Proceedings
of
Jaffna Science Association

Presidential Address
Chief Guest's Address
Sectional Chairpersons' Addresses
Popular Lectures
Theme Seminar Presentations

Volume: 24 **No: 02**

Twenty-Fourth Annual Sessions
03 - 05 May 2017
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From Editor's Desk

The Jaffna Science Association (JSA) was established in 1991 by the founder president late Professor A. Thurairajah, with the objective of disseminating scientific knowledge among the students and general public in the Northern region of Sri Lanka. Since then, the JSA has been engaged in various activities, such as conducting guest lectures, workshops, seminars, and annual sessions, and organizing school science programme.

The key objectives of the JSA annual sessions are to educate people on latest advancements in science and to encourage researchers in publishing their research findings. Every year, a crucial issue relevant to the region is identified as a '***theme of the year***', and seminars, theme lectures and popular talks are organized based on the identified theme, during the annual sessions. Then, the presentations made at the annual sessions are recorded and published as proceedings.

I am very delighted to present the second issue of Volume 24. This proceeding contains the presidential address, chief guest's address, chairpersons' addresses, popular lectures and theme seminar presentations delivered at the 24th Annual sessions of JSA. The sessions were held 03-05 April 2017 on the theme of '***Youth Empowerment***' at the Faculty of Graduate studies, University of Jaffna. It is a privilege to be the editor of the proceedings of Jaffna Science Association this year, and I wish to thank the distinguished speakers for their contributions to this volume.

Dr. (Miss). S. Rasalingam,
Chief Editor,
Jaffna Science Association,
May 2018

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Presidential Address

Career Development, Employment and Employability among Youths

Mrs. S. M. C. Mahenthiran Aloysius
Department of Human Resource Management, University of Jaffna

Introduction

Career is an inevitable part in human life as it determines wellbeing of individuals. People earn income through different means such as paid job or self-employment and they invest their time, skills, knowledge and energy on various activities related to their employment to get the expected return from them. In the way, individuals may hold many positions in their life time. The series of positions held by a person is called as career. On the other hand getting desired job is not a simple task in Sri Lanka due to the problems associate with people, industry and the labour market conditions (environment). Every day, newspapers and the Social Medias carry various news in relation to activities forwarded by graduates, volunteer employees, trainees and temporary employees to appeal the government officials to get permanent government employment. The Nation faced two major insurgencies due to the youth unrest. According to the reports, the Nation has been facing many social problems due to under and unemployment among youths. Apart from the criticism regarding curriculum and its mismatch with industries at University level and school level, there are many root causes associated with employability. At school level, even though it slowly starts from primary education , subjects selection(basket) at ordinary level and stream selection at advanced level cause major problems in finding suitable jobs. The influence of parents' aspirations and friends are noted as great in the stream selection. Lack of soft skills development, poor understanding of self and the environment, poor career guidance and counseling at school level and the University are some of them. Now there is a big question in front of us how are we going to solve the problem or reduce seriousness of the problem that create many social and economic issues in our community? Moreover, some of the social changes and their impacts need to be taken into account while trying to find the sustainable solution to the issues such as increasing trend in women participation in the labour market, nuclear families and work- life balance. The following table clearly explain unemployment in Sri Lanka.

Table 1:Unemployment rate according to the level of education

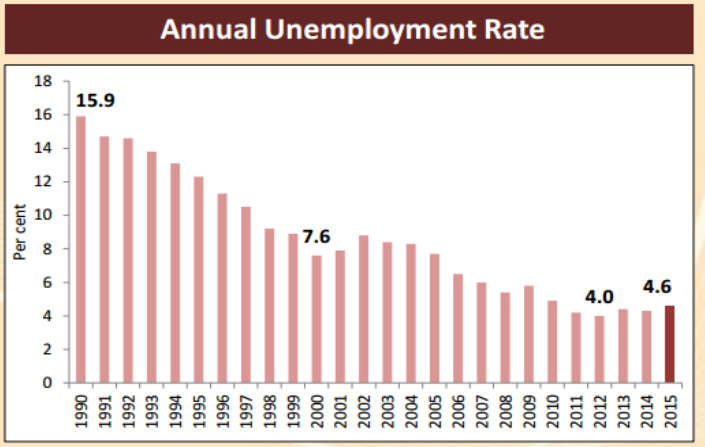
Level of Education	Unemployment rate %		
	Total	Male	Female
Total	5.2	2.7	7.0
Grade 05 or Below	*	*	*
grades 6-10	3.3	2.6	5.2
G.C.E.(O-L)	5.2	3.4	8.9
G.C.E.(A-L)	9.0	5.4	13.1

Source: Department of Census and Statistics

The above table clearly shows how unemployment is among school leavers. It is noted that unemployment rate increases with the level of education. Especially among female school leaver is at higher rate. The following diagram and the table give a full picture of the situation of the country.

Unemployment rate increased to 4.6% during 2015, compared to 4.3% recorded in 2014…

- **Female unemployment rate increased from 6.5% to 7.6%**
- **Male unemployment rate declined marginally from 3.1% to 3.0%**
- **Increase in unemployment among youth and those with GCE A/L qualifications and above was notable (from 8.1% in 2014 to 9.2% in 2015).**



As many years, the governments of Sri Lanka initiated various programme including major changes in the administration system of education, introducing English as medium of instruction, human capital development programmes and curriculum revision at school level and etc. to improve employability of school leavers.
Balasuriya and Hughes (2003) noted that a vast majority of students progressing through the educational system are ultimately unable to be accommodated and depart frustrated at being unable to achieve their educational goals and underprepared for entry into the labour market.

Education Sector Development Framework and Programme (ESDFP) initiated in 2009 mentioned that the programme will be continued in the next ten years. The ESDFP is planned to increase GCE (OL) pass rate from the present level of 56% to 65% and GCE (AL) pass rate from the present level of 60% to 75% percent by 2020 while increasing relevance of secondary education to the labour market requirements (The emerging wonder of Asia (2009).pg 114).

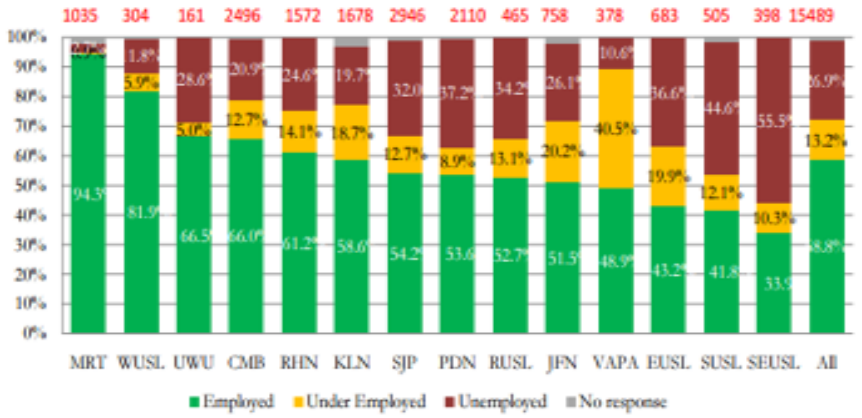
Sri Lanka Labour	Last	Previous	Highest	Lowest	Unit
Unemployment Rate	4.20	4.50	11.30	3.70	percent
Employed Persons	8006700.00	7999821.00	8554179.00	4962105.00	
Unemployed Persons	348141.00	376180.00	953794.00	282648.00	
Labor Force Participation Rate	54.00	53.80	54.30	46.90	percent
Wages	8839.35	7556.25	8839.35	3121.95	LKR/Month
Population	21.20	20.96	21.20	9.90	Million
Employment Rate	95.50	95.40	96.30	91.00	percent
Living Wage Family	55614.20	53881.90	55614.20	53881.90	LKR/Month
Living Wage Individual	30889.70	30116.00	30889.70	28560.80	LKR/Month
Wages High Skilled	51400.00	50000.00	51400.00	49500.00	LKR/Month
Wages Low Skilled	25000.00	20600.00	25000.00	20600.00	LKR/Month
Youth Unemployment Rate	21.00	21.60	21.70	15.40	percent

Presidential Address

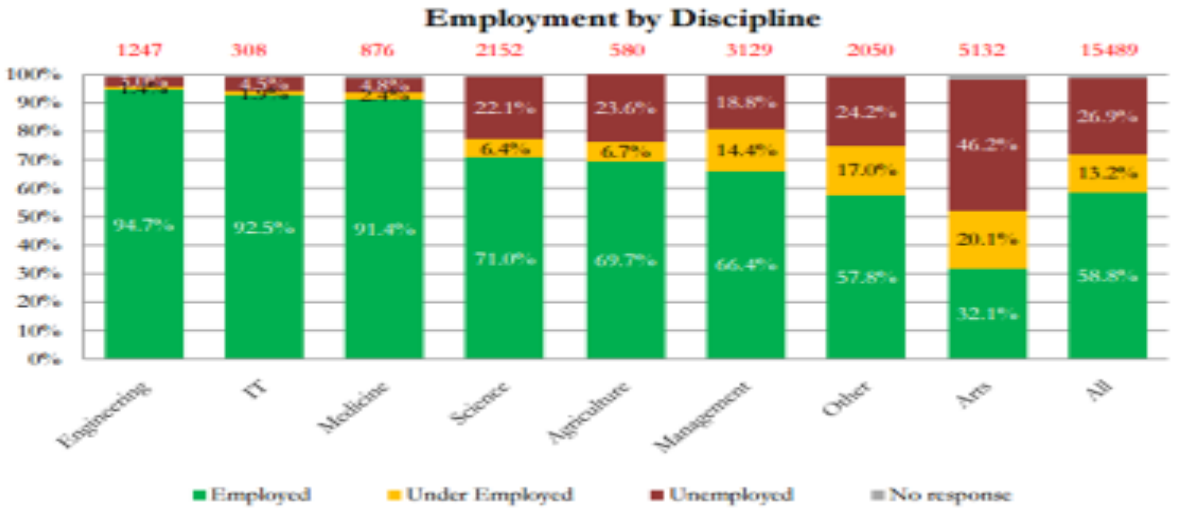
According to research, even though the country can boast of successfully bringing down the overall unemployment rate to 4.4% previous years, the unemployed rate of the educated is a disturbing 10.2%. The numbers are even more disconcerting as the unemployment rate of the overall youth (15-29 years), is 26.5% .
- See more at: http://www.ft.lk/2015/03/19/graduates-in-the-21st-century

On the other hand if we look at University education, Weerakoon (2010) says graduate unemployment is greater than national unemployment, he further says the level of unemployment of graduate is high as 45.5% in certain disciplines due to lack of transferable skills.

According to Ministry of Higher Education, unemployment and under employment among graduates are as follows. The first diagram depicts Universities wise statistics of unemployment and under employment among graduates. Unemployment and under employment are high in number among Universities in North and East.



Ministry of Higher Education,2012



Discipline wise analysis shows that graduates from Arts faculties are unemployed and under employed than other faculties' graduates. Approximately 40% of graduates are under employed

and unemployed. From the development point, this is not a good sign as nation pay millions of money for free education at all levels.
The following table depicts district wise employment status of graduates

District	Employed	Employed	Unemployed	response
Colombo	77%	9%	14%	1%
Gampaha	67%	12%	20%	1%
Kandy	64%	11%	24%	1%
Kalutara	63%	10%	27%	0%
Moneragala	60%	17%	22%	1%
Badulla	60%	14%	26%	0%
Kegalle	58%	16%	25%	1%
Kurunegala	58%	15%	27%	1%
Vavuniya	57%	12%	31%	0%
Polonnaruwa	56%	14%	29%	1%
Nuwara Eliya	55%	17%	29%	0%
Galle	54%	14%	32%	0%
Puttalam	54%	14%	31%	1%
Matara	54%	15%	31%	0%
Hambantota	53%	16%	30%	1%
Batticaloa	52%	17%	30%	1%
Jaffna	52%	18%	29%	1%
Trincomalee	52%	11%	36%	1%
Matale	51%	19%	29%	0%
Mullaitivu	51%	14%	31%	4%
Killinochchi	51%	12%	37%	0%
Ratnapura	49%	12%	38%	1%
Mannar	49%	8%	43%	0%
Ampara	46%	14%	40%	0%
Anuradhapura	44%	16%	39%	1%

Among the graduates in Jaffna district, approximately 52% of graduates were able to get the employment. Therefore, we need to pay attention on the issue and find the solution for the betterment of the region as well as individual graduates.

All the tables and findings of the previous researches indicate that unemployment and under employment related problems are continuing to date. According to National education commission (2016) unemployment is high among better educated youths than uneducated. The commission stated three reasons such as:

- Mismatch between education and skills of job seekers and what the economy demands
- Numbers of new entrants and the capacities of the economy to absorb them.
- Expectations of youth and the availability of jobs.

What is Employability?
Employability denotes a person's ability to gain initial employment, to maintain that employment and to obtain new employment if required (European Training Foundation). Employability can be broadly defined as the ability to gain and maintain employment, both within and across organizations (Finn, 2000). To make sure their graduates' employability, faculties are asked to prepare their curriculum with the consideration of their graduate profile.

Graduate profile can be divided into two main categories such as (1) those which pertain to an individual's capacity for citizenship; and (2) those which pertain to an individual's capacity for employability. As such, it has to be prepared and take initiatives to implement the said matters in the profile by the universities to enhance the level of their graduates' employability (Bridgstock, 2007).

However, it is understood that employability related problems in Sri Lanka, generated and continued due to the weaknesses related to the education system. Career indecision is common feature among the students in the Universities (especially Arts) and schools.

Career Development

Generally people are categorized into three types such as those who make things happen, those who watch what happens, and those who wonder what happened. - Mary Kay Ash
Career development is the lifelong process of managing learning, work, leisure, and transitions in order to move toward a personally determined and evolving preferred future (Canadian Standards and Guidelines for Career Development Practitioners, 2012).

Activities that are essential to develop career

Career Guidance in Schools Universities

"Career guidance refers to services and activities intended to assist individuals, of any age and at any point throughout their lives, to make educational, training and occupational choices and to manage their careers. Such services may be found in schools, universities and colleges, in training institutions, in public employment services, in the workplace, in the voluntary or community sector and in the private sector". (OECD, A Handbook for Policy Makers, 2004).

The general education system started its guidance and counseling services in Sri Lanka in 1957. The circular No. 10 of 1957 issued by the Director of Education introduced counseling services and vocational guidance to the school system. But this programme was not in operation since the early 1970's.

Career guidance centers in schools have been established according to the circular No.16/2006 and No. 6/2013. This programme is named 'School Guidance and Counseling Programme'. The Ministry of Education addressed some of the issues in general education through this circular. Not only personal guidance and counseling but they have emphasized preparation of students into the future labour market and made the parents aware of it too.

The guidance and counseling programmes in the education system were carried out by the Department of Evaluation, Guidance and Research of the Ministry of Education. This unit was formed in 1983. Guidance and counseling programmes were inaugurated by the unit with the collaboration of the National Youth Services Council In 1985. In the first attempt it was only for Colombo as a pilot programme and later they introduced counseling services to selected schools in the Bandarawela, Colombo, Galle, Kandy and Rathnapura education regions. This programme was named "Yovun Mithuro" School Counseling Programme.

Even though these programmes started to improve employability of school leavers, it is obvious they were not implemented properly in the schools. Even though Universities have career guidance units, the achievements of the Universities in North, East and South East are not in the acceptable level.

Conclusion

As stated in the previous paragraphs, employability of Youths is not at desired level. First of all, we need to pay attention on how to reduce unemployment rate in the region and to develop strategies to improve employability related skills among youths. JSA should initiate career guidance programmes among school students and University students and support relevant authorities to energize existing career guidance and counseling system.

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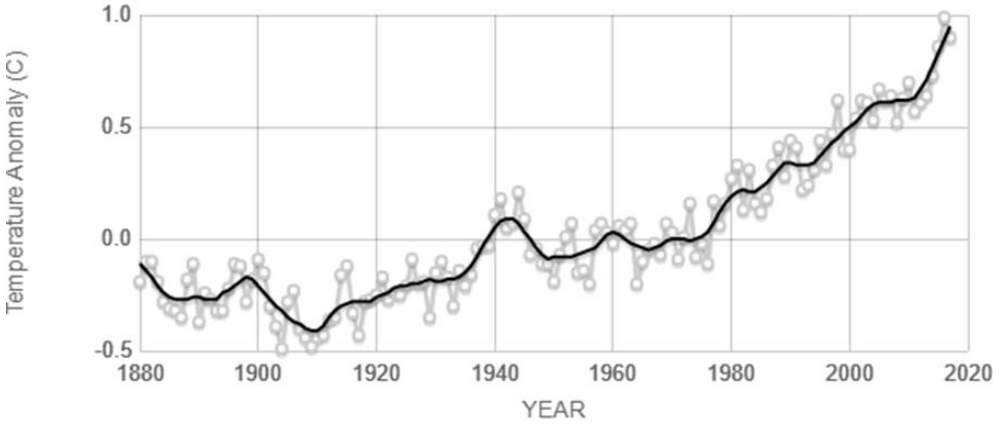
Climate Change and Youth

Dr. P. Iyngaran,
Department of Chemistry, University of Jaffna

We have a climate change problem in real time and there is still no solution! This article discusses the fundamentals of climate change and the effect of youth action on climate change. The climate of a region or city is its typical or average weather. Climate change is a change in the typical or average weather of a region or city, e.g. a change in a region's average annual rainfall. Climate change is also a change in Earth's overall climate, e.g. a change in Earth's average temperature. Climate change is not new for us. There is a lot of evidence showing Earth has faced climate change millions of years ago, e.g. the Antarctic was a tropical paradise a 100 million years ago and the Earth's surface was completely encrusted with sea ice all the way to the equator more than 650 million years ago. Over the past 10,000 years, which covers all the time human civilization has existed, Earth's climate has been unusually steady. Now, our stable reliable climate is changing. The term climate change is now generally used to describe the changes caused by human activities, and is often used interchangeably with global warming.

Global warming is the unusually rapid increase in Earth's average surface temperature over the past century, primarily due to human activity that increases the concentration of greenhouse gases in the atmosphere far beyond their natural levels. Continuous monitoring of global surface temperature from 1880 up to the present day is shown in the graph below. This surface temperature is shown relative to 1951-1980 average temperature at the center of the graph.

Global warming can be explained by the "Greenhouse Effect". As land, ocean, and air warm, they



radiate heat energy (infrared radiation) back towards space. Some infrared radiation passes through the atmosphere into space and some infrared radiation is absorbed and re-emitted by greenhouse gas molecules. This re-emitted radiation warms both the surface of the earth and lower atmosphere again. If all the outgoing radiation were to escape, the surface of the earth would be at -16°C (same

temperature as on the moon). The greenhouse effect is therefore beneficial for life on Earth, since as a consequence of it the average surface temperature of the Earth is 15°C.

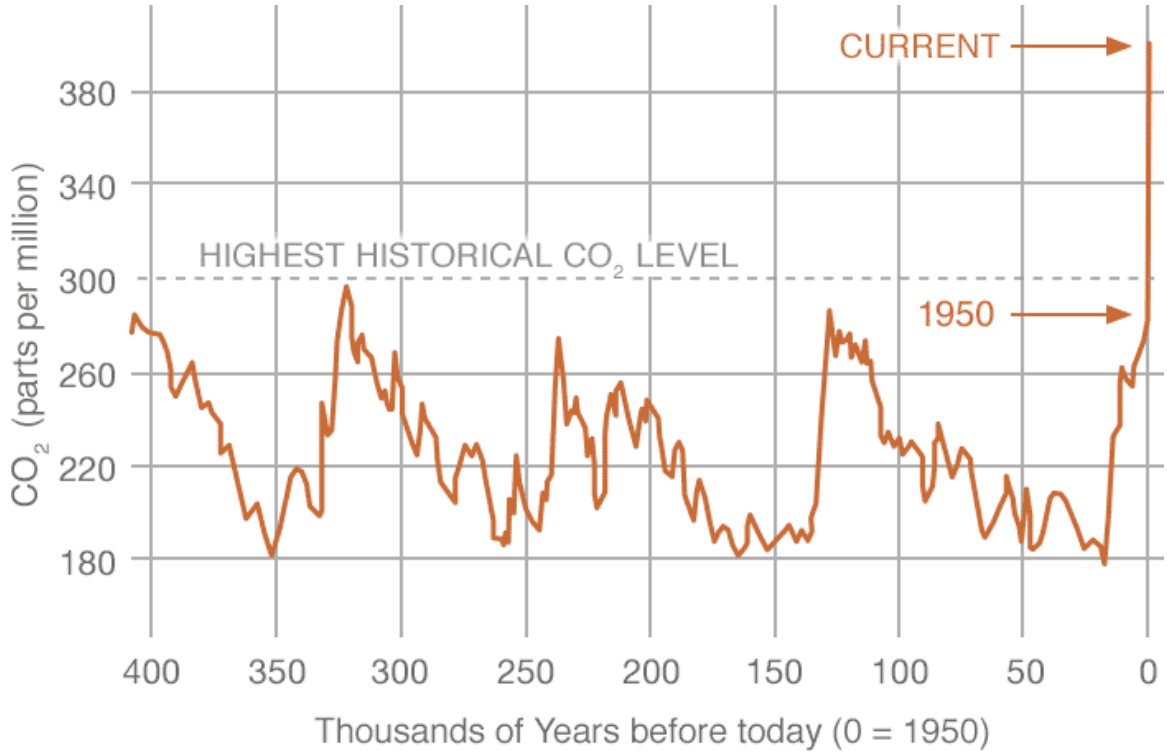
Most climate scientists agree the main cause of the current global warming trend is due to human magnification of the "Greenhouse Effect". The most important greenhouse gases are nitrous oxide (N_2O), water (H_2O), carbon dioxide (CO_2) and Methane (CH_4).

When the atmospheric lifetimes of these greenhouse gases increases, the global warming effect of these greenhouse gases will also be increased. Atmospheric lifetime is the approximate amount of time it would take for the anthropogenic increment to an atmospheric greenhouse gas concentration to return to its natural level. Either these greenhouse gases are being converted to other chemical compounds or are being taken out of the atmosphere via a sink. Atmospheric lifetime depends on both the greenhouse gas's sources and sinks as well as its reactivity. A long lifetime will allow the greenhouse gas to mix throughout the atmosphere. Average lifetimes can vary from a week (sulfate aerosols) to more than a century (carbon dioxide).

