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MESSAGE FROM THE CHIEF GUEST PUBLIC HEALTH'19

Representing Ministry of Health Sri Lanka it is an honour to welcome delegates to the International Conference on Public Health and Well-being with the theme, *"Promoting the well-being of humanity to ensure healthy lives for all"*. A role in public health is vital for increasing life expectancy, however, it is rarely thought of until a crisis catches our attention.

Over the years, health initiatives and management for global communities are increasingly recognised as an important component for the overall wellness of human beings. Public health is constantly evolving in response to the needs of the population around the world. Initiatives like clean air, water policies and vaccinations keep people healthy and safe by preventing injury and disease. Hospital based treatment may be more apparent to many; community based health initiatives need to be given more emphasis to increase the awareness of the health professionals, and also the public of their valuable role in a healthy population. It is necessary to remove various cultural, social and logistical barriers to enhance knowledge about healthcare needs, closing the gap in health disparities within countries.

I sincerely hope the International Conference on Public Health and Well-being will facilitate the exchange of research findings, opinions and views on issues related to Public Health among healthcare professionals and academicians from different parts of the world and different health care systems. May the participants today gain valuable experience and put into good use what is learnt.

Dr. Sunil de Alwis
Deputy Director General Medical Services,
Ministry of Health,
Sri Lanka.

MESSAGE FROM THE CONFERENCE CO-CHAIR PUBLIC HEALTH'19

We wish you a very warm welcome to the 2019 Sri Kankan Public Health and Well-being Conference. Our hope is that over the next 2 days you will not only listen to and discuss important and timely issues in public health but that you will also meet and make friends with colleagues from Sri Lanka as well as participants from abroad. We have tried to arrange the presentations in specific areas of interest including: Reproductive & MCH; nutrition; Health Care Management; Epidemiology; Health Promotion and Disease Prevention; Non-Communicable disease; Patient Care and Environmental Health. In addition, please do not neglect to attend the poster session tomorrow morning. Examining posters will give you a chance to discuss in detail with your colleagues not only specific public health issues but the also methods used in attempting to discover causes and solutions.

Astonishingly, some of the major health advances in the past century which were accomplished through Public Health research and measures are currently being challenged. The anti-vaccine or anti-vaxers as they are called have organized and disseminated through social media or non-peer reviewed journals their critiques that vaccination leads to autism or cancer. This leads to the fact that measles is making a come-back in the USA. As recently as a year ago health workers in other parts of the world have been murdered by religious extremists when attempting to vaccinate children against polio. Gun control is another public health measure which has been successfully fought against by gun manufacturers who put their profits above the health of the public. And the free and easy way that "pain killers" have been distributed leading to a continuous climb in drug overdoses and mortality can be attributed to big pharma's search for profit above public's health.

Thus, we have many challenges ahead of us and much work to do. It is hoped that by continuing our work and meeting together periodically to discuss research methods and findings that we will further protect and secure the public's health.

Prof. Sally Guttmacher
Emeritus Professor of Public Health,
New York University, USA
Senior Technical Advisor,
HealthRight International, USA

MESSAGE FROM THE CONFERENCE CO-CHAIR PUBLIC HEALTH'19

I am pleased to warmly welcome all distinguished invitees, delegates, speakers, researchers, health professionals and participants to the International Conference on Public health and Well-being 2019 on 4th and 5th of April in Negombo. This will be the first international conference of this nature which has focused on publishing original research, innovative projects and best practices on the theme "*Promoting the well-being of humanity to ensure healthy lives for all*".

The emerging public health issues need to be addressed with innovative approaches. Meanwhile some of the innovative projects in public health, field research and best practices are confined to the place of invention; they are not shared with the communities of interest. The present conference has included many papers from Sri Lanka and elsewhere which have dealt in many challenging public health issues. I hope this conference will help the authors of Sri Lanka and elsewhere to share their experiences in bringing about more meaningful solutions to emerging public health challenges.

I am pleased to see that a conference of this nature has committed to maintain the high standards of research practice through anonymous peer reviewing by public health practitioners and maintaining ethical standards. We see nowadays many conferences are organized without giving much attention to scientific integrity and ethical norms. I eagerly hope that this conference will be a trendsetter where public health physicians and other health professionals delineate the standards for scientific validity and ethical practice by taking over the responsibility of partnering with other stakeholders for the betterment of public health.

I would like to close my message with a round of thanks for everyone who made the International Conference on Public health and Well-being 2019 a reality. Our chief guest, Dr. Sunil de Alwis, Deputy Director General (Medical Services), the fellow co-chair Prof. Sally Guttmacher, the keynote speakers Prof. Christina Zarowsky, Prof. Jack Needleman, members of the scientific committe and the conference manager Ms. Thulakshana Liyanage deserve my special thanks for having contributed immensely to making this a success. Also I thank all of you who are participating in this conference from different parts of the world despite your busy schedules.

Dr. Ruwan Ferdinando
Deputy Director (Training) of the National Institute of Health Sciences (NIHS), Sri Lanka

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Cultural Influences on Maternal and Child Health in Singkil District, Aceh, Indonesia

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Abstract

Maternal and child health (MCH) mortality continues to be a serious problem worldwide. Most maternal deaths occur in developing countries especially in rural areas; the majority of child health challenges occur in the first five years of life. Aceh province has one of the highest maternal and child mortality rates in Indonesia. The Singkil district in this area has cultural influences that affect MCH. Called Badapu practices, these include food and water restriction for post-partum women, and restriction to small, smoke-filled rooms to ensure their bodies stay warm and fresh. Negative impacts of these cultural practices are malnutrition, anemia, and reduced breast milk production in post-partum women; reduced growth and development, and high risk for respiratory tract infection for babies. All of these contribute to mortality and morbidity. Addressing these cultural practices is necessary to improve maternal and child health. Stakeholders should consider collaboration in Badapu with shamans and midwives to negotiate positive behavioral change.

Keywords: Badapu, cultural influence, collaboration practice, maternal and child health

Introduction

The World Health Organization defines maternal health as the health of women during pregnancy, childbirth, and post-partum periods. Maternal health practices include the activities or habits of women throughout these periods, which impact to their health. Every day, approximately 830 women die from preventable causes, with 99% of maternal deaths happening in developing countries and in rural and poor communities there (World Health Organization, 2018). Child health is also a serious problem worldwide, with the majority of child health morbidity and mortality occurring in the first five years of life, and over half among newborns (World Health Organization, 2018). Children represent the most vulnerable segment of society and childhood illness contributes substantially to the global burden of disease. The majority of childhood deaths are preventable or treatable with currently available intervention (Denno & Stewart, 2013).

Singkil district is a district in Aceh Province, Indonesia. Data from the Health District Office stated that the province has one of highest maternal and child mortality rates in Indonesia (Koto et al. 2018). In the period 2011-2014, maternal and neonatal/infant death in Singkil District increased each year. For mothers, this increase occurred in the post-partum period; for children, the increase was the result of low birth weight, asphyxia, pneumonia, and diarrhea (Dinas Kesehatan Kabupaten Aceh Singkil

2015). A maternal and child health (MCH) study of the Singkil District found the increases to be directly related to pre-eclampsia, infection, and hemorrhage.

Few studies have focused on socio-cultural factors such as MCH-related beliefs and traditions. An understanding of these beliefs and traditions is particularly important in designing culturally appropriate interventions (Morris et al. 2014b). This study reports on MCH cultural influence related to Badapu culture in Singkil District.

Methods

This was a qualitative study conducted in July 2019 to explore influences of "Badapu" culture on MCH in Singkil District. Researchers conducted in-depth interviews with women providing care to postpartum women to and stakeholders from primary healthcare and health district offices. An interview guide was developed by the research team to achieve the goals of the study. Interviews were recorded, transcribed, and re-checked. Inductive content analysis was performed to identify themes in the data. Verbal informed consent was obtained from each study participants. The identity of each participant was kept confidential. The research received permission from Indonesian Ministry of Village, Development of Disadvantaged Regions, and Transmigration.

Results

Badapu is a hereditary cultural tradition that believes in food restriction for postpartum women, while warming the woman and the baby in a room full of smoke. Mothers and their babies have to participate in Badapu for 40 until 60 days.

> *"... Every woman after giving birth they only consume rice with little water. They also cannot consume any vegetable and fruits. We believe that chicken, meat and water make delay in wound healing" (Participant 1, Family of woman after giving birth).*

Badapu tradition also believes that the mother and her baby have to live in a small room full of smoke and not go anywhere. The woman should lay down in a bed with hot stones on her feet, and should not raise their arms. This position is supposed to make sure all of the woman's body will stay warm.

> *"We believe that woman who sweaty will make their wound related to giving birth will healed. Every woman and her child will stay in a small room to warm up our body. We also restrict theirself-care such as take a bath to make sure our body still sweaty" (Participant 2, Woman).*

Badapu culture affects the quality of MCH. Side effects of Badapu include discontinuation of breastfeeding, which makes malnutrition of the baby. It is believed that the newborns and infants living in the small room full of smoke from the firebox to warm their bodies will have a positive impact on their respiratory tract. However, these same newborns and infants will be at risk for respiratory tract infection and pneumonia that can cause the high mortality in Singkil District.

"Badapu is one of the contributing factors related to high maternal and child mortality in Singkil District. Women have high risk for anemia related to food restriction and the baby is at risk for respiratory tract infection" (Participant 3, Local Development Officer).

Stakeholders in Singkil District such as health district office and local development office stated that they have a program to minimalize health impacts related to the Badapu tradition.

"Our government motivates collaboration among midwife and local shaman to improve MCH. We make memorandum of understanding (MoU) to increase awareness of health behavior" (Participant 4, Midwife)

Discussion

This study describes Badapu as a culture related to MCH in Singkil District. Badapu is a culture which involves food restriction for post partum women and need for women to live in a small room that full of smoke. Women only eat rice and consume a small amount of water. They believe that this culture will help women to feel resh after giving birth (Badan Perencanaan Pembangunan Daerah, 2016).

Badapu requires food restriction for post-partum women that affects their nutritional status. Post-partum women who intake less nutrition are at risk for anemia. A study byDeri (2009) found that 82.2% of subjects in the area had anemia, with average hemoglobin (Hb) level of 9.01±1.48 gr/%. Over two-thirds (68.9%) of the post-partum women involved in Badapu had a body mass index (BMI) under 25, with a statistically significant relationship with intake, Hb and BMI. This lack of nutrition delays the wound healing process, which requires high protein for fibrinogen formation, not protein restriction. Post-partum women also need increased nutrition for adequate breastfeeding. The baby needs breast milk as an important nutrition source. Low intake of breast milk for babies means that they lack an important source of nutrition, which has a negative impact on growth and development. Finally, the mother and baby in Badapu culture living in a room full of smoke from firewood means that exposure to carbon monoxide from the smoke leads to low oxygen levels (Badan Perencanaan Pembangunan Daerah 2016).

Badapu cultural practices such as described in this study are similar in Madagascar, which considers pregnancy and childbirth to be dangerous times for woman. Practices with postpartum women there seek to clean dirty blood by using hot water to promote healing and return the body to pre-pregnancy state, minimizing movement, and restricting bathing. These maternal practices are supporte by family and community members (Morris, Short, Robson, & Andriatsihosena, 2014).

Conclusion

The sociocultural environment of a community can have both positive and negative effects because of the relationship between health and culture. Culture affects behavior and responses related to health and disease. Health care providers have an important role in changing unhealthy behaviors and can negotiate and modify the culture (Rahayu et al. 2017). Local stakeholders can reduce negative impacts of Badapu by making collaborative agreements between shamans and midwives in order to negotiate

positive behavioral change. Such a collaborative process can result in a shared vision of patient-centered care.

Acknowledgment and Conflict of Interest

References

Badan Perencanaan Pembangunan Daerah, 2016. Kajian Faktor Resiko Kematian Ibu dan Bayi.

Bakke, H.K., 2017. First-aid training in school: amount, content and hindrances. *Acta Anaesthesiologica Scandinavia*, 61, pp.1361–1370.

Dinas Kesehatan Kabupaten Aceh Singkil, 2015. Profil kesehatan kabupaten aceh singkil. , (55).

Koto, E., Andriani, L. & Ginting, R., 2018. Kompetensi Komunikasi Kemitraan Bidan Desa dan Dukun Bayi dalam Mendukung Penurunan Angka Kematian Ibu dan Bayi. *Jurnal Ilmiah Kajian Politik Lokal dan Pembangunan*, 4, pp.26–36.

Morris, J.L. et al., 2014a. Maternal Health Practices , Beliefs and Traditions in Southeast Madagascar. , 18(September), pp.101–117.

Morris, J.L. et al., 2014b. Maternal Health Practices , Beliefs and Traditions in Southeast Madagascar Maternal Health Practices , Beliefs and Traditions in Southeast Madagascar. , (October).

Parreira, S.F., 2018. Dimensions of interprofessional work and of collaborative practices developed at a primary care unit by a Family Health team. , 22, pp.1717–1728.

Rahayu, I.S. et al., 2017. Faktor Budaya Dalam Perawatan Ibu Nifas Cultural Factors In Treatment In The Postpartum Mother desa yang sederhana dapat bertahan dengan. , 3.

Factors Related to Delayed Presentation of Cervical Cancer among Adult Females at Apeksha Hospital, Sri Lanka

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Abstract

Cervical cancer is the second most common cancer among women globally and in Sri Lanka. Delayed presentation of cervical cancer, increases morbidity, mortality, and decrease the survival rate of these patients. This study examined factors related to a delayed presentation of cervical cancer among adult females with cervical cancer. A descriptive cross-sectional design with an interviewer-administered questionnaire administered to a convenience sample of participants (n=286) with cervical cancer. Descriptive statistics were used to analyze the data. Nearly half of the participants were 56 years and older, did not attend to well women clinic and had not had a Pap smear test. There was a significant association between age and knowledge regarding cervical cancer, education level and knowledge regarding cervical cancer (p<0.05). Low level of education, old age, poor knowledge about cervical cancer, non-attendance of well women clinics, no pap test were associated with a delayed presentation of cervical cancer. Awareness of regular cervical cancer screening could reduce delayed presentation.

Keywords: Cervical cancer, delayed presentation, perceived factors, Sri Lanka

Introduction

Cervical cancer is the 3rd most common type of cancer worldwide, with an estimated 530000 new cases, more than 85% of which were in developing countries (Ferlay et al., 2010). Furthermore, in developing countries, cancer of the cervix is a significant public health problem (Ferlay et al., 2010). Worldwide cervical cancer comprises approximately 12% of all cancer in women. Cancer occurs due to the abnormal growth of cells that having the ability to invade or spread to other parts of the body (metastasis) (Robert & Jeffery, 2005). Cervical cancer develops over a long period. Vaginal bleeding, contact bleeding (bleeding after sexual intercourse), moderate pain during sexual intercourse and vaginal discharge are early symptoms of cervical cancer (Brunner & Suddarth, 2011). Cervical cancer is associated with the present infection of the human papilloma virus (Kane et al., 2006). Although cervical cancer screening services are available, late presentation of cervical cancer and deaths are increasing. Ironically, cervical cancer is perhaps the curable form of any human cancer if detected at the precancerous stage (Adanu et al., 2002).

