in a restaurant. Another fix might be to cease giving only positive values to events that actually detract from a country's well-being, like hurricanes and floods; both boost GDP through construction costs.

The second group of critics, meanwhile, has sought to recast the criticism of GDP from an accounting debate to a philosophical one. Here things get far more complicated. The argument goes like this: Even if GDP was revised as a more modern, logical GDP 2.0, our reliance on such a measure suggests that we may still be equating economic growth with progress on a planet that is possibly overburdened already by human consumption and pollution. The only way to repair such an imbalance would be to institutionalise other national indicators (environmental, say, or health-related) to reflect the true complexity of human progress. Just how many indicators are required to assess societal health — 3? 30? 300, à la State of the USA? — is something economists have been struggling with for years as well.

levels of psychological satisfaction derived out of common set of resources largely dependent on individual/group/community circumstances and capacities. If our indicators of measurement are flawed, the policies we design and the inferences we draw from it will also be flawed. With the data revolution there may be opportunities to convert some of the conceptual elements of well-being so far discussed in the literature into measurable indicators.

As elaborated in the earlier chapters, BRICS countries have a distinct approach to wellness based on country contexts. The idea of holistic health, bringing together human and environmental health has been pursued though traditional values. In India, the emphasis has been on maintaining the fine balance between human civilisation and environmental sustainability through integrative approaches to lifestyle to achieve this. Such a paradigm has definite lessons to offer for new approaches floated in Western contexts like sustainable consumption and production. While, sustainable consumption and production may be understood as a means, the objective may not flow from the idea itself. Whereas the concept of integrative approaches to life may subsume both means and ends and provide continuity of the process in the intergenerational sense.

China has traditionally followed similar ideals of 'nature and humanity'. As a point of departure, China has defined well-being, specifically subjective well-being as collective well-being. China promotes collectivism and lays emphasis on collective opinions and experiences. There is serious need to appreciate the ideals of collectivism for achieving sustainability. Wellness measurements should extend beyond individual parameters and determination of national performance to promote the idea of collective wellness at the level of community. While freedom to pursue opportunities has specific individual characters, collective bargaining for rights and collective action leading to societal and human development may widen the scope for well-being.

Brazil in accepting that the broad concept of wellness encompasses multiple meanings linked with desired lifestyle which in turn is accompanied by consumer values, personal achievements, aesthetic desires and interactions with the nature has strongly highlighted the importance of local contexts given its wide geographical expanse and cultural diversity. Standardisation can bring in huge challenges given that diverse populations live in diverse ways. South Africa also highlights the criticality of preserving environmental ecosystems for sustainability of the human race and in bridging gaps between healthy living and the lack of resources and opportunities for the same.

The need, therefore, is to integrate these efforts to attain a robust understanding on wellness and adopt a flexible template for measuring wellness in the context of BRICS.

The Contours of a BRICS Wellness Index

Wide variety of statistical efforts in understanding well-being parameters is underway in BRICS countries. National statistical offices are primarily guided by administrative surveys with varied frequencies and coverage. Such surveys account for status and attainment of various socio-economic parameters to facilitate objective analysis and policymaking. Much of wellness related dimensions discussed so far can be derived from development indicators captured in such surveys. New areas may be introduced as well. However, analysis of individual perceptions on quality of life and satisfaction as discussed in the literature would require significant departure from the current methodologies used for administrative surveys. The scope and feasibility of such surveys would depend on the political willingness and administrative capacities at a decentralised level. Some of these surveys can be easier to implement in countries with homogenous composition of the population and with smaller size of the population. BRICS countries, on the other hand, are geographically wide and population wise significantly large countries with diverse population characters.

BRICS countries have emerged as hubs of economic activity with significant contribution to world GDP diminishing the economic clout of the OECD countries. However, as discussed, assessment of economic progress may not be reduced to national income alone. Distribution of income and whether individuals have adequate resources at their disposal including housing and related physical infrastructure have important implications for material well-being. This potentially covers many aspects related to material well-being. Along with income distribution it is important to account for economic opportunities in terms of gainful employment. Gender equity in economic opportunities should be fundamental to any measure of inclusiveness. For large countries and higher population size as in BRICS, national progress measured in terms of economic activities is unevenly spread across different geographic and administrative sub territories. Appraisal of regional disparity is crucial to policy design. Finally, with significant improvements in physical and digital connectivity, the benefits must reach the last person. This could significantly improve access and also quality of life for those at the margins. On a different note, it has also been argued that quality of economic progress and prospects of higher national income should be seen in the light of debt sustenance and indebtedness. In this context, government and private sector debt to GDP ratios are commonly cited.