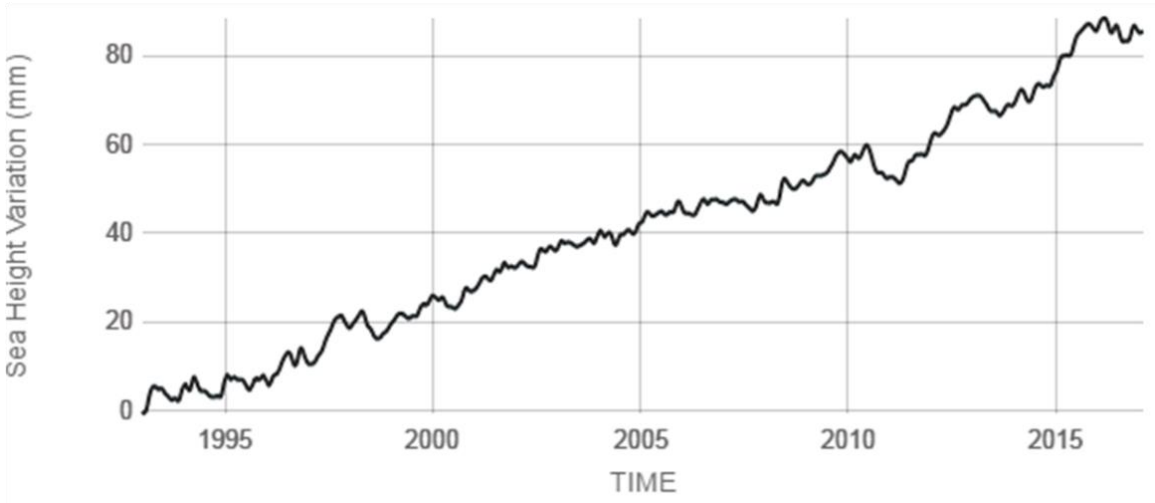
The abilities of different greenhouse gases to trap heat in the atmosphere can be explained by Global Warming Potentials (GWPs). Carbon dioxide is used as the base for all the calculations, so its global warming potential is 1. The table below shows the principal greenhouse gases, their atmospheric lifetimes, their global warming potential and their primary current sources.

Greenhouse Gas	**Primary Current Sources**	**Atmospheric Lifetime (Years)**	**GWP (100 Year Time Horizon)**
Carbon dioxide	Fossil fuel combustion Land-use conversion Cement production	~100	1
Methane	Fossil fuels Rice paddies Waste dumps	12	25
Nitrous oxide	Fertilizer Industrial process Combustion	114	298
Tropospheric ozone	Fossil fuel combustion Industrial emissions Chemical solvents	Hours to a day	N.A.
CFC-12	Liquid coolants Foams	100	10900
HCFC-22	Refrigerants	12	1810
Sulfur hexafluoride	Dielectric fluid	3200	22800

Carbon dioxide is the chief greenhouse gas produced by human activity and is released by deforestation and burning fossil fuels, as well as natural processes such as respiration and volcanic eruptions. The first graph below shows atmospheric CO_2 levels measured at Mauna Loa Observatory, Hawaii, in recent years, with the average seasonal cycle removed. The second graph below shows CO_2 levels during the last three glacial cycles, as reconstructed from ice cores.



There are several evidences for rapid climate change. One of the best examples is ocean acidification. Since the beginning of the Industrial Revolution, the acidity of surface ocean waters has increased by about 30 percent due to emission of more carbon dioxide by human activities into



the atmosphere and hence more being absorbed into the oceans. The amount of carbon dioxide absorbed by the upper layer of the oceans is increasing by about 2 billion tons per year. Another good example is sea level rise, which is caused by primarily two factors. The first factor is the added water from melting ice sheets and glaciers, and the second is the expansion of the volume of seawater as it warms. The below graph shows the change in sea level since 1993 as observed by satellites.

If we don't mitigate the climate change occurring now, we will face more severe problems in future such as temperatures continuing to rise, frost-free season (and growing season) lengthening, changes in precipitation patterns, more droughts and heat waves, hurricanes becoming stronger and more intense, and sea levels rising by 1-4 feet by the year 2100 and the arctic likely to become ice-free. We can avoid these disastrous effects of climate change by mitigation and adaptation. Mitigation means reducing the scale of climate change by stabilizing greenhouse gas levels in a timeframe which allows ecosystems to adapt naturally to climate change. It involves reducing the flow of heat-trapping greenhouse gases into the atmosphere by human interference with the climate system. There are several mitigation methods such as sustainable transportation, energy conservation, renewable energy and improving vehicle fuel efficiency. Adaptation means adapting to life in an actual or expected future climate. Some adaptation methods are infrastructure upgrades (sewers & culverts), green roofs, local food production and building design for natural ventilation.

Youth action on climate change

Our youth has immense power to determine the future of our planet. They can play a crucial role in combating climate change using their power as citizens, consumers, campaigners and change-makers to champion alternative ways of living. Youth have a responsibility to protect the planet in fighting the complex scientific problems and social quandaries presented by climate change. Across the world, many young people are involving in finding the solutions to the challenges of climate change. Youth education is one of the most effective tools to combat the destructive potential of climate change. Youth are adaptable and can quickly make low-carbon lifestyles and career choices a part of their daily lives. Youth are also the ones who are going to suffer most in the future from the consequences of global warming.

The theme of International Youth Day, 2008, was "Youth and Climate Change: Time for Action". The Secretary-General of the United Nations (UN), Mr. Ban Ki-moon, said in his address that "Young people who are adept at spreading new habits and technologies are well placed to contribute to the fight against climate change". Further, he said "youth are adaptable and can quickly make low-carbon lifestyles and career choices a part of their daily lives". Youth in developing countries are likely to feel the impact of climate change on their lifestyles and livelihoods more quickly and directly than youth in developed countries. Climate change may also cause conflicts due to resource scarcity, which could affect the lives of many youths in the long term. Impacts of climate change can create extra work for girls and young women, as they take more of their time for finding and fetching water or growing crops during drought and floods. As a result, many girls and young women miss out on their education, which means fewer opportunities for them to have better living conditions and become actors of sustainable development".

Youth can work on the following areas to mitigate and adapt to the climate change:

1. **Travel and transport:** Mobility is very essential for the economy of the country and its social development. More than half of the world's population live in cities due to rising migration caused by increasing mobility. Rising mobility brings a challenge to the existing transport infrastructure such as roads and public transport, which are developing more slowly. It creates more congestion and pollution. Youth should discover and utilize the most environmentally-friendly modes of transport, which should be sustainable and not require fossil fuels, because the youth often form habits that continue into adulthood. A good example is carpooling, the sharing of rides in a private vehicle and car sharing.

2. **Energy:** Demand of energy increases proportionally with increasing world population. There are two choices which will have to make. The first choice is that energy should be obtained from renewable sources such as sun and wind. The second choice is to use energy in a more efficient and wise way. These choices pose a big challenge to the younger generation. Youth can use their innovative ideas to invent more efficient renewable energy sources. Youth can develop methods to fully control the temperature or light in the buildings they are in, to avoid wastage of energy. Youth should talk about energy control with others who share their home, school, college, university or workplace. It is the best way to start reducing energy usage, like electricity.
3. **Food:** The food which we eat contributes a lot to climate change. Food that is transported hundreds or even thousands of kilometers away, contributes significantly in raising the level of carbon dioxide in the atmosphere. Youth can make campaigns aimed at persuading consumers to buy food that is produced locally. Buying local and seasonal foods will reduce the use of fossil fuels, boost local economies and increase people's awareness of where their food comes from. Youth can also get involved in growing their own food.

4. **Learning for change:** Education is a vital tool for youth in finding solutions to challenging problems related with climate change. Education for sustainable development (ESD) should be introduced to youth. ESD provides a framework that can help us understand and respond to the challenges of climate change. The UNESCO Climate Change Education for Sustainable Development program uses ESD to help young people to understand the impacts of climate change. It will help to increase climate literacy among young people.

5. **Lifestyle:** The younger generation now wants a better life than the preceding generation. Day-to-day they are changing their own lifestyles. Youth should focus on a maintaining a sustainable lifestyle. A sustainable lifestyle means reorganizing our ways of living without harming our environment. If our youth follow a sustainable lifestyle, our societies will live in harmony with our natural environment. Youth should build a sustainable lifestyle based on energy use, transport, food, waste, communication and solidarity at both their home and work places.

6. **Leisure and entertainment:** Youth always want to enjoy their life to the maximal extent possible. Leisure time is an inevitable component of a sustainable lifestyle for healthy living.

There are many low carbon choices in the all leisure and entertainment fields. Youth should change their attitude to lead the growth in climate-friendly low-carbon events.

7. **Money and jobs:** The current trend of the Universities is to produce job creators instead of job seekers. Therefore, youth should invest their money on low carbon choices to build low carbon economies. Youth as the bank customers, have the collective power to influence the banks to invest their money in any business whose core activity does not contribute to global climate change.

8. **Connecting with others:** Youth can communicate well globally and locally with others about the causes, effects and ways of reducing climate change through email and social media such as Facebook, WhatsApp and Viber.

We can motivate the youth to get involved in the above areas to actively respond to the challenges of the climate change. Youth should recognize their position to address the climate change of the globe as global citizens. The UN Economic and Social Council's Youth Forum made the following several proposals for increasing youth participation:

- Ensuring that official Youth Delegates are on the delegations of all countries.
- Providing financial support to cover the expenses incurred by youth volunteers working directly for the Youth Constituency at UN climate change meetings.
- Establishing an annual Youth Pavilion at the annual UN climate change conferences to improve youth engagement.
- Setting up a Global Challenges Youth Center in every city or local community.
- Developing information and communication technology tools that map, document, evaluate and incentivize youth-led climate action in a globally-coordinated way.
- Using music, social media, celebrities' engagement and broadcast media partnerships for local and global resource mobilization in support of youth-led climate action.

There is a quote from Nelson Mandela that says, "The youth of today are the leaders of tomorrow". Therefore, we should recognize the key role of the youth in tackling climate change. It is essential that the youth must now act fast by adopting low carbon lifestyles and transforming our societies into low carbon societies.

Online resources and Books

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Vocational Training versus General Education: An Empirical Study in the Northern Province of Sri Lanka

Dr. K. Sooriyakumar
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Introduction

Sri Lanka has been successful at producing a population of literate individuals. Literacy alone will no longer suffice in the knowledge era. It will be increasingly important for educated individuals to supply the workforce with the market oriented skills needed to create rapid economic growth and national development. Sri Lanka has been unable to provide students with high quality educational services. Sri Lanka ranks poorly in terms of science and math education and internet access in schools. Alternatively, India has been able to provide its students with quality science and math educations, well trained staff, and well managed schools despite low levels of adult literacy. Sri Lanka's efforts have been primarily concentrated on basic education, particularly secondary, with much less focus on higher levels of education. Knowledge has always been central to development. Knowledge is a much broader concept than information, which is generally know-what and know-why components of knowledge. Other types of knowledge, particularly know-how and know-who, are more tacit knowledge and are more difficult to arrange into a systematic code and measure.

The development of information technology may be regarded as a response to the need for handling know-what and know-why portions of knowledge more effectively. All knowledge which can be arranged into a systematic code and reduced to information can now be transmitted over long distances with very limited costs. Computer literacy and access to network facilities tend to become more important than literacy in the traditional sense. As access to information becomes easier and less expensive, the skills and competencies relating to the selection and efficient use of information become more crucial. Tacit knowledge in the form of skills needed to handle codified knowledge is more important than ever in labour markets. Education will be the centre of the knowledge-based economy, and learning the tool of individual and organizational advancement. This process of learning is more than just acquiring formal education. In the knowledge-based economy "*learning-by-doing*" is paramount. Training and learning in non-formal settings are more common. The labour market preference for workers with general competencies in handling codified knowledge is having negative effects on the demand for less-skilled workers.

Sri Lanka's ability to create a demand-driven education system that focuses on lifelong learning will determine the country's capacity to embrace the benefits of the knowledge economy. To truly capture the benefits of the knowledge economy it will now need to improve the quality of education and expand access to tertiary education and vocational training. Existing public sector institutions will have to have more autonomy along with greater accountability. Government can also increase the amount of spending currently devoted to education which has hovered around 2 percent of GDP in recent years. Expanding participation of the private sector is a key requirement for improved quality, relevance and access to higher education in Sri Lanka.

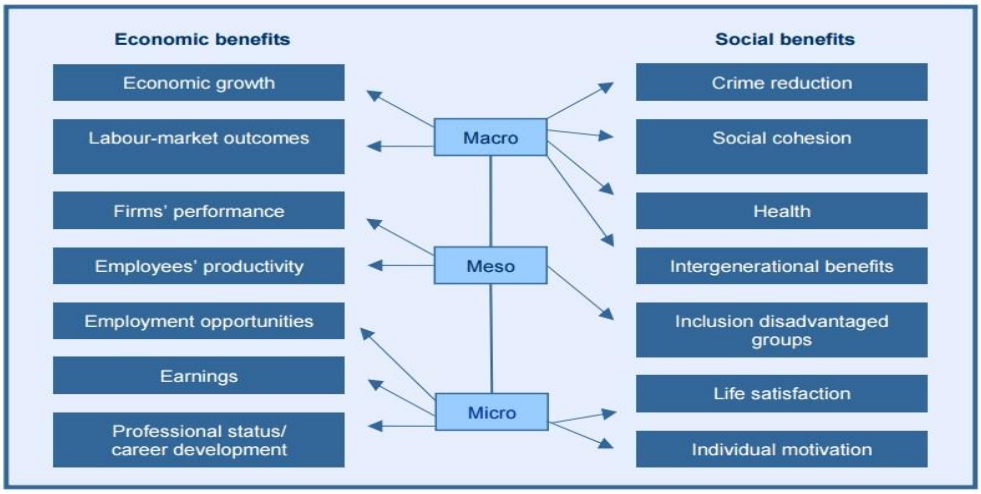
Establishing good quality private sector universities and other educational institutions will also help encourage young Sri Lankans to avoid travelling overseas and spending hard currency in neighbouring countries. Government needs to encourage English language and increase the number of science and technology courses currently offered. At the lower levels the curriculum could be improved by focusing on how children learn rather than what they learn. Introducing problem solving skills and entrepreneurship at an early age will help reorient future graduates early on. Creating formal linkages between Sri Lanka's universities and the private sector will create a symbiotic relationship that will also help academia become more relevant. Government must expand private sector access to finance all levels of education but particularly at the tertiary level. Government must increase its investment in Research and Development in public sector educational institutions. It should also encourage increased linkages between universities and the private sector.

The structure of the education system in Sri Lanka and the mismatch between the system outputs and the labour market needs has led to significant unemployment of secondary and university graduates. There are a large number of jobs that go unfilled as employers cannot find workers with the relevant skills. Enrolment at university is dropping rapidly as students fail to see the benefits in pursuing higher education. Sri Lanka's formal education system has become supply driven and has a poor record of providing industry relevant skills. Sri Lanka's Technical Education and Vocational Training (TEVT) institutions have become an effective option for students leaving the formal education sector. Sri Lanka's development of TEVT institutions has facilitated the school to work transition and has helped reduce the skill gaps and skill mismatches in the labour market. The TEVT sector is currently made up of an extensive system of public, private, and NGO sector training providers.

Vocational training programs began to return more prominently to the agendas of governments and international donor agencies in the mid-2000s (King and Palmer, 2010). The persistence of labor market imbalances has led to the worry that unemployment is becoming more structural in nature, requiring an emphasis on skills training to help reduce skills mismatches (ILO, 2012). Investing in a strong, public vocational education and training (VET) sector must be crucial in knowledge-based societies as well as in developing countries. Due to the globalization and the revolution in information and communication technology, technical and vocational education should be a vital aspect of the educational process in all countries (UNESCO, 2001). As VET is by definition positioned close to the market, acting as a hub between general education and the labour market, VET is particularly vulnerable to these pressures. VET is strongly associated with high growth rates in economies in South-East Asia as well as the industrialized world.

Benefits of VET can be categorized as economic benefits and social benefits.

Both can be analyzed on three different levels: the micro level (the benefits for individuals); the meso level (benefits for enterprises/groups); and the macro level (benefits for society as a whole). Economic benefits of VET are widespread. Several countries highlighted positive impacts on wages, employment, mobility and employment opportunity. There are also some indications that VET contributes to reducing unemployment and may protect people from becoming unemployed.



In terms of benefits for enterprises, the evidence points towards positive impacts on productivity, innovation, employment growth and organisation culture. High labour-market participation implies a low rate of unemployment and can have favourable consequences for national competitiveness and GDP growth. The Vocational Training Authority of Sri Lanka (VTA) was established on 16th August 1995 under the provisions of the Vocational Training Authority of Sri Lanka Act No.12 of 1995. The VTA is operating as the largest training center network of Vocational Training with 224 Rural Vocational Training Centers, 22 District Vocational Training Centers and 7 National Vocational Training Centers. Approximately, 25,000 youth get trained annually 83 trades in 18 trade sectors by the VTA. The objective of this study is to investigate the impact of vocational training on the probability of being employed, employment status, and monthly labour earning in Northern Province.

Methodology

Department of Census and Statistics conducts annual labour force survey in four quarters. For this survey, it selects a sample of 25 000 household units from whole country. Using the data of 2014 annual labour force survey we have studied the impact of vocational training on the probability of being employed, employment status and monthly labour earning in Northern Province. In Northern Province, 600 housing units were selected for this survey from Jaffna district and 360 housing units were selected from Kilinochchi, Mullaitivu, Vavuniya and Mannar. We selected the data of the individuals who are 15 years old and above and not going to school from these housing units. The data for our study from these housing units include 1539, 811, 800, 752 and 656 individuals from jaffna, vavuniya, mannar, kilinochchi and mullaitivu respectively. Totally, 4562 individuals were included in our study. The variables considered in this analysis are age, gender, education level, martial status, vocational training, employment, employment status, monthly earnings and district.

Cross sectional data of these variables were used to develop the models for the probability of being employed, employment status, and monthly labour earning by using treatment effect estimation. Augmented Inverse Propensity Weighted estimator was used to estimate the effect of vocational education and training on employment. Endogenous treatment effect estimation was used to study the impact of vocational education and training on employment status. Linear regression with endogenous treatment was employed to estimate the effect of vocational

education and training on monthly earning. Since we investigate the impact of vocational education and training on the probability of being employed, employment status, and monthly lobour earning, the treatment variable for these models is past vocational training.

Results & Discussion

Table 1 describes the statistics of variable considered in this analysis. Average age and average education level of these sample individuals are 42 years old and around 9th grade respectively. 48% of these sample individuals are employed. Among the employed, self employed, employer and employee are 35%, 3% and 60% respectively. Only 6% of these sample individuals got vocational education and training.

Table 1: Descriptive statistics of the variables

Variable	Obs	Mean	Std. Dev.	Min	Max
gen	4,562	.4715	.499	0	1
age	4,562	42.85	16.60	15	95
married	4,562	.7783	.415	0	1
edu	4,562	8.680	3.232	0	17
emp	4,562	.4813	.499	0	1
vet	4,562	.0596	.236	0	1
Selfemp	2,281	.3542	.478	0	1
employer	2,281	.0245	.154	0	1
employee	2,281	.6014	.489	0	1

Table 2: Employment Model

emp		Robust Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
ATE							
vet							
	(1 vs 0)	.243	.069	3.48	0.000	.106	.380
POmean							
vet							
	0	.473	.007	61.95	0.000	.458	.488
OME0							
gen		2.647	.080	32.77	0.000	2.489	2.80
age		-.038	.003	-12.91	0.000	-.044	-.033
married		1.239	.128	9.65	0.000	.987	1.49
edu		.048	.014	3.34	0.001	.019	.076
_cons		-1.115	.207	-5.38	0.000	-1.52	-.708
OME1							
gen		1.689	.462	3.65	0.000	.782	2.595
age		.015	.024	0.65	0.518	-.032	.063

married	-.194	.439	-0.44	0.659	-1.05	.666
edu	-.079	.111	-0.71	0.475	-.298	.139
_cons	.484	1.196	0.41	0.685	-1.86	2.83
TME1						
gen	-.401	.143	-2.80	0.005	-.681	-.120
age	-.025	.006	-4.22	0.000	-.037	-.013
Married	-.084	.177	-0.48	0.633	-.431	.262
Edu	.529	.030	17.16	0.000	.468	.589
_cons	-7.18	.428	-16.77	0.000	-8.02	-6.34

Augmented Inverse Propensity Weighted estimates were presented in Table 2. These estimates indicate that vocational education and training increases the probability of being employed by around 24% and it reduces the difference between male and female in the probability of being employed. But the probability of female participation in vocational training is 40% lower than that of male. Participation in vocational training increases with the general education level but decrease with age.

Table 3: Employment status model

employee	Robust Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ATE						
vet						
(1 vs 0)	.448	.010	42.59	0.000	.427	.469
POmean						
vet						
0	.537	.010	51.50	0.000	.517	.558
TME1						
gen	-.566	.086	-6.54	0.000	-.736	-.396
age	-.011	.004	-2.83	0.005	-.019	-.003
edu	.182	. 016	10.84	0.000	.149	.215
married	.010	.091	0.11	0.912	-.169	.189
_cons	-2.52	.247	-10.22	0.000	-3.01	-2.04
OME0						
gen	.597	.098	6.08	0.000	.404	.789
age	-.022	.003	-7.10	0.000	-.028	-.016
edu	-.067	.019	-3.46	0.001	-.105	-.029
married	-.017	.080	-0.22	0.825	-.176	.140
_cons	.873	.222	3.92	0.000	.436	1.30

OME1						
gen	.886	.460	1.92	0.054	-.016	1.78
age	.013	. 014	0.91	0.363	-.015	.0411
edu	.052	.129	0.41	0.682	-.200	.305
married	-.868	.319	-2.72	0.007	-1.49	-.242
_cons	3.55	3.69	0.96	0.337	-3.69	10.80
TEOM0						
_cons	-5.95	1.06	-5.58	0.000	-8.04	-3.86
TEOM1						
_cons	-4.27	3.23	-1.32	0.186	-10.62	2.06

Endogenous treatment effect estimates were presented in Table 3. These estimates shows that Probability of being employee among those who got vocational education and training is 44% higher than that of those who did not get vocational training. This means vocational training decreases the probability of being self employed or employer. Probability of being employee among male who got vocational training is higher than that of female who got vocational training.

Table 4: Earning Model

	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
earning						
gen	7659.75	805.57	9.51	0.000	6080.85	9238.66
age	479.841	168.53	2.85	0.004	149.520	810.161
married	3659.84	1125.9	3.25	0.001	1453.04	5866.64
edu	1196.34	120.04	9.97	0.000	961.062	1431.62
age2	-5.4113	1.8117	-2.99	0.003	-8.9623	-1.8602
1.vet	15685.2	2028.8	7.73	0.000	11708.6	19661.8
_cons	-13413.1	3567.2	-3.76	0.000	-20404.9	-6421.4
vet						
gen	-.45231	.12374	-3.66	0.000	-.69485	-.20977
age	-.00453	.00587	-0.77	0.440	-.01604	.00697
married	-.08520	.16116	-0.53	0.597	-.40109	.23067
edu	.18697	.02499	7.48	0.000	.13799	.23596
_cons	-2.971	.38177	-7.78	0.000	-3.7192	-2.222
/athrho	-.6661	.1077	-6.18	0.000	-.8773	-.4548
/lnsigma	9.349	.0239	390.29	0.000	9.302	9.3967
rho	-.5825	.0712			-.7051	-.4258
sigma	11496.1	275.3			10968.8	12048.7
lambda	6695.63	906.0			-8471.4	-4919.7

Earning model indicates that, on average, monthly labour earning of those who got vocational training is around Rs.15000 higher than that of those who did not get vocational training. Monthly labour earning increases with age initially and decreases in the old age. Monthly earning of male labour is around Rs 7000 higher than that of female labour

Conclusion

This study concludes that vocational training increases the probability of being employed by around 24% and also it reduces the difference between male and female in the probability of being employed. Probability of female participation in vocational training is 40% lower than that of male. Participation in vocational training increases with the general education level but decrease with age. Probability of being employee among those who got vocational training is 44% higher than that of those who did not get vocational training. On average, monthly labour earning of those who got vocational training is around Rs.15000 higher than that of those who did not get vocational training. This study suggests that more students should be admitted to the vocational education and training program and awareness program about vocational training should be conducted to the school students; especially to female school students. Necessary action should be taken to complete the higher grade of school education. Facilities should provide the students who complete the vocational training to start self employment and include the courses related to entrepreneurship in all vocational training courses.