Cancer of the cervix is a significant public health problem globally, especially in developing countries where it is the most common cancer in women (Ferlay et al., 2010). Cervical cancer ranks as the 2nd cause of most common female cancer in women aged 15 to 44 years in Sri Lanka. About 1,721 new

cervical cancer cases are diagnosed annually and about 690 new cervical cancer deaths occur annually in Sri Lanka (ICO Information Centre on HPV and Cancer 2015).

Although cervical cancer screening programmers routinely screened for cervical cancer at the well women clinics and educate woman about risk factors of cervical cancer to detect it early, there is less reduction in cervical cancer incidence over the past few years in Sri Lanka (NCCP Sri Lanka Prevention and Early Detection of Common Gynecological Cancer, 2015). Furthermore, data available in factors related to delayed presentation of cervical cancer among women in Sri Lanka are limited. Therefore, this study focused on perceived factors related to delayed presentation of cervical cancer.

Objectives

General objective

- To determine perceived factors related to delayed presentation of cervical cancer among women in Apeksha hospital, Sri Lanka.

Specific objectives

- To determine socio-demographic, knowledge, attitudes and risk factors related to delayed presentation of cervical cancer.

- To determine the association between socio-demographic, knowledge, attitudes and risk factors and delayed presentation of cervical cancer.

Methodology

Study design

A descriptive cross-sectional design used.

Study setting

Apeksha Hospital, Sri Lanka

Sampling method

Convenience sample (n=286) of inpatients diagnosed with cervical cancer. Critically ill patients were excluded.

Data Collection lnstrument and Method

Data was collected using a pre-tested (n=10) an interviewer-administered questionnaire developed by the researchers based on intensive and extensive literature search. This questionnaire mainly includes Part A – Socio-demographic characteristics of the participants, Part B - Disease related knowledge and attitudes of the participants and Part C – Risk factors affection on participants.

Data Analysis

Data were analyzed using descriptive statistics and chi-square test with the SPSS version 21.

Ethical considerations

Ethical approval was obtained from the ethics review committee of KAATSU International University, Sri Lanka. Further permission was obtained from the Director, in Apeksha hospital Sri Lanka. Informed written consent was obtained from all participants before the data collection.

Results

A total of 286 participants participated in the study (Table 1). Nearly half of them (n= 140, 48.8%) belonged to age group above 56years. Most of the participants were (n= 205, 71.6 %) Buddhist and most of them (n=234, 81.9%) were Sinhalese. More than half of them (n= 191, 66.7%) were married. More than half of participants (n= 161, 56%) had education up to grade 11. Unoccupied participants percentage was (n= 124, 43.3%) and (n= 51, 17.8%) of the participants were labours.

Table 1: Socio-demographic characteristic of the participants. (n=286)

Demographic Data	Frequency(n)	Percentage (%)
Age category		
35-45	50	17.4%
46-55	96	33.8%
Above 56	140	48.8%
Religion		
Buddhist	205	71.6%
Catholic	34	11.8%
Hindu	23	8.04%
Islam	24	8.39%
Race		
Sinhala	234	81.9%
Tamil	29	10.1%
Islam	22	7.6%
Burger	1	0.3%
Marital Status		
Married	191	66.7%
Widowed	62	21.6%
Divorced	29	10.1%
Single	4	1.3%
Number of children		
Childless	13	4.5%
Less than 3	92	32.16%
3-5	149	52.09%
More than 5	32	11.1%
Educational level		
No school	64	22.3%
Up to Grade 11	161	56.2%
Up to Grade 13	49	17.1%

Higher education	12	4.2%
Occupation		
Unoccupied	124	43.3%
Labour	51	17.8%
Foreign employ	23	8%
Self –employed	19	6.6%
Garment	18	6.2%
Clerical	13	4.5%
Administration	9	3.1%
Teacher	9	3.1%
Farmer	8	2.4%
Businessmen	7	3.1%
Health sector	4	1.4%
Security	1	0.3%
Monthly Income (LKR)		
5000-20000	112	39%
20001-40000	95	33.2%
40001-60000	57	19.9%
> 60000	6	2.1%
Not responded	16	5.5%

Disease-related information of the participants is summarized in Table 2. Most (76.3%) did not attend to well women clinic and the majority (79.1%) not had a pap smear test.

Table 2 Disease-related factors of the participants (n=286)

Attendance of the well women clinic	Frequency	Percentage
Yes	67	23.4%
No	219	76.5%
Pap Smear test is done		
Yes	60	20.9%
No	226	79.1%
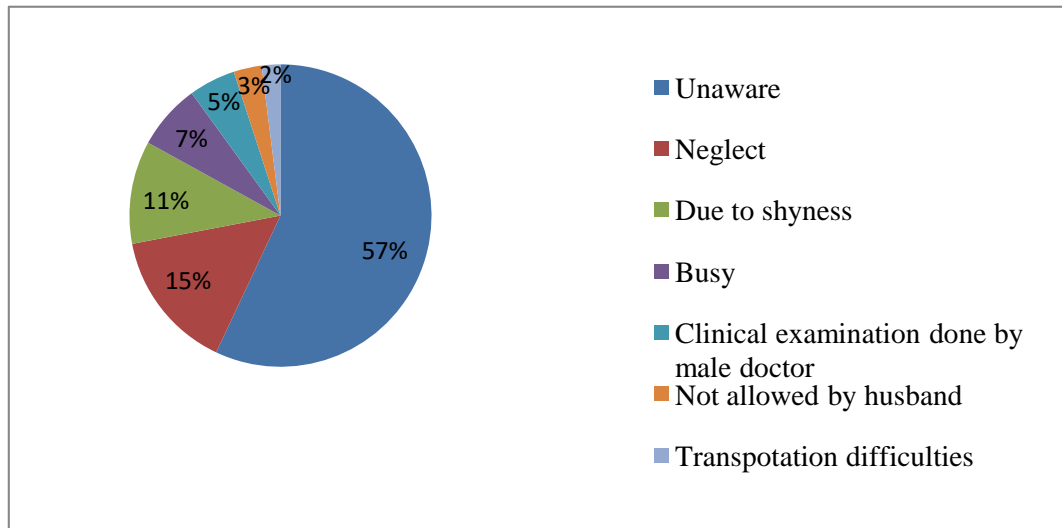
Figure 1: Reasons for nonattendance to well women clinics (n=286)

As shown in figure-1, more than half of participants (57%) did not attend to well women clinic due to lack of awareness.
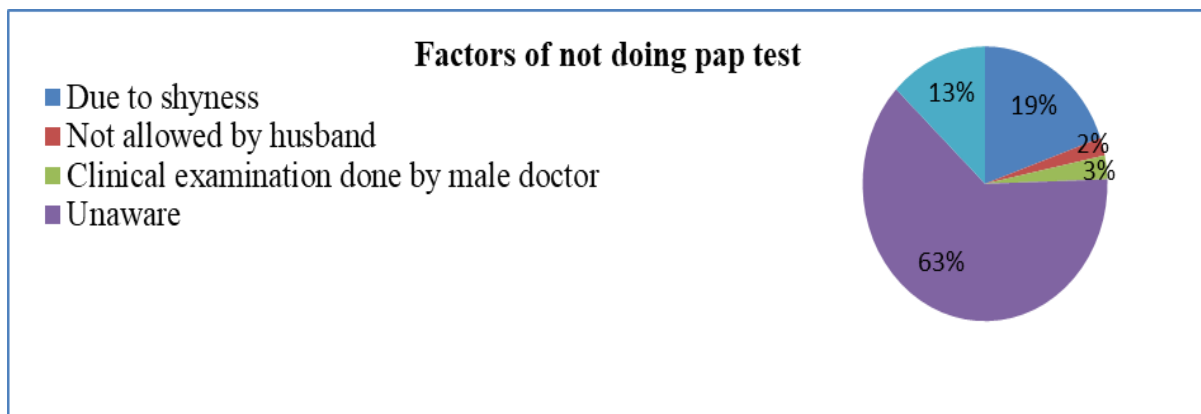
Figure 2: Factors associated with NoPap smear test (n=286)

As shown in figure 2, more than half of the participants (63 %) did not do the Pap test because of lack of unawareness; (19 %) did not have a Pap test because of shyness, 3 % of the participants did not want a clinical examination done by a male doctor, and 2% 0f participants did not participate because their husbands did not allow it.

Table 3 shows that the cervical cancers were more prevalent among women who were sexually active from their early life (n=162, 56.6%); 18 (6.3%) women had multiple partners, 132 (46.1%) women were either active or passive smokers, 79 (27.6%) women were long term contraceptive users, and 89 (31.1%) women were multiparas. Some participants gave multiple answers.

Table 3: Risk factors for Cervical Cancer among the participants. (n=286)

Risk factors	Frequency	Percentage
Having sex at an early age	162	56.6%
Multiple sexual partners	18	6.3%
Active or passive smoking	132	46.1%
Long term use of contraceptives	79	27.6%
Multipara women	89	31.1%
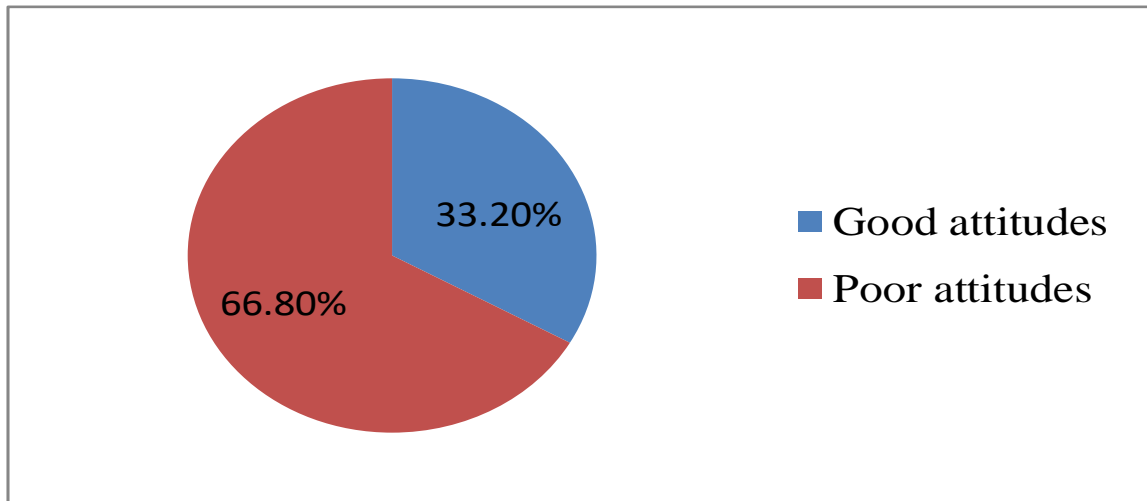
Figure 3: Participants attitudes on disease condition (n=286)

Most of the participants (66.8%) had poor attitudes towards cervical cancer
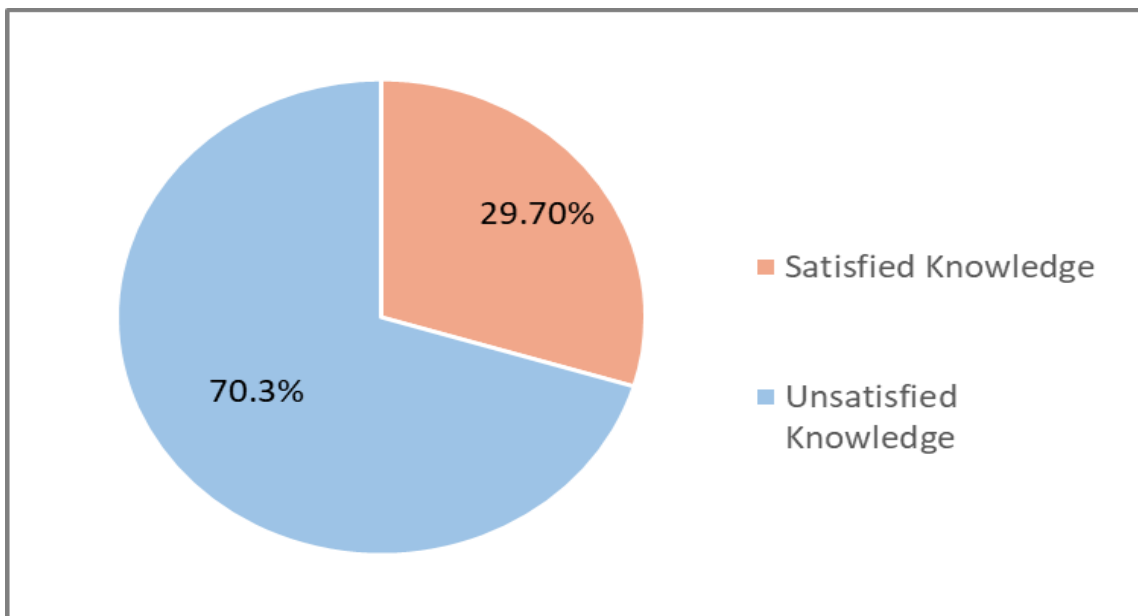
Figure 4: Participants knowledge of disease condition (n=286)

Most of the participants (70.3%) had unsatisfied knowledge related to cervical cancer.

Table 4 shows the relationship between the demographic characteristics of participants with knowledge of cervical cancer and attitudes of cervical cancer. We use for that Pearson chi-square.

Table 4: Association between knowledge and attitudes towards cervical cancer with demographic characteristics

Demographic characteristics	Associated factor	Chi-square value	P value
Age	Knowledge of cervical cancer	15.319	.000 *
Education	Knowledge of cervical cancer	35.689	.000*

*P< .05 satirically significant association

Discussion

The majority of participants did not attend for well-women clinics and not done a pap test in this study. The result from this study is in concordance with those done with patients with lower socioeconomic status who were found to have a lesser probability of participation in programs for disease prevention and screening (Dragan et al., 2013). In this study, most of the participants had not known about screening test, signs and symptoms and risk factors of cervical cancer. Similar results were found in studies done in Malaysia, South Africa, and the USA. (Tan, Hassam & Qodryiah, 2010; Eshanul, 2010; Cottrell & Burnard, 2014).Most of the participants who had lower income and lower educational level were less likely to attend well women clinics. Contrast results were found in the study done in South India (Kaku, Methew & Rajan, 2008). This study identified barriers like fear, shyness, dislike of male providers as influencing not doing screening test. The most common reason in the female who avoid Pap smear is fear of vaginal examination (Nilaweera et al., 2012).

More than half the sample had education up to ordinary level and (22.6%) of a participant not gone school. Most of the participant was married (66.6%), and near half of the participant (43.2%) were unemployed. The similar results were found in the study done in Uganda. Same results were found in a survey done by (Mwaka et al., 2016). A similar relationship between education and delayed presentation of cervical cancer has been reported in some countries including the United States of America, Florida (Ferrante et al., 2000); South India (Kaku, Methew & Rajan, 2008). Sudan (Ibrahim et al., 2011). Nepal, (Gyenwali et al., 2014). Morocco (Berraho et al., 2012). Those are found that women with less education have difficulties in understanding the benefits of screening.