The capacities to drive income growth and derive benefits from it at the individual level reside in personal capabilities shaped through education and skill development. At the same time it is important to assess whether economy is benefiting from technical and other professional skills among the workforce.[1] However, quality bottlenecks at lower levels of education actually hinder learning, resulting in poor skills in children and youth. This can potentially widen inequities.

Under human health, preventive healthcare should not only include immunisation with the help of modern medicines which have been covered for tracking health in many countries but appropriate use of traditional medicine systems and knowledge for sustainable lifestyle are also very important. Traditional medicine system backed with authorised and credible infrastructure and resources widen the choice and improve outcomes. Preventive health may also include information on disease profile according to race, ethnicity, location and possible causes. This also holds true for curative health. However, indicators related to health facilities and specialised health infrastructure as well as access to medicines and treatment would remain important indicators on health. Digressing from self-reported health status of individuals that also include information on mental health, we propose that disease profile related to mental stress syndromes and mental health including drug abuse and suicide rate should provide valuable support to the understanding of wellness. Finally health hazards may include several dimensions like extent of tobacco consumption, exposure to harmful gases in work environments, unnatural deaths (road accidents and industrial accidents) and rate of homicide. The parameters indicated may be appropriate in the BRICS context.

Sustainability of the environment may be slightly more straightforward since the urgency of addressing such issues has already been noted in several countries including BRICS. However, the challenge is to balance development and sustainability concerns given the level of development of the BRICS nations. This can only be done by incorporating green models in most areas of industrialisation and infrastructure development and by laying emphasis on waste management and biodiversity conservation. Renewable energy generation is not sufficient but its use and dissemination is critical, for example, in the context of sustainable infrastructure. Waste management is also linked with water and air quality. Management of harmful industrial waste, urban sewage and junk electronic products are important areas in this regard. Measuring quality water supply and air quality may not be difficult.

Therefore, the four areas that may define wellness concerns in BRICS are: (i) Material Well-being, (ii) Human Proficiency, (iii)

Human Health for Intergenerational Wellness, and (iv) Sustainability of the Environment for Future Generations. Under the last two considerations we have tried to capture intergenerational equity and the choice of parameters supporting these must satisfy this criteria. Well-being or wellness only for the present generation is unduly restrictive when we consider national wellness which is linked with changing generational dynamics affecting resource use.

Proposed Indices and Indicators

We propose four indices for BRICS and propose a set of indicators to determine these, based on indicators currently being used as well as some new and challenging ones that are evolving.

The four proposed indices are:

- Aggregate Material Well-being Index (MWI)
- Human Proficiency Index (HPI)
- Composite Health Index (CHI)
- Sustainability Index (SI)

The categories of parameters covered under each of the above and relevant indicators are presented in Table 1.

Aggregate Material Well-being Index (MWI)

This index is meant to capture material well-being of citizens in terms of inequality, regional disparity, inclusiveness, economic opportunities, living standards and connectivity in BRICS. This index may ideally capture three dimensions: (i) income and inclusiveness; (ii) quality housing and infrastructure; and (iii) physical and digital connectivity. We have proposed certain well established indicators for this index. Under income and inclusiveness we propose to include GDP per capita, poverty head count ratio, indices that capture regional disparity, unemployment rate and women labour force participation rate.

To capture living standards we may use per capita electric power consumption and provision of affordable housing as indicators. As discussed previously, connectivity brings maximum welfare gains to people at the margins and to those who are remotely located. Hence, rural connectivity through all season and motorable road can be included as an indicator. Apart from land transport, exploring waterways gives greater mobility and may help in connecting interior and coastal areas. This is beneficial for both economic activities as well as for welfare gains of citizens. Digital connectivity is important as a means to derive welfare from information exchange at minimum costs in real time. The indicator may vary from tele-density to proportion of internet users. This may also be captured through frequency of use of a particular digital platform subject to age profile, etc. Hence, we propose that an appropriate indicator(s) in this context may be evolved through due consultations.