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Sectional Chairpersons' Address – Section C

An insight into dengue and dengue hemorrhagic fevers (DF/ DHF) in Jaffna

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Introduction

Dengue is one of the most common vector-borne infectious diseases two-fifth at risk of dengue in the world's population. Worldwide it is estimated that 50-100 million clinically apparent dengue viral (DENV) infections occur annually. Of the clinically apparent DENV infections, 500,000 cases of dengue are life-threatening and called dengue haemorrhagic fever (DHF)/ dengue shock syndrome (DSS) causing over 22,000 annual deaths (WHO, 2012). Moreover, an average of 1 million dengue cases has been reported annually in more than 100 countries in tropical and subtropical regions (Mendez et al., 2010). Dengue is an African word meaning "bone breaking". There is no breaking of bones in the dengue fever (DF) patient but it means there is severe body aches and pain in DF affected patients.

Structure of DENV

DENV fall into 4 phylogenetically and genetically divergent serotypes classified as DENV-1, DENV-2, DENV-3 and DENV-4. These serotypes are antigenically related to each other. Infection with one serotype provides lifelong immunity to the same serotype only but it has been associated with increased risk of severe dengue illness when secondary infection occurs with a different serotype (Rothman, 2003).The DENV particle is composed of an icosahedral nucleocapsid encased by a lipid envelope.

Transmission of DENV

DENV are transmitted to humans through the bites mosquito vectors, principally *A. aegypti*, carrying the infectious virus. However, the virus also can also be transmitted by the *A. albopictus* and *A. polynesiensis* mosquitoes. *A. aegypti* has been considered to be the principal vector and A. albopictus has been considered to be the secondary vector in the DENV transmission. Female mosquitoes can acquire the virus while feeding in viraemic humans. Viraemia in humans lasts approximately for 5 days and takes place after an incubation period of 6-8 days.

The spread of DENV is attributed to multiple factors including urbanization, global travel and the expanding distribution of mosquito vectors. With the changing climate, virus and vector adaptations to different environments, dengue has become the most important viral infection transmitted by mosquitoes in the world.

A. aegypti is a highly domesticated mosquito that breeds in artificial containers such as water storage tanks, subterranean pits, flower pot trays, discarded tyres, buckets, other ornamental containers and they also breed in natural sites such as tree holes and discarded coconut shells. The vector prefers to rest indoor, although studies have shown that they may seek oviposition outdoors. They are day-active and the peak biting activity is in the early morning or late afternoon. The multiple feeding behavior of *A. aegypti* and its preference for human hosts are assumed to

contribute to the explosive spread of DENV, even in the presence of a low *A. aegypti* population (Scott et al., 1997).

Clinical features of dengue

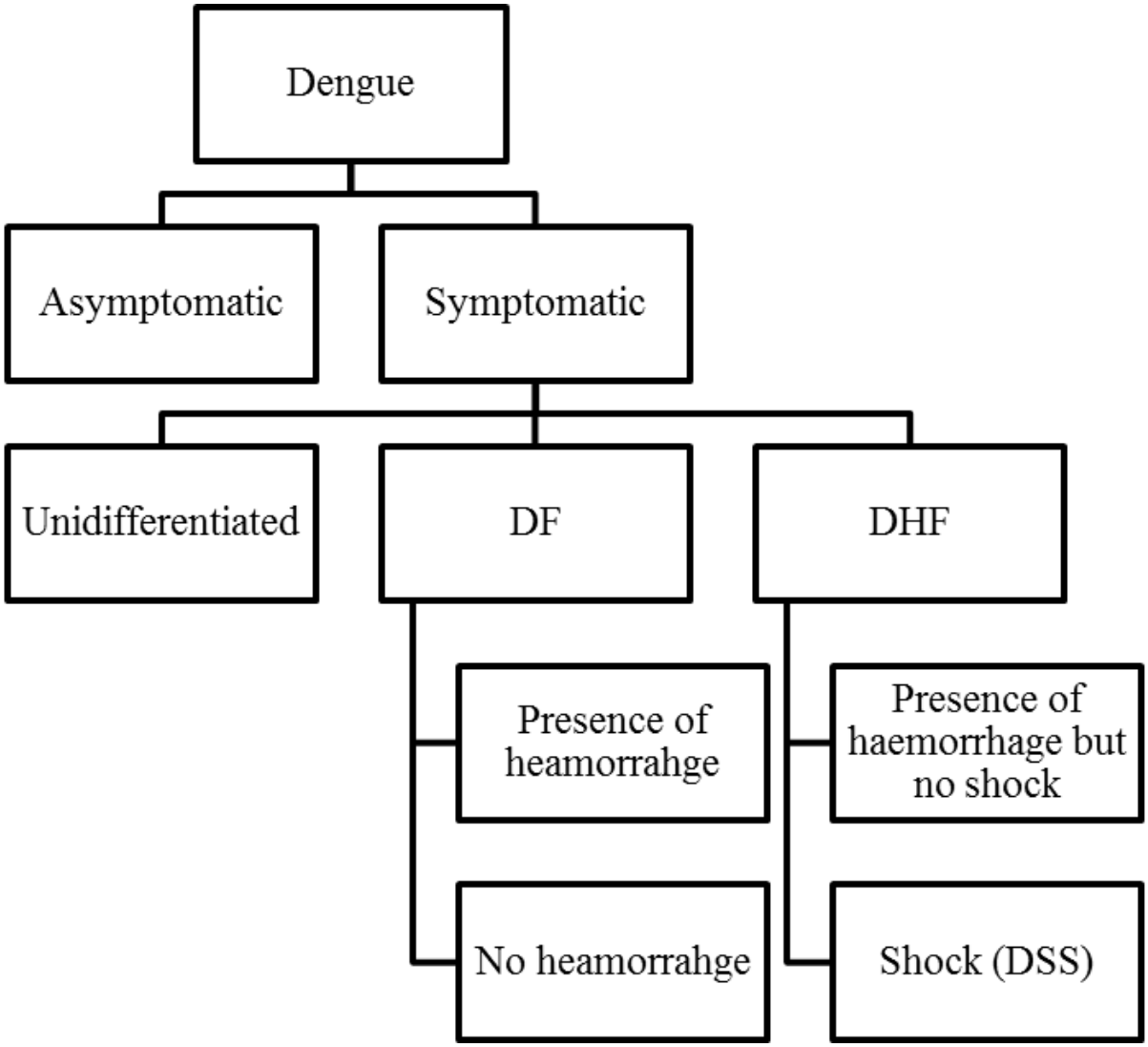

Figure 1 Clinical categorization of dengue (Adapted from Coffey et al., 2009).

Two third of all dengue infected individuals are asymptomatic, that is, they have no clinical signs or symptoms of disease. DENV infected symptomatic patients can be with a spectrum of clinical manifestation ranging from mild infection to potentially lethal complications, DHF or DSS (Figure 1). DF is a flu-like illness characterized by high fever, severe headache, retro-orbital pain, muscle and joint pain, nausea, vomiting and rash lasting approximately two to seven days. DHF is defined by haemorrhagic manifestations, thrombocytopenia, often with hepatomegaly but rarely with splenomegaly and plasma leakage. DSS is a more severe complication where extensive plasma

leakage leads to prolonged shock and disseminated intravenous coagulation. The pathogenesis of severe dengue is not fully understood, but it is generally accepted that the complications are immune-mediated and virus induced.

Infection with one serotype provides lifelong immunity to the same serotype only but it has been associated with increased risk of severe dengue illness when secondary infection occurs with a different serotype.

Laboratory diagnosis of dengue

The morbidity and the mortality of DHF can be reduced by an early detection, hospitalization and symptomatic care. Laboratory diagnosis of DENV infection can be made by detection of the virus, DENV antigen and genomic RNA or antibodies. Currently used methods for the diagnosis of DENV infections include virus isolation, detection of the genomic RNA, NS1 antigen detection and DENV specific antibodies such as anti-DENV IgM / IgG.

Treatment and prevention of dengue

There is no specific antiviral treatment for dengue and the affected patients are given analgesics (pain relief) with acetaminophen such as panadol and paracetamol but not aspirin. Patients are advised to rest, drink plenty of fluids and seek medical advice if worsening of the illness happens. If they experience nausea and severe abdominal pain in the first 24 hours of defeversence, they are immediately hospitalized for further evaluation and monitoring (CDC online, 2014).

Dengue infection in Sri Lanka

Sri Lanka has been affected by DF for over three decades. Although serologically confirmed dengue has been an old disease in Sri Lanka dating back to early sixties, only after late eighties dengue became an important public health problem in the island. In 1962, dengue cases were serological confirmed. There was an island-wide epidemic of dengue with 51 cases of DHF and 15 deaths between 1965 and 1968

In 1989, the first larger dengue epidemic with a total of 203 cases and 20 deaths has been documented in Sri Lanka (Messer, 2012). Subsequently, the number of dengue cases has increased annually with increased severity of the clinical disease. In 2004 and 2009/2010, Sri Lanka experienced major dengue outbreaks. Currently DF/DHF has become a well-established vector borne viral disease causing significant morbidity and mortality in many parts of the country.

Dengue infection in Jaffna District

The dengue cases started to increase in the Jaffna District from mid-2009 and this time period correlated with the opening of major highways connecting the Jaffna peninsula to the rest of the country after 30 years. In that regard prior to 2009, only less than 50 dengue cases have been reported to the Epidemiology Unit and that dengue was not considered as a public health issue in the Northern Province. Thus there were no detailed epidemiological studies or diagnostic data available on DF/DHF in the Jaffna District. However, after mid-2009, Jaffna District has been experiencing massive dengue outbreaks affecting many causing morbidity and mortality in the region.

Retrospective analysis of demographic and clinical features of suspected dengue from 2009-2010 in the Jaffna peninsula

In 2014 a retrospective study investigated 1085 individual patient's clinical and diagnostic notes from BHTs at THJ by Murugananthan et al. The major drawbacks observed in this study included the absence of DENV specific laboratory data to confirm the clinically diagnosed DF/DHF cases. All patients were diagnosed using the clinical criteria based on the National dengue guidelines and the majority of the patients were admitted 8 days after the onset of symptoms. Conversely, more than half of the DF/DHF cases were not notified to the Epidemiology Unit of the Ministry of Health (Murugananthan et al., 2014). In the retrospective study, incidence of clinically suspected DF/DHF cases clearly showed a seasonal trend in the distribution.

Prospective study on Clinical, non-specific and specific virological laboratory profiles of clinically suspected dengue in the Jaffna peninsula from 2009-2012

Murugananthan et al conducted a prospective study using a sample of clinically suspected DF/DHF patients to assess the clinical, non-specific and specific virological laboratory profiles in 2015 (Murugananthan et al 2013). This study provides valuable insights for the diagnosis of DENV infection in clinically suspected DF/DHF patients in the study area. Detection of anti-DENV IgM alone is not sufficient for confirming a more recent DENV infection. Detecting DENV NS1 and anti-DENV IgM together improves the detection of clinically apparent DENV infection in more than 2/3 of the study cohort. Moreover combining DENV NS1 antigen, anti-DENV IgM and the platelet count of <100,000 together for screening improves the detection by more than 90% in the study cohort. Thus a combined evaluation of DENV NS1 antigen, anti-DENV IgM and the platelet count of <100,000 will help the clinicians to fine tune the hospital admission during the first visit of a patient during an outbreak.

Diagnostic efficiency of a rapid ICT assay in the diagnosis of DENV infections

Molecular / ELISA based diagnosis for the detection of DENV markers is not widely available in resource limited countries like Sri Lanka. Since the rapid ICT assays do not require any laboratory infrastructure or expertise, their usage in developing countries becoming very popular. Accuracy of the rapid ICT assays in the diagnosis of DENV infection is less studied in Sri Lanka. Thus the ICT assay (Cortez, USA) which was widely available in the study area was validated by Murugananthan et al in 2017 using a standard ELISA (Pan Bio, Australia) for anti-DENV IgM/IgG detection. A total of 765 patients' samples collected from clinically suspected dengue patients from the 2011/2012 outbreak were tested for anti-DENV IgM and IgG using a rapid ICT assay and anti-DENV IgM and IgG ELISA.

Sensitivity and specificity for the anti-DENV IgM detection by a rapid ICT assay was moderate and for the anti-DENV IgG detection by the same rapid ICT assay was relatively high (Murugananthan et al 2017).

Molecular characterization of DENV in the Jaffna District from 2009 to 2012

Since the RT-PCR is known to be sensitive and specific for the detection of the genomic identity of DENV and thus acute DENV infections, Murugananthan et al in 2015 used RT-PCR for identification and DENV typing of DENV derived from 765 patients to study the molecular epidemiology of DENV infections from 2009 to 2012 in the Jaffna District.

Murugananthan et al described the first report on DENV typing of in the Jaffna District from 2009 to 2012. In the 2009/2010 outbreak, DENV-2 and DENV-3 were the predominant serotype identified as responsible for the outbreak. Moreover, co-infections were identified with DENV-2 and DENV-3 in 2009/2010. Whereas in the 2011/12 outbreak, DENV-1 was the predominantly identified DENV type and this type had co-infection with DENV-2 and DENV-3. The same trend was observed in Western and Central provinces during the same time period (Senaratne et al., 2016; Srisena and Noordeen unpublished data).

Culture free NGS and phylogenetic analysis of DENV-1serotype from Jaffna isolate

The whole genome analysis of DENV-1 isolated from the Jaffna District detected the similarities and differences of the isolate with DENV-1 isolated from other provinces (Murugananthan et al 2015). The DENV nucleic acid from several patients was transferred to University of Calgary, Canada using a cost effective way of DENV cDNA preservation and transport. Moreover, the current study also used a novel culture free technique for the acquisition of DENV cDNA for NGS band this is the first time a culture free acquisition of DENV cDNA was done. NGS has produced a high quality, consensus sequence of a DENV-1 isolate from a patient's sample without the use of virus culture. The whole genome sequence of this DENV was deposited in the NCBI GenBank (Accession No: KP398852). Phylogenetic analysis of the sequenced DENV-1 isolated from the current study closely associates with the DENV-1 isolates derived from other parts of Sri Lanka indicating a common ancestry and a single introduction event around 2007 (2007-2008) to the island.

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Women Issues in Post war context in Northern Sri Lanka

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Introduction

Sri Lankan women are in better position compare to other developing countries, but they are struggling to achieve gender equality according to international laws. The sex ratio was in favour of women, the island wide 2014/15 National Census reported a population of 21,271,464 of whom 51.5% were women.

Thirty years of civil war highly affected the Nothern Sri Lanka, especially for women. Civil war ended when the Sri Lankan military defeated the Liberation Tigers of Tamil Eelam (LTTE) in May 2009. Civil war took heavy toll on women's life. The huge number of men killed during the war and disappeared in 2009. Due to the civil war and post war context, women denied to access land housing, economic activities, resettlement assistant and others. Under this situation poverty has forced to many women to take on dangerous situation. This leads to increasing violence against women in Northern Sri Lanka.

Violence against women

The concept of gender based violence necessarily includes two aspects - violence which arises out of asymmetrical power relations resulting from socialisation processes, as well as gender based discrimination arising from structural violence against women, as can be seen, for example through the impact of violence against women as a result of armed conflict.

- Sexual harassment in public spaces
- The privacy of the home
- Workplaces.

Poverty and Gender based violence

Poverty and Gender based violence Poverty in Sri Lanka has a direct affect on women. Despite an increase in employment and the resultant decline in the rate of unemployment, income inequalities have remained and there have been little change in the poverty status experienced in Sri Lanka. At present a large segment of the population, over 40% lives below the poverty line. The fact that more than half the population of Sri Lanka is women highlights the gravity of the poverty status of women, although specific statistics are scarce. Alcohol, drug and other

Substance abuse and gender based violence

Alcohol, drug and other substance abuse and gender based violence Links between alcohol abuse and gender based violence are often drawn in Sri Lanka and aggravating wife. Most women identified alcohol abuse by men as the predominant factor instigating one is intoxicated spreads over to being a norm when sober. When a father's alcohol abuse leads to a lack of care for the children. Alcohol consumption affects behavioural patterns and cultural norms making violent behaviour while intoxicated acceptable".

Unequal power structures and gender based violence

The concept of "gender" in itself sets out to clarify the ways in which patriarchal socialisation processes plays a critical function in creating socially "acceptable" norms of behaviour and rights for women and for men. Which could take the form of acts of verbal, physical and sexual violations, whether in the privacy of their own homes or in the public sphere

Gender based violence recognized as a Health issue

WHO Sri Lanka National Report on Violence and Health (2008) –

- ❖ Violence in Sri Lanka is mainly considered as a police, legal, personal or a family problem.
- ❖ Currently there is no comprehensive national plan that deals with every form of violence.

The response to violence is mainly from the Police Department with only limited strategic

Research Methodology

This study is basically descriptive and analytical in nature. The data used in this research from secondary data from published and unpublished government and Non-government agencies.

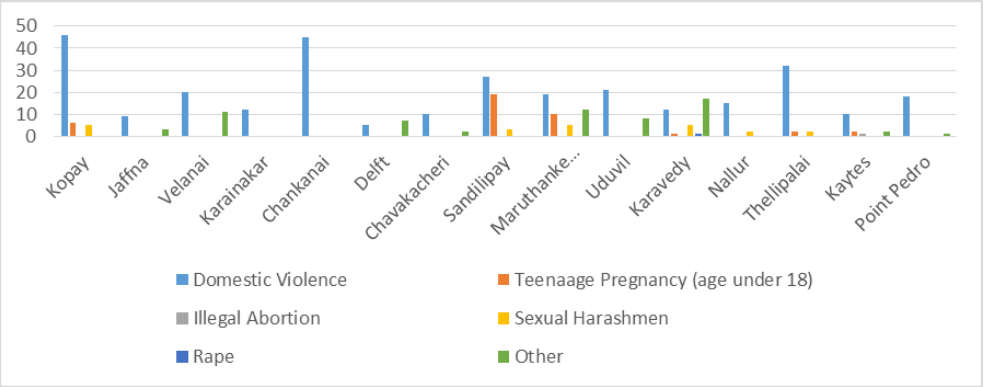

Fig 1: Gender based violence in Jaffna (01.01.2015 to 31.12.2015) – District Secretariat Report

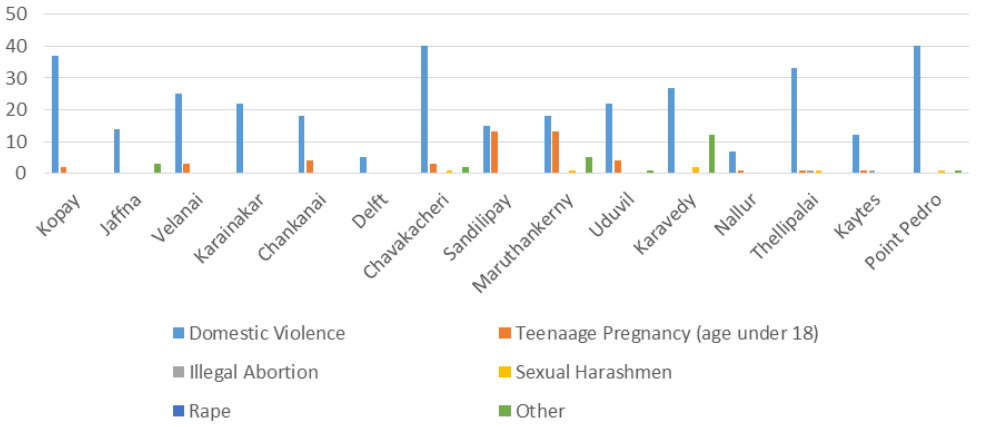

Fig 2: Gender based violence in Jaffna (01.01.2016 to 31.12.2016) – District Secretariat Report

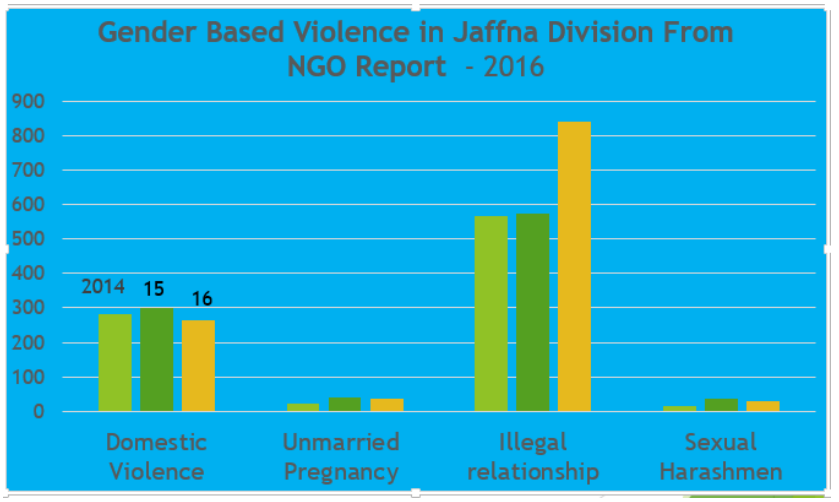

Fig 3: Gender based violence in Jaffna - NGO Report 2016

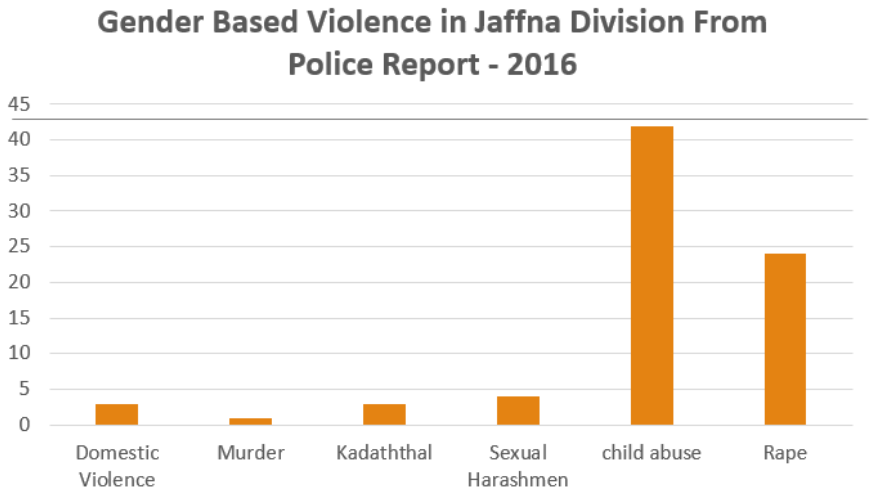

Fig 4: Gender based violence in Jaffna Division - Police Report 2016

Figure 1 & 2 show that, the comparisons between different types of gender based violence in Jaffna district based on district secretariat report. Compare to all, the domestic violence has the highest rate of violence in Jaffna district.

In the research survey the data collected from NGO shows the illegal relationship has the highest violence and the police report resulted child abuse has the highest rate of violence. There are three different results based on the data collected from different sources. It concluded that there are no proper mechanisms to report these violence in a place.