The association between smoking and passive smoking with cervical cancer has been reported in many studies. In this study, 132 participants were passive smokers. According to passive smoking as a carcinogen potentially could progress the transition of persistent infection or pre-invasive lesions to invasive cervical cancer. Though the mechanism by which passive, as well as active smoking, induce cervical cancer is not understood clearly, the possible mechanism is that tobacco smoke contains carcinogen which could cause immunosuppressant and consequently progression of HPV infection to disease (Louie et al., 2011). Most of the participants correctly knew that cervical cancer could be prevented through early diagnosis, but they did not get any treatment or advice. The same results reported could be found in South Africa (Khanet, 2005).

In this study, participants reported other perceived factors of cervical cancer, including prolonged use of hormonal contraceptive, having sex at an early age, multiple sexual partners, passive smoking multiple and having more pregnancies. Similar results were found in a study done in Uganda. In their study reported causes of cervical cancer early onset of sexual activity, having multiple sexual partners, smoking, multiparity, prolonged use of family planning pills and injections (Mwaka et al., 2015).

This study shows poor knowledge regarding cervical cancer and similar results were reported by (Bansal et al., 2015; Tran et al., 2011; Shrestha et al., 2013). However, the level of knowledge was far less than in developed countries. For example, a study was done in Kuwait, nearly half their participants had good experience about cervical cancer (Al Sairafi et al., 2009) and in London, most of their study participants with cervical cancer had adequate knowledge about (Yu & Rymer., 1998). Concerning attitude towards cervical cancer and its screening, a study done by (Bansal et al., 2015) reported that less than half of their study participants had positive attitudes toward cervical cancer and screening.

In the present study, an association between the average monthly income and the advanced stage presentation of the disease was identified. Most of the participants were in middle-level socioeconomic status. Few amounts of participants belonged to the lower level of monthly income. This condition also caused to increase cervical cancer among women. A similar study conducted in USA, the patients, living in areas with a low or average income had a higher probability of having advanced Stage disease at the time of presentation when compared with woman who lived in areas with a higher monthly income (Ferrante et al., 2010; Mandelbatt et al., 2010). Similar results were found in Morocco, a study done by (Tanturovski et al., 2013). Their study results showed that low monthly income, lower level of education caused to increase delayed stage presentation of cervical cancer.

Recommendations

Cervical cancer can be cured through early detection and medication. The society should be made aware of the Pap test and well women clinics for women above 35 years. The government should pay attention to minimize cervical cancer through an analysis of personal attitudes. Furthermore, quickly become the victims of cervical cancer due to not enough knowledge on cervical cancer, Pap test and well women clinics.

The women should be made aware of the HPV vaccine given by government hospitals, and regular methods should be implemented to distribute HPV vaccine throughout the country by the government. Health education programmes can be organized for healthcare workers, specially for community health workers with the help of cancer control programmes. Specific awareness programmes about risk factors, prevention methods and available facilities should be organized for target groups with using mass media, Audio and Visual aids. Besides, the findings of this study could serve as baseline information for planning for extensive studies and performing large scale education programmes for the general population. The consequences will be early detection, proper management, and reducing disease-related mortality. Remove cultural barriers to detection disease.

Limitations

Consequently, the results could not be generalized to all women in Sri Lanka due to geographic and cultural differences among the different regions of the country.

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References

Adanu, R. M. K. (2002). Cervical cancer knowledge and screening in Accra, Ghana. Vol. 11(6), pp.487-488. Retrieved from https://doi.org/10.1089

Bansal, A. B., Pakhare, A. P., Kapoor, N., Mehrotra, R., Kokane, A. M. (2015). Knowledge, attitude and practices related to cervical cancer among adult women. Journal of Natural Science, Biology and Medicine, 6(2), 324-328. doi: 10. 4103/0976-9668. 159993.

Berrho, M., Obtel, M., Bendahhou, K. (2012) Socio-demographic factors and delay in

diagnosis of cervical cancer in Morocco. From http://www.panatricom.med.journal.com/content article/12/14/full /

Brunner & Suddarth'sTextbook of Medical-Surgical Nursing(2012)P 138-147 Cervical Cancer GLOBOCAN (2011) Cancer FactSheets: IARC confirms the efficacy ofncervix cancer screening for women 25-65 in reducing mortality; Retrieved from www.iarc.fr/en/cancertop ics/cervixtopcs.php.

Cervical cancer screening in developing countries, Report of a WHO consultation (WHO Geneva, 2002). Page 1 from www.who.int/cancer/media/en/cancer_cervical_37321.pdf. retrieved on 25/03/2018

Dragan, Z.A., Aleksopulos, H.G., Antic, L.G., Trajkovic, G.Z. (2014). Differences in the level of Knowledge on cervical cancer among health care students, midwives and patient in Serbia. .Asian Pacific journal of cancer prevention: APJCP 15(7), 3011-3015.

Ferrante, J., Gonzalez, E., Roetzheim, R., Pal, N., Woodard, L. (2000). Clinical and demographic predictors of late-stage cervical cancer.

Ferlay, J., Shin, R., Bray, F., Forman, D., Mathers, C., Parkin, D.M. (2008). An estimate of worldwide burden of cancer. GLOBOCAN 2008 International Journal of Cancer 2010

Gyenwali, D., Pariyar, J., Onta, S.R. (2012) Factors associated with late diagnosis of cervical cancer in Nepal from http://www.biomedcentral.com/1472-6874/14/29

Gyenwali, D., Khanal, G., Paudel, R., Amatya, A., Pariyar, J.,… Onta, (2014). Estimates of delays in diagnosis of cervical cancer in Nepal. BMC Women's Health, 14:29. Retrieved from October 2012, from http//www.biomedcentral.com/1472-6874/14/29

Hoque, M. E. (2010). Cervical cancer awareness and preventive behaviour among female university students in South Africa. Asian Pacific Journal of Cancer Prevention, 11, 127-30.

Ibrahim, A., Rasch, V., Pukkula, E., Aro, A. (2011). Predictors of cervical cancer Being at an the advanced stage at diagnosis in Sudan.

ICO Information Centre on HPV and Cancer, (2015) Human Papillomavirus and Related Diseases report. Sri Lanka. from www.hpvcentre.net/statistics/reports/LKA.pdf

International Federation of Gynecology & Obstetrics (IFGO) (2008).

Kane, M.A., Sherris, J., Coursaget, P., Aguado, T., Cutts., F. (2006). HPV vaccine use in the developing world. Vaccine, 2006.

Louie, K. S., Sanjose, S., Diaz, M. (2009). Early age at first sexual intercourse and early pregnancy are risk factors for cervical cancer in developing countries. British Journal of Cancer, 2, 1191-1197.

Michelle, Kaku, Aleyamma, M., Ranjan, B. (2008). Impact of socio-economic factors in delayed reporting and Late-stage presentation among patient with Cervical cancer in a Major Cancer Hospital in South India.

Mwaka, A.D., Wabigna, H.R., Mayanja, K.H. (2013). Perception of health care professionals on challenges and proposed remedies for cervical cancer help-seeking in post-conflict Northern Uganda BMC family practice vol.14 Retrieved April 2018, from http://www.ncibianlm.gov/pubmed.

Mwaka, M. D., Chhistopher, O. G., Edward, W. M., Georgios, L., Martin, W. H. R. (2016).mAwareness of cervical cancer risk factors and symptoms. IJPP Health Expect, 19(4), 854-867. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/pmc49576

National Cancer Control Programme, Ministry of Health & Indigenous Medicine Sri Lanka,Cancer Incidence Data (2008).

National Cancer Control Programme Sri Lanka, (2015). Prevention & Early Detection of Common Gynecological cancer.National Cancer Institute Maharagama (2015) Statistical Review.

Nilaweera, R.I.W., Perera, S., Paranagama, N., Anushanthan, A.S. (2011). Knowledge and practices on breast and cervical cancer screening methods among female health care workers. Asian Pacific Journal of Cancer Prevention,13, Retrieved 2018, from http dx.doi.org/10.7314/APJCP.2012.13.4.1193.://

Robert, N., & Jeffrey, T. (2005). Cancer and its management. P283-309

Shrestha, J., Saha, R., Tripathi, N. (2013). Knowledge attitude and practice regarding cervical cancer screening amongst women visiting a tertiary centre in Kathmandu, Nepal. Nepal J Med Science, 2, 85-90.

Tanturovski, D., Zafirova, E., Stojovski, M., Bashesha, N., Jovanovska, V. (2013). Impact of Socio-demographic factors on the delayed diagnosis and advanced stage presentation of patients with invasive cervical cancer in Macedonia. from http://www.biomedcentral.com/1472-6874/14/29

Tan, Y.Y., Hesham, R., Qodriyah, H. M. S., (2010). Knowledge and attitudes of university students in the health sciences on the prevention of cervical cancer. Medical Journal of Malaysia, 65(1), 53-57.

WHO. Comprehensive Cervical cancer Control; A Guide to Essential Practice, (2006). Geneva,Switzerland. WHO Press, World Health Organization.

District Level Assessment of Spatial Clustering and Determinants of Diabetes Mellitus among Older Adolescents and Young Adults in India

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Abstract

Globally non-communicable disease is the leading cause of death. Amongst all, diabetes mellitus (DM) represents the most prevalent non-communicable disease in India. However, the burden of DM shifting towards the lower ages has received relatively little attention in India. Thus, this study aims to assess the district level spatial clustering and determinants of DM among older adolescents and young adults. The study used data from the fourth round of the National Family Health Survey. A person in the age group 15-29 years of age is considered to be older adolescents and young adults. Moran's I and LISA were used to examine the presence of spatial autocorrelation and clustering respectively. Simultaneous Autoregressive Model was used for the assessment of determinants. Prevalence of DM across 640 districts ranged from 0.15 percent to 35 percent. Global Moran's I is 0.61 implying significant spatial correlation. There is significant high-high clustering of the prevalence of DM in the districts of northeastern states, eastern states, southern states and Delhi National Capital Regions. And, significant low-low clustering of the prevalence of DM in the districts of northern states and central India. Overweight and professionals who are physically inactive are at higher risk of acquiring DM. As the older adolescent and the young adults are the potential assets to the nation, reduction in the prevalence of DM among older adolescents and young adults is important and would be possible only if area-specific measures would be adopted on those clusters of districts where DM is high considering the other intervening covariates.

Keywords: Diabetes mellitus, spatial clustering, older adolescents, young adults

Introduction

Globally, non-communicable disease is the leading cause of death. Almost 67 percent of all deaths are due to non-communicable diseases (Mote 2016). Diabetes mellitus (DM), which is one of the major contributors to the burden of non-communicable diseases, is no longer the disease of opulent developed nations; its prevalence is increasing rapidly in developing countries (Mohan *et al.* 2017). In India, the contribution of DM to the burden of non-communicable diseases represents one of the most important among all other diseases. Every fifth diabetic case in the world is an Indian, and thus India is called the capital of diabetes (Joshi *et al.* 2007). According to the International Diabetes Federation South-East Asia, there were 69.1 million cases of DM in India in 2015 with a prevalence of 8.7 percent among the adults aged 20 to 79 years. The average cost of each of these patients is $94.9. By 2040, the figure is expected to increase to 123.5 million cases (IDF 2015). The long-term economic implications of DM in developing countries are worrying (Bjork *et al.* 2003). The socioeconomic burden due to DM in India is one of the highest in the world (Bjork *et al.* 2003; Kapur 2007; Shashank *et al.* 2008). DM is a risk factor for various other diseases like cardiovascular, renal and atherosclerotic vascular disease (Koch *et al.* 1997; Sowers *et al.* 1988; Martin *et al.* 2014;

Tuttolomonde *et al.* 2015). The rapid change in lifestyle associated with urbanization in combination with inevitable high genetic risks and behavioural risk factors are also a possible risk factor for the disease (Ramachandran *et al.* 1999; Tuomilehto *et al.* 2001; Whittemore *et al.* 2002; Simpson *et al.* 2003; Rejeski *et al.* 2012). Both in India and in the Western countries, obesity is one of the significant risk factors for DM (Chan *et al.* 1994; Steppan *et al.* 2001; Mohan *et al.* 2008). Due to urbanization, rise in living standards, increased sedentariness, and the cheap availability of calorie-rich fatty fast foods to all sections of people alike are also a few reasons for the worldwide increase in the prevalence of DM (Gupta *et al.* 2006; Diamond 2011).

The problem of DM is heterogeneous in India (Arora *et al* 2010; Anjana *et al.* 2017). Numerous studies have discussed the relationship between DM and its associated risk factors, but particularly for the adult and elderly population. However, the burden of DM shifting towards the lower ages has received relatively less attention in developing countries like India. And as the older adolescents and the young adults are the potential assets to the nation, this paper aims to highlight the clustering of prevalence and determinants of DM among the older adolescent and young adults in India.

Methods and Materials

Data and Variables

The district-level information for all 640 districts in India was obtained from the fourth round of the National Family Health Survey. The survey was conducted in 2015-16 across all districts of all states and union territories of India. The survey collects information on population, health, and nutrition for each state and union territory. Apart from these, the survey also collects information on clinical, anthropometric and biomedical data to provide vital information on prevalence of hypertension, blood glucose levels as well as some other nutritional indicators through a series of biomarkers, tests and measurements (IIPS and ICF 2017).

We used the blood glucose level provided in the survey to identify whether a person is diabetic or not. A person whose blood glucose level is greater than 140 mg/dL is considered to be diabetic. And, persons in the age group 15 – 29 years of age are defined as older adolescents and young adults (Bleyer 2002).

The unit of analysis for the study is the districts of the states and union territories of India. The outcome variable is the prevalence of DM among older adolescents and young adults in each of the 640 districts. The choice of predictor variables are governed by the existing literature (Whittemore *et al.* 2002; Mokdad *et al.* 2003; Savoca *et al.* 2004; Pereira *et al.* 2005). The fourth round of the National Family Health Survey provides household socioeconomic characteristics and community characteristics such as wealth quintile and place of residence. The wealth quintile of a household is categorized as - poorest, poorer, middle, richer and richest. A person is categorized as professional who are physically inactive if he/she is in a managerial, clerical and sales professions. Persons whose body mass index is greater than 24.9 are categorized as overweight. The survey also provides behavioural risk factors of DM such as consumption of tobacco, smoking and drinking alcohol. Thus we used the district level percentage of urban household, percentage of household with richest wealth quintile, percentage of the overweight population, percentage of professionals who are physically inactive and the behavioural risk factors viz. prevalence of tobacco consumption, smoking and

drinking alcohol as the predictors of the prevalence of DM. The information on the frequency of intake of nine food groups was also collected in the survey out of which four are vegetarian food items viz. (milk, pulses or beans, dark green leafy vegetables and fruits), and three are non-vegetarian food items viz. eggs, fish and meat and the remaining two are fried food and carbonated drinks. Thus, we also consider these food habit patterns of the households as the prognosticator of DM.

Statistical Analysis

Univariate exploratory spatial data analysis such as Moran's I, a univariate local indicator for spatial correlation (LISA) and simultaneous autoregressive model (SAR) was used to assess the spatial clustering and determinants of DM among older adolescents and young adults.