Human Proficiency Index (HPI)

It is well established that human skills drive economic growth and facilitates individual well-being based on personal capabilities to engage in gainful economic activity. Therefore, quality of skill development services being offered, individual capabilities and technical/professional skills shape human proficiency levels at the country level. In this index we capture the following four dimensions: (i) access to school education; (ii) quality of school education; (iii) access to vocational education and skill development opportunities; and (iv) access to professional education.

It is not only important that we capture access to education at the primary and the secondary levels, but as is increasingly being drawn from evidence, access may not lead to learning or skill development. Children from less privileged backgrounds have poor learning abilities. This is also linked with improper nutrition and faculty development that are captured under the CHI. Moreover, it is also important to assess if increasing number of students have appetite for completing school education. Therefore, the indicators proposed cover both access and

quality parameters and include primary and secondary enrolment ratios, secondary drop-out rates, enrolment among girls and extend to numeracy skills at primary level, pupil-teacher ratios, basic infrastructure and facilities for IT education. Finally, vocational and professional training may be captured through numerical estimates of proportions of workforce having relevant qualifications. In the professional category it would be important to distinguish between qualifications related to science-technology-engineering (popularly called STEM – Science, Technology, Engineering and Mathematics) and other professional degrees.

Composite Health Index (CHI)

The centrality of human health in connection with natural environment stands as the key pillar of wellness elaborated thus far. We have also outlined the dimensions that can ideally be incorporated to build this index. The broad dimensions of mortality and morbidity; preventive health; curative health; maternal and child health; mental health and health hazard have been included in this index. One important addition has been made in terms of attempting to propose some indicators that capture the choices that citizens have in making use of traditional health systems both for preventive and curative health. Traditional health systems are widely followed in BRICS countries and the relevance of such indicators is strong. Such systems are often seen to derive out of integrative approaches that see human health in conjunction with the nature.

We present a variety of indicators that could possibly be included in such an index. While some of the indicators are well established, several indicators that capture traditional medicine systems, disease profile, access to life saving drugs, prevalence of drug addition and response system need careful selection. Under the composite health index there is scope to account for access to safe drinking water as an important precondition to preventive health and nutrition status in terms of accounting for the number of stunted children.

Sustainability Index (SI)

As is evident from the literature discussed in the previous chapter, there are increasing attempts to account for environmental and sustainability dimensions. However, identifying appropriate indicators has been a difficult exercise due to data limitations at various levels. The Sustainability Index which we propose to be developed should focus on such dimensions that are equally important for quality of human life as well as for meeting the expectations of environment protection.

Accordingly, we cover the following dimensions in the Sustainability Index: renewable energy and clean energy; sustainable infrastructure; waste management; and biodiversity protection. BRICS countries have encouraged generation and use of renewable energy to make credible attempts at environmental sustainability. However, since it would be futuristic to rely mainly on renewable sources, it is also important to account for clean sources of energy. This would lead to pollution control and improve ambient conditions for healthy living. There has been much discussion around green models of development and hence sustainable infrastructure. Sustainability not only means minimum ecological footprint but also resilience in terms of preparedness for climate change related impacts. Such indicators that can exclusively contribute to this indicator may be evolved for BRICS.

Ambient condition that is essential for human health is expected to improve with efficient waste management system designed to protect both terrestrial and marine ecosystems. Appropriate indicators in this case may also be arrived at through consultations under BRICS. Biodiversity concerns are often linked with sustainability of ecosystems. However, rich biodiversity also helps in promoting traditional systems of medicines. Several indicators accounting for biodiversity loss and protection measures are already in use globally. Such indicators may be suitably adapted in the context of BRICS.