Policies for Violence Against women

Gender equality and non-discrimination of women is a guiding principle of State machinery and State action in Sri Lanka. The Constitution of Sri Lanka promulgated in 1978 in Article 12(2) sets out the principle of non-discrimination on the ground of sex (and other specified grounds), over two decades the government of Sri Lanka has been actively committed towards gender equality and the advancement of women including working towards reducing gender based violence

Women's Bureau of Sri Lanka

In 1978 the government established the Women's Bureau of Sri Lanka, the first ever national level machinery for women set up as a key institution under the Ministry of Plan Implementation.

Sri Lanka Women's Charter

The Sri Lanka Women's Charter was drafted and adopted by the State in March 1993 and is the main policy statement by the government, regarding the rights of women, expressing the States' commitment to remove all forms of discrimination against women and address crucial areas relevant to women.

The National Plan of Action for Women (NPA)

The National Plan of Action for Women (NPA) was adopted by Sri Lanka in May 1996 following the 1995 World Conference on Women, and has been developed based on the Global Platform for Action on Women.

The NPA is a collaborative effort between the government and the NGO sector in Sri Lanka and encompasses these sectors: Violence Against Women, women and human rights, women and armed conflict, education and training, economic activities and poverty, health, environment, decision making, the girl child and the media.

Limitations

I found following limitation are be on obstacles of this research,

Limitations faced by NGOs and other organisations working towards preventing and addressing gender based violence in Sri Lanka often carry out work with their mandates not in holistic approaches. They handle on diverse issues, for lobbying, advocacy, protest, implementing specific projects, these organizations they never come together.

Women's coordinating body of Jaffna district consists of Government officers and NGOs but this forum is not as active today as several years ago, the membership comes together frequently on discussed diverse issues.

Raising funds and other resources, sharing expertise and knowledge and jointly implementing projects through the sharing of decision making does not happen from the bottom widely due to the working styles of each government and NGOs have developed .

In terms of technical expertise, women activists are handicapped due to the lack of resources for certain types of activity and proper skills. particularly so in documenting, tracking and recording incidences of violence through systems that provide for safe sharing of information as well as in depth analysis, proper advocacy skills for advocacy campaigns and access to new and innovative thinking, discourse and skills.

Conclusions

Women's issues in the post war as a crucial issue that needs focused and strategic responses and diverse sectors, state, non-governmental, professional, service sectors and academia provide multi-faceted initiatives aimed at addressing and reducing gender based violence. There is a need analysing gaps and shortcomings that have prevented the yielding of highly successful results from the programming in the past decades. Further strong focus and long term commitments to reduce gender based violence.

The government has mostly dismissed women's security issues and fears, especially in the north and east. The international community has failed to appreciate and respond effectively to the challenges faced by women and girls in the former war zone.

Popular Talk – Section A

Biofuels – as an alternative for a greener future

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Introduction

Biofuel is a kind of fuel produced from renewable biomass material, commonly used as an alternative, cleaner fuel source to burning fossil fuels. Biofuels are low in carbon intensity so they don't directly affect global warming. Biofuel is a hydrocarbon that is made by or from a living organism that we human can use to power something. They can be derived from agricultural crops including conventional food plants or from special energy crops. Biofuels are not new. In fact, Henry Ford had originally designed his Model T car to run on ethanol. More advanced and sophisticated methods are available now to extract biofuels from materials such as wood, crops and waste material.

A biofuel in any type of fuel in which the energy is derived from the process of biological carbon fixation. Biological carbon fixation occurs in living organisms. The biggest difference between a biofuel and a fossil fuel is the time period over which the fixation occurs. In a biofuel, fixation occurs in months or years. In a fossil fuel, fixation occurs over thousands or millions of years. Additionally, fossil fuels are made entirely of hydrogen and carbon atoms while biofuels contain carbon, hydrogen, and oxygen.

Classification of Biofuels

Biofuels are often broken into three generations.

1st Generation Biofuels: These are also called as conventional biofuels. These are all food products. Any biofuel made from a feedstock that can also be consumed as a human food is considered a first generation biofuel. First generation biofuels are produced directly from food crops. The biofuel is ultimately derived from the starch, sugar, animal fats, and vegetable oil that these crops provide. It is important to note that the structure of the biofuel itself does not change between generations, but rather the source from which the fuel is derived changes. Corn, wheat, and sugar cane are the most commonly used first generation biofuel feed stock. Corn is the primary source of the world's fuel ethanol and most of that corn comes from the United States.

The Advantages of corn are:

- Infrastructure for planting, harvesting, and processing is already in place.
- Relatively simple conversion of corn starch to ethanol.
- Potential to use the rest of the plant (stalk, cob, etc.) to produce ethanol as well.
- There are no indirect land use costs with corn.

There are some disadvantages of corn are:

- Relatively high requirement for pesticide and fertilizer. Not only is this expensive, but it leads to soil and water contamination.
- It is a food staple and use in biofuel has increased food prices worldwide, leading to hunger.
- The production rate is low at an average of just 350 gallons of fuel per acre.

2nd Generation Biofuels: These are produced from sustainable feedstock. The sustainability of a feedstock is defined by its availability, its impact on greenhouse gas emissions, its impact on land use, and by its potential to threaten the food supply. No second generation biofuel is also a food crop, though certain food products can become second generation fuels when they are no longer useful for consumption. Second generation biofuels are often called as advanced biofuels. The only time the food crops can act as second generation biofuels is if they have already fulfilled their food purpose. For instance, waste vegetable oil is a second generation biofuels because it has already been used and is no longer fit for human consumption. Virgin vegetable oil, however, would be a first generation biofuel.

Because second generation biofuels are derived from different feed stock, Different technology is often used to extract energy from them. This does not mean that second generation biofuels cannot be burned directly as the biomass. In fact, several second generation biofuels, like Switch grass, are cultivated specifically to act as direct biomass.

For the most part, second generation feedstock are processed differently than first generation biofuels. This is particularly true of lignocellulose feedstock, which tends to require several processing steps prior to being fermented into ethanol. There are several processing technologies available for the second generation biofuels;

Thermochemical Conversion

The first thermochemical route is known as gasification. Gasification is not a new technology and has been used extensively on conventional fossil fuels for a number of years. Second generation gasification technologies have been slightly altered to accommodate the differences in biomass stock. Through gasification, carbon-based materials are converted to carbon monoxide, hydrogen, and carbon dioxide. This process is different from combustion in that oxygen is limited. The gas that result is referred to as synthesis gas or syngas. Syngas is then used to produce energy or heat. Wood, black liquor, brown liquor, and other feedstock are used in this process.

The second thermochemical route is known as pyrolysis. Pyrolysis also has a long history of use with fossil fuels. Pyrolysis is carried out in the absence of oxygen and often in the presence of an inert gas. The fuel is generally converted into two products: tars and char. Wood and a number of other energy crops can be used as feedstock to produce bio-oil through pyrolysis.

A third thermochemical reaction, called torrefaction, is very similar to pyrolysis, but is carried out at lower temperatures. The process tends to yield better fuels for further use in gasification or combustion. Torrefaction is often used to convert biomass feedstock into a form that is more easily transported and stored.

Popular Talk – Section A

Biochemical Conversion

A number of biological and chemical processes are being adapted for the production of biofuel from second generation feedstock. Fermentation with unique or genetically modified bacteria is particularly popular for second generation feedstock like landfill gas and municipal waste.

Common Second Generation Feedstock

To qualify as a second generation feedstock, a source must not be suitable for human consumption. It is not a requirement that the feedstock be grown on non-agricultural land, but it generally goes without saying that a second generation feedstock should grow on what is known as marginal land. Marginal land cannot be used to cultivate "arable" crops, meaning it cannot be used to effectively grow food. The second generation feedstock should not require a great deal of water or fertilizer to grow.

Grasses

A number of grasses like Switch grass, Myscanthus, Indian Grass, and others have alternatively been used for producing second generation biofuels. The particular grass chosen generally depends on the location as some are more suitable to certain climates. In the United States, Switch grass is favoured. In Southeast Asia, Myscanthus is the choice.

The advantages of grasses are:

- They are perennial and so energy for planting need only be invested once
- They are fast growing and can usually be harvested a few times per year
- They have relatively low fertilizer needs
- They grow on marginal land
- They work well as direct biomass

The disadvantages of grasses are:

- They are not suitable for producing biodiesel
- They require extensive processing to produce ethanol
- It may take several years for switch grass to reach harvest density
- The seeds are weak competitors with weeds. So, even though they grow on marginal land, the early investment in culture is substantial
- They require moist soil and do not do well in arid climates.

3rd Generation Biofuels: The term third generation biofuel has only recently enter the mainstream and it refers to biofuel derived from algae. In general, this term is applied to any biofuel derived from algae. These biofuels are given their own separate class because of their unique production mechanism and their potential to mitigate most of the drawbacks of 1st and 2nd generation biofuels. Previously, algae were lumped in with second generation biofuels. However, when it became apparent that algae are capable of much higher yields with lower resource inputs than other feedstock, many suggested that they be moved to their own category.

Popular Talk – Section A

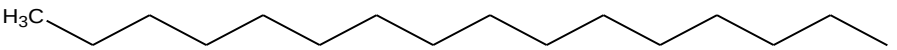
When it comes to the potential to produce fuel, no feedstock can match algae in terms of quantity or diversity. The diversity of fuel that algae can produce results from two characteristics of the microorganism. First, algae produce an oil that can easily be refined into diesel or even certain components of gasoline. More importantly, however, is a second property in it can be genetically manipulated to produce everything from ethanol and butanol to even gasoline and diesel fuel directly. The fuels that can be derived from algae include biodiesel, butanol, gasoline, methane, ethanol, vegetable oil and jet fuel.

One of the major benefits of algae is that they can use a diverse array of carbon sources. Most notably, it has been suggested that algae might be tied directly to carbon emitting sources (power plants, industry, etc.) where they could directly convert emissions into usable fuel. This means that no carbon dioxide would be released from these settings and thus total emissions would be reduced substantially.

As with everything, algae have a drawback too. Algae, even when grown in waste water, require large amounts of water, nitrogen and phosphorus to grow. So much in fact that the production of fertilizer to meet the needs of algae used to produce biofuel would produce more greenhouse gas emissions than were saved by using algae based biofuel to begin with. It also means the cost of algae-base biofuel is much higher than fuel from other sources.

Chemistry of Biofuels

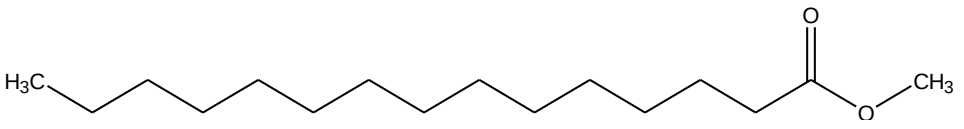
Petroleum diesel (petro diesel) is a product produced through the fractional distillation of crude oil. The product contains a mixture of hydrocarbon molecules that range in size from 8 to 21 carbon atoms. A typical petro diesel molecule would look something like this 16-carbon molecule.



Petro diesel with 16 carbon molecules

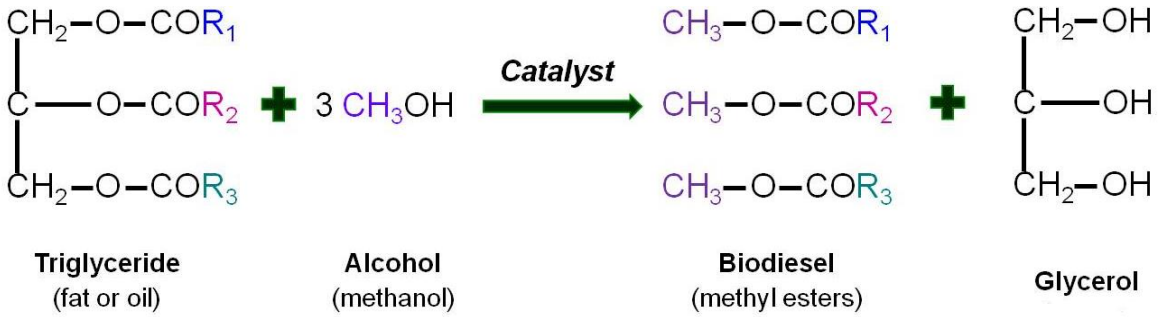
Note that the petro diesel molecule is a pure hydrocarbon, containing only hydrogen and carbon atoms and no oxygen. In ideal conditions, with abundant oxygen, burning this molecule releases only CO_2 and H_2O. Of course, oxygen makes up only 21% of the gas in air, with the rest being a mixture of about 78% nitrogen (N_2) and small amounts of other gases like methane, neon, helium, hydrogen, etc. Beyond that, many petroleum deposits are contaminated by hydrogen sulphide (H_2S) and other sulphur compounds. The result is that burning petro diesel produces sulphur compounds like sulphuric acid, nitrogen compounds like nitric oxide, and other contaminants. In other words, the reaction is not ideal.

Compare the petro diesel molecule above with a typical biodiesel molecule as shown here.



Biodiesel with 17 carbons (with an ester group)

In many ways, the biodiesel and petro diesel molecules are similar. In fact, the only real difference is on that the biodiesel has two oxygen atoms compared to the petro diesel molecule. These oxygen atoms are what make all the difference in biofuels like biodiesel, when they are burned. Oxygen is present in biodiesel because of the way it is produced. Petro diesel is produced under anaerobic conditions over very long periods of time. These conditions result in the removal of oxygen from dead plant and animal matter, leaving only hydrogen and carbon to form petroleum and other fossil fuels. Biofuels, on the other hand, are produced through a process known as transesterification. In this process, fats and oils from living organisms are broken apart to yield very long molecules that contain the oxygen atoms.



Process of Transesterification

Major Types of Biofuels

Bio alcohols (Bioethanol): This is the most common type of biofuels found and used around the world. They are the result of the fermentation reaction of microorganisms over the sugar substrate. They can be obtained from corn, molasses, wheat, sugar beets and many other starchy foods. Apart from fermentation, distillation and drying, and enzyme digestions are some other methods of production of ethanol. It is used as fuel for automobiles as well as for heating purposes at homes.

Biodiesel: The biggest consumer of this form of biofuel is Europe. Europe also leads in the production of this form. This is produced by the most common method of production of biofuels that is transesterification, which was described above. The examples of sources from where the triglycerides maybe be obtained are sunflower, soy, algae and corn. The reason of popularity for biodiesel is mainly its clean nature of burning which emits very low amount of polluting gases. Biodiesel is now not only used in automobiles but it is also used in running machineries and other commercial equipments. All the diesel engines that were designed after the year 1994 can use biodiesel as the source of fuel.

Bio ethers: These types of biofuel can improve the performance of engines when considering fuel/oxygen factor. They can enhance the levels of fuel/oxygen. This factor ensures spontaneous and high temperature burning. On a whole engine performance can be improved as a result of this.

Biogas: The anaerobic digestion process which is a reaction involving the work of anaerobic bacteria that work on any substrate without the presence of oxygen, gives rise to biogas. All organic biodegradable substances that are collected from your waste bin like wood and paper

can be the substrate for anaerobic digestion. All such apparent trash materials can actually produce something as useful as biogas.

Syngas: This form of biofuel can also be used in a number of equipments as a source of fuel. Diesel engines, turbines, combustible engines can make use of this fuel. It is the result of partial combustion of biomass and it includes gases like carbon monoxide and hydrogen.

Questions to be addressed with the use of Biofuels for a Greener future!

- Can we grow enough plant material to produce sufficient amount of biofuels?
- Can we produce biofuels without affecting food prices?
- Can we make other photosynthetic organisms (algae) capable of producing affordable biofuel?
- Can biofuels be produced cheaply enough to compete with petroleum fuels?
- Can biofuels be produced with minimal energy input for better Green House Gases (CHG) reductions?
- Can engines be designed to burn biofuels better?

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Popular Talk – Section B

Online freelancing as interim solution to youth unemployment problem, with particular relevance to the Northern Province*

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Abstract

Changes in transaction costs are redefining the boundaries of the firm and making it possible to outsource tasks at increasingly granular levels to distant locations. Online freelancing, a platform-based market for digital labor, has emerged without government promotion or oversight. It allows buyers and sellers of services to discover each other, for negotiation and completion of transactions, and for delivery of products and the making of payments. A 2017 Sri Lanka wide study using quantitative and qualitative research shows that as many as 22,000 persons are engaged in this work part time, earning on average LKR 20,000 per month. The research also documents levels of awareness and willingness to work by district. The challenges faced by online freelancers are documented and possible solutions outlined. The special relevance of online freelancing as an interim solution for the problems of high youth unemployment and low labor-force participation in the Northern Province is discussed.

Key words: Internet, services, online freelancing, digital labor, northern province
* Acknowledgements: *This work was carried out with financial support from the UK Government's Department for International Development and the International Development Research Centre, Canada. The views expressed in this work are those of the creators and do not necessarily represent those of the UK Government's Department for International Development, the International Development Research Centre, Canada or its Board of Governors.*

Introduction

By the end of 2016, 47 percent of the world's population was using Internet (ITU, 2016). Increased Internet use has led to an increase in, and transformation of, information production and consumption activities (World Bank, 2016). Research has shown that Internet access has an impact on productivity, job creation, consumer surplus and firm efficiency (Katz, 2012). Koutroumpis (2009) builds a strong case on the economic impact of broadband on growth based on a research on 22 OECD countries.

With increased global connectivity, the nature of work and possibilities of outsourcing are changing as the location of certain types of work is becoming insignificant. Therefore, more people are working virtually (without co-presence, as in offices) and employers are increasingly outsourcing work online to benefit from the low costs made possible by access to a large pool of competent workers.

Atasoy (2013), in a study of Internet access and labor markets in the United States 1999-2007, showed that access to broadband services at the county level is associated with approximately a 1.8 percent increase in the employment rate, with larger effects in rural and isolated areas. Empirical evidence suggests that Internet technologies have positive

externalities but are heavily biased in favor of skilled workers (Galperin & Viecens, 2017). Complementarity of skilled labor and Internet technologies was studied by Forman, Goldfarb and Greenstein (2012) by analyzing the relationship between US county-level wage growth and Internet investment from 1995-2000. They identified a skill bias in the employment effect of Internet technologies.

Research questions

1. What is the extent of the web-based labor platform economy in Sri Lanka?
2. Who is working in web-based labor platforms in Sri Lanka?
3. What are the challenges faced by workers in web-based labor platforms in Sri Lanka?
4. What policy measures may be taken to overcome these challenges?
5. How may those not participating in the labor force or are unemployed, particularly in the Northern Province, benefit from these opportunities?

Theoretical background

Web based labor platforms

In the days of Adam Smith, most goods and services were supplied by individuals or by small businesses. After the rise of mass production associated with Henry Ford in the late 19th Century, most goods and services were produced within firms, and outside the market system. In a seminal contribution, Coase (1937) asked why so much of economic activity took place outside the efficient market system. His answer was that the transaction costs of organizing complex production processes determined the boundary between firm and market. Greater the transaction costs, the larger the remit of the firm.

ICTs, especially the Internet, are changing transaction costs of producing goods and services. Therefore, the boundaries of the firm are being reset. It is now possible to outsource what once was routinely done within firms using the methods of command and control. What was first outsourced within countries began to be given to firms located in different time zones and countries. What work that was given to other firms, as in the case of business process outsourcing (BPO), can now be outsourced to individuals. The granularity of the tasks being outsourced has also increased.

Business process outsourcing began within the US (e.g., New York to Iowa) and quickly became international (e.g., New York to Ireland). In the early days "raw data" was moved by air and the processed data or output came back over telecom lines. Very soon, proliferation of leased lines and the resulting reductions in costs and improvements in quality made the entire process dependent on telecommunciations.

With the availability of broadband connections, it was now possible to outsource work beyond specialized locations that could provide the volumes needed to justify leased lines. At the present time, online markets, described by some as digital labor platforms (Graham, Hjorth & Lehdonvirta, 2017), are emerging where participants need not even be firms, but can be single individuals at the end of a mobile broadband connection. Categorization of these platforms has been attempted by Schmidt (2017). The basic types of labor platforms are:

Popular Talk – Section B

Cloud work (web-based digital labor)

1. Freelance marketplaces (E.g., Upwork, freelancer)
2. Microtasking crowd work (E.g., Amazon Mturk, Crowdflower)
3. Contest-based creative crowd work (E.g., 99designs, jovoto)

Gig work (location-based digital labor)

1. Accommodation (E.g., Airbnb)
2. Transportation and delivery services (E.g.,Uber, Lyft)
3. Household services and personal services (E.g., Taskrabbit)

The paper has as its focus web based digital labor, especially freelance marketplaces.

Web-based labor is enabled by platform where buyers and sellers can discover each other and complete the transaction: following market discovery, the buyer sources the work from the seller of the service, the buyer and seller communicate during the carrying out of the work, the output is delivered, and the buyer pays the seller. The platforms enable sellers to advertise themselves. The buyer can select the seller directly based on a search process, or the buyer can advertise the job and enable multiple sellers to bid for the job and select one based on lowest price or other critiera. The sellers are ranked based on multiple critieria including reputation rankings as well as indicators automatically measured by the platform. The platforms usually charge a commission out of what the seller is paid by the buyer. For sellers online outsourcing has generated new opportunities to access work in a global market, anywhere at anytime, as long as they have a computer, Internet access and the relevant skills (Kuek, et al., 2015).

Challenges faced by workers in web based digital labor platforms

Graham, Hjorth, & Lehdonvirta (2017) describe four key concerns of workers in web-based digital labor platforms based on qualitative and quantitative research in the Philippines, Malaysia, Vietnam, South Africa, Kenya and Nigeria.

The first concern is bargaining power, because the workers are unable to negotiate their pay in the global labor platforms. Based on an empirical study conducted in the United States, the Philippines and Nepal, Lehdonvirta (2016) claimed that the workers in web-based work platforms are physically, temporally, and administratively detached and desynchronized from each other. Therefore they lack collective bargaining power and sense of belonging to a community.

The second concern is economic exclusion and discrimination based on religion, ethnicity, disability or gender. Beerepoot & Branbegts (2015), based on quantitative research conducted in Bangladesh, Pakistan, India and the Philippines described how racial discrimination takes place on digital work platforms. An example is a job advertisement that discourages bidders from Bangladesh and Pakistan from applying.

The third concern is intermediation whereby high performing digital workers will bid for a job and outsource the work to another digital worker in the same platform for a lower payment.

The final concern is skill and capability development where digital workers performed low-end tasks which did not correspond to their existing skill set, professional experience and

expertise. Zittrain (2008) states that digital labor can range from highly creative projects to miniature tasks where the worker is not aware of the effect of their work.