Moran's I, statistic is defined as,

$$I = \frac{n}{S_0} \frac{\sum_i \sum_j w_{ij}(y_i - \bar{y})(y_j - \bar{y})}{\sum_i (y_i - \bar{y})^2}, \quad \text{Where} \quad S_0 = \sum_i \sum_j w_{ij}$$

Here we assume that the global means $\bar{y}$ is an adequate representation of the variable of interest y. Moran's I value ranged from -1 to $+1$. Negative values indicate negative spatial autocorrelation and positive values indicate positive spatial autocorrelation. A zero value indicates a random spatial pattern.

The index which is used to observe spatial autocorrelation at the local level is LISA, which can be seen as the local equivalent of Moran's I. For each location, LISA values allow for the computation of its similarity with its neighbours and also test its significance. Thus, five scenarios may emerge (Gupta *et.al.* 2016): (a) Locations with high values, with similar neighbours (high-high), referred to as "hot spots", (b) Locations with low values, with similar neighbours (low-low), referred to as "cold spots", (c) Locations with high values, but with low-value neighbours (high-low), referred to as potential "spatial outliers", (d) Locations with low values, but with high-value neighbours (low-high), also referred to as potential "spatial outliers", (e) Locations with no significant local autocorrelation.

The Spatial Autoregressive Models (SAR) specification uses a regression on the value from the other areas to account for the spatial dependence (Robert Gentleman *et.al.* 2008). Which means that the error terms ε are modelled so that they depend on each other in the following way,

$$e_i = \sum_{i=1}^{m} b_{ij}e_i + \varepsilon_i$$

Where ε_i are residuals errors which are assumed to be independently distributed according to a

Normal distribution with mean zero and diagonal covariance matrix Σ_ε with elements σ^2_ε, i = 1, …, m.

The b_{ij} values are used to represent spatial dependence between areas, b_{ij} must be set to zero so that each area is not regressed on itself.

If we express the error terms as, $e = B(Y - X^T\beta) + \varepsilon$, the model can be expressed as

$$Y = X^T\beta + B(Y - X^T\beta) + \varepsilon$$

Which implies that,

$$(I - B)(Y - X^T\beta) = \varepsilon$$

Where B is a matrix that contains the dependence parameters b_{ij} and I is the identity matrix. In order that the SAR model to be well defined, the matrix $I - B$ must be non-singular. Under this model, Y is distributed according to multivariate normal mean, $E[Y] = X^T\beta$ and covariance matrix

$$Var[Y] = (I - B)^{-1}\Sigma_\varepsilon(I - B^T)^{-1}$$

Often Σ_ε is taken to depend on a single parameter σ^2, so that $\Sigma_\varepsilon = \sigma^2 I$ and then Var[Y] simplifies to

$$Var[Y] = \sigma^2(I - B)^{-1}(I - B^T)^{-1}$$

It is also possible to specify Σ_ε as a diagonal matrix of weights associated with heterogeneity among the observations. If $B = \lambda W$, where λ is a spatial autocorrelation parameter and W is a matrix that represents spatial dependence, which is often assumed to be symmetric.

Results

Descriptive Findings

Figure 1 presents the distribution of the prevalence of DM among older adolescents and young adults across 640 districts of India. Its prevalence varied widely ranging from 0.57 percent to 35 percent and it is spread across all the districts of the country. Some of the Indian districts have a prevalence of less than 5 percent while many of them have prevalence more than 10 percent. Compared to districts in northern states, districts in eastern, northeastern, western, and southern states seem to be better as almost all the districts have prevalence less than 5 percent. Many of the districts in northern, western, central and northeastern states have prevalence more than 10 percent.
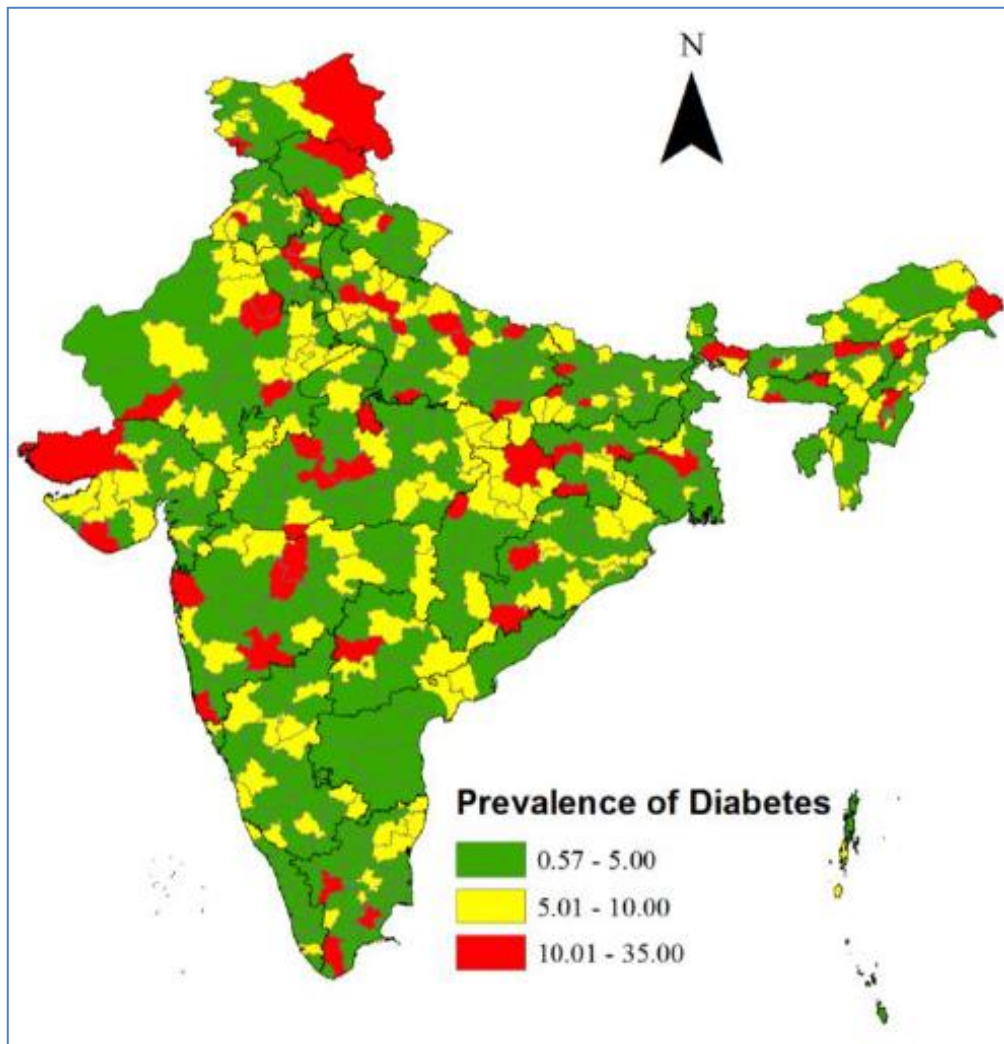
Figure 1: Prevalence of diabetes among older adolescents and young adults across 640 districts of

India

Global Moran's I for Prevalence of DM in India

The results of the study are entirely based on aggregated district-level data. Overall Global Moran's I spatial autocorrelation is 0.61 (p-value < 0.001; 999 permutations) indicating high spatial autocorrelation and significant positive association with the levels of prevalence of DM between the districts of India. Therefore, it is necessary to analyze spatial clustering at the local level to identify the areas with significant clustering of the prevalence of DM.

LISA Maps for Prevalence of DM in India

For obtaining the significant clustering of the prevalence of DM, we generate the LISA cluster map. Figure 2 presents the LISA map for the prevalence of DM among older adolescents and young adults. There is significant high-high clustering of the prevalence of DM in the districts of northeastern states, eastern states, southern states and Delhi National Capital Regions (NCR). And, significant low-low clustering of the prevalence of DM in districts of northern states and central India for which the health care and delivery system are relatively poor.
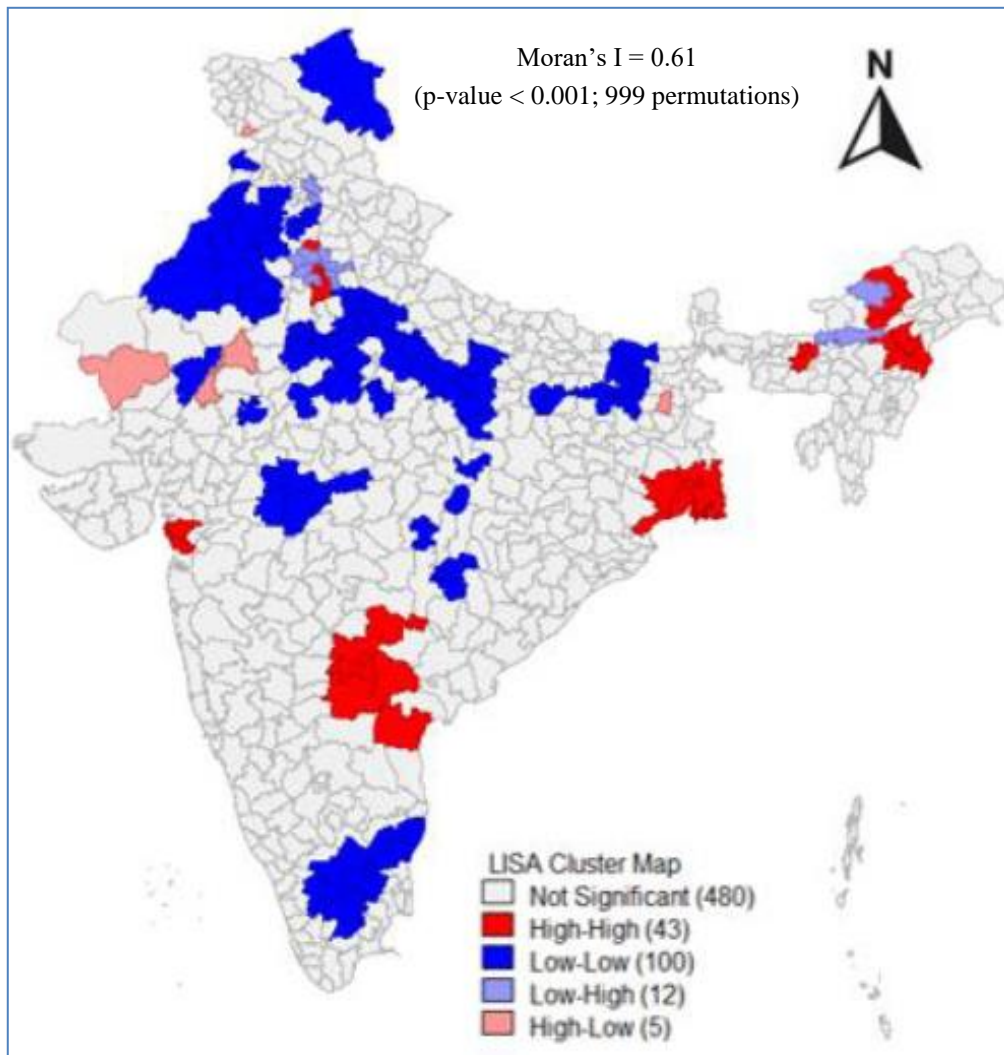
Figure 2: LISA map for the prevalence of DM among older adolescents and young adults

Spatial Regression – Simultaneous Autoregressive Model

After confirming the presence of significant spatial autocorrelation in the prevalence of DM across 640 districts of India. The spatial effect has been model by using Simultaneous Autoregressive Model (SAR). Table 1 presents the estimates from the SAR model assessing the determinants of DM among older adolescents and young adults in India. The study found the value of lambda (λ) capturing spatial effect is positive and highly statistically significant. This indicates the substantial spatial dependence in the prevalence of diabetes across the neighbourhood districts.

Prevalence of DM is likely to increase by 0.040 times as the percentage of urban household increases. Similarly, an increase in the percentage of the overweight population is likely to increase the prevalence of DM by 0.180 times. Behavioural risk factors also have an impact on the prevalence of DM. As the prevalence of tobacco consumption, smoking and drinking of alcohol increases, the prevalence of DM is likely to increase by 0.123, 0.101, and 0.106 times respectively. The professionals who are physically inactive are also at a higher risk of having DM. As the percentage of professionals who are physically inactive increases, the prevalence of DM is likely to increase by 0.065 times. Compared to districts with a lesser percentage of household with richest wealth quintile

and median years of education, the prevalence of DM is likely to decrease as the percentage of household with richest wealth quintile and median years of education increases. Prevalence of DM is likely to decrease by 0.051 times if the percentage of household with the richest wealth quintile increases. And the prevalence of DM is likely to decrease by 0.084 times if the median years of the education of the population increases.

Table 1: Estimates from the simultaneous autoregressive model (SAR) assessing determinants of DM among older adolescents and young adults in India.

Characteristics of Interest	Estimated Coeff.
Intercept	4.241
% of Urban Household	0.040***
% of Overweight Population	0.189***
% of Household in Highest Wealth Quintile	-0.051***
% of Household Consuming Veg. & N-Veg. Occasionally	0.680
% of Household Consuming at least One Veg. Daily	0.655
% of Household Consuming at least One N-Veg. Daily	0.659
% of Household Consuming at least One Veg. & N-Veg. Daily	0.702
% of Household Consuming Fried Food Daily	0.010
Prevalence of Tobacco Consumption	0.123**
Prevalence of Smoking	0.101**
Prevalence of Drinking	0.106**
% of Professional Who are Physically Inactive	0.065**
Median Years of Education of the population	-0.084
Lambda (λ)	0.620***
Akaike Information Criteria (AIC)	3181.8

*Note: ** p-value < 0.05 & *** p-value < 0.01; Veg.- Vegetarian & N-Veg. – Non-Vegetarian*

Discussion

The prevalence of DM is increasing in India and is shifting towards the lower ages (Ramachandran *et al.* 2001; Wild *et al.* 2004; Joshi *et al.* 2007; IDF 2015). The data from the fourth round of National Family Health Survey reveals the prevalence of DM among older adolescents and young adults greater than 10 percent in as many as 59 districts spreading across more than 20 Indian states. In the past decades, there has been evidence of disproportionate distribution of prevalence of DM across the Indian states (Anjana *et al.* 2017; Arora *et al.* 2010). Compared to districts in other states, the districts in northern, western, central and northeastern states have a higher prevalence of DM among older adolescents and young adults. The prevalence of DM is highly influenced by the regional variation between the districts. The study indicates the substantial spatial dependence (Moran's I = 0.61) in the prevalence of DM between the 640 districts of Indian states. The prevalence of DM among older adolescents and young adults is high and significantly clustered in the districts of northeastern states, eastern states, southern states and Delhi National Capital Regions (NCR). While the prevalence of DM among older adolescents and young adults is low and significantly clustered in districts of northern states and central India which are typically characterized by poor health indicators accompanied with poor health care and delivery system (Kumar and Prakash 2011; Kumar and Mishra 2015). Compared to the burden of non-communicable diseases, the burden of communicable

diseases is relatively higher in these regions (Reddy *et al.* 2005; Upadhyay 2012). Many studies have highlighted the socioeconomic burden of non-communicable diseases particularly DM in India (Bjork *et al.* 2003; Kapur 2007; Shashank *et al.* 2008). The study also reveals that as the percentage of the household with the richest wealth quintile and the median years of education increases, the prevalence of DM among older adolescents and young adults is more likely to decreases. But, the impact of urbanization and change in the lifestyle plays a very significant role in increasing the prevalence of DM (Tuomilehto *et al.* 2001; Whittemore *et al.* 2002; Simpson *et al.* 2003; Kosaka *et al.* 2005; Lindstrom *et al.* 2006; Rajeski *et al.* 2012). The prevalence of DM among older adolescents and young adults in districts of Indian states are likely to increases with the increase in the percentage of urban households. Similarly, as the percentage of overweight and professionals who are physically inactive increases, there is higher risk of increasing the prevalence of DM among older adolescents and young adults. The importance of behavioural risk factors in escalating the prevalence of DM cannot be ignored (Rimm *et al.* 1995; Le *et al.* 1997; Manson *et al.* 2000; Shi *et al.* 2013). As the prevalence of the behavioural risk factors such as tobacco consumption, smoking and drinking of alcohol among older adolescents and young adult's increases, the prevalence of DM is also likely to increase.