Several indicators would flow from the national statistical system and some may be absorbed from the indicator framework

Table 1: Indicator Framework for the Proposed BRICS Wellness Index

Aggregate Material Well-being Index (MWI)	Human Proficiency Index (HPI)	Composite Health Index (CHI)	Sustainability Index (SI)
Income and Inclusiveness • GDP per capita • Poverty Head Count Ratio • Regional Disparity* • Unemployment Rate • Women Labour Force Participation Rate **Living Standards** • Electric power consumption per capita • Proportion of urban population living in slums, informal settlements or inadequate housing **Physical and Digital Connectivity** • Proportion of villages connected through all season, motorable roads • Inland, waterways and seaways transportation infrastructure* • (length of rail lines/ rail passenger traffic/ freight and passenger movement through waterways) • Digital connectivity* • (mobile cellular subscription per 100 people/internet users per 100 people)	**Access to School Education** • Primary and Secondary Enrolment • Secondary Drop-out rates • Enrolment among girls **Quality of School Education** • Numeracy Skills at primary level • Pupil-Teacher ratios* • Basic Infrastructure in School* • IT Education **Access to Vocational Education/Skill Development** • Proportion of vocationally educated workforce **Access to Professional Education** • Proportion of professionally educated workforce (STEM/non-STEM)*	**Mortality and Morbidity** • Health adjusted life expectancy • Index of life threatening diseases* **Preventive Health** • Proportion of Population with access to safe drinking water • Proportion of Children covered under immunisation • Number of registered traditional health care professionals (doctors and therapists) per 1000 population* • Proportion of population using safely managed sanitation services **Curative Health** • Number of Registered Medical Practitioners per 1000 Population • Number of hospital beds per 1000 population • Number of Registered Traditional Therapists per 1000 population* • Drug Price Index* **Maternal and Child Health** • Infant Mortality Rate • Maternal Mortality Rate • Prevalence of Stunting **Mental Health** • Drug Addiction among youth • Concentration of rehabilitation and counselling centres • Reported Suicide Rate **Health Hazard** • Annual Number of Deaths in Road Accidents • Homicide rate	**Renewable and Clean Energy** • Renewable energy share in the total final energy consumption • Proportion of population with primary reliance on clean fuels and technology **Sustainable Infrastructure** • Eco-friendly designs for buildings* • Disaster resilient infrastructure* (type of building/roofing material) **Waste Management** • Volume of untreated industrial waste* • Recycling capacities* **Biodiversity Protection** • Proportion of protected terrestrial and freshwater biodiversity zones

BRICS Wellness Index (BWI):

- BRICS Wellness Index would primarily be based on output indicators.
- BRICS Wellness Index can be computed at individual country level by selecting the indicator variables from the four indices (MWI, HPI, CHI and SI)

Note: *Appropriate indicators may be developed in the BRICS context.

proposed for the implementation of the UN Sustainable Development Goals (UN-SDG). The methodology of some of these indicators has been developed by specialised UN agencies and is in the public domain (being measured globally in many countries). However, indicators widely vary in areas like sustainable infrastructure, waste management, infrastructure for recycling wastes, etc. Even under the evolving UN-SDG indicator framework common agreement on such indicators is rare. It is here that the BRICS countries can put in renewed efforts towards a common indicator framework for sustainability issues and that can be useful for the proposed Sustainability Index. We would however, keep aside finance and investment related indicators for such indices since national priorities vary. Similarly, we also do not explicitly consider that indicators may cover detailed information on regulation, penalties, incentives and response.

Model to Compute BRICS Wellness Index

Computation of a wellness index has been a challenging task, particularly for evolving an index in the regional context. As discussed earlier, the proposed wellness index has several components including material well-being index, proficiency index, composite health index and sustainability index. Under each index, there are handful of variables, which are enriching their relevance in the model. The analysis would focus on estimation of composite indices and their inter-relationship among socio-economic indicators in the model.

The socio-economic variables covered under various comprehensive indices are representing various dimensions of economic and social development. They differ in their units and economic relationships. Summing them up linearly to arrive at a composite index is a complex task. For example, per capita income, enrolment ratio, head count poverty ratio, etc., are in different units, having constraints to aggregate them in their original forms. Similarly, participation rate and social inequality are material well-being indicators, but their movement are in opposite directions, showing prosperity of the society. In this case, linear combination of variables may not lead us to arrive at the desired level of results. In order to address these issues in a methodological framework, we have chosen the Principal Component Analysis (PCA) to compute 'Wellness Index' and its sub-sectoral indices for this report.