Labor force participation and unemployment in Sri Lanka

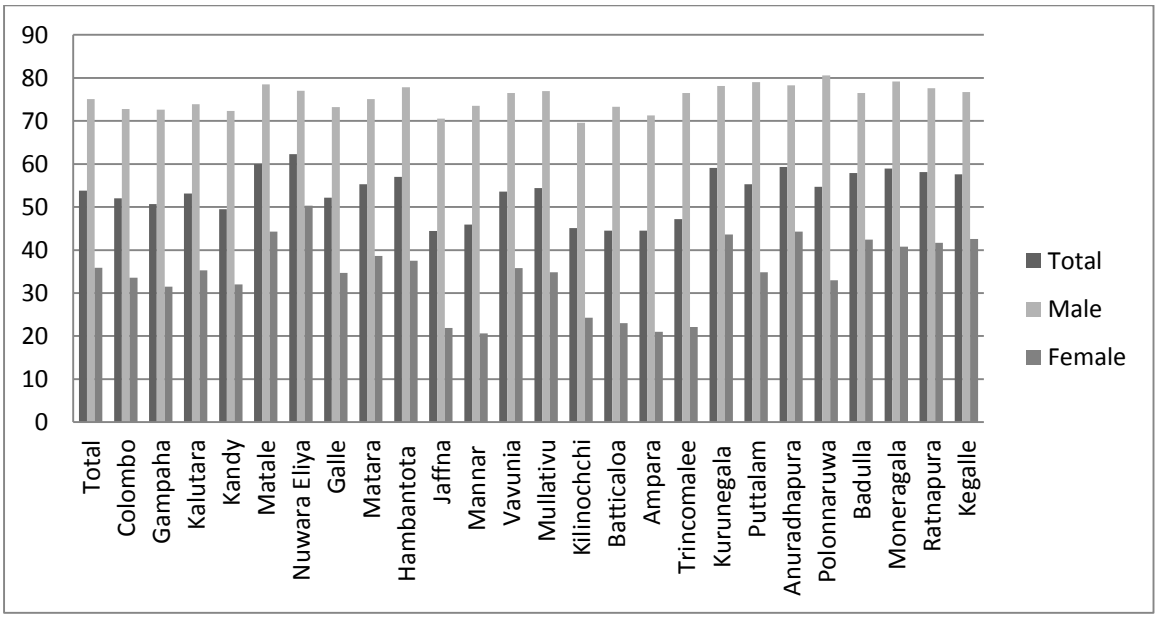
Labor force participation rate in Sri Lanka is low compared to its peers (Table 1). This is mainly because female labor force participation is low in Sri Lanka (Figure 1). Central Bank of Sri Lanka (2015) reports that women's participation in the labor force has significantly increased after independence compared with men. Yet, the female labor force participation rate in Sri Lanka was at 35.9 percent in 2016. The reasons behind low labor force participation by women are identified as deterioration of opportunities for women, rise of income levels and decrease of poverty levels, high costs of child care and housekeeping in relative to expected earnings in the market (Madurawala, 2017). Female labor force participation was very low in the Jaffna and Mannar districts (21.9% and 20.6%) in Northern Province.

Table 1: Labor force participation rate in Sri Lanka, Ghana, Indonesia, Thailand and Vietnam

	2011		2012		2013		2014		2015	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Indonesia	82.90	51.0	83.4	51.5	82.9	50.7	82.7	50.6	82.5	50.8
Sri Lanka	74.00	34.4	75.0	33.0	74.9	35.6	74.6	34.7	74.7	36.0
Thailand	81.10	65.9	81.2	65.3	79.9	62.7	78.7	61.5	77.9	61.1
Vietnam	81.70	72.6			82.1	73.2	82.5	73.3	82.4	72.7

Source: https://data.worldbank.org/indicator/SL.TLF.CACT.FE.NE.ZS

Figure 1: Labor Force participation rates by gender and district – 2016

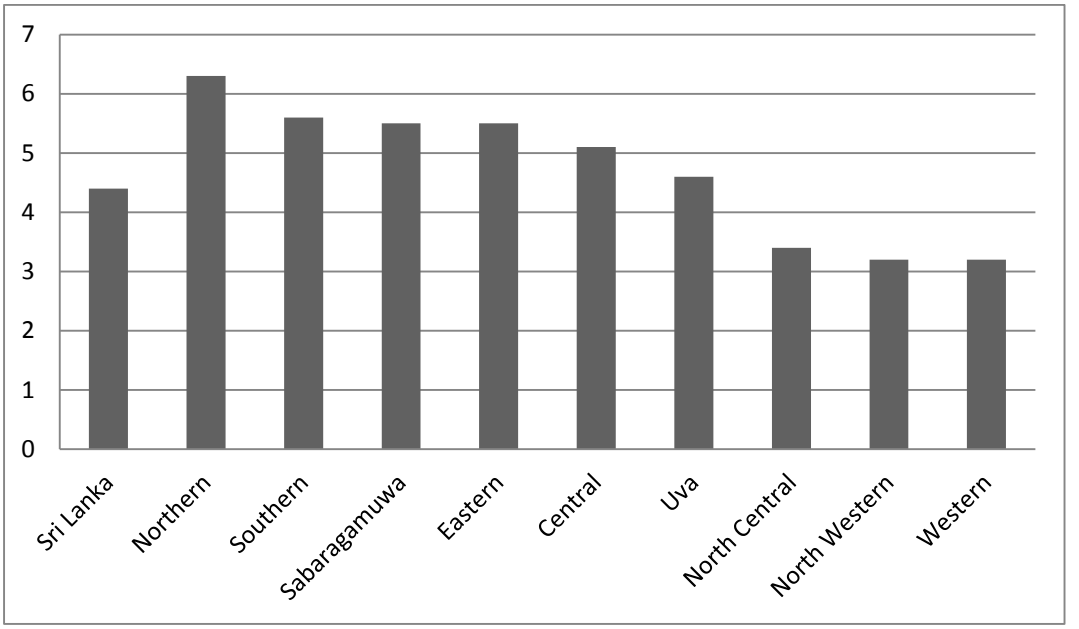


Source: Sri Lanka labor force survey, 2016

Popular Talk – Section B

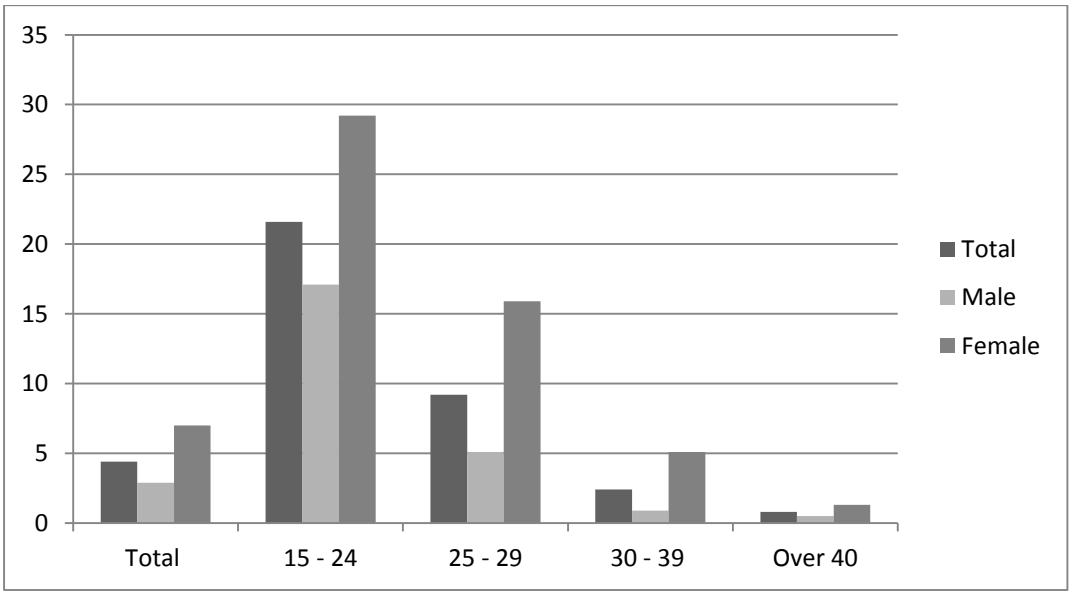
Sri Lanka's unemployment rate was 4.4 percent at the national level. The unemployment rate for females was 7 percent and more than twice that of the rate of males which was 2.9 percent. The Northern Province reported the highest unemployment rate in the country at 6.3 percent (Figure 2). In all age groups, the female unemployment rate was higher than the male unemployment rate (Figure 3). Overall youth (15-24 years) unemployment rate was more than 4 times higher than national average. Unemployment was higher among the educated youth (Figure 4).

Figure 2: Unemployment rate for each province - 2016



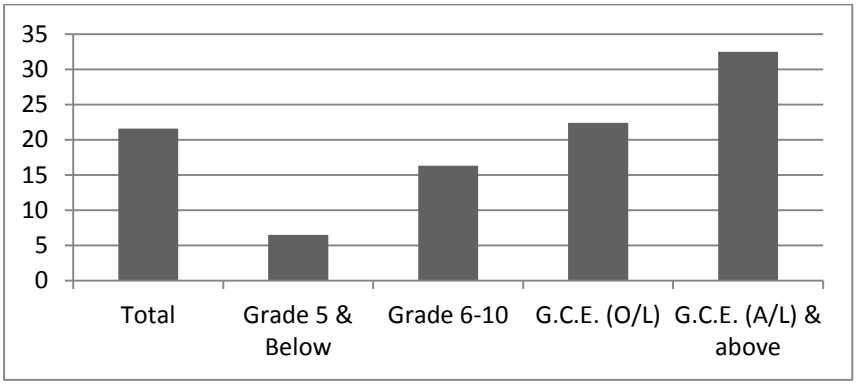
Source: Sri Lanka labor force survey, 2016

Figure 3: Unemployment rate by age group and gender – 2016



Source: Sri Lanka labor force survey, 2016

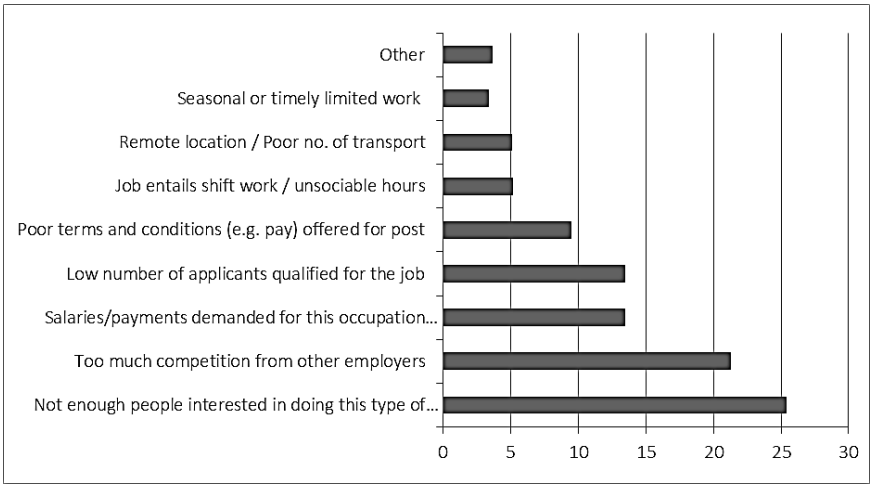
Figure 4: Youth unemployment rate by education level 2011 - 2016



Source: Sri Lanka labor force survey, 2016

The estimated labor demand by enterprises in Sri Lanka in 2017 was 497,300 (Department of Census and Statistics, 2017). When asked about the difficulties to fill the vacancies by the enterprises in Sri Lanka the main reason employers gave was that people were not willing to do the jobs offered to them (Figure 5).

Figure 5: Percentage distribution of the reason for hard-to-fill vacancies



Source: Sri Lanka labour demand survey 2017

Digital labor in Sri Lanka

More than a quarter of the population (26.8 percent) was reported as being computer literate [1] in 2015 and around the same percentage of households had a computer (Department of Census and Statistics, 2015b). Over 19.5 percent of the population had Internet Access (Central Bank of Sri Lanka, 2015b). Sri Lanka also boasts of the highest literacy rate in South Asia. As of 2012, the literacy rate of the country was 95.7 percent; 36.5 percent of Sri Lankans are able to read and write in English and 23.8 percent can speak the language (Department of Census and Statistics, 2012). The latest census states that three percent of Sri Lankans possess a degree or superior qualification.

[1] Definition for Computer literacy: A person (aged 5-69) is considered as a computer literate person if he/she could use a computer on his/her own. For example, even if a 5 years old child can play a computer game then he/she is considered as a computer literate person

Sri Lanka is a lower middle-income country where most of the employment is in the tertiary (services) sector. In terms of Sri Lankan workers, claims have been made about the creativity, friendliness and adaptability, soft skills that facilitate easy integration in to foreign units (ATKearney, 2015).

A survey by the Information and Communication Technology Agency of Sri Lanka (ICTA) in 2013 revealed that the BPO sector workforce was 75,107 (Daily FT, 2014). The year-on-year employment growth rate was 17 percent (2012-2013). The standard entry-level qualification on recruitment for BPO sector in Sri Lanka is a Bachelor's degree. Sixty three percent of the ICT workforce held a graduate or post-graduate level qualification in 2013 (SLASSCOM, 2014). Bachelor's degree as the standard entry qualification for IT-BPM sector is a reasonably high barrier to entry, given that Sri Lanka produces on average 25,000 university level bachelor's degree holders per year, and only 5,778 of these are in computer science and engineering or related topics. But each year, it is estimated that an additional 1,250 Sri Lankans complete professional courses that are equivalent to a bachelor's degree (Gamage & Wijesooriya, 2012). Many more partially complete other technical qualifications.

Even though traditional BPO/BPM sector work requires a bachelor's degree as the minimum entry qualification, others are likely to have skills that could benefit from opportunities in web based labor platforms.

Web based digital labor in Sri Lanka

Web-based labor platforms are among some of the top sites accessed by Internet users in Sri Lanka. Fiverr.com, Freelancer.com, Upwork.com and microworkers.com are a few of the well-known web based digital labor platforms in Sri Lanka. Alexa rankings indicate that Sri Lankans use web based labor platforms.

Therefore, this research explores the web based labor platform economy of Sri Lanka, including who works on these platforms, in what capacity and what challenges are faced by them. These issues are not documented. This research will contribute to fill this gap in literature.

Methodology

This research has three components:

Island wide quantitative survey

Quantitative findings are based on a nationally representative survey with a sample size of 5,377. The sample was designed to represent the target population, covering both urban and rural areas in nine provinces and 25 districts of the country with no more than ±2.5% margin of error. Respondents were selected using a multi-stage stratified random sampling method using probability proportional to size (PPS). The main stratification was based on the population size of the district. Within each district urban and rural centers were randomly selected. Fieldwork was conducted in October - December of 2015.

Non-representative survey

To validate the findings of the island wide survey, a survey was conducted among 84 current freelancers who attended Dialog Axiata's FreelancerSL 2.0 event on 22nd of October 2016.

Popular Talk – Section B

Qualitative survey

The qualitative research was designed to understand people's perceptions and attitudes towards work in web based labor platforms. Six focus group discussions (FGD) and one in-depth interview (IDI) were carried out in the three population centers: Colombo (4), Jaffna (1) and Galle (1). Each FGD had between 3 to 6 respondents and lasted 2.5 hours on average. The IDIs were conducted with a respondent who could not participate in a FGD, and lasted 2 hours. A total of 20 respondents were interviewed using the two methods.

For both lines of research, our target age group was the population between the ages of 16-40. The lower level was set at 16, as this is the age when students sit for the national Ordinary Level exam (after 10 years of schooling), after which some may go into the workforce full-or part-time. The literature suggests that a majority of online freelance workers are young and between the age group of 18-28 (Kuek, et al., 2015). We wanted to understand the dynamics of such work among slightly older persons who might still have the necessary skills to participate on platforms. Therefore our upper age cut-off was set at 40.

Results and discussion

Who is working on web based labor platforms in Sri Lanka?

An estimated number of 17,000- 22,000 workers

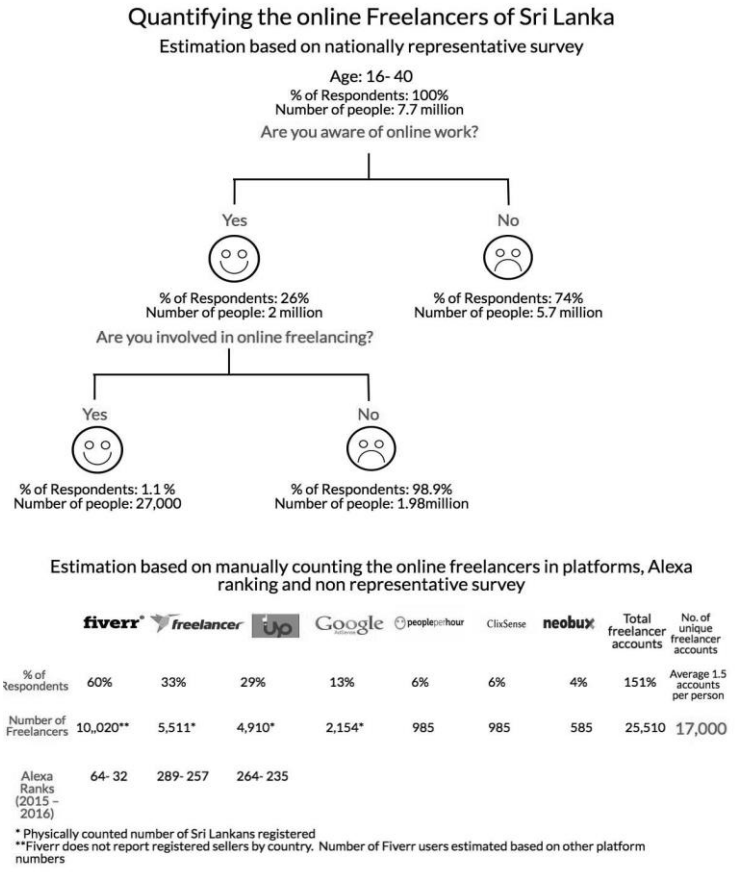
A two-fold approach was adapted to estimate the number of workers in web based labor platforms. Based on the nationally representative survey, we identified 22,000 workers working on web-based digital labor platforms in Sri Lanka. To further validate this, we manually calculated the registered Sri Lankans in web based labor platforms and conducted a survey at the FreelancerSL event and asked the current workers who participated in the event which platform they worked on. We identified 17,000 workers from the latter methods. This method was adapted because public data was not available on registered workers in "Fiverr" platform. We estimated the Sri Lankan workers in the "Fiverr" based on its "Alexa" ranking.

Therefore, based on these two approaches, our study estimates there were 17,000 - 22,000 workers in web-based digital labor platforms in Sri Lanka in mid 2017.

Annual growth of 44%

We asked the respondents of the non-representative survey at FreelancerSL 2.0 event when they registered on these platforms. 44% of the respondents registered themselves during the last year. This response was further validated by Alexa rankings, where the increase use of the site was evident by the increase of the world rank in Sri Lanka in the Alexa website.

Figure 6: Graphical representation of quantifying online freelancers in Sri Lanka



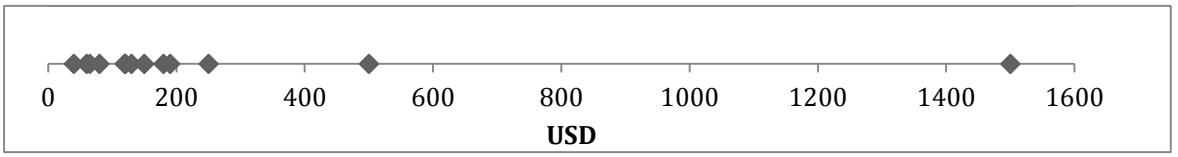
Source: LIRNEasia, Nationally representative survey on online freelancing in Sri Lanka, 2016, Base: 5,377

Value of web based labor platform economy

Income of online freelancers

Most of the workers worked on web based labor platforms part time, and were involved in work only two- three hours a day. Workers earned around LKR 20,000 (USD 140) per month by working part time. The workers who worked full time on platforms earned around LKR 50,000 (USD 350) per month. A few workers earned more than their full time job by working part time. There were some exceptional freelancers who earned around LKR 150,000- LKR 200,000 (USD 1,000- USD 1,300) per month.

Figure 7: Average monthly earnings of Sri Lankans working on web based digital labor platforms



Most frequent project values

Most frequent project value of online work was around USD 5 per project. A few workers charged USD 50-200 per project.

Figure 8: Most frequent project values of work done by Sri Lankans

Source: LIRNEasia, Survey on potential of online freelancing in Sri Lanka, 2016, Base: 160

Value of web based digital platform economy

Based on the number of workers in Sri Lanka, the value of web based digital platform economy was calculated based on pessimistic assumptions. We assumed that 40 percent of the workers are active and that they earn a regular income. This was around 7,800 workers online. As the monthly average income of workers were USD 200, the total amount taken home from working on web based labor platforms was calculated as below:

USD200 (monthly average earning)*12 (months)*7800 (workers) = USD18.7 Million

The per-employee contribution of those working on digital labor platforms in 2016 was USD 2,400 and in the BPO industry USD 10,625. Employees in the BPO industry of Sri Lanka were working full time and had a contract with the organization. Whereas the digital workers in online platforms were working for multiple buyers online at a given time and had no job security. To earn USD 2,400 per year most freelancers worked 2-3 hours a day whereas BPO workers worked 8 hours a day to earn USD 10,625 per year.

Table 2: Comparing web based digital labor platform sector with the IT/BPM sector of Sri Lanka

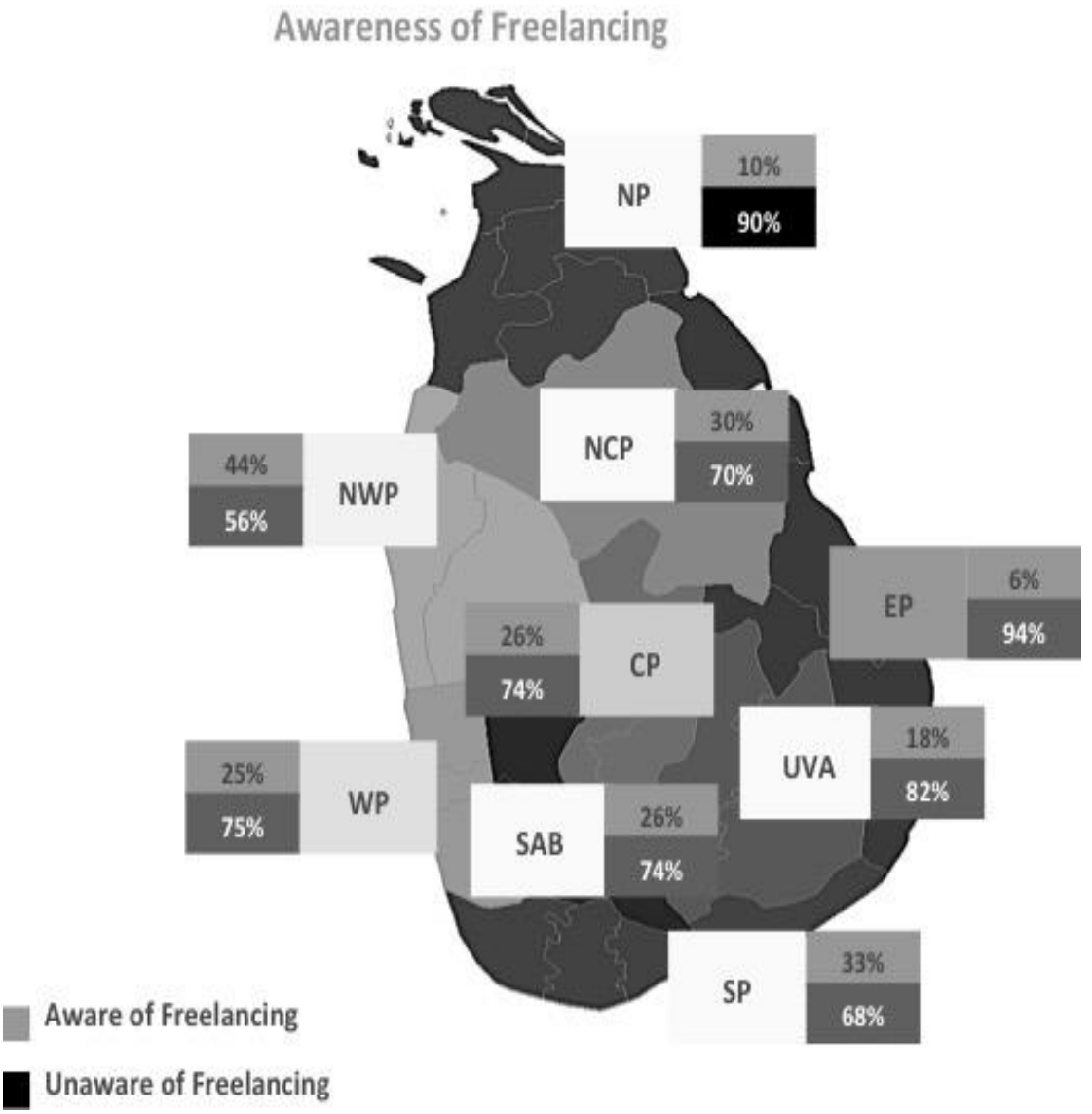
Comparison	Revenue per year (millions)	Employees	Per employee contribution	Nature of work
BPO Industry	USD 850*	80,000*	USD 10,625	Full-time
Web based labor platforms	USD 18.7	7,800	USD 2,400	Majority part-timers

SLASSCOM Strategy document 2016, https://slasscom.lk/sites/default/files/SLASSCOM%20Strategy%20Document%202016.pdf and LIRNEasia research

Awareness and willingness to undertake online freelancing

At the national level, 26 percent of the 16-40 age group were aware of online freelancing. Awareness was higher in North Western Province, Southern Province, North Central Province and Sabaragamuwa Province than in the usually leading Western Province.