Limitations of the study

Every study is subject to limitations and the study suffers from two inevitable limitations. First, the blood glucose level provided in the survey to define the respondents as diabetic or not is based on the series of biomarkers test and measurements. But, the measurement was taken randomly i.e. whether the respondents were fasting on not prior to the test was not considered. And second, the National Family Health Survey is a cross-sectional survey. Thus, the causality of DM cannot be established from the study. And the prevalence of DM or any characteristic might vary greatly across a district.

Conclusion

The study shows increasing and widespread prevalence of DM among older adolescents and young adults in India. Since this is a disease which cannot be cured, increasing prevalence among this population would lead to a drastic change in social as well as economic conditions of the country. Urbanization and sedentary habits leading to overweight, professions with inactive physical activities and behavioral risk factors such as smoking, consumption of tobacco and drinking of alcohol are the major risk factor escalating the risk of DM among older adolescents and young adults. Therefore, reduction in the prevalence of DM among this population is necessary and would be possible only if area-specific measures would be adopted in those clusters of districts where DM is high considering the other intervening covariates.

References

Anjana, R.M., Deepa, M., Pradeepa, R., Mahanta, J., Narain, K., Das, H.K., Adhikari, P., Rao, P.V., Saboo, B., Kumar, A. and Bhansali, A., 2017. Prevalence of diabetes and prediabetes in 15 states of India: results from the ICMR–INDIAB population-based cross-sectional study. The Lancet Diabetes & Endocrinology, 5(8), pp.585-596.

Arora, V., Malik, J.S., Khanna, P., Goyal, N., Kumar, N. and Singh, M., 2010. Prevalence of diabetes in urban Haryana. Australasian Medical Journal (Online), 3(8), p.488.

Bjork, S., Kapur, A., King, H., Nair, J. and Ramachandran, A., 2003. Global policy: aspects of diabetes in India. Health Policy, 66(1), pp.61-72.

Bleyer, W.A., 2002. Cancer in older adolescents and young adults: epidemiology, diagnosis, treatment, survival, and importance of clinical trials. Medical and Pediatric Oncology: The Official Journal of SIOP—International Society of Pediatric Oncology (Societé Internationale d'Oncologie Pédiatrique, 38(1), pp.1-10.

Chan, J.M., Rimm, E.B., Colditz, G.A., Stampfer, M.J. and Willett, W.C., 1994. Obesity, fat distribution, and weight gain as risk factors for clinical diabetes in men. Diabetes Care, 17(9), pp.961-969.

Diamond, J., 2011. Medicine: diabetes in India. Nature, 469(7331), p.478.

Gupta, A.K., Ladusingh, L. and Borkotoky, K., 2016. Spatial clustering and risk factors of infant mortality: district-level assessment of high-focus states in India. Genus, 72(1), p.2.

Gupta, R., 2006. Smoking, educational status & health inequity in India. Indian Journal of Medical Research, 124(1), p.15.

International Diabetes Federation (2015) International Diabetes Federation Diabetes Atlas, 7th edition https://www.idf.org/e-library/epidemiology-research/diabetes-atlas/13-diabetes-atlas-seventh-edition.html

International Institute for Population Sciences (IIPS) and ICF. 2017. National Family Health Survey (NFHS-4), 2015-16: India. Mumbai: IIPS.

Joshi, S.R. and Parikh, R.M., 2007. India; the diabetes capital of the world: Now heading towards hypertension. Journal-Association of Physicians of India, 55(Y), p.323.

Kapur, A., 2007. Economic analysis of diabetes care. Indian Journal of Medical Research, 125(3), p.473.

Koch, M., Gradaus, F., Schoebel, F.C., Leschke, M. and Grabensee, B., 1997. Relevance of conventional cardiovascular risk factors for the prediction of coronary artery disease in diabetic patients on renal replacement therapy. Nephrology, dialysis, transplantation: official publication of the European Dialysis and Transplant Association-European Renal Association, 12(6), pp.1187-1191.

Kosaka, K., Noda, M. and Kuzuya, T., 2005. Prevention of type 2 diabetes by lifestyle intervention: a Japanese trial in IGT males. Diabetes Research and Clinical Practice, 67(2), pp.152-162.

Kumar, C. and Prakash, R., 2011. Public-private dichotomy in utilization of health care services in India. Consilience, (5), pp.25-52.

Kumar, V. and Mishra, A.J., 2015. Quality of health care in primary health care system: a reflection from Indian state. International Journal of Health System and Disaster Management, 3(3), p.136.

Le Marchand, L., Wilkens, L.R., Kolonel, L.N., Hankin, J.H. and Lyu, L.C., 1997. Associations of sedentary lifestyle, obesity, smoking, alcohol use, and diabetes with the risk of colorectal cancer. Cancer Research, 57(21), pp.4787-4794.

Lindström, J., Ilanne-Parikka, P., Peltonen, M., Aunola, S., Eriksson, J.G., Hemiö, K., Hämäläinen, H., Härkönen, P., Keinänen-Kiukaanniemi, S., Laakso, M. and Louheranta, A., 2006. Sustained reduction in the incidence of type 2 diabetes by lifestyle intervention: follow-up of the Finnish Diabetes Prevention Study. The Lancet, 368(9548), pp.1673-1679.

Manson, J.E., Ajani, U.A., Liu, S., Nathan, D.M. and Hennekens, C.H., 2000. A prospective study of cigarette smoking and the incidence of diabetes mellitus among US male physicians. The American Journal of Medicine, 109(7), pp.538-542.

Martín-Timón, I., Sevillano-Collantes, C., Segura-Galindo, A. and del Cañizo-Gómez, F.J., 2014. Type 2 diabetes and cardiovascular disease: have all risk factors the same strength?. World Journal of Diabetes, 5(4), p.444.

Mohan, V., Anjana, R.M., Pradeepa, R., Unnikrishnan, R., Tanvir, K. and Das, A.K., 2017. The ICMR INDIAB Study–A Compendium of Type 2 Diabetes in India: Lessons Learnt for the Nation. API.

Mohan, V., Mathur, P., Deepa, R., Deepa, M., Shukla, D.K., Menon, G.R., Anand, K., Desai, N.G., Joshi, P.P., Mahanta, J. and Thankappan, K.R., 2008. Urban rural differences in prevalence of self-reported diabetes in India—The WHO–ICMR Indian NCD risk factor surveillance. Diabetes Research and Clinical Practice, 80(1), pp.159-168.

Mokdad, A.H., Ford, E.S., Bowman, B.A., Dietz, W.H., Vinicor, F., Bales, V.S. and Marks, J.S., 2003. Prevalence of obesity, diabetes, and obesity-related health risk factors, 2001. Journal of American Medical Association, 289(1), pp.76-79.

Mote, B.N., 2016. A regional epidemiology of India's "NCD's risk factors" focusing particularly on Maharashtra: A call for "Health promotion" once again. International Journal of Medicine and Public Health, 6(1).

Pereira, M.A., Kartashov, A.I., Ebbeling, C.B., Van Horn, L., Slattery, M.L., Jacobs Jr, D.R. and Ludwig, D.S., 2005. Fast-food habits, weight gain, and insulin resistance (the CARDIA study): 15-year prospective analysis. The Lancet, 365(9453), pp.36-42.

Ramachandran, A., Snehalatha, C., Kapur, A., Vijay, V., Mohan, V., Das, A.K., Rao, P.V., Yajnik, C.S., Kumar, K.P., Nair, J.D. and Diabetes Epidemiology Study Group in India (DESI, 2001. High prevalence of diabetes and impaired glucose tolerance in India: National Urban Diabetes Survey. Diabetologia, 44(9), pp.1094-1101.

Ramachandran, A., Snehalatha, C., Latha, E., Manoharan, M. and Vijay, V., 1999. Impacts of urbanisation on the lifestyle and on the prevalence of diabetes in native Asian Indian population. Diabetes Research and Clinical Practice, 44(3), pp.207-213.

Reddy, K.S., Shah, B., Varghese, C. and Ramadoss, A., 2005. Responding to the threat of chronic diseases in India. The Lancet, 366(9498), pp.1744-1749.

Rejeski, W.J., Ip, E.H., Bertoni, A.G., Bray, G.A., Evans, G., Gregg, E.W. and Zhang, Q., 2012. Lifestyle change and mobility in obese adults with type 2 diabetes. New England Journal of Medicine, 366(13), pp.1209-1217.

Rimm, E.B., Chan, J., Stampfer, M.J., Colditz, G.A. and Willett, W.C., 1995. Prospective study of cigarette smoking, alcohol use, and the risk of diabetes in men. BMJ, 310(6979), pp.555-559.

Robert Gentleman, Kurt Hornik, Giovanni Parmigiani (2008). Applied Spatial Data Analysis with R.

Savoca, M.R., Miller, C.K. and Ludwig, D.A., 2004. Food habits are related to glycemic control among people with type 2 diabetes mellitus. Journal of the American Dietetic Association, 104(4), pp.560-566.

Shashank, R.J., Das, A.K., Vijay, V.J. and Mohan, V., 2008. Challenges in diabetes care in India: sheer numbers, lack of awareness and inadequate control. Journal of Association of Physicians of India, 56(6), pp.443-450.

Shi, L., Shu, X.O., Li, H., Cai, H., Liu, Q., Zheng, W., Xiang, Y.B. and Villegas, R., 2013. Physical activity, smoking, and alcohol consumption in association with incidence of type 2 diabetes among middle-aged and elderly Chinese men. PloS One, 8(11), p.e77919.

Simpson, R.W., Shaw, J.E. and Zimmet, P.Z., 2003. The prevention of type 2 diabetes—lifestyle change or pharmacotherapy? A challenge for the 21st century. Diabetes Research and Clinical Practice, 59(3), pp.165-180.

Sowers, J.R., Levy, J. and Zemel, M.B., 1988. Hypertension and diabetes. Medical Clinics of North America, 72(6), pp.1399-1414.

Steppan, C.M., Bailey, S.T., Bhat, S., Brown, E.J., Banerjee, R.R., Wright, C.M., Patel, H.R., Ahima, R.S. and Lazar, M.A., 2001. The hormone resistin links obesity to diabetes. Nature, 409(6818), p.307.

Tuomilehto, J., Lindström, J., Eriksson, J.G., Valle, T.T., Hämäläinen, H., Ilanne-Parikka, P., Keinänen-Kiukaanniemi, S., Laakso, M., Louheranta, A., Rastas, M. and Salminen, V., 2001. Prevention of type 2

diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. New England Journal of Medicine, 344(18), pp.1343-1350.

Tuttolomondo, A., Maida, C. and Pinto, A., 2015. Diabetic foot syndrome as a possible cardiovascular marker in diabetic patients. Journal of Diabetes Research, 2015.

Upadhyay, R.P., 2012. An overview of the burden of non-communicable diseases in India. Iranian Journal of Public Health, 41(3), p.1.

Whittemore, R., Chase, S.K., Mandle, C.L. and Roy, C., 2002. Lifestyle change in type 2 diabetes: A process model. Nursing Research, 51(1), pp.18-25.

Wild, S., Roglic, G., Green, A., Sicree, R. and King, H., 2004. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. Diabetes Care, 27(5), pp.1047-1053.

The Effect of Front-of-Package Traffic Light (FoPTL) Nutrition Label Design on the Acceptability and Understanding of Nutrition Labels for Hypertension Patients

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Abstract

The practice of reading nutrition labels and understanding the information still remains low in Indonesia, especially among hypertensive patients. Yet, Front-of-Package Traffic Light (FoP-TL) labels can be well received by the community compared to information labels that display nutritional values. Hypertension sufferers need to understand such FoP-TL labels in order to be aware of their sodium consumption and not exceed recommended limits. The purpose of this study was to assess the effect of nutrition label designs on acceptance and understanding among hypertensive patients. The quasi-experimental study design was applied over a period of three weeks, with a control group containing 11 subjects (nutritional value information labels) and an intervention group comprising 10 subjects (FoP-TL labels) selected by purposive sampling. The collection of primary data at the beginning of the study included data on the subjects' characteristics (age, education, income, weight, height, BMI and blood pressure), knowledge of nutrition and health, their behaviour relating to the reading of nutritional value information labels, and their understanding of nutrition labels and perceptions of their attractiveness. In the first week, the subjects were given a pre-test on nutrition labels with the help of a dummy, aimed at determining their understanding of nutritional value information labels. During the second week, education was provided in the form of different booklets and dummies according to each group, while in the third week a post-test was administered to measure the effects of the nutrition labels received by both groups. The results showed significant differences in terms of the increase in understanding between the control and intervention groups (22.15 points in control group and 34.3 points in intervention group), while there were also differences in the average acceptability scores for both groups (47.7 points in control group and 55.7 points in intervention group. FoP-TL labels can thus be used to understand what constitutes good nutrition labels for use with hypertensive patients.

Keywords: Hypertension, Front-of-Package Traffic Light, nutrition labelling understanding, acceptance

Introduction

An examination of nutrition labels prior to the purchasing of packaged foods can be used by people as a means of assessing the nutritional content of such foods and can thus help members of the community to select the right foods (Nelson et al, 2014; Campos et al., 2011; Gupta and Dharni, 2016; FDA, 2016). Improving the habit of reading food packaging labels that display information on nutritional value can be an effective way of improving good eating habits and working towards the prevention of certain chronic diseases related to poor eating habits (Post et al., 2010; Gupta and Dharni, 2016), such as hypertension, heart disease and diabetes (FDA, 2014). The greatest impact of

reading food packaging labels can be observed when consumers consider sugar, salt and saturated fat content before buying and consuming packaged foods (Helfer and Shultz, 2014).

The results of a study by the National Consumer Protection Agency showed that only 6.7% of people read the nutrition labels on foods (BPKN, 2007). This is very low considering the frequency with which packaged foods are purchased by the community, which has increased from 35% to 47% (Deloitte, 2016). Moreover, even consumers who read labels do not properly understanding the information they contain. This is because such nutrition labels contain a surplus of information that people find difficult to understand (Jacobs et al, 2010). What we know about consumers reading nutrition labels is consistent with the finding that the nutritional knowledge of consumers continues to be low (Zahara and Triyanti 2009; Palupi et al, 2017; Themba and Tanjo, 2013; Williams and Mummery, 2012).