The Principal Component (PC) Analysis has been an established quantitative technique, which was evolved in 1901 and passed through further theoretical development until 1933. This multi-variate technique can deal with several variables with many economic dimensions. This data reduction technique uses original information of the variables without losing much information about them while converting them into indicators. With transformation of variables and presenting variables in an orderly and meaningful manner, the PCA technique fulfills the objective of presenting a comprehensive index, representing all variables in it.

Under this technique, PCs are linear combination of transformed random variables in to a few principal components. By transforming original variables into a few PCs, it would be relatively easier to include a composite variable in a model. The maximum number of PCs could be equal to the number of dimensions in original data set. Unlike original variables, PCs are uncorrelated to each other, indicating that they are orthogonal in nature. The first PC explains maximum variations in a data set and the level of explanatory part declines as we move to next PCs.

The PCA technique normalises the associated variables in a data set and combine them linearly to estimate a principal component. In the model, X^1, X^2..., X^p are the transformed variables which are linearly combined with factor loadings (λs) as the following:

$$Z^1 = \lambda^{11}X^1 + \lambda^{21}X^2 + \lambda^{31}X^3 + ... + \lambda^{p1}X^p$$

where,

Z^1 represents the first principal component and factor loading coefficients are denoted by

λ^1, λ^2,....., λ^{p1} of the first principal component where the model contains 'p' number of variables. Similarly, different sets of λs are estimated for different principal components. The sum of each set of λs is restricted to one in order to satisfy certain mathematical properties to avoid the possibility of exploding of the index (PC). Though the PCA model has the potentiality to estimate 'p' number of principal components, depending upon explanatory power of the PCs, the first one is generally considered for representing the comprehensive index, since it has the maximum explanatory power in the variations in the data set. Larger being the size of the explanatory power of the first PC, larger would be the volume of information embodiment in it. The explanatory power of the subsequent PCs would decline as compared to the earlier ones, though these PCs are uncorrelated among themselves.

In the present study, we propose to use PCA to make linear combinations of transformed variables in a model, defined for each index. The absolute value of an index may not explain much about the levels of contribution of variables, but distance between any two observations can explain this aspect. This would provide some direction about positioning of various countries in the accomplishment of an index.

To Sum Up

We have conceptualised and elaborated a framework for a possible BRICS Wellness Index and a host of other sub-indices. We have explained the rationale behind these indices and have offered new insights to approach well-being from a 'wellness' perspective. While there has been substantial research at various levels that has produced several templates for well-being measurements, the task of balancing dimensions of development that facilitates individual wellness with that of environmental sustainability remains a difficult job. BRICS countries are at a cusp of history when they are deprived of a choice to choose one or the other. Hence, identifying a common objective function that takes care of both human health in totality (achieved as an outcome of conducive material conditions) and environmental health probably is the way forward. Such integrated approaches draw spontaneously from traditional knowledge on human health, conduct and lifestyle as inherited in countries within BRICS.

However, the overarching rationale for adopting a wellness index is not only about facilitating comparisons for policy making and resource distribution but also to develop a framework of meaningful indicators that readily informs the wider citizenry about divergence between accumulation of wealth and the status of human and environmental health. This should trigger collective action for creating awareness and opportunities of sustainable living and facilitate knowledge exchange, demonstration and persuasion for holistic health to achieve intergenerational wellness. The diversity of nuances and subtleties in the understanding of well-being (and wellness) in BRICS countries would enrich the framework and help these emerging economies to conform through self driven approaches and seize the promise of wellness anchored in both health and wealth.

Endnote

[1] The contribution of technology to industrial production and economic growth has been widely researched upon in economics from both theoretical and empirical perspectives. RIS has previously explored such inter-linkages in a series of studies. Das (2005) focusses on analysis and policies for developing countries in this context.