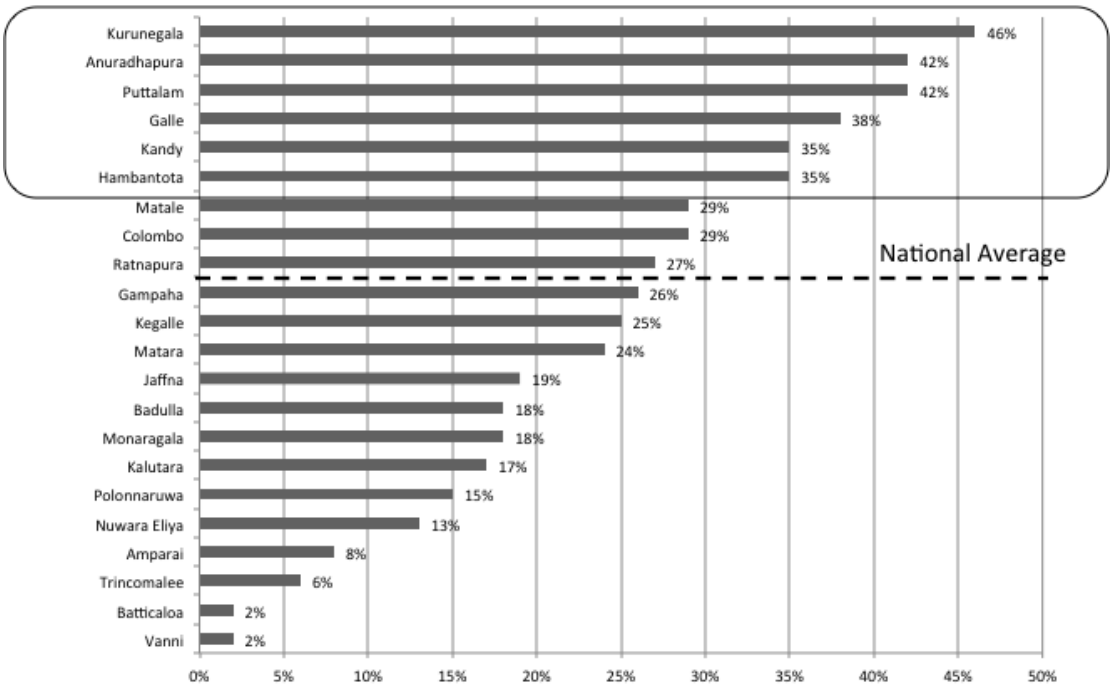
Figure 9: Map of Sri Lanka representing awareness of freelancing



Source: LIRNEasia, Nationally representative survey on online freelancing in Sri Lanka, 2016, Base: 5,377

Kurunegala, Anuradhapura & Puttalam Districts have highest awareness of online freelancing and awareness in Jaffna, Vanni districts were below the national average.

Figure 10: District level awareness of freelancing



Source: LIRNEasia, Nationally representative survey on online freelancing in Sri Lanka, 2016, Base: 5,377

Of the 16-40 age group 12 percent were willing to freelance but faced barriers such as no Internet connection, no computer, don't know information about this work and do not have relevant skills.

Profile of freelancers

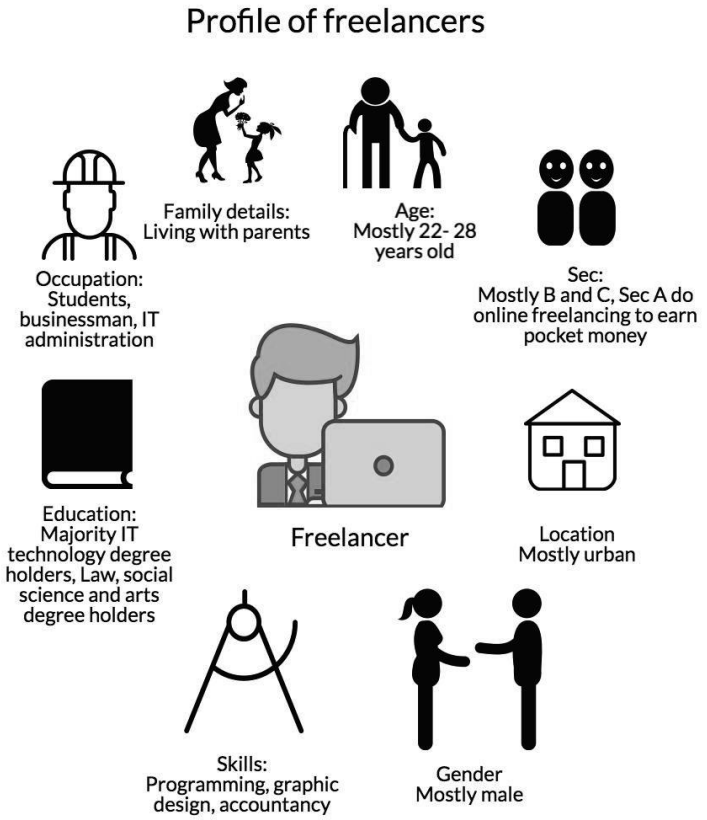
Successful freelancers who participated in our research were within the age of 22-28 years, predominantly males and belonged to Socio Economic Classification[2] B & C. Most of them were go-getters who intended to establish themselves at any cost. They stated that they are even willing to migrate for better prospects. Workers lived with their parents or extended family, even though parents did not approve this kind of work. The parents of the respondents did not understand the nature of work involved in this sector. The parents of female respondents were against them working in this field. But once they started earning, the parents did not oppose work on platforms because they supported their families financially from the earnings.

A majority of the online workers expected or did a job in the IT Sector. Most freelancers worked on web based labor platforms part time. When we asked those with day jobs why they work part time on platforms, they said that they are willing to work extra hours utilizing their skills to increase their living standard. The successful workers on platforms

[2] The Socio Economic Classification (SEC) of Households is defined by twin variables (The Occupation of the Main Earner & the Highest Examination passed by the Main Earner)

were entrepreneurs, they were determined, responsible and had good customer relationship management skills. They were self disciplined, good at time management, self-confident and flexible.

Figure 11: Profile of online freelancers in Sri Lanka



Source: LIRNEasia qualitative survey among online freelancers, 2016

Perception of employment prospects and working on platforms

Workers believed that there is a skilled workforce in Sri Lanka. This was an advantage for Sri Lankans working on web based labor platforms. They feared that trade agreements with India will negatively effect this BPO/BPM workforce in Sri Lanka. As an example, the respondents feared that the Economic and Technology Cooperation Agreement (ETCA) would bring cheaper labor from India and take the jobs of Sri Lankans. There was also a perception that in order to get a job/ enter a profession, connections/ contacts or knowing the right people was necessary in Sri Lanka.

"We have best global firms in Sri Lanka. We have MIT and Virtusa in Lanka. MIT is registered (sic) in the London stock exchange. But I have a concern in signing the ***Economic and Technology Cooperation Agreement (ETCA)*** *with India. We have a skilled IT workforce and we are trying to bring Indians here. This is a challenge to us: Nuwan, 25, Sec B, Part-time worker"*

Popular Talk – Section B

*"One of my **personal contacts** found me the **job** at the University. In Sri Lanka, if you have good contacts, you can find a job: Sampath, 26, Sec B, Part-time worker"*

Introduction to working on web-based labor platforms and rationale

Workers were introduced to online work by their relatives, friends, colleagues or lecturers. Then they started looking for information online and offline by using Google search, blog posts and advertisements on paper.

*"I got to know about online work from Amazon Lanka **paper ad.** I went with my daughter and listened to it. Then I tried it out on the computer by my self: Gunawardana, 48, Sec B, Part-time worker"*

*"I got to know about it from a **blog post**. It had step by step, how everything has to be done. This blog post was done by a Sri Lankan. I got to know about Fiverr through this. I followed these steps and registered in Fiverr and added a gig: Sudesh, 28, Sec C, Part-time worker"*

Most workers registered in these platforms two to three years ago.

*"I started working in **2011**. One of my friends has an Internet card in Sampath bank. He brings stuff using it. Ho told me that he just make an video and upload it, then money goes to his Paypal account and he uses his paypal to purchase stuff. Therefore, not in the motive of earning, just to buy stuff I like, I started working online: Gayantha, 23, Sec B, Part-time worker"*

Most were working on platforms to earn a secondary income. They are attracted to the sense of freedom attached to this type of work.

*"Anyway, personally I was **saving up** for a computer. So I wanted to save a bit of cash so that I can get it. So my other friend has told Shenaya (friend's name), and I called my other friend and somehow got in to it: Chaya, 25, Sec A, Part-time worker"*

Skills

Respondents believe that Sri Lankans are all-rounders. The communication skills of Sri Lankans working in web based labor platforms were perceived as high. Most were involved in graphic design, programming and technical tasks. Some were involved in online marketing and research.

Nature of work

The time taken to do a particular task depended on the type of work that workers do on platforms. The time may vary from 10 minutes to weeks.

***"10-15 minutes**: I do IT support. I earn around USD 10- 15 from this type of work: Nipun, 25, Sec B, Part-time worker"*

***"1 ½- 2 hours**: I do online marketing. 1 ½- 2 hours I can finish 15 USD project: Suresh, 28, Sec C, Part time-worker"*

Most online freelancers do this work at night, after they go home. This is because their full time job or education needs their attention during the day. Some workers do this work during office time, at office. They hold jobs that allow this.

*"I **work at night** most of the time. I go to university and come and do this work during evenings: Praveen, 25, Sec B, Part-time worker"*

*"To tell the truth, I actually don't spend that much of an effort in to this. I do this during the free time I have. **I don't do freelancing work after 4-5 p.m. After 4, I play games**. And I don't work during the weekend as well. My income is with less effort: Ruwan, 25, Sec A, Part-time worker"*

Reasons for workers from Sri Lanka to thrive in web based labor platforms

Successful workers were able to build relationships with customers on platforms and start working with them away from the platforms. Most targeted US/ UK and Australian buyers while some worked for any buyer. Buyers from the Western countries were preferred because they pay for the work done and because it was easy to work with them.

*"I worked for a New Zealand customer. Then he came out of Fiverr and **contacted me directly** and I worked with him: Dhanuka, 26, Sec B, Part-time worker"*

Some workers in these platforms acted as intermediaries, getting the job from the platform and outsourcing it. We came across a few emerging businesses based on these platforms, where registered rated sellers hire others to do the work and pay them a lower rate for the work done.

*"I created the profile and posted it. I wrote everything. I try to get the job most of the time. **I get the job and give some other person to do** the job: Dhanuka, 26, Sec B, Part-time worker"*

*"He has a **small company and he has 4 employees**. He does logo design. He charges 150 dollars per logo. That is the thing with top seller. Everyone comes to him: Ruwan, 25, Sec A, Part-time worker"*

Most workers were satisfied with their income. Due to the advantage of the high exchange rate of the dollar, their earnings were higher than in local market.

*"We can live from this, from working on the platform. **We can earn double and triple more than they pay in Lanka:** Sudesh, 28, Sec C, Part-time worker"*

Workers found new methods to convert digital money to physical money. They created Paypal accounts in other countries and transferred money to their Sri Lankan accounts, as Paypal is not available as a service in Sri Lanka.

*"**I use paypal. I have created a Malaysian account**. It's under my name. It is not counted. It comes unofficially, from back channels. Even for me, although I get money from a Malaysian account, sometimes commercial banks ask from me how this money came. Now it is illegal, but I can get money from private banks from some loophole: Piyumi, 25, Sec A, Part-time worker"*

Workers emphasized the benefits of flexible working hours as a major advantage of online work. Having control over time (Work at night from home/ work during office hours/ stay at home and work), ability to avoid rush hour traffic, scheduling work among the available time were a few benefits they mentioned.

The freelancers were not fluent in English. But they thrived in online freelancing. They said that language does not affect working online.

*"We **don't know that much of English**. But they say what they want and we communicate with them: Sudesh, 28, Sec C, Part-time worker"*

What are the challenges faced in labor platforms?

Working on fake sites with the hope of getting paid at the end of the task

There were some who had worked online, ad clicking fake sites in the hope of getting paid in the end. They did monotonous work for months so that they got paid at the end of the assigned tasks. We came across a stay at home mother who has worked online for months in a fake site in the hope of getting paid at end of the task. Her story:

*"The name of this site **is 2 dollar click**. The work I did in this site was ad click. I worked on this for 6 months. It says that **USD 1,000** is added to my Paypal account, but my Paypal account doesn't show this amount. It maybe an issue with withdrawing money from Paypal. I'm not sure: Suneetha, 29, Sec C, Part time-worker"*

Less social interaction when working online

Workers emphasized that they have less social interaction after they started working online. Some made use of this to interact with their friends and family (closer social circle) more whereas others didn't do online work because of this factor.

*"I have **a positive attitude** towards online work. But it's not my passion. So, I do online work as a part time job: Chaya, 25, Sec A, Part time worker of a web based digital labor platform"*

*"The best thing about online freelancing is **less interaction with the society**. Therefore, my mind is free than before. I have more time to involve in activities in my locality: Lalantha, 36, Sec B, Full time worker of a web based digital labor platform"*

Online work platforms are biased towards the buyer

The workers who are just starting to work in these platforms say that they return money to buyers when the buyer's rate them low in web based digital labor platforms to retain a good ranking in the platform. Also they stated that the platforms favours buyers and bias towards the buyer.

*"One customer didn't like the work I did and he gave me a low rating. This affected my overall rating. So **I refunded his money**. We should bear these types of losses for some time until we reach up to a certain level in platforms: Nuwantha, 18, Sec C, Part-time worker"*

"This system is biased towards the buyer. If I didn't deliver a good product, the buyer can cancel. If we provide a good product and if he cancels it, we can contact Fiverr directly. If you are a level I seller (entry level), they don't get back to you quickly: Malith, 25-year, Sec C, Part-time worker"

Moving up the levels in platforms is difficult

Digital workers complained that moving up the levels in digital labor platforms is difficult. In some platforms, the highest level was given by the platform itself and the workers didn't know how to get to this level.

"I'm level 2 on Fiverr. There is a top level… It is difficult to move up to the top level. Our rankings have to be 100%...Level 1 and 2 are given from the system automatically. The top level is given by Fiverr management itself: Subash, 25, Part-time worker"

Power cuts

Load shedding is a serious problem. Working online requires delivery of work on time. When the work is not delivered on time, customers give workers low ratings. These low ratings affect their profile and their marketability in the long term.

"The power cuts in Sri Lanka are unannounced. ***It's really difficult when we have power cuts****. The customers don't believe us when we say that we can't deliver work on time because we have power cuts. These are people who have never experienced power cuts in their entire life: Sandun, 25-year, Sec B, Part time worker"*

Lack of job security and income stability

Most Sri Lankans involve themselves in online work as part time work. This is because they are reluctant to start working online full time. They are unable to prove that they have a secure job and that they can earn a steady income. The banks in Sri Lanka do not issue loans for online workers.

"Online freelancers are ***not given loans from local banks****. The first question the officers ask us is whether EPF/ ETF is deducted from our salary. This is how they understand whether we have a stable job or not. They refuse to issue us loans because we don't have a stable job. This is not the case in other countries: Sandun, 26, Sec B, Part- time worker"*

Apart from this, freelancers are not assured that these platforms will be there in the long run. Therefore, they opt to work online part time with a day job.

"The other risk of working online is, if something happens someday, if an issue arise, say its because regulations of Sri Lanka, or because of some other reason, ***you might lose everything all of a sudden****. If this happens, I'll lose my income. In this context, if I have a steady day job, with experience I can go for another job: Nuwantha, 25, Sec B, Part-time worker"*

Inability to receive money through PayPal (popular payment platform)

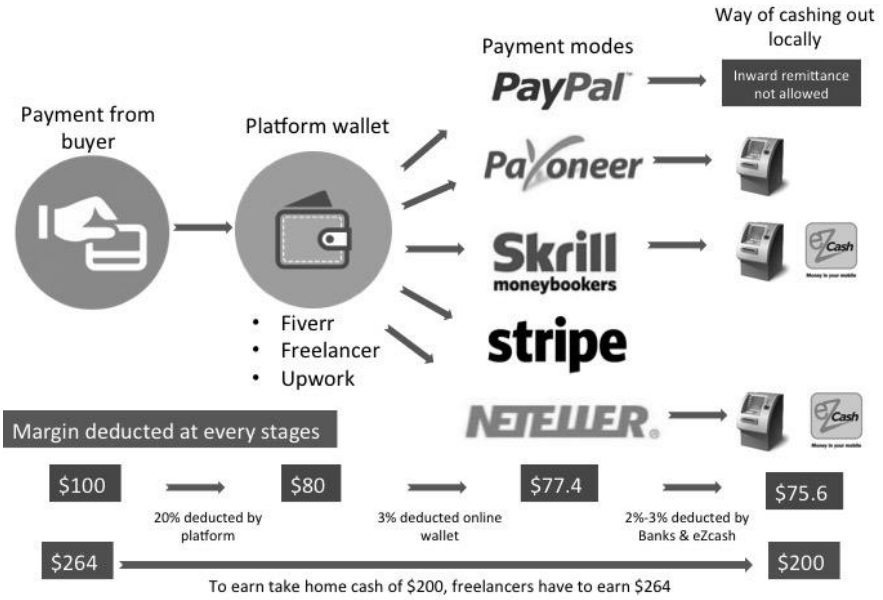
PayPal inward remittance is not allowed in Sri Lanka. This was raised as a concern by some of the workers. Some freelancers had PayPal accounts. The money remitted to the

PayPal account for the work they did was used to buy goods online as they cannot cash out this money. Other workers found other payment methods such as Payoneer, Skrill, Stripe and Netteller, which enabled them to cash out the money that they earned.

"The previous government said that they'd give us PayPal, and they didn't. This government said that they'd give PayPal, and no news after they were elected… If we look at it from the angle of development of Sri Lanka, this is a huge loss: Nadeesha, 25, Part-time worker"

Available payment methods are costly

Figure 12: Margins deducted at each stage



To take home USD 200, workers had to earn USD 264. Fees were deducted at three levels, namely, platform, online wallet and banks.
"If I'm the seller, I only receive USD 4 out of the USD 5 I've earned on the platform. So the platform gets 1.50 USD. This is 0.50 USD from the buyer and 1 USD from the seller… This platform gives the card in partnership with Payoneer. I can load money onto this card. I can load the money that I get from Fiverr and take cash out from a master [Mastercard] ATM located here… The money deducted when I take cash out using this card depends on the bank. In HNB, its LKR 200. Commercial bank its LKR 350: Supun, 25, Part-time worker"

High competition from other countries
The low rates offered by sellers from other countries and fellow Sri Lankans were emphasized.

*"The tasks that were listed for **100 dollars I've bid and done for 5 dollars** because if not I won't get that job. This brother said that Indians are doing it. Even I've done it: Gayan, 23, Sec B, Part-time worker"*

Popular Talk – Section B

Low Internet upload speed
Sri Lankan workers emphasized the need for high speed Internet and uplink.

"We need uplink. Most provide download speed but upload is low. If we host a website, what we need is upload. It's difficult to do it here: Dhanuka, 26, Sec B, Businessman"

Perceptions of exploitation
Some digital workers perceived exploitation by intermediaries on platforms. They did not know they were exploited until they found out the options available online by themselves.

"She sent us words over email and we wrote articles based on them. Then I started to see that we are been ***underpaid****. Because normally what we do is, SEO content writing, in other countries they get paid USD 5 for writing 300 words. She (the client) only gave us USD 1.5 per article and we had to write a minimum of three articles per day. I felt that* ***we are being exploited****. Sometimes the words are very hard, you are investing yourself, researching and everything: Niendi, 25, Part-time worker"*

Low social acceptance
"That is something that Sri Lanka has. Imagine you go to the US. If you're a professional, you can do a cleaning service after you finish the day job. There is no such thing in Sri Lanka. ***If you say that you are doing freelance work, no one accepts you****." Suneth, 25, Part-time worker*

Policy measures to address challenges
The solutions involve multiple actors. Solutions have to come from government, platforms, digital workers, civil society, telcos and other commercial actors.

Table 3: Challenges, possible solutions and responsible actors

Challenge faced by worker	Possible solution	Actor				
		Govt.	Platform	Digital workers	Civil Society	Commercial actors*
Online work platforms are biased towards the buyer	- Platform enforced rules (e.g. maximum number of revisions buyer can demand) - Workers rate the buyer based on responsiveness		✓	✓		
Moving up levels within platforms is difficult	- Awareness programs - Regular meet ups, networking events		✓	✓	✓	✓

High competition	- Increase "sticky" jobs (locality based) listed on platforms			✓	✓	✓
Low upload speed	-Internet packages with high upload speeds					✓
Perceptions of exploitation	-		✓	✓	✓	✓
Inability to receive money through PayPal	- Partnerships to encourage multiple payment providers (increase competition)	✓	✓	✓	✓	✓
Available payment methods are costly	- Partnerships to encourage multiple payment providers (increase competition)					✓
Power cuts interrupt continuous work online	- Pre-registration for prior notification		✓	✓	✓	✓
Lack of job security and income stability	- Insurance schemes for digital workers - Education programs on investing/securing income	✓	✓	✓	✓	✓
Low social acceptance	- Awareness programs		✓	✓	✓	✓
Fraudulent platforms	- Awareness programs to focus on pitfalls		✓	✓	✓	✓

*Telcos, Internet service providers/ payment platforms/ insurance organizations

Implications for the Northern Province

As shown above, the Northern Province has the highest unemployment rate in Sri Lanka. It is likely that the youth unemployment problem in the country is further exacerbated in the Northern Province. It is not that Sri Lanka lacks demand for labor (Satharasinghe, 2018). The problem is that the demand and supply are mismatched. Educated youth and their parents are not willing to take up the available jobs. The Department of Census and Statistics reports that most vacancies exist for "sewing machine operators, security guards, other manufacturing laborers, shop sales assistants and advertising and marketing

professionals. Reported demand for these occupations was approximately 77,200, 57,000, 39,400, 28,200 and 21,000 respectively." In addition, 70 percent of the vacancies are located in the Western Province.