People prefer labels that are simple and easy to understand (Feunekesa et al, 2008; Kees et al, 2014; Julia et al., 2015). Simple labels require less in the way of effort to digest and time to understand compared to more detailed labels (Andrews et al., 2011; Azman and Sahak, 2014). The use of an attractive design for nutrition labels can also motivate people to read them (Ranilovic and Baric, 2011). Therefore, various efforts have been made to provide convenience to consumers. One such example is the front-of-packaging (Front of Pack – FoP) label developed by the UK Food Standards Agency (FSA) that uses a traffic light (Front-of-Package Traffic Light–FoP-TL) format. This system of traffic-light labelling can make it easier for people to understand the nutritional content of packaged foods (McLean et al, 2012; Mohan et al, 2009; Me´jean et al, 2014; Hodgkins et al, 2015; Regan et al, 2016).

FoP-TL labelling was created with the aim of supplementing nutritional value information labels and as a means of overcoming their limitations in attracting public attention (Roberto and Khandpur, 2014). The advantages of FOP-TL labelling include its use of a colour system to indicate the nutritional content of packaged foods, rather than the numerical information-based format of nutritional value information labels (Roberto and Khandpur, 2014). Some studies have found that FOP-TL labelling is well received by the public and is easier to understand than labels displaying nutritional value information (Edge et al, 2014). Research in Europe shows that some people are more interested in the FOP-TL label format for use as a reference prior to purchasing packaged food because it is easier to use (Azman and Sahak, 2014). Meanwhile, research in America has demonstrated that consumers prefer FOP (63%) to Back of Pack (BOP) (42%) labelling (Graham, Heidrick, & Hodgin, 2015).

Sodium labeling

The public, despite the fact that packaged foods often have high sodium content (Watson et al, 2014), rarely treats sodium content as a concern. Sodium can trigger an increase in blood pressure that leads to hypertension. Indonesia has a high prevalence of hypertension, standing at 25.8%, thus indicating the need to encourage people to read labels and choose food with lower sodium content (Ministry of Health, 2013). Researchers are therefore interested in conducting studies on the effect of FoP-TL labelling in patients with hypertension.

Methods

Study population

This research is a quantitative study with a quasi-experimental study design. Two communities in Kramat Jati Village were chosen as the control and intervention groups based on the location of the remote area. The location of the region was determined to minimize the interaction between the two groups. The subjects in this study were selected using purposive sampling based on the characteristics of sex (female), age (30–59 years) and those with blood pressure in the hypertensive category (systolic $\geq$ 130 mmHg or diastolic $\geq$ 80 mmHg) or with normal blood pressure but who took medication for hypertension.

Design and Intervention

The control group (10 subjects) was given nutritional value information labels, while the 11 subjects in the intervention group were given FoP-TL labels (Figure 1). The instruments used in this study were questionnaires, scales, a microtoise and a sphygmomanometer. The questionnaire was used to determine the characteristics of the subjects (age, education and income), their perceptions, attitudes and beliefs regarding nutrition, behaviour in relation to the reading of nutritional value information labels, nutrition and health-related knowledge, pre- and post-test understanding and acceptance of the labels. Scales were used to measure each subject's weight; the microtoise was used to measure their height, which is useful for determining the nutritional status of the subject, while the sphygmomanometer was used to determine the subjects' blood pressure.

The data collection began with age screening and blood pressure measurements. A subject's age was taken from their ID card, while a student from the Faculty of Nursing who is an expert in using the sphygmomanometer took the blood pressure readings. The subjects included in this study were those who had blood pressure in the hypertensive category (higher than 140/90 mmHg) who had normal blood pressure but were taking hypertension medication.

Subjects who met the criteria were given a questionnaire to be completed independently. The questionnaire enquired as to the subjects' demography characteristics, whether they read labels containing information on nutritional value, knowledge, and understanding of the nutritional value information presented in labels (pre-test), anthropometry measurement data and blood pressure. Questions on the understanding of labels for nutritional value information were answered with the help of a dummy example of food and beverage packaging developed by the researchers. The enumerator provided assistance with the questionnaire by providing an explanation in the event that an element was not understood by the subject, in addition to checking the completeness of the answers to the questions. After having completed the questionnaire, the subjects were provided with an explanation of hypertension, including its causes, symptoms and classification, along with the types of food to either consume or avoid.

One week later, the participants were provided with an educational booklet containing information on nutritional value or FoP-TL labelling (according to the control and intervention groups). The contents were also explained to the respondents orally prior to them being given a copy of the booklet. One week after being given this material, namely in the fourth week, the post-test similar with the pre-test

was conducted by distributing questionnaires to the subject in order to elicit their acceptance and understanding after one week of treatment. The behavior of reading food labels was categorized as either obedient or disobedient. The subjects were said to be obedient if they answered 'always' and 'often', and categorized as disobedient if they provided the answers 'sometimes', 'rarely' and 'never' to questions related to their habit of reading the different components of food labels. The respondents' understanding was assessed based on their answers to 16 questions and was categorized as less again need different labels if they had ≤ 60% correct answers, and good if they had > 60% correct answers. The ability receiving nutritional value information labels and FoP-TL labels was determined based on several aspects, including the preference for label design (4 questions), attractiveness (4 questions) and cognitive workload perception (5 questions). Each question was awarded a value according to the answer given, namely strongly agree = 5; agree = 4; normal = 3; disagree = 2; and strongly disagree = 1.

Results

The demographic characteristics, BMI, blood pressure and level of knowledge were similar for both the intervention and control groups except that the control group had a significant higher income than the intervention group (Table 1). The components of the food labels most frequently observed by the subjects were the date of expiration (control group 81.8% and intervention group 100%). Subject compliance in reading information labels on nutritional value was low for both the control (36.4%) and intervention groups (50.0%) as shown in Table 2.

Table 1. Characteristic of control and intervention groups

Variabel	Control (n=11)	Intervention (n=10)	95% CI	p
	n (%)	n (%)		
Age (years old):				
30 – 45	2 (18.2)	3 (30.0)	(0.25 – 14.88)	0.52
46 – 59	8 (81.8)	7 (70.0)		
Last education:				
Less than senior high school	5 (45.5)	3 (30.0)	(0.85 – 3.10)	0.46
More than senior high school	6 (54.5)	7 (70.0)		
Monthly income (IDR):				
Less than 3.,00,000	10 (90.9)	3 (30.0)	(0.004 – 0.502)	0.008*
More than equal to 3,000,000	1 (9.1)	7 (70.0)		
BMI (Body Mass Index)				
Normal status (18.5-24.9)	3 (27.3)	5 (50.0)	(0.434 – 16.39)	0.38
Obesity (>= 25.0)	8 (72.7)	5 (50.0)		
Blood pressure (mmHg):				
Sistolic:				
< 140	5 (45.5)	3 (30.0)	(0.08 – 3.10)	0.65
≥ 140	6 (54.5)	7 (70.7)		

Diastolic:

< 89	1 (9.1)	2 (20.0)	(0.19 – 32.80)	0.58
≥ 90	10 (90.9)	8 (80.0)		

Nutrition label knowledge level

Low (≤58.7)	6 (54.5)	5 (50.0)	(0.15 – 4.63)	1.00
Adequate (> 58.7)	5 (45.5)	5 (50.0)		

* p < 0.05

Table 2. Food label reading practices at both groups at the beginning of study

Label component	Compliance level	Control	Intervention
		n (%)	n (%)
Serving portion information	Obey	5 (45.5)	5 (50.0)
	Did not obey	6 (54.5)	5 (50.0)
Brand's name	Obey	3 (27.3)	3 (30.0)
	Did not obey	8 (72.7)	7 (70.0)
Nutrition information label	Obey	4 (36.4)	5 (50.0)
	Did not obey	7 (63.6)	5 (50.0)
Ingredient's information	Obey	2 (18.2)	4 (40.0)
	Did not obey	9 (81.8)	6 (60.0)

There was a significant difference in the average scores of the two groups with regard to the component of reading behaviour of nutritional value information labels. Intervention group was more likely to read the nutritional value information at the end of study. Both the control and intervention subjects increased their understanding of nutritional labels between the pre and post test. There was significant difference of understanding score at post-study as seen in Table 3. The subjects of intervention group displayed a greater score increase (34.37 points) compared to those in the control group (22.15 points) at the end of study. The similar description was also showed in Table 4 in which the intervention group had the mean score of nutrition labels acceptance was bigger than the control group. Understanding and acceptance of nutrition labels had significant difference in the two groups after the study.

Table 3. Mean score of nutrition labels understanding

Group	Change (Δ)			95% CI	p value
	Min	Max	Mean		
Control	00.00	43.75	22.15	26.76 – 0.169	*0.047
Intervention	18.75	56.25	34.37		

* p < 0.05

Table 4.   Mean score of nutrition labels acceptance

Group	Change (Δ)			95% CI	p-value
	Min	Max	Mean + SD		
Control	38.00	59.00	47.71 + 7.00	14.60 – 1.34	*0.02*
Intervention	41.00	63.00	+ 7.51		

*p < 0.05

Discussion

A better understanding of the intervention group shows that FoP-TL labelling can help the community to identify the ingredients in packaged foods and thus select healthier foods. This is in line with research conducted by Findling et al. (2018) on female subjects in which it was shown that FoP-TL labelling can improve the understanding and ability to choose between two food products with better nutritional quality. In addition, FoP-TL labelling can provide information pertaining to the levels (i.e. high, medium and low) of nutrients in food products. This research shows positive results with regard to the understanding of the subjects after being given FOP-TL labels, thus indicating that this type of nutrition labelling may be considered for further examination by The National Agency of Drug and Food Control of Republic of Indonesia (BPOM).

Acceptance was measured at the end of the study together with the post-test. Measurements were not taken at the beginning due to the unfamiliarity of the subjects with FoP-TL labels, which meant it was not possible to determine the acceptability prior to the intervention being administered. The acceptance of the subjects in the intervention group of the FoP-TL labelling was better than that for the nutritional value information label.. This finding is consistent with that from a study conducted by Gorton, et al. (2008) in 25 New Zealand supermarkets, which stated that FOP-TL labelling is preferred by consumers relative to nutritional value information labels in both high- and low-income groups. This receiving power what is receiving power? is very important because it can affect consumers' habit of reading nutrition labels, which will also impact on their decision of whether or not to buy a product. Consumers will pay attention to the information contained in the label and will proceed to understand and store this information prior to making a purchase decision (Miller and Cassady, 2015). The study shows that the subjects in the intervention group (FoP-TL) were able to answer questions correctly concerning which products were healthier. This finding is in line with the research of Ducrot et al (2015) showed that FoP-TL label can improve subjects' ability to choose healthier products compared to labels without a FoP label. The results of research by McLean et al (2012) also demonstrated that subjects were able to compare products with high and low sodium contents using a FoP-TL label that included less in the way of numerical information and was more visually interesting in terms of the inclusion of colour. FoP-TL labels tend to be simpler, easier for consumers to use and more accurate when looking to make healthier product choices from a range of different product options (Me´jean et al, 2012).

FoP-TL labels are preferred because they tend to be simpler in comparison to nutritional value information labels. Nonetheless, the FSA has recommended the combination of a colour-based classification of nutrient content (high, medium and low) with a percentage of RDA figure as the most effective format (Night et al, 2009). Grunert and Wills (2007), in their review, also stated that although people tend to like the easy label format, they also want to know more about what the

colours mean that are used to classify the nutrient content of different types of food and drink. Indeed, it is this that underlies the usage of the FOP format with colour to communicate the classification of the energy, sugar, salt, total fat and saturated fat content, so that people who read this type of label can quickly understand the ingredients without any loss of important information about the content.

Conclusion

After the study, the intervention group had a higher level of understanding and acceptance of nutrition labels than the control group. The FOP-TL label is effectively able to improve understanding and be well received by the community compared to the nutritional value information label. This research on FOP-TL labelling may be used as the basis for a study by The National Agency of Drug and Food Control of Republic of Indonesia (BPOM) to begin regulating and implementing this type of system in Indonesia. In addition, research on the influence of FOP-TL labels is still very rare in Indonesia, this is the point especially with regard to studies looking at the factors that affect understanding and acceptability. This indicates that further research is needed with larger samples and in reference to regulations on food and nutrition labelling systems based on BPOM laws and regulations.

References

Andrews, J. C., Burton, S., & Kees, J. (2011). Is Simpler Always Better? Consumer Evaluations of Front-Of-Package Nutrition Symbols. Journal of Public Policy & Marketing, 30(2), 175-190.

Azman, N., & Sahak, S. Z. (2014). Nutritional Label and Consumer Buying Decision. Procedia - Social and Behavioral Sciences, 130, 490-498.

Baliwati, Y. F., Khomsan, A., & Dwiriani, M. C. (2004). Pengantar Pangan dan Gizi. Depok: Penebar Swadaya.

BPKN, B. P. (2007). Hasil Kajian BPKN di Bidang Pangan Terkait Perlindungan Konsumen. Jakarta. Retrieved Maret 2018, from http://ditjenspk.kemendag.go.id/files/pdf/2013/06/04/hasil-kajian-badan-perlindungan-konsumen-nasional-bpkn-di-bidang-pangan-terkait-perlindungan-konsumen-id0-1370355071.pdf

Campos, S., Doxey, J., & Hammond, D. (2011). Nutrition labels on pre-packaged foods: a systematic review. Nutrition labels on pre-packaged foods: a systematic review, 14(8), 1496-1506.

Deloitte. (2016). Deloitte Consumer Insights The Evolution of The Indonesian Consumer. UK: Deloitte Southeast Asia.

Ducrot, P., Méjean, C., Julia, C., Kesse-Guyot, E., Touvier, M., Fezeu, L., . . . Péneau, S. (2015). Effectiveness of Front-Of-Pack Nutrition Labels in French Adults: Results from the NutriNet-Santé Cohort Study. Plos One, 1-15.

Edge, M. S., Toner, C., Kapsak, W. R., & Geiger, C. J. (2014). The Impact of Variations in Fact-Based Front-of-Package Nutrition Labeling System on Consumer Comprehension. Journal of The Academy Nutrition and Dietetics, 114(6), 845-854.

FDA, F. a. (2016). Sodium in Your Diet: Use the Nutrition Facts Label and Reduce Your Intake. Retrieved Maret 3, 2018, from http://www.fda.gov/educationresourcelibrary

Feunekes, G. I., Gortemakera, I. A., Willemsa, A. A., Liona, R., & Kommer, M. v. (2008). Front-of-pack nutrition labelling: Testing effectiveness of different nutrition labelling formats front-of-pack in four European countries. Appetite, 50, 57-70.

Findling, M. T., Werth, P. M., Musicus, A. A., Bragg, M. A., Graham, D. J., Elbel, B., & Roberto, C. A. (2018). Comparison five front-of-package nutrition labels infuence on consumers perception and purchase intentions. Preventive Medicine, 106, 114-121.

Gorton, D., Mhurchu, C. N., Chen, M.-h., & Dixon, R. (2008). Nutrition Labels: A Survey of Use, Understanding and Prefences Among Ethnically Diverse Shoppers in New Zealand. Public Health Nutrition, 12(9), 1359-1365.