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Conclusion and Recommendations

The concept of wellness has had a long gestation period since its conception and its time has now come to the fore. As the cliché goes when the time of an idea has come nothing can stop it. As expatiated in Section I, the concept encompasses the total wellness of the human being in the world in which he lives. BRICS countries have in varying degrees welcomed this idea. However, in the renewed efforts of all countries towards achievement of Sustainable Development Goals, which talk about all-round development of human beings in a sustainable way that preserves and conserves the environment and biological resources since the very survival of life on the planet is dependent on a healthy environment and does not treat a man as an isolated creature, the concept has special salience. This perception of *Homo sapiens* as a microcosm in the macrocosm of the world is basic to the indigenous philosophies of these countries. The imbalance in this relationship is what is considered as the cause of sickness. Restoration of that balance is what brings wellness, whether it is mental or physical or environmental. This volume has been an attempt to look at this concept, its evolution, its place in the current development praxis and what role BRICS can play in taking the idea forward in the larger interest of humanity.

Towards a New Development Concept

The concept of the development of wellness perspective is the non-satiation of the aspirational longings of vast majority of humanity by the purely monetary approach to development, ignoring the human person for whom the whole process is supposed to be. The conventional approach had, in fact, increased economic inequalities despite immense expansion of economies. The measurement of growth was the rising spiral of money in the economy, without looking at how the financial resources impacted the lives of people. The wealth of nations was gauged purely on the total quantum of the cost of the goods and services, ignoring the effectiveness of the use of those goods and services. The Washington Consensus advocated governments to focus on financial bank centred accounting as the way forward for development. After the initial euphoria over this Gross Domestic Product (GDP)-centric development perspective, slowly many economists started doubting the whole approach as general discontent persisted. Many felt that the standard components of GDP failed to capture certain phenomenon that have an impact on the well-being of citizens. In the previous Section, the slow but systematic emergence of different thought lines among

economists during the second half of the twentieth century has been presented. Gertner Jon, in a 2010 essay summed up the entire in a memorable quote from Alex Michalos that "the economists messed everything up."[1]

> "The main barrier to getting progress has been that statistical agencies around the world are run by economists and statisticians," Michalos said. "And they are not people who are comfortable with human beings." [Gertner Jon][2]

The attempts to develop more robust measurements of development and growth by including social and environmental factors or counting physical quality of life on the basis of self reported happiness and life satisfaction reflect the felt need for an alternative. One of the famous models has been the Human Development Index that was enunciated in the last decade of the last century. The Human Development Index (HDI) model definitely helped in bringing human beings to the centre of developmental discourse. The indices tended towards easily measurable statistics such as school enrolment and dropouts, maternal and child mortalities, and so on. It also coincided with and might have influenced the development of Millennium Development Goals of the United Nations and the Development Agenda of the World Intellectual Property Organisation. The quality of life aspect, however, remained an elusive norm.

Health is not the reduction of mortality rates alone. In the current decade, world over morbidity is a major concern. Increasing numbers of Alzheimer cases and Schizophrenics raise concerns about the current approach to healthcare that solely depend on the reductionist science of tackling micro-organisms. Keeping the body alive for longer years through artificial means and machine interventions may not be adding to the value of life.

Economists and scientists have to work together to develop a holistic approach to economic development that keeps a healthy human being at the centre of development policies. Both mental health and physical health have to be accounted for, along with other factors such as education, in the sense of developing the capabilities to handle knowledge in a positive and productive way, and environment that contribute to the quality of life in the society. The GDP based development paradigm had ignored the impact of the resultant developments on the environment, to the dangers of which the world leaders have now woken up. Equity and sustainability have to be the guiding principles of the new development framework. The various prevailing political systems definitely have their differences and conflicts on policies but not insurmountable ones since all systems have, at their core, development of the people within its geographical domain. The persisting inequalities need to be addressed in a comprehensive way so that the fruits of development reach all. The BRICS countries, though some have already taken initiatives, collectively can show the way forward in this by adopting a paradigm shift in the basic economic framework to one based on wellness concept, a much broader one than the various existing ones.