Information Technology (software) and IT enabled services (business process outsourcing) jobs are more likely to meet the expectations of educated youth and their parents. Some opportunities have been created by the establishment of firms such as Extreme SEO in Vavuniya and WSO2 and MicroImage branch facilities in Jaffna. The government has offered significant tax incentives to encourage private investment in the Northern Province. However, progress has been slow.

The ideal solution would include the components of creating more service-sector employment in the Northern Province on one hand and the provision of training and incentives for those currently sitting out the labor market (evidenced by the low participation of females in the labor force). But immediate, interim measures are needed.

Online freelancing, above described as work using web-based platforms, has great potential as an interim solution. The work can be done from any location. All that are needed are the necessary skills, a broadband connection and a relatively reliable electricity supply. The attitudes that appear to be associated with online freelancing are likely to be useful in developing an entrepreneurial culture in the Northern Province.

Given what has been discovered through the research, online freelancing should be seen as a comprehensive solution to the youth unemployment problem in the Northern Province. Ideally, it should be encouraged as a part-time activity for those engaged in tertiary education or other employment and seen as a gateway to something better.

Platform-based labor markets are not exempt from the law of supply and demand. As more suppliers of services join the platforms, competition will intensify. Unless demand increases, prices will fall. There may be merit in launching awareness and persuasion campaigns in the economic centers of Sri Lanka to start offering more assignments on platforms.

Platform-based labor markets emerged without government sanction or support. They are volatile and quite vulnerable to technological and market changes. For example, automation in various forms, including applications of artificial intelligence, can quickly make obsolete some of the skills now valued on platforms.

Nevertheless, there is merit in promoting online freelancing in the Northern Province as a gateway to entrepreneurship which is the only solid basis there is to economic development.

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Popular Talk – Section C

Epidemic of Non Communicable diseases – An emerging challenge

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The Mortality and morbidity due to Non Communicable diseases (NCD) have superseded the communicable diseases over the last few decades. NCDs were responsible for 68% of total death in 2012. The main types of NCDs are cardiovascular diseases, Cancers, Diabetes and Chronic respiratory diseases.

Cardiovascular diseases and diabetes are the major component of NCD deaths. The prevalence of NCDs has been increasing gradually for the last two decades. In Sri Lanka, 75% of total deaths in 2014 were due to NCDs. Diabetes and Cardiovascular diseases were responsible for the largest proportion of NCD deaths (47%) in our country. According to the 2014 National survey on self – reported health in Sri Lanka over 60 years, one out of every two reported as having some chronic illnesses.

The economic consequences of NCDs are huge, because of the combined burden of health care costs and lost economic productivity due to illness and premature deaths. A study commissioned by the World Economic Forum concluded that the word will sustain a cumulative output loss of $47 trillion between 2011 and 2030 because of NCDs and mental illness, about $30 trillion of which will be attributable to cardiovascular diseases, cancers, chronic pulmonary diseases and diabetes.

There are Non modifiable (Age, gender and hereditary) and modifiable risk factors for the development of NCDs. According to the World Health Organization (WHO), the main risk factors for NCDs are use of tobacco, physical inactivity, alcohol abuse and unhealthy diet. The WHO Global NCD action plan 2013 – 2020 has identified key targets for the prevention and control of NCDs. These targets are:

1. Reducing mortality from NCDs
2. Reducing harmful use of alcohol
3. Reducing prevalence of physical inactivity
4. Reducing salt intake
5. Reducing use of tobacco
6. Reducing the prevalence of raised blood pressure
7. Halt the rise in diabetes and obesity
8. Providing drug therapy to prevent heart diseases
9. Providing essential medicines

In order to prevent the disease progression and the complications of NCDs, the sensible option would be early and efficient detection of NCDs at the primary care set up by doing screening programs.

We have to organize a systematic and efficient awareness program to prevent the emergence of NCD epidemic. The general public needs to change their attitude and behavior towards NCDs by lifestyle modifications such as their dietary habits, physical activity, stress management and usage of tobacco and alcohol. The school going children would be the major target of these programs to make awareness about the prevention of NCDs. We should use behavioral interventions approach (5 As) for this NCD prevention. The 5 As are Assess, advice, agree, assist and arrange.

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Sri Lanka Diabetes and Cardiovascular initiative (SLDC) is an island wide program aimed at preventing Non – Communicable disease and promoting health among people in Sri Lanka which is funded by the World Diabetes Federation, initiates under the leadership of ministry of Health, with the partnership of the Sri Lanka College of Endocrinologists and Sri Lanka Medical Association. Several reputed medical organizations in Sri Lanka such as Ceylon College of physicians Co – Sponsor this SLDC program.

The SLDC has launched the first project on prevention of NCDs in Northern Province recently (14th of March 2017) with the help of PDHS, RDHS, Director, T.H. Jaffna and Consultants of T.H. Jaffna.

We, the Health care professionals have obligation to carry out intensive awareness program among the general public to prevent the epidemic of NCDs in our Country.

Popular Talk – Section D

Youth Empowerment through Spirituality

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We have to do spiritual sadhana to empower us spiritually

What is Sadhana?
Sadhana is the Sanskrit word for spiritual practice or spiritual discipline. Bhagawan Sri Sathya Sai Baba defined sadhana as "an activity undertaken for achieving one's goal or purpose in life" (SSS 18.15), which He said, "is to realise the inherent divinity" (SSS 21.11).

"How do you do sadhana? By making your outlook pure. … It is 'taking out' from within you what is bad and evil, your negative traits. It is also 'recognising and bettering' what is good and godly in you, your positive traits" (Sanathana Sarathi, July 1996).

This universal process purifies your consciousness. Sadhana purifies your mind and heart so you know and experience your true Self as love. Sathya Sai Baba revealed that "every religion has, as its technique, this transformation, this cleansing process" (SSS 8.35). This process incorporates many spiritual practices, including meditation, devotional singing, service and the study of scriptures. The heart of all of these practices is love.

Importantly, Swami asked each of us to "Remember that you are that changeless original—the Atma (Self). All your sadhanas should be directed towards establishing yourself in this firm conviction and unwavering faith" (SSS 24.1). This is known as Self-confidence, which leads to Self-satisfaction and self-sacrifice. "A time will come when the mind will be extinguished and the merger with the Divine (Self-realisation) achieved" (SSIB 1993.6).

The Sadhana of Love
Sathya Sai Baba said, "Cultivating love is the true spiritual practice" (SSS 33.10). "You may perform any number of spiritual practices ..., but love should form the undercurrent of all these practices. … Hence, give highest importance to love. Love is important. Love is God. Live in love. This is the spiritual practice that we have to undertake" (SSS 40.21).

"What, then, is true *prema* (love)? Pure, unselfish love towards all living beings, considered as embodiments of the Divine, with no expectation of reward, is true love" (SSS 18.10). "*Prema* is not mere reciprocal love. It is an extended and sublimated form of self-love. It is the extension of love to humanity and to the entire creation. The essence of *prema* as a sadhana lies in the cultivation of humanitarianism, universal compassion and altruism" (SSIB 1979.17).

"Love more and more people, love them more and more intensely; transform the love into service, transform the service into worship; that is the highest sadhana" (SSS 5.17). "Try to subsume the many in the One, the physical bodies of yourself and others, the family, the village, the community, the state, the nation, the world, thus progressively march on towards more and more inclusive loyalties and reach the stage of Unity, in thought, word and deed. This is the

sadhana of love, for love is expansion, inclusion, mutualisation. The individual has to be universalised, expanded into Vishwaswarupa (Cosmic form of God as everything)" (SSS 12.36).

"Expand into universal love, unshaken equanimity, and ever-active virtue. That is the path which will bring out the divinity in you to the fullest" (SSS 12.16).

Love is the Source ♥ Love is the Path ♥ Love is the Goal

Dear Embodiments of Love

The *Sadhana of Love – Love is the Source, Love is the Path, Love is the Goal* is a spiritual discipline programme that presents a universal path to Self-realisation through the practice of love.

This divinely-inspired programme is based entirely on the teachings of Bhagawan Sri Sathya Sai Baba. Originally developed for the Sathya Sai World Youth Festival 2016, the programme was implemented and embraced with love around the globe, by youth and adults alike.

Sathya Sai Baba told us, "Every living being is on a pilgrimage—whether it is aware of it or not. … The destiny of all beings is to return to their origin" (SSS 14.45). As such, the *Sadhana of Love* offers a divine opportunity to individually and collectively focus with full awareness on love, purify our minds and hearts, and realise love as our divine origin and essence.

Sathya Sai Baba's teachings highlight countless ways to realise the love that we are and this is reflected in the 72 sadhanas contained in the programme. Each of these practices is like a glowing pearl that can illumine our whole life; and the shining golden thread that holds them together is love.

Through these seemingly different sadhanas, Swami has provided multiple paths for us, as embodiments of love, to manifest love and merge in love. It is love loving itself—and therefore, there is truly only one path. As Sathya Sai Baba explained during an interview, "The spiritual path is a very easy path—where there is love, there is the path."

The guidelines for the *Sadhana of Love* programme are also very simple: Choose one sadhana from each of the four steps of the programme: Self-confidence, Self-satisfaction, self-sacrifice and Self-realisation. Guided by your conscience, choose sadhanas that will help you to manifest the most love in your life and respectively:

> cultivate the greatest faith and confidence in your true Self—Self-confidence cultivate the greatest satisfaction with your true Self—Self-satisfaction enable the sacrifice of the false self or ego—self-sacrifice lead to realisation of the Self—Self-realisation.

To realise the Self is to realise our true nature as love.

All your actions must be aimed at purifying your minds and hearts to experience the Divine. When the heart is pure, the light of wisdom shines. The illumined heart becomes the receptacle of pure love. Love is everything. ... It is inherent in every being. 'I am the Spirit immanent in all beings.' The Divine Atma (Self or God) is present in all beings. The Atma has no form. It is experienced as love. If there is no love, there is no Atma, hence, love is our life-breath. Love is

our soul. Love is our everything. It should be unchanging. 18.10: 6 May 1985, http://www.sssbpt.info/ssspeaks/volume18/sss18-10.pdf
It is built around His four progressive steps of Self-confidence, Self-satisfaction, self-sacrifice and Self-realisation.

> One can attain divinity only when one has steady faith. First of all, one should have faith in one's own Self. Develop Self-confidence, which will lead to Self-satisfaction. When you have Self-satisfaction, you will be prepared for self-sacrifice. Only through self-sacrifice, can one attain Self-realisation. Self-realisation means to realise that you are everything. Self-confidence is the foundation, Self-satisfaction is the wall, self-sacrifice is the roof and Self-realisation is life. No one can live in a building without a roof. Roof cannot be laid without walls and walls cannot be raised without foundation. So, Self-confidence, Self-satisfaction, self-sacrifice are very essential for Self-realisation.

SSS 34.18: 9 October 2001, http://www.sssbpt.info/ssspeaks/volume34/sss34-18.pdf

> The terms 'I', Brahman (God), Atma and Self are all synonymous. The 'I' sans mind is the Atma, or the Self, in its pristine purity. The 'I' associated with the mind is the false self …. There is only one Atma or Self and that is the 'I'. … There is nothing other than the Self in the universe. All the things you see as existing in the phenomenal world are but reflections of the One Self. … What today's man needs to do is to constantly contemplate on the Self, to realise the Self, to be firmly established in the Self, and to experience the bliss of the Self.
>
> SSIB 1990.11: 29 May 1990, http://www.sssbpt.info/summershowers/ss1990/ss1990-11.pdf The real name of Atma (Self) is love.
> SSS 40.21: 15 December 2007, http://www.sssbpt.info/ssspeaks/volume40/sss40-21.pdf

Thus, the word 'Self' in Self-confidence, Self-satisfaction and Self-realisation refers to our true Self or Atma.

> The Bhagavad Gita teaches us that by good and sacred work we can purify our hearts; that by worship we can attain one-pointedness of the mind and that by wisdom we can remove the veil of ignorance and attain union with God. Thus by work, worship and wisdom, man can become divine.
> SSIB 1979.29, http://www.sssbpt.info/summershowers/ss1979/ss1979-29.pdf

Self-confidence
- ❖ work
- ❖ worship
- ❖ wisdom

Self- satisfaction
- ❖ work
- ❖ worship
- ❖ wisdom

Self-sacrifice
- ❖ work
- ❖ worship
- ❖ wisdom

Self-realization
- ❖ work
- ❖ worship
- ❖ wisdom

Popular Talk – Section D

When a person is yearning for the precious goal of Self-realisation, all the forces of nature and all creation will help him and render all assistance. ... Aim high, resolve on the supremest adventure— everything will be set right to lead you on, to the goal.
SSS9.25: 17 October 1969, http://www.sssbpt.info/ssspeaks/volume09/sss09-25.pdf

A SELF REALIZED PERSON IS A mighty potentate in the world.
Sadhana Summary
Guided by your conscience, the voice of God within, choose and practice one sadhana from each of the four steps that will manifest the most love and respectively:

> cultivate the greatest faith and confidence in your true Self—**SELF-CONFIDENCE**
> cultivate the greatest satisfaction with your true Self—**SELF-SATISFACTION**
> enable the sacrifice of the false self or ego—**SELF-SACRIFICE**
> lead to realization of the Self—**SELF-REALISATION**

1. Self-Confidence
Guided by your conscience, choose and practice one sadhana from the 18 Self-confidence sadhanas below that will manifest the most love and cultivate the greatest faith and confidence in your divine Self.

Work
- ♥ Sadhana 1.1 Keep good company and avoid bad company.
- ♥ Sadhana 1.2 Share stories about GOD and the benefits of practicing His teachings with other devotees.
- ♥ Sadhana 1.3 Cultivate faith in the scriptures of your religion and sincerely practice their teachings.

Worship
- ♥ Sadhana 1.4 Participate enthusiastically in devotional singing.
- ♥ Sadhana 1.5 Contemplate your experiences with your favourite deity, remembering His Love and Grace.
- ♥ Sadhana 1.6 Practice daily meditation and prayer.
- ♥ Sadhana 1.7 Chant the Gayatri Mantra.
- ♥ Sadhana 1.8 Practice *Likhita Japa* (repeated writing of the Lord's Name) wholeheartedly with full concentration.
- ♥ Sadhana 1.9 Practice *Nama-smarana* (repeating the Lord's Name) with your heart full of love.

Wisdom
- ♥ Sadhana 1.10 Get to know through daily reading of GOD and His life and teachings as well as devotees' experiences with Him.
- ♥ Sadhana 1.11 Get to know the lives of some of the great souls and Avatars spoke about.
- ♥ Sadhana 1.12 Listen to DIVINE Discourses and practice what you learn.
- ♥ Sadhana 1.13 Participate in study circles on GOD's teachings and practice what you learn.
- ♥ Sadhana 1.14 Remind yourself that your Loving Lord is always with you, in you and around you.

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- ♥ Sadhana 1.15 Regard whatever happens to you as for your own good.
- ♥ Sadhana 1.16 Learn to follow your conscience, the voice of God within.
- ♥ Sadhana 1.17 Contemplate constantly on GOD's affirmations.

2. **Self-Satisfaction**

Guided by your conscience, choose and practice one sadhana from the 18 Self-satisfaction sadhanas below that will manifest the most love and cultivate the greatest satisfaction with your divine Self.

Work

- ♥ Sadhana 2.1 Give up four bad practices: eating meat, drinking alcohol, smoking and gambling.
- ♥ Sadhana 2.2 Replace dull and stimulating sensory inputs with pure sensory inputs.
- ♥ Sadhana 2.3 Develop patience and forbearance (*kshama*).
- ♥ Sadhana 2.4 Promote good thoughts and put aside bad thoughts.
- ♥ Sadhana 2.5 Speak softly, lovingly and sparingly, and avoid talking ill of others.
- ♥ Sadhana 2.6 Practice right conduct by acting only from love.
- ♥ Sadhana 2.7 WATCH your Words, Actions, Thoughts, Character and Heart.
- ♥ Sadhana 2.8 Practise unity of thought, word and deed.
- ♥ Sadhana 2.9 Practise the five human values by manifesting love in thought, speech, action, feeling and understanding.

Worship

- ♥ Sadhana 2.10 Be grateful for all that God and others have done for you.
- ♥ Sadhana 2.11 Worship the Lord's feet or footprints in your mind.
- ♥ Sadhana 2.12 Worship with full confidence that the image or idol is alive and saturated with consciousness and power.
- ♥ Sadhana 2.13 Treat your mother, father, teacher, guest and everyone you meet as you would treat Swami.
- ♥ Sadhana 2.14 Offer all your thoughts, words and actions to God as an act of worship.
- ♥ Sadhana 2.15 See God in all and have reverence towards nature and all life. *Wisdom*
- ♥ Sadhana 2.16 Make your conscience your Master.
- ♥ Sadhana 2.17 Practice equanimity.
- ♥ Sadhana 2.18 Discriminate constantly between the permanent and impermanent.

3. **Self-Sacrifice**

Guided by your conscience, choose and practise one sadhana from the 18 self-sacrifice sadhanas below that will manifest the most love and enable the sacrifice of the false self or ego.

Work

- ♥ Sadhana 3.1 Eliminate the six enemies of man: desire, anger, greed, delusion, pride and jealousy.
- ♥ Sadhana 3.2 Practise Ceiling on Desires, do not waste food and utilise the savings for service of the needy.
- ♥ Sadhana 3.3 Practise Ceiling on Desires, do not waste money and utilise the savings for service of the needy.
- ♥ Sadhana 3.4 Practise Ceiling on Desires and do not waste time.
- ♥ Sadhana 3.5 Practise Ceiling on Desires and do not waste energy.

- ♥ Sadhana 3.6 Practise JOY: Jesus first, Others next and Yourself last.
- ♥ Sadhana 3.7 Serve your family members with love and detachment, and keep your home and surroundings clean.
- ♥ Sadhana 3.8 Engage in selfless service
- ♥ Sadhana 3.9 Engage in selfless service with in the wider community.
- ♥ Sadhana 3.10 Participate in the educational programmes for children.
- ♥ Sadhana 3.11 Help Ever, Hurt Never.
- ♥ Sadhana 3.12 Make friends with GOD and take Him everywhere with you.
- ♥ Sadhana 3.13 Surrender your likes and dislikes.
- ♥ Sadhana 3.14 Practise giving and forgiving.
- ♥ Sadhana 3.15 See all work as God's work.
- ♥ Sadhana 3.16 Remember constantly that God is the doer and you are the instrument.
- ♥ Sadhana 3.17 Develop detachment.
- ♥ Sadhana 3.18 Surrender your ego to the Lord.

4. Self-Realisation

Guided by your conscience, choose and practise one sadhana from the 18 Self-realisation sadhanas below that will manifest the most love and lead to realisation of the Self.

Work

- ♥ Sadhana 4.1 Perform all action without desire as an offering to God (*nishkama karma*).
- ♥ Sadhana 4.2 Love All, Serve All.

Worship

- ♥ Sadhana 4.3 Develop love.
- ♥ Sadhana 4.4 Be happy and make others happy.
- ♥ Sadhana 4.5 Manifest bliss, which is your true nature.
- ♥ Sadhana 4.6 Develop the feeling of oneness.
- ♥ Sadhana 4.7 Practise divine vision and see everything as God.
- ♥ Sadhana 4.8 Practise Sathya Sai Baba's Light (*Jyoti*) Meditation.

Wisdom

- ♥ Sadhana 4.9 Read elevating literature about the Self. See Recommended readings.
- ♥ Sadhana 4.10 Maintain outer and inner silence as much as possible.
- ♥ Sadhana 4.11 Cultivate concentration.
- ♥ Sadhana 4.12 Make your mind steady and still for at least eleven seconds.
- ♥ Sadhana 4.13 Be the witness.
- ♥ Sadhana 4.14 Practise Constant Integrated Awareness.
- ♥ Sadhana 4.15 Practise 'Not this, not this' (*Neti, neti*).
- ♥ Sadhana 4.16 Practise Self-enquiry and realise your divine Self.
- ♥ Sadhana 4.17 Contemplate constantly on the four *Mahavakyas* (Great Aphorisms).
- ♥ Sadhana 4.18 Contemplate constantly on the Self (Atma).

Vital to spiritual life is Self-confidence, the conviction that one is the Atma (Self).

CWBSSSB, p.88 or http://media.radiosai.org/journals/Vol_04/01MAY06/conversation.htm

> Who is a real human being? One who does not undergo a change; one whose faith in the Atma-*tatwa* (Self) is firm and steady. That is Self-confidence.

Popular Talk – Section D

SSS 42.4: 21 February 2009, http://www.sssbpt.info/ssspeaks/volume42/sss42-04.pdf

How to develop Self-Confidence?

Man should not give scope to *ahamkara* (ego) by identifying himself with the body. 'I' does not correspond to the body. 'I' corresponds to the eternal and immortal Atma, which is not tainted by ego, pomposity, andimmorality. Only when man develops such Atma-*vishwasa* (Self-confidence) can he set an ideal to others. Man today does not understand the meaning of Self-confidence. First of all, man should have faith in himself.

SSS 36.8: 14 April 2003, http://www.sssbpt.info/ssspeaks/volume36/sss36-08.pdf

You should consider Self-confidence as the most important asset in life. Without Self-confidence you can never attain bliss. Therefore, try to develop Self-confidence in order to lead a good life. You are Godyourself, God is the eternal resident of your heart. Therefore, there is nothing greater than your own heart. You should love everyone and hate none. ... When you practise this principle, you can also attain theDivine that Sai Baba is. If Sai has attained such fame and reputation, what is responsible for it? It is His LovePrinciple alone. This Love is My real property and treasure. You should also set ideals in the society bydeveloping Self-confidence and by sharing your love with others.

SSS 34.23: 23 November 2001, http://www.sssbpt.info/ssspeaks/volume34/sss34-23.pdf

If one has no Self-confidence, one will not be able to achieve much although he has faith and devotion. One may have confidence in one's own Self; but if he has no devotion and faith, that too will not help him.Devotion and Self-confidence are like the negative and positive. It is the combination of these two that will enable us to fulfil our sacred thought.

SSIB 1977.10, http://www.sssbpt.info/summershowers/ss1977/ss1977-10.pdf

Each one should ask themselves this question: Great souls (*mahatmas*) and sages were also people like me; they were also embodied beings. If they could attain perfection, so can I, if I follow their method.
Prema Vahini, p.5, http://www.sssbpt.info/vahinis/Prema/PremaVahiniInteractive.pdf
What does we mean by self-satisfaction?
In order to elevate oneself … one must learn Self-confidence and Self-satisfaction, to be content with one's Self, to derive joy from the Atma which one is. One should not be tempted by what appear to be sources of joy in the external world.
SSS 14.59: 24 November 1980, http://www.sssbpt.info/ssspeaks/volume14/sss14-59.pdf

How to develop self-satisfaction?