Graham, D. J., Heidrick, C., & Hodgin, K. (2015). Nutrition Label Viewing during a Food Selection Task: Front-of-Package Labels vs Nutrition Facts Labels. Journal of The Academy of Nutrition and Dietetics, 115(10), 1636-1646.

Grunert, K. G., & Wills, J. M. (2007). A review of European research on consumer response to nutrition information on food labels. J Public Health, 15, 385-399.

Gupta, K. &. (2016). Use and influence of nutrition labelling: an emerging market experience. Nutrition & Food Science, 46(3), 441-456.

Gupta, K., & Dharni, K. (2016). Use and influence of nutrition labelling: an emerging market experience. Nutrition & Food Science, 46(3), 441-456.

Helfer, P., & Shultz, T. R. (2014). The effects of nutrition labeling on consumer food choice: a psychological experiment and computational model. ANNALS OF THE NEW YORK ACADEMY OF SCIENCES, 1331(1), 174–185.

Hodgkins, C. E., Raats, M. M., Fife-Schaw, C., Peacock, M., Gro¨ppel-Klein, A., Koenigstorfer, J., . . . Yaprak Gulcan4, Y. K. (2015). Guiding healthier food choice: systematic comparison of four front-of-pack labelling system and their effect on judgements of products healthiness. British Journal od Nutrition, 113, 1652-1663.

Jacobs, S. A., Beer, H. d., & Larney, M. (2010). Adult Consumers' Understanding and Use of Information on Food Labels: A Study Among Consumers Living in the Potchefstroom and Klerksdorp Regions, South Africa. Public Health Nutrition, 14(3), 510-522.

Julia, C., Kesse-Guyot, E., Ducrot, P., Péneau, S., Touvier, M., Méjean, C., & Hercberg, S. (2015). Performance of a five category front-of-pack labelling system - the 5-colour nutrition label- to differentiate nutritional quality of breakfast cereals in France. BMC Public Health, 15(1), 179.

Kees, J., Royne, M. B., & Cho, Y.-N. (2014). Regulating Front-of-Package Nutrition Information Disclosures: A Test of Industry Self-Regulation vs. Other Popular Options. The Journal Of Consumers Affairs, 3(4), 300-306.

Knox, B., Hill, D., & Hamilton, J. (2001). Consumers talking about reduced fat foods. Food Industry Journal, 4(1), 12-25.

Liu, R., Hoefkens, C., & Verbeke, W. (2015). Chinese consumers' understanding and use of a food nutrition label. Food Quality and Preference, 41, 103-111.

Malam, S., Clegg, S., Kirwan, S., McGinigal, S., & Research, B. S. (2009, May). Comprehension and use of UK nutrition signpost labelling schemes. Retrieved Juni 25, 2018, from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.610.1749&rep=rep1&type=pdf

McLean, R., Hoek, J., & Hedderley, D. (2012). Effects of alternative label formats on choice of high- and low-sodium products in a New Zealand population sample. Public Health Nutrition, 15(5), 783–791.

Me´jean, C., Macouillard, P., Pe´neau, S., Hercberg, S., & Castebon, K. (2012). Perception of front-of-pack labels according to social characteristics, nutritional knowledge and food purchasing habits. Public Health Nutrition, 16(3), 392-402.

Me´jean, C., Macouillard, P., Pe´neau, S., Lassale, C., Hercberg, S., & Castetbon, K. (2014). Association of Perception of Front-of-Pack Labels with Dietary Lifestyle and Health Characteristics. Plos One, 9(3), e90971.

Miller, L. M., & Cassady, D. L. (2015). The effects of nutrition knowledge on food label use. Appetite, 92, 207-216.

Mohan, S., Campbell, N. R., & Willis, K. (2009). Effective population-wide public health interventions to promote sodium reduction. CMAJ, 181(9), 605-609.

Nelson, D., Graham, D., & Harnack, L. (2014). An Objective Measure of Nutrition Facts Panel Usage. Journal of Nutrition Education and Behavior, 46(6), 589-593.

Palupi, I. R., Naomi, N. D., & Susilo2, J. (2017). Penggunaan Label Gizi dan Konsumsi Makanan Kemasan pada Anggota Persatuan Diabetisi Indonesia. Kesmas: Jurnal Kesehatan Masyarakat, 11(1), 1-8.

Post, R. E., Iii, A. G., Diaz, V. A., Matheson, E. M., & Everett, C. J. (2010). Use of The Nutrition Fact Label in Chronic Disease Management: Result from the National Health and Nutrition Examination Survey. Journal of the American Dietetic Association, 110(4), 628-632.

Ranilovic, J., & Baric, I. C. (2011). Difference Between Younger and Older Population in Nutriiton Label Reading Habits. British Food Journal, 113(1), 109-121.

Regan, Á., Shan, C. L., Wall, P., & McConnon, Á. (2016). Perspectives of the public on reducing population salt intake in Ireland. Public Health Nutrition, 19(7), 1327-1335.

Roberto, C., & Khandpur, N. (2014). Improving the design of nutrition labels to promote healthier food choice and reasonable portion size. International Journal of Obesity, 38, 525-533.

Themba, G., & Tanjo, J. (2013). Consumer Awareness and Usage of Nutrition Information in Botswana. Business and Management Horizons, 1(1), 44.

Vyth, E. L., Steenhuis, I. H., Brandt, H. E., Roodenburg, A. J., Brug, J., & Seidell, J. C. (2012). Methodological quality of front-of-pack labeling studies: a review plus identification of research challenges. Nutrition Reviews, 70(12), 709-720.

Watson, W. L., Kelly, B., Hector, D., Hughes, C., King, L., & Crawford, J. (2014). Can front-of-pack labelling schemes guide healthier food choices? Australian Shoppers' Responses to Seven Labelling Formats. Appetite, 72, 90-97.

Williams, S. L., & Mummery, K. W. (2012). Characteristics of consumers using 'better for you' front-of-pack food labelling schemes – an example from the Australian Heart Foundation Tick. Public Health Nutrition, 16(12), 2265-2272.

Zahara, S., & Triyanti. (2009). Kepatuhan Membaca Label Informasi Zat Gizi di Kalangan Mahasiswa. Kesmas: National Public Health Journal, 4(2), 78-83.

Modified Cassava Flour Dates Biscuit Effect on the Lipid and Anthropometry Profiles of Type 2 Diabetes

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Abstract

Purpose: To assess the effect of caromma biscuit consumption on the lipid profile and anthropometry of type 2 DM write our first time patients.

Design: A pretest-post-test randomized controlled trial (RCT) design was used on 33 subjects of an intervention group given caromma biscuits and 31 subjects of a control group given tempeh dates biscuits (temma) for four weeks. Anthropometry profile data collection included weight, height, waist-hip circumference ratio (WHCR), body fat percentage (BFP), blood pressure, and fasting blood glucose (FBG). Lipid profile included total cholesterol, Low Density Lipoprotein (LDL), High Density Lipoprotein (HDL), and triglycerides collected before and after study.

Findings: The majority of subjects in both groups had over-nutrition, high body fat percentage, risk of central obesity from WHCR, pre-hypertension, and high fasting blood glucose. Lipid profile showed high cholesterol, LDL, and triglycerides, and low HDL. At the end of the study, there was an increase of weight, BMI (Body Mass Index), BFP, and WHCR in both groups. Blood pressure, FBG, cholesterol, LDL, HDL, and triglycerides decreased in both groups.

Practical implication: Lipid and animal protein intakes should be limited for type 2 diabetic patients. It can prevent high levels of lipid profile which is danger for them. Caromma and temma biscuits can be consumed by diabetic patients to obtain a positive blood lipid profile, but not for a improve anthropometric profile.

Keywords: Type 2 DM, caromma biscuit, temma biscuit, anthropometry profile, lipid profile

Introduction

Obesity, smoking, a lack of fruit and vegetable consumption, the consumption of too much sweet food, and a lack of physical activity, such as exercise, are the risk factors of Diabetes Mellitus (DM) (Basic Health Research, 2018). DM is often asymptomatic; thus, for a long time, the patients may have no idea that they have DM. When DM is finally diagnosed, some patients' blood glucose level have elevated without their realization. Changes in lifestyle including eating habits and physical activity are preventive measures for type 2 DM. This type of DM occurs mostly in developing countries in patients aged over 45 years without insulin dependency (Samuel D, 2006).

The appropriate diet of a DM patient includes the regulation of calories, carbohydrates, fat, and protein contained in the seven groups of food classification. One way to regulate food or diet is by choosing the amount and type of appropriate carbohydrates using the concept of the Glycemic Index (GI). Foods containing high GI increase blood glucose level quickly after the food has been

consumed. Foods high in gluten, such as flour, need to be avoided by diabetics because they can increase blood glucose level. Foods high in gluten can hinder metabolism in the form of nutritional absorption disorder in patients with type 1 and 2 diabetes, which leads to malnutrition in patients with DM (Sinta, 2013).

Various complications to other parts of the body, starting from blood vessels (atherosclerosis) to the heart (Coronary Artery Disease/CAD) can be initiated by DM. This is caused by hyperlipidemia in DM patients. Studies performed on type 2 DM patients in India proved triacylglycerol (TAG), VLDL, and cholesterol/HDL increased significantly (Jain H et al. 2016). The common nutritional status profile found in type 2 DM patients includes over-nutrition to obesity, WHCR over the cut-off point 0.8 for women and 0.9 for men, high body fat percentage (BFP), and hypertension. Most common characteristics found in type 2 DM include dyslipidemia, obesity, and hypertension. Dyslipidemia, commonly found in DM is insulin deficiency and resistance, which affects enzymes and the lipid metabolism pathway (Hirano, 2018). Dyslipidemia in type 2 DM patients is characterized by increased triglycerides, decreased HDL, and increased LDL (Chang YC et al. 2013).

Body fat percentage (BFP) and body mass index (BMI) have a significant correlation in DM patients. The majority of DM patients experience lipid disorder, i.e., dyslipidemia which is characterized by increased triglycerides, decreased HDL, and increased LDL. This abnormality can lead to CAD write out first time which aggravates the health status of DM patients (Kelley D.E., 2003). Management of type 2 DM consists of pharmacological and non-pharmacological therapy to maintain the blood glucose level at a normal value. One of the non-pharmacological efforts is the consumption of food with low glycemic index (GI) to manage normal BGL. Functional food consumption may improve this condition.

A pilot study regarding the effect of the caromma biscuit on BGL changes in 141 diabetics patients. The study showed an increase of BGL at postprandial two hours after consuming the biscuit (6.4 points) was the lowest in the intervention group (caromma biscuit) compared to control group (temma, mocaf tempe kurma, and dates biscuits) (Fatmah, 2017). However, the effect on the changes of the anthropometry profile and the lipid profile in DM patients has not yet been studied. This study aimed to assess the impact of caromma biscuit consumption on anthropometry profile (BMI, WHCR, BFP) and blood lipid profile (total cholesterol, LDL, HDL, and TAG).

Materials and Methods

Population and subject

The study used a quasi-experimental design on 66 type 2 DM patients in Depok City. Ethical clearance was obtained from the Research Ethics Committee of Health Research and Development Board of the Indonesian Ministry of Health. The research design was a single-blind randomized treatment-control experimental trial with 66 subjects. From the chosen DM patients, randomization was conducted to divide the subjects into two groups. The researcher knew the type of biscuit given to the intervention and the control group (Sastroasmoro and Sofyan Ismail, 2014).

Subjects were chosen when they met the inclusion criteria as follows: male or female; aged between 35-75 years; had DM for at least 12 months; currently consuming oral diabetic medication; currently

not drinking herbal medicine such as sour soup leaves, god's crown leaves, rosella tea, and other food that might decrease blood glucose; not currently suffering with a chronic disease such as cancer, CAD, stroke; diagnosed with type 2 diabetes mellitus by a doctor (based on fasting blood glucose level examination with the result of > 200 mg/dl and 2 hours after eating if > 126 mg/dl) (ADA, 2010); and have symptoms of DM, i.e. polyphagia, polydipsia, and polyuria, and rapid weight loss. A power analysis showed that 30 subjects were needed in this study to observe a difference in means of at least between the two groups. There was a total of 70 subjects for the treatment group and the control group after adding 5 subjects for each group.

Data collection and analysis

Sixty-four subjects divided evenly between two groups participated in this study. The treatment group was given a caromma biscuit, and the control group was given a temma biscuit, one package per day for four weeks. The compliance level of biscuit consumption was determined by a home visit every two days to record daily food consumption and the amount of biscuit distributed. In addition, the anthropometry profiles (BMI, FBG, blood pressure, BFP, waist-hip circumference ratio) and lipid profile (cholesterol, LDL, HDL, and triglycerides) were measured before and after the study. Baseline data was collected at the start of the study which included the characteristics of the subjects, history of DM, the health status of the subjects two weeks before the interview, and one-day food recall. Their body weight was analyzed using the 2007 World Health Organization standard with WHO Anthroplus software version 02, 2009 according to body weight/age indicator. Univariate data analysis was performed using SPSS program version 13.

Results

At the beginning of the study, there were 70 subjects evenly divided between two groups (each consisting of 35 people). However, 6 subjects dropped out, either through their own resignation or being asked to leave by the author. The reasons for leaving were: the subject felt bored and decided not to continue with the study (2 subjects), they went home without the assurance of returning (1 subject), they were admitted to the hospital for a few days (1 subject). Thus, biscuit consumption was stopped, or they complained of frequent urinating after biscuit consumption (2 subjects). The majority were females less than 60 years of age. The mean subject age was considered homogenous between the two groups from 50 years to 60 years. Subjects in the intervention and control group had mostly finished their education at a low level (nine years of education). More than three-quarters of the total subjects in both groups were unemployed (Table 1).

An anthropometry profile and lipid profile at pre and post-study is presented in Table 2. Anthropometry profile indicators including waist circumference, WHCR; and lipid profile represented by systolic blood pressure, cholesterol, LDL, HDL, and triglycerides had significant differences for both groups before and after the study. Only body fat percentage had significant difference at pre-post study between the groups.

Table 3 showed mean macro and micro-nutritional intake before and after the intervention. Each group had significant difference in fat, carbohydrate, and vitamin E intakes from before to after the study. Both groups had significance differences in protein intake at pre-post study with intervention group was a little bit higher than control group. Table 4 showed the macro-micronutrients contained

in both types of biscuit. The caromma biscuit had lower energy, fat, Fe, Zn than the temma biscuit. The fiber content in caromma biscuit was slightly higher, but the cholesterol content was slightly higher compared to the temma biscuit.

Discussion

Most subjects in both groups were overweight and obese due to their high body fat level, especially in the abdomen, leading to insulin effect resistance. This was supported by the majority of subjects having a WHCR higher than the cut off points mean defining obesity (WHO, 2008). Commonly, type 2 DM patients experienced dyslipidemia in the form of lipid metabolism disorder, i.e., increased total cholesterol level, triglycerides, LDL, and decreased HDL (Gordon et al, 2010). Decreased FBG level, cholesterol, LDL, and triglycerides in the intervention group of this study was consistent with a study of type 2 diabetes patients in India (Agrawal et al, 2012). However, no significant changes were found in the anthropometry profile of BMI and WHCR. Glycemic control was positively correlated with the blood triglyceride level. Excess glucose in the blood is stored in the form of fat, especially triglycerides during the advanced phase of the pathogenesis process of type 2 DM. Glucose was transformed into triglycerides, leading to an increased triglycerides level, which causes a lower HDL level and an increased cholesterol level in the blood (Parhofer KG, 2015).

Caromma biscuit can decrease FBG of diabetes patients by the high fiber content in mocaf flour (Tempo, 2014). This was in accordance with a pilot study, which found an increase of blood glucose post-prandial two hours after consuming the caromma biscuit in type 2 diabetics with the lowest point of 6.4 amongst the other kind of biscuits (Fatmah, 2017). The caromma biscuit had low GI value (< 55) according to the American Diabetes Association (ADA, 2014; Healthy Magazine, 2011; Food & Nutrition Center Laboratory of Gajah Mada University, 2015). It can decrease cholesterol absorption, dilute toxins, and increase short-chain fatty acid production. The high fiber content in mocaf flour as the main ingredient of caromma biscuit is assumed to help decrease cholesterol (Sinta, 2013). This was in line with the study conducted on type 2 DM patients. Cholesterol and LDL significantly decreased in type 2 DM patients after applying a low glycemic index diet (Majchrzak LC et al, 2014; Jarvi AE et al., 1999; Wolever TM et al, 1992; Fahime Z et al, 2016). Date jam has been proven not to increase the blood glucose level of diabetics because it contains low GI (Munadi and Dedi A, 2002).

Caromma and temma biscuits had low glycemic index. A low glycemic index diet in type 2 diabetic patients can decrease weight, BMI, and hip circumference (Lopez SV and Sandra NMK, 2009; Duygu S et al, 2018; Fatemeh S et al, 2019). Dates contained several phytochemicals such as carotenoid, polyphenol (phenolic acid), isoflavone, lignin, flavonoid, tannin, and sterol and fiber that can inhibit the absorption of LDL cholesterol. A study on date diet in rats with 1.5%, 2.5%, and 5.2% content can decrease triglycerides, cholesterol. Another study conducted on a healthy population with dates consumption found no increase of FBG, with triglycerides decreased by 15% (Mohan J, no year). Limited subject size and duration of intervention may not prove a significant correlation between the effect of caromma biscuit consumption and changes in anthropometry profile such as BMI and WHCR. Further studies are needed to prove both of the above with a larger number of subjects and a different intervention duration. In conclusion, the consumption of caromma and temma biscuits has potency affecting blood lipid profile positively (decrease cholesterol, LDL, and triglycerides).

Acknowledgement

References

Agrawal et al. (2010). "Effect of oyster mushroom on glycemia, lipid profile and quality of life in type 2 diabetic patients". Australian Journal of Medical Herbalism, Vol 22 No 2, pp. 50-54.

American Diabetes Association. (2011). "Standards of medical care in diabetes-2011". Diabetes Care 2011, Vol 34 (Supplement 1), pp. S11-S61.

Chang YC, Wen-Chuan Wu. (2013). "Dyslipidemia and diabetic retinopathy". The Review of Diabetic Studies, Vol 10 No. 2-3, pp. 121-132.

Duygu S, Mendane S, Nurhan S. (2018). "The effect of consumption of low glycemic index, high fat content bread on anthropometric measurement and cardiometabolic risk factors in women with type 2 diabetes mellitus". International Journal of Diabetes in Developing Countries, Vol 39 No 1, pp. 166-172.

Fahime Z, Hadis AS, Omid T, Shima A et al. (2016). "A review of the relationship between dietary glycemic index and glycemic load and type 2 diabetes". Journal of Nutrition and Food Security, Vol 1 No. 1, pp.: 73-79.

Fatemeh S, Saedeh S., Ali K, Masoumeh A. (2019). "Effect of natural honey on glycemic control and anthropometric measures of patients with type 2 diabetes: a randomized controlled crossover trial". Int J Prev Med , Vol 10, No. 3, pp: no page.

Fatmah. (2017). "Effect of modified cassava flour lentil date biscuit on the blood glucose level of diabetics". Pakistan Journal of Nutrition, Vol 16 No. 1, pp.16-21.

Food and Nutrition Laboratory of Gajah Mada University. (32015). Glychemic index of Temma, Caromma, and Bisma Biscuits. Yogyakarta.

Gordon L., Dalip R., Errol YAM, Eric CK, et al. (2010). Lipid Profile of Type 2 Diabetic and hypertensive patients in the Jamaican Population, Vol 2, No.1, pp. 25-30.

Healthy Magazine. (2011). Indeks glikemik: arti dan manfaatnya. http://www.majalahkesehatan.com/indeks-glikemik-arti-dan-manfaatnya. Diakses tanggal 5 Januari 2014.

Hirano T. (2018). "Pathophysiology of diabetic dyslipidemia". J Atheroscler Thromb, Vol 25, pp. 771-782.

Jain HR, Shetty V, Singh GS, Shetty S. (2016). "A study of lipid profile in diabetes mellitus". International Journal of Scientific Study, Vol 4 No 9, pp.56-61.

Jain SM. (2015). "Health benefits of date palm: phytochemicals and their functions", paper presented at 3rd International Conference and Exhibition on Pharmacognosy, Phytochemistry & Natural Products, October 26-28 2015, India, available at https://www.longdom.org/proceedings/health-benefits-of-date-palm-phytochemicals-and-their-functions-30053.html

Jarvi AE, Karlstrom BE, Granfeldt YE, Bjorck IE et al. (1999). "Improved glycemic control and lipid profile and normalized fibrinolytic activity on a low-glycemic index diet in type 2 diabetic patients". Diabetes Care, Vol 22 No. 1, pp. 8-10.

Kelley DE. (2003). "Sugars and starch in the nutritional management of diabetes mellitus". Am J Clin Nutr, Vol 78 No 4, pp. 858S-864S.

Lopez SV, Sandra NMK. "Use of the glycemic index for weight loss and glycemic control: a review of recent evidence". Current Diabetes Report, Vol 9 No 5, pp. 379-399.

Ministry of Health. (2018). Basic Health Research 2018. MOH, Jakarta.

Centre of University Gajah Mada Laboratory. (2015). Analyst test of modified cassava flour lentil dates biscuit. Gajah Mada University, Yogyakarta.

Parhofer KG. (2015). "Interaction between glucose and lipid metabolism: more than diabetic dyslipidemia". Diabetes Metb J, Vol 39, pp. 353-362.

Majchrzak LC, Teresa G, Marta K, Krystyna C et al. (2014). "The use of low-carbohydrate diet in type 2 diabetes- benefits and risks". Annals of Agricultural and Environmental Medicine, Vol 21 No 2, pp. 320-236.

Munadi and Dedi A. (2008). "Blood glucose change of controlled type 2 diabetic at post dates consumption". Nusantara Medical Magazine, Vol 41 No 1, pp. 29-35.

Samuel- Jack. (2006). "Primary prevention of type-2 diabetes in developing countries". Journal of the National Medical Association, Vol 98 No 3, pp.415-419.

Sastroasmoro S., Sofyan I. (2014). Dasar-Dasar Metodologi Penelitian Klinis 5th edition. Sagung Seto, Jakarta.

Sinta. (2013). Modified cassava flour as wheat flour replacer, available at: http://www. http://shintaluki.blogspot.com/2013/11/mocaf-sebagai-pengganti-terigu.html, accessed 10 January 2014.

Tempo. (2014). "Obat diabetes dari tepung kacang koro pedang", available at http://www.tempo.co/read/news/2011/12/08/095370608/Obat-Diabetes-dari-Tepung-Kacang-Koro, accessed 5 January 2014.

Wolever TM, Jenkins DJ, Vuksan V, Jenkins AL et al. (1992). "Beneficial effect of low-glycemic index diet in overweight NIDDM subjects". Diabetes Care, Vol 15 No 4, pp. 562-4.

WHO. (2008). Waist-circumference and waist-hip ratio: report of a WHO expert consultation, Geneva, 8-11 December 2008. www.who.int.

Appendix

Table 1   Socio-demography characteristic of the subjects

Variable	Type of biscuit			
	Group 1:caromma (n=33)		Group 2: emma (n=31)	
	n	%	n	%
Sex:				
Male	6	18.2	3	9
Female	27	81.8	28	90.3
Age :				
< 60 y.o	19	57.6	20	64.5
>= 60 y.o.	14	42.4	11	35.5
Mean + SD	57.4 + 9.9		53.4 + 8.7	
Last education level:				
Low (did not graduate from elementary – junior high school)	20	60.6	21	67.7
Middle (graduated from senior high school – academy/university)	13	39.4	10	32.3
Working status now:				
Does not work	26	78.8	27	87.1
Works	7	21.2	4	22.9

Table 2. Anthropometry and lipid profiles of subjects at pre-post study

	Group	Pre-study			Post-study			p*
		n	Mean	SD	N	Mean	SD	
Weight	Caromma	33	58.60	12.67	33	58.84	12.55	0.002
	Temma	31	61.18	9.33	31	61.37	9.60	0.057
	P		0.359			0.371		
BMI	Caromma	33	24.47	5.62	33	24.56	5.55	0.008
	Temma	31	26.68	3.82	31	26.75	3.92	0.072
	P		0.073			0.075		
Body fat percentage	Caromma	33	32.18	6.83	33	32.68	7.22	0.400
	Temma	31	35.96	5.34	31	35.90	5.15	0.907
	P		0.017			0.046		
Waist circumference	Caromma	33	80.16	13.73	33	83.09	13.43	0.000
	Temma	31	84.04	9.52	31	87.51	8.51	0.000
	P		0.197			0.123		
Hip circumference	Caromma	33	93.92	11.68	33	95.36	11.96	0.046
	Temma	31	97.63	9.84	31	98.31	7.88	0.504
	P		0.176			0.253		

		n	Mean	DS	n	Mean	DS	p*
Waist/hip circumference	Caromma	33	0.85	0.67	33	0.86	0.65	0.015
	Temma	31	0.86	0.66	31	0.88	0.40	0.006
	P		0.494			0.147		
Sistolic blood pressure	Caromma	33	121.52	16.23	33	115.76	18.71	0.029
	Temma	31	128.39	16.55	31	117.42	19.66	0.001
	P		0.099			0.730		
Diastolic blood pressure	Caromma	33	87.88	9.60	33	85.76	7.92	0.182
	Temma	31	88.71	9.91	31	87.10	7.83	0.378
	P		0.735			0.499		
Fasting blood glucose	Caromma	33	167.06	82.80	33	154.85	95.10	0.150
	Temma	31	173.19	92.72	31	150.06	73.64	0.095
	P		0.781			0.824		
Cholesterol	Caromma	33	239.73	35.30	33	195.70	34.13	0.000
	Temma	31	264.42	75.10	31	204.68	37.11	0.000
	P		0.072			0.317		
LDL	Caromma	33	145.18	29.89	33	122.24	29.00	0.000
	Temma	31	154.97	53.59	31	125.45	30.56	0.001
	P		0.114			0.668		
HDL	Caromma	33	61.00	17.76	33	51.12	15.40	0.000
	Temma	31	59.68	13.28	31	49.48	11.52	0.000
	p		0.738			0.633		
Trigliserida(sp)	Caromma	33	175.09	112.64	33	123.67	73.69	0.000
	Temma	31	226.00	172.56	31	152.48	99.88	0.007
	p		0.423			0.192		

p: uji t independen, p* uji t dependent

Table 3   Macro-micronutrient intakes changes of subjects at pre-post study

Type of nutrient	Group	Pre-study			Post-study			p*
		n	Mean	DS	n	Mean	DS	
Energy (kkal)	Caromma	33	1124.82	422.22	33	1237.85	358.28	0.161
	Temma	31	988.86	266.12	31	1107.77	234.87	0.038
	p		0.131			0.093		
Protein (gr)	Caromma	33	38.13	18.38	33	42.81	8.95	0.130
	Temma	31	35.28	15,14	31	38.10	8.04	0.320
	p		0.502			0.031		
Fat (gr)	Caromma	33	34.81	19.93	33	46.25	11.37	0.001
	Temma	31	34.87	15.33	31	46.06	11.91	0.001
	p		0.990			0.948		
Carbohydrate (gr)	Caromma	33	154.24	69.05	33	190.51	41.07	0.003

		n	Mean	DS	n	Mean	DS	p
	Temma	31	129.54	59.84	31	172.75	33.29	0.001
	p		0.132			0.063		
Fiber (gr)	Caromma	33	6.31	3.22	33	8.14	3.05	0.004
	Temma	31	6.61	3.53	31	7.99	2.57	0.060
	p		0.720			0.833		
Cholesterol (gr)	Caromma	33	156.94	156.36	33	143.30	66.89	0.604
	Temma	31	81.73	86.20	31	128.20	72.24	0.015
	p		0.021			0.389		
Vitamin A (µg)	Caromma	33	343.72	456.29	33	455.83	295.10	0.269
	Temma	31	227.85	220.88	31	454.24	313.85	0.000
	p		0.205			0.983		
Vitamin E (mg)	Caromma	33	1.44	3.37	33	0.11	0.16	0.026
	Temma	31	1.23	2.50	31	0.15	0.19	0.018
	p		0.778			0.425		
Vitamin C (mg)	Caromma	33	38.37	57.58	33	38.36	30.43	0.821
	Temma	31	32.63	32.29	31	41.83	33.43	0.220
	p		0.628			0.666		
Natrium (mg)	Caromma	33	457.00	614.56	33	474.61	214.91	0.781
	Temma	31	587.78	719.53	31	415.34	224.57	0.217
	p		0.436			0.285		
Calcium (mg)	Caromma	33	214.85	228.46	33	237.48	244.48	0.400
	Temma	31	232.04	227.80	31	197.07	150.55	0.208
	p		0.764			0.432		
Iron (mg)	Caromma	33	5.25	3.58	33	7.72	4.14	0.000
	Temma	31	8.26	7.25	31	7.55	4.60	0.613
	p		0.038			0.876		
Zinc (mg)	Caromma	33	4.25	2.49	33	4.38	0.97	0.024
	Temma	31	4.82	2.71	31	4.78	0.95	0.931
	p		0.379			0.104		

p:independent t-test, p*: dependent t-test

DS : Deviation standard

Table 4   Nutrient contents of 100 gram biscuit

Type of biscuit	Energy (kkal)	Carbohydrate (gr)	Protein (gr)	Fat (gr)	Natrium (mg)	Iron (mg)	Zinc (mg)	Vit. A (IU)	Fiber (gr)	Cholesterol (mg)
Caromma	486	67.6	9.62	21,9	455	1.4	0.96	168	3.23	79.1
Temma	490	61.8	9.62	22,7	267	1.9	1.9	139	2.93	62.4

Source: BBIA Laboratory 2016

Migration, Human Rights, and Public Health in Sri Lanka and Nepal

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Introduction

The experiences of migrants have consequences for human rights and public health. Not only do migrants face hazards when traveling to a foreign destination, but they commonly lack protections once they arrive. Overseas migrant workers need medical care, yet frequently are unaware of or lack access to state sponsored health care resources in the host country. Migrants who become ill rarely have health coverage in their host country and may be reticent to seek care