Wellness Index

This volume is an attempt to develop this alternative narrative of development which is based on the rich history and long old traditions of the five countries. Section I has captured well the distinct and different ways of approaching wellness in each one's local and historical context. All countries have kept in view the need for maintaining balanced and sustainable development that ensures overall well-being for the whole populace. Conservation and protection of biological resources as an essential ingredient for human health has been accepted by all the countries. The African philosophy of "UBUNTU: *Umuntu ngumuntu ngabantu / motho ke motho ka batho* meaning a human being is a human being through other human beings"[3] emphasises on the high-lighted interrelationships not only amongst human beings but also between human beings and nature including other living beings. Both China and India have been following the philosophies that considered human being as part of nature and effective balancing of developmental imperatives and biological conservation as way for sustainable development. Brazil's idea of wellness includes lifestyle, aesthetic desires and interaction with nature. The efforts and initiatives that these countries have

taken in promoting human wellness of their population may be integrated to develop a flexible template for measuring wellness. Such an index can impact developmental and economic policies and programmes of the countries in the larger common interest.

In the previous Section, some of the possible approaches to a BRICS Wellness Index have been suggested. These include statistical approach which depends on national surveys but differ from the current methodologies used for administrative surveys. The surveys need to take within their scope the wellness parameters in addition to many of the existing economic parameters. A major additional element has to be the inter-generational equity that has to be captured so that the fruits of development pass on to future generations in a more equitable way. Also, quality aspects of the social parameters such as of healthcare and education will have to be accounted for and not merely relying on quantitative aspects. In the health sector, not mere enhanced length of life but quality of life that is comparatively free from morbidity and enables human beings to enjoy life and contribute in a positive and productive way to the society, has to be accounted for. BRICS dialogue should focus much more than in the past on preventive healthcare and effective use of traditional systems of medicine in this regard than on curative modern medicine system. In most cases, it involves coming out of certain pre-programmed mindsets and freely and openly using one's own mental faculties and thinking resources. Such an approach can lead to development of integrative healthcare and better quality of life.

A special aspect of the new index will be the thrust on environment and conservation of biological resources as also have been agreed and appreciated by BRICS under the Convention of Biological Diversity. In the traditional approaches and practices of the BRICS countries this has been an essential part. In this respect also the quality aspect will have to be focussed on. Conservation of nature is as the macrocosm in which human beings exist. The umbilical linkage with nature of all living beings has to be the rationale for conservation. Ensuring such a nature is what will contribute to wellness. Protection of environment will also be a factor in measuring sustainability of various economic programmes. With increasing population, energy requirements have been expanding like anything. Development of sustainable energy sources that will not cause harm to the environment or living beings has to be a priority item for BRICS members and could form part of the indices.

Keeping the above concerns four specific indices have been proposed in this volume as components of BRICS Wellness Index. These are:

- Aggregate Material Well-being Index (MWI)
- Human Proficiency Index (HPI)
- Composite Health Index (CHI)
- Sustainability Index (SI)

The four different indices capture income and inclusiveness, living standards, physical and digital connectivity, access to school education, quality of school education, access to vocational education/skill development, access to professional education, mortality and morbidity, preventive health, curative health, maternal and child health, mental health, health hazard renewable and clean energy, sustainable infrastructure, waste management, and biodiversity protection. The basic norm of these indices is the quality of outcome and not mere quantity.

These indices could be adapted to specific country situations so that the Wellness Index reflects the actual situation in each country as per its own requirements that would contribute to its policy making.

Based on these parameters and adapting to the local requirements, a BRICS Wellness Index (BWI) can be developed which could set in motion a process that will spread over the whole world through different global fronts such as G-20. Being in a unique position, particularly as home to international bio reserves with most of the medicinal biological resources of the world, BRICS members could take the lead to bring in global order the principles of planned utilisation of these precious bio resources. They need to work to integrate the conservation of biological resources and associated traditional knowledge in the composite developmental plans and ensure utilisation and further development without over-exploitation or misappropriation.

Intellectual Property Rights

The innovations in the field of modern science have been protected through the Intellectual Property Rights regime. The parameters of many kinds of the existing IPRs do not account for either conservation of biological resources or protection of the traditional medicinal and other traditional knowledge. The examination systems of some patent offices do not include traditional medicine knowledge in their prior art search thereby resulting in grant of patents on such knowledge leading to misappropriation of the same. There is need to develop *sui generis* systems that can guarantee intellectual property protection for the traditional knowledge as well as traditional medicine systems and BRICS members should show the way forward in this regard. They should also take measures to facilitate protection of their own heritages within the currently available regimes also.