Keep the mind away from low desires that run after fleeting pleasures. Turn your thoughts away from them and direct the thoughts toward permanent bliss, which is derivable from the knowledge of the immanent divinity. Keep before the mind's eye the faults and failures of

sensory pleasures and worldly happiness. Thus, you will be helped to grow in discrimination and non-attachment and to make spiritual progress.
Jnana Vahini, p.27, http://www.sssbpt.info/vahinis/Jnana/JnanaVahiniInteractive.pdf
Uparati is the process of turning the mind inward and purifying one's thoughts and feelings. By these means of self-control and self-regulation, one should try to get Self-satisfaction. This comes when one lives up to the dictates of his conscience. Make your conscience your master.
SSS 21.15: 23 June 1988, http://www.sssbpt.info/ssspeaks/volume21/sss21-15.pdf We should do only such acts which are acceptable to our conscience. Self-satisfaction is very important.

SSS 41.4: 7 March 2008, http://www.sssbpt.info/ssspeaks/volume41/sss41-04.pdf
Samadhana refers to contentment. He who has the least desires is the richest man in the world. He who is filled with desires is the poorest man in the world. Therefore, one should have contentment and Self-satisfaction.

SSS 18.15: 7 July 1985, http://www.sssbpt.info/ssspeaks/volume18/sss18-15.pdf Exercise self-control. Only through self-control can you achieve Self-satisfaction.

SSS 37.23: 17 October 2004, http://www.sssbpt.info/ssspeaks/volume37/d041017.pdf

Know that whatever you feel or do is an offering to God, flows towards God. So, be cautious. Do not offer bad thoughts, words and deeds which He does not accept. Offer instead the holy and the pure. That is your duty. That will ensure Self-satisfaction.

SSS 17.29: 23 November 1984, http://www.sssbpt.info/ssspeaks/volume17/sss17-29.pdf
Four steps are laid down in the scriptures to help man succeed in this effort: discrimination between the permanent and the impermanent, withdrawal from the process of catering to the senses, positive control of the feelings, thoughts and pursuits, and incessant yearning for liberation from all bonds.
SSS 12.36: 10 June 1974, http://sathyasai.org/search/volume12/sss12-36.pdf

What does we mean by self-sacrifice?
The emphasis must be on the sadhana of purity and sacrifice. Purity is Divinity. Through sacrifice, there is purity of mind and heart. By purity, Divinity is realised. Sacrifice is an offering, a giving up to the Lord, a dedication to the Lord. What is to be sacrificed to the Lord is the sense of ego, of 'mine.' Once all sense of ego is sacrificed to the Lord, given up to the Lord, heart and mind are purified of ego-attributes and Divinity can then be realised.
CWBSSSB, pp.214–215 or http://media.radiosai.org/journals/Vol_05/01DEC07/02-conversations.htm

God is love, and love is selflessness. Selflessness is the abolition of all sense of the ego and separateness, of all spurious identification with the isolationist life of that counterfeit thing called 'self' (ego); self (ego) is separateness, and separateness is the denial of wholeness, holiness, God. … The Godward process called 'self-sacrifice' is, in its essence, love. For God is love, and love alone can lead to Him. … Love must be totally selfless to be Godward, to be Divine. Its criterion must be, 'the Beloved, first'; its technique must be 'your happiness before mine'. The way to happiness is to forget oneself and to remember God.

Popular Talk – Section D

Sathyam Shivam Sundaram – The Life of Bhagawan Sri Sathya Sai Baba, 4.6, Part C, Sathya Sai Baba's letter to students, http://www.vahini.org/sss/iv/words-c.html

It is not a question of surrendering or giving to someone else. One surrenders to himself. Recognition that the Atma is oneself is surrender. Surrender really means the realisation that all is God, that there is nobody who surrenders, that there is nothing to be surrendered, nor is there anyone to accept a surrender.All is God. There is only God.

CWBSSSB, p.102 or http://media.radiosai.org/journals/Vol_04/01JUL06/conversation.htm

How to develop self-sacrifice?

Give no room for the ego. If anyone examines his position in this vast cosmos, he will realise his infinitesimal smallness. Egoism arises out of ignorance. Expel the ego and develop love. With love, develop the spirit of sacrifice. Sacrifice alone can confer immortality.

SSS 30.10: 11 April 1997, http://www.sssbpt.info/ssspeaks/volume30/sss30-10.pdf

The *Atmic* Principle (Atma *Thathwa*) can be realised if only one could shed the feelings of 'I' and 'mine'. Today, many people make efforts to realise the *Atmic* Principle, but their efforts do not succeed because they are unable to get rid of the feelings of 'I' and 'mine'. In fact, they are the obstacles to Self-realisation. First and foremost, one has to remove the feeling of 'I' (ego). Then realisation will dawn on you. The religious symbol of Christianity (†) also denotes this cutting off of ego. The egocentric assertion of 'I' is the root cause for all sorrows, unrest, and difficulties. One has to realise this truth. The feeling of 'mine' has also to be shed. When a teacher develops a feeling "these are all my disciples," ego will raise its head there also. Hence, the feelings of 'I' and 'mine' has to be removed. Then only can the *Atmic* Principle be realised.

SSS 41.10: 18 July 2008, http://www.sssbpt.info/ssspeaks/volume41/sss41-10.pdf

Surrendering to the Lord is surrendering all thoughts and actions, not wishing for the fruits of the action, not doing action to gain its fruit but doing the action because it is one's duty. The act is dedicated to the Lord and the results, therefore, are borne by the Lord. Actions done thus—fruits abandoned at the time of the action—such action is free of *karma*. Since the ego, in this way, is not fed and cultivated, it disappears before long. For example, if one shaves, which is classed as an uninspired mundane task, the attitude is that one is preparing for the sake of the Lord in the heart, and one is making the best of his appearance to honour the Lord, and not for one's personal vanity or reward. Also, in walking, offer the action to the Lord to maintain a body fit for the Lord to live in; and that is the attitude for every single act of the day. Sweeping the house is dedicated to the Lord so that He may have a fit dwelling. And cooking also is dedicated to Him so that the body may be strong and vigorous for the benefit of the Lord.

CWBSSSB, p.15 or http://media.radiosai.org/journals/Vol_03/02FEB01/cws.htm52
Only when one develops Self-confidence will he be able to develop peace of mind and experience the satisfaction or *ananda* of the Atma; and then he will sacrifice everything else.

Popular Talk – Section D

SSIB 1974pt2.29, http://www.sssbpt.info/summershowers/ss1974/ss1974part2-29.pdf

Yajna (sacrifice) is the destiny of every living being. Life is sustained by the sacrifice of the living. Every being, from the tiniest amoeba to the most profound scholar, is perpetually engaged in *yajna*. … Only, most of it is not conscious; most of it is not voluntary; most of it is not righteous. It is done out of fear or greed or with a view to the fruits thereof, or by mere instinct or primeval urge. It must be consciously done, it must be for spiritually elevating purposes, especially in man. Then, when life becomes *yajnamaya* (sacrifice-filled), egoism will disappear and the river will merge in the sea.

SSS 2.41: 1 October 1962, http://www.sssbpt.info/ssspeaks/volume02/sss02-41.pdf
What does we mean by self-realisation?
Self-realisation means to realise that you are everything.
SSS 34.18: 9 October 2001, http://www.sssbpt.info/ssspeaks/volume34/sss34-18.pdf

Realisation that the entire universe is nothing but Brahman (God), which is the only Reality. When there is this realisation of Brahman, the one without a second—even the mind ceases to exist. It is only the operations of the mind that result in the perception of diversity in the universe. When oneness is experienced, there is no mind at all. All is Brahman in that state of consciousness. There is room only for *prema* (love) in this state. That love is truth.
SSS 29.31: 31 July 1996, http://www.sssbpt.info/ssspeaks/volume29/sss29-31.pdf

Hislop: The Buddha taught that Nibbana (Nirvana) was the ultimate goal. Is that different from the liberation of which Swami speaks?
Sai: It is the same. Nirvana, Liberation, Realisation are just different words.

CWBSSSB, pp.112–113 or http://media.radiosai.org/journals/Vol_05/01AUG07/02-conversations.htm

Consider yourself as the embodiment of Divinity. Experience your true nature of love. This is Self-realisation.

SSS 33.10: 16 July 2000, http://www.sssbpt.info/ssspeaks/volume33/sss33-10.pdf

How to attain self-realisaition?
Self-realisation is possible only through knowing your own real nature.
SSIB 1990.3: 21 May 1990, http://www.sssbpt.info/summershowers/ss1990/ss1990-03.pdf

Realisation, which is not possible through logic, which is not possible through ritualistic sacrifice, and which is not possible through discussion and other disciplines, can be achieved only through love.
SSIB 1972.18, http://www.sssbpt.info/summershowers/ss1972/ss1972-18.pdf

Therefore, listen, all aspirants! You, whose real nature is *Atmic*! Seek to discover your true Self, your genuine Reality; attain the knowledge that you are the Atma itself; exult in the Atma alone; taste the undiluted incomparable unlimited bliss of the awareness of the real Self.

Popular Talk – Section D

Prasanthi Vahini, p.56, http://www.sssbpt.info/vahinis/prasanthi/prasanthivahiniinteractive.pdf
For experiencing the Atma (Self) as your reality, control of the senses, removal of physical attachment and truth are essential. … Only by throwing off attachment to the body and purifying the mind and intellect can you merge in your truth and earn the eternal bliss, highest peace, the purest wisdom. Thus only can one earn liberation from the bondage of birth and death.

Upanishad Vahini, pp.53–54, http://www.sssbpt.info/vahinis/Upanishad/UpanishadVahiniInteractive.pdf74

God is man and man is God. All of us have something of God, the divine spark, within us. All men are divine like Myself, but with the spirit embodied in human flesh and bone. The only difference is that they are unaware of this Godhood. They have come into this *karmic* prison through the mistakes of many lives. I have taken this mortal form out of My own free will. They are bound to the body, while I am free of this bondage. The main difference is that they are shoved hither and thither by desire but I have no desire except the supreme one to make them desireless.

Take paddy or rice by way of an illustration. Every grain of rice is enclosed in a husk. You have to remove the husk to get the grain of rice. Now husk and rice, both come from the same seed. Rice is the equivalent of God in man, while the husk can be compared to desire which reduces God to man. Therefore, My formula is:

LIFE + DESIRE = MAN

LIFE - DESIRE = GOD

Life without desire means the realization of the pure, genuine Self that is Atma. Bound to desire, the self degenerates into selfishness. Atma turns into ego. The way of Self-realization is to cleanse the self of this ego of selfishness. Then you reach a state of consciousness beyond the mind or intellect, revealing the true Self that is God. The mind is like a cloth that covers and stifles consciousness, the threads of which are desires. If we give up the desires, the threads fall and the cloth disappears, revealing our true nature. That is what the Vedanta (end part of the Vedas dealing with ancient wisdom and knowledge) means when it enjoins that one must get rid of the ego to realize oneself.

God lives in India, pp.10–11 or Swami explains – The Blitz Interview (September 1976) with R.K. Karanjia, http://www.saibaba.ws/articles2/blitz.htm

BY SPIRITUALLY EMPOWERING THEMSELVES, the YOUTH CAN ACHIEVE ANY HEIGHT!!

THANK YOU

Estimation of Origin-Destination Traffic Demand: Importance, Challenges and Solutions

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Introduction

During the past couple of decades, traffic planners have been focusing on the problem of traffic congestion and its mitigation due to rapid increase in vehicles. A significant share of Gross Domestic Product (GDP) is lost due to traffic congestion. The primary causes for the traffic congestion are poor city planning, insufficient and inefficient public transport facilities, poor traffic management systems, and poor driving behavior. By improving all the above, traffic congestion problem could be solved to a certain extent. However, due to the perks persist in private transport, people will continue using their own vehicle, therefore the no. of vehicles is still going to remain relatively high. To meet escalating no. of vehicles, the states have insufficient funds to provide ample infrastructure facilities. On the other hand, to alleviate traffic congestion, demand – supply management is recommended highly.

Traffic demand is defined as number of vehicles travel from one place (origin) to another place (destination) at a particular time. The traffic demand is certainly high during usual peak hours, and remains moderate otherwise. Figure 1 shows a typical traffic demand variation with time.

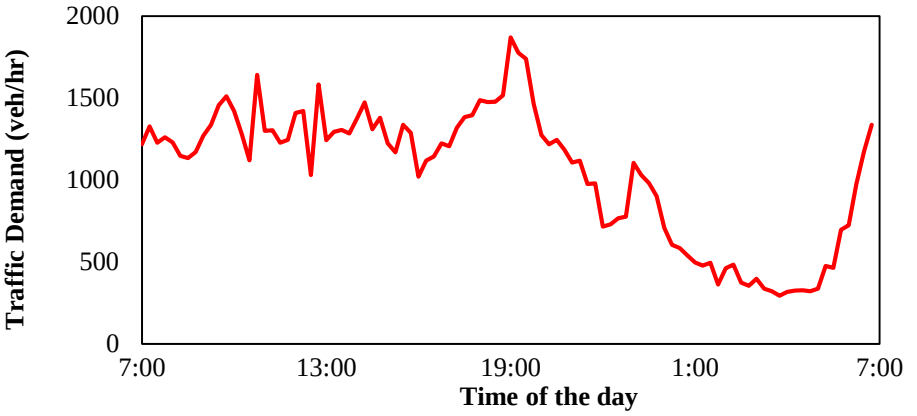

Figure 1: Typical variation of Traffic demand with time

As the peak traffic demand lasts for less than 25% of a day, it is obvious that spending on infrastructure development to cater the peak demand is not an efficient solution. Traffic demand management throughout the day is therefore considered a better option to solve traffic congestion associated issues.

Traffic demand of a transport network is given in the form of a matrix, namely Origin-Destination (OD) traffic demand matrix. Each element of OD matrix represents the traffic demand between an origin zone from where a vehicle departs and a destination zone to which the vehicle reaches.

Typically, OD traffic demand matrices are generated from household or roadside surveys. Unfortunately, gathering OD demand information directly by conducting surveys is very costly and time consuming, and so they take place infrequently. Besides, the survey based OD demand data is usually too outdated, and they often fail to capture temporal changes in traffic demand such as, those resulting from temporary changes in the network, including road closures, unusual weather conditions, or special events. The outdated OD demand data is particularly detrimental to devising effective real-time traffic

management strategies for relieving traffic congestion. On the other hand, dynamic OD traffic demand estimates can grasp rapid changes in the network within a short time period. The attempts to estimate dynamic OD demands are still in developing stage and remain to be controversial. A noteworthy development in dynamic OD traffic demand estimation is relating the known traffic counts to unknown OD demand and thus estimate the latter. This relationship was formed by various means and recently converged to Simulation-based Dynamic Traffic Assignment (DTA) models. DTA models seek to project traffic conditions over time and space with the given dynamic OD demands in a transportation network according to specific user behaviour and system assumptions. OD demands are thus recalibrated and adjusted according to the deviation between outputs obtained from simulation-based DTA models and corresponding latest observations from the field.

Solution Framework

Figure 2 illustrates a traffic simulation based dynamic OD demand estimation developed in Kalman filter framework. It consists of two stages;

a. prediction of traffic states with the current OD traffic demand, using a traffic simulation model;
b. adjustment of OD traffic demand according to the deviation between predicted traffic states and corresponding latest traffic state measurements obtained from the field.

To incorporate different types of traffic simulation models, the framework is solved with unscented Kalman filter (UKF) which provides flexible algorithm to deal with wide range of applications. The UKF deals with nonlinear dynamic state-space models. In the UKF, a number of deterministically selected sample points are produced to represent a Gaussian random variable. This is called unscented transformation and the sample points refer to as sigma points. When sigma points propagated through a nonlinear system, they capture the posterior mean and covariance of the random variable to the second order Taylor series expansion, preserving nonlinearity of the estimation.

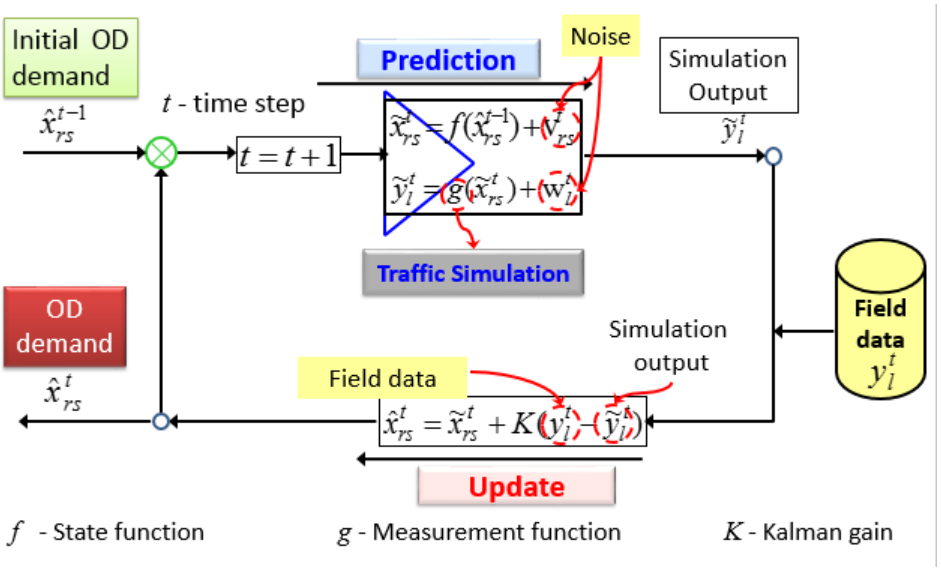

Figure 2: Dynamic OD traffic demand estimation framework

A case study performed on a freeway corridor consists of 15 OD pairs to evaluate the performance of framework shown in figure 2 results OD traffic demand estimation with percentage mean relative error of 17 – 20%. Further, the same framework applied for an urban arterial network results estimation with

more than 50% mean relative error. The field data used for the estimation are traffic counts and flow speeds collected at various locations.

Concluding remarks

Estimation of OD traffic demand is crucial in providing a solution for traffic congestion. Due to the rapid variation in vehicle usage/ driver behavior estimation of OD remains cumbersome. The simulation based OD traffic demand estimation framework approach proposed in this study is theoretically applicable to any road network including urban arterials. To get more accurate results, especially in large traffic networks, sophisticated simulation models should be incorporated and tested. The incorporation of Intelligent Transportation Systems data such as probe data, telematics data could contribute to further improve the OD demand estimation accuracy.

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Theme Seminar – Section C

Adolescent behavior and sexual and Reproductive health – A Jaffna situation

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Adolescent period is conventionally defined as 10 – 19 years of age, where 10 – 14 years is early adolescent period and 15 – 19 years is late adolescent period (Forfar and Arneil's text book of pediatrics, 2008). Adolescents are neither children nor adults. The early adolescent period is critical in every child's life as they form their own identity, who they will be as adults during this period. The factors that influence their psychological makeup is shaped by several factors including their own genetic makeup, family environment, school environment, peer influences on alcohol, substances, Cigar rete and unsafe sexual exposures and any natural disasters or other traumas they experience during childhood and so on.

Owing to their abstract thinking pattern (Immature grey matter development of Adolescent brain which prevents them from critically analyzing and considering the long term effects of their actions is known as abstract thinking (Forfar and Arneil's text book of pediatrics, 2008)), high level of energy and exploring into the new adventures makes them highly vulnerable for several unhealthy behaviors which may be continued into the adulthood or affect their educational achievement leading to poor quality of life in adulthood which becomes a vicious cycle on its own.

A study done in adolescent school children in Kandy revealed that 11.3% of them smoked, 17.3% consumed alcohol, 2.1% of them used illegal drugs. More alarmingly 18.6% of them have started smoking before the age of 10 years. Peer influence pushed them to use illegal drugs in 43.5%.Father was a smoker in 38 % of the male smokers and in 40 % of the illegal drug users there was family member who used it before (Munasinghe, 2009).

Adolescent sexual and Reproductive health is always a challenge even in developed countries not to mention about Sri Lanka. The main issues connected to these are: Early school drop outs due to unplanned and unwanted pregnancies, Teen pregnancies, Illegal abortions including septic abortions leading to maternal deaths in youngsters, Sexually transmitted diseases, Sexual abuses, Gender based violence, single mother families abandoned by the abusers etc.

If the social, economic and cultural consequences are considered the list may include further untouched areas which may need multi-sectoral approaches at various levels with necessary policy changes.

When considering the teen-age pregnancies (pregnancy up to 19 years), the Northern Province health statistics for the year 2016, reveals the following. Teen pregnancy rate in Mullaitivu 7.7%: Klinotchi 6.0%: Vavuniya 5.1%: Mannar 4.1% and Jaffna 3.0% (www.fhb.health.gov.lk).

The risks of Teenage pregnancies are, maternal and fetal malnutrition (especially under nutrition), Inadequate Antenatal care (avoiding or hiding from the routine primary health care by the Medical Officer of Health owing to the stigma related to the social issues), fetal deaths and increased incidence of cervical cancers and pelvic inflammatory diseases due to involvement in the sexual activities in early adolescent period, Increased incidence of maternal and fetal complications in teenage pregnancies to name a few.

Few case studies of teenage pregnancies in Jaffna and discussions with the adolescent school students both males and females carried out in 2007(not available in report form) and Focus group discussions done with the teenage mothers in the communities by Govt. of Sri Lanka with the support of U.N.D.P (United National Development Program) revealed the following issues (Sri Lanka National Human Development Report, 2014).

1. School based adolescent sexual and reproductive health lessons have been mostly avoided by the school teachers partly due to lack of confidence and not knowing the health and socio economic consequences or the long term impact in the society despite several policy changes by which the reproductive health have been included in the text books from grade 7 - 11.
2. Early teens get wrong or perverted information through internet and are practicing unsafe sex without understanding the grave consequences. Freely available internet access without the needed life skills may be a factor to be addressed.
3. Adolescents have several doubts and questions about the bodily and emotional changes that occur during their period of growth with no responsible adults to answer them .This usually include their own parents/ teachers.
4. False courage and the need for education (Tuition classes) made young girls fall in traps set for them by various categories of people which at some instances included spiritual leaders!

And this paved the way to produce a learning video C.D and a booklet with simple relevant information on adolescent sexual and reproductive health with the involvement of W.H.O Consultant(Dr N. Sivarajah), A Psychiatrist (Dr. S. Sivayogan), A Medical officer of Maternal and Child health (Dr J. T. Sivashankar) and A Psycho social worker (Mr. S. Ravindran).

This C.D introduced to the relevant teachers in all 5 educational zones during the same year with the financial support of local N.G.O, Sewa Lanka. This had the following main information.

1. The science of adolescent physical psychological and emotional changes with relevant anatomy and audio teachings.
2. The answers to their common doubts regarding their reproductive issues.
3. How do males and females behave when they want a sexual encounter without expressing it directly?
4. How they can be trapped into unsafe situations and how to ensure their safety or inform an adult as soon as possible.
5. What are the consequences of unsafe sex?
6. Where can they obtain reliable reproductive health information (eg: Medical officer of health, Public Health Midwife or Public health Inspector and their telephone numbers).
7. What should they focus on to become a responsible adult with an assured quality of life in future?

The C.Ds have been distributed to all the Medical officer of Health areas in Jaffna district for health promotion. The C.D could be obtained from Dept. of Community medicine or from the Author (Dr. J. T. Sivashankar).

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