Integrated Healthcare

The Beijing Declaration on Traditional Medicine in 2008 had recommended the promotion of safe and effective use of traditional medicine in the national health care. BRICS members should carry forward this process of integrating traditional medicine with national health care particularly since they have national policies for doing so. Right from medical education to practitioners of health delivery system shall have to imbibe this integrated medicine system.

Development of human resources in the wellness sector particularly traditional medicines is to be addressed on priority base. Formalisation of education in those countries which have not yet done and mutual recognition of degrees will help in this.

Trade Barriers

A major concern in the spread of traditional medicine systems to other countries from their own homes is that of acceptable quality and standards. Countries will have to adopt regulations and clearance processes that addresses these issues such as insisting on Good Manufacturing Practices, standard clinical data and any new trials on medicines wherever required, providing adequate consumer friendly data on packets and so on. They need to develop research data and measures to control the production and distribution of the medicines.

An issue that crops up is the prevailing confusion of the traditional medicine formulations with modern herbals. BRICS members should make conscious efforts to remove this confusion and present their own traditional medicines as specific entities. This is necessary to overcome many of the trade barriers such as Phytosanitary measures that many developed countries have imposed on the trading of these medicines. Development of appropriate international trade classifications for traditional medicine will contribute to the augmentation of trade. BRICS can take the joint initiative in developing such classifications.

Conservation and Protection of Biological Resources

It is necessary to develop reliable and comprehensive statistical database on the biological resources available in each country both in the interest of conservation and promotion of traditional medicine which largely depend on them. Tools and techniques for measuring these may be an intense point for new research concept.

To sum up, BRICS Members are in a unique position, since there is a general concern about the current models of development and call for returning to nature is being echoed by academics and concerned citizens, to develop a new paradigm for development that is based on wellness. The Sustainable Development Goals 2030 provide them the plank and opportunity to push this concept on to the world stage. Their own heritages and generations of wisdom and experience will definitely make the world a better place by taking on new paths of sustainable development strategies that integrates man with nature.

Endnotes

1 New York Times, May 13, 2010, New York.

2 *Ibid.*

3 Government of South Africa, Department of Health, Draft Policy on African Traditional Medicine for South Africa, Government Gazette, 25 July 2008. P.5.

What is Wellness Index ...?

Economists and philosophers have expended time and energy to develop measurements for economic growth and development. One of the most prominent ones is the GDP based index, which does not account for the developmental aspects of human beings and income inequality. The Human Development Index was developed to overcome the limitations of GDP based measurements. This index, however, failed to fully reflect impact of structural factors on human development. A more comprehensive way was thought to be evolved in terms of the concepts of happiness, wellbeing and wellness. Though statistically robust, many such indices perhaps miss the wood for the trees.

This volume is an attempt to develop a holistic wellness index that accounts for human development, material progress, and environmental sustainability. It is a new way of looking at development, but based on the ancient wisdom and traditions. With the global consensus on Sustainable Development Goals (SDGs) that focus on comprehensive development, there is an widened window of opportunity for the BRICS countries, themselves storehouses of ancient wisdom and home to the rich biodiversity, and as emerging economies of the world, to cut a new way of looking at measuring economic progress in its entirety, viz. the Wellness Index.

About RIS

Research and Information System for Developing Countries (RIS) is a New Delhi-based autonomous policy research institute that specialises in issues related to international economic development, trade, investment and technology. RIS is envisioned as a forum for fostering effective policy dialogue and capacity-building among developing countries on global and regional economic issues.

The focus of the work programme of RIS is to promote South-South Cooperation and collaborate with developing countries in multilateral negotiations in various forums. RIS is engaged across inter-governmental processes of several regional economic cooperation initiatives. Through its intensive network of think tanks, RIS seeks to strengthen policy coherence on international economic issues and the development partnership canvas.

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Core IV-B, Fourth Floor, India Habitat Centre
Lodhi Road, New Delhi-110 003, India.
Ph. 91-11-2468 2177-80, Fax: 91-11-2468 2173-74-75
Email: dgoffice@ris.org.in
Website: http://www.ris.org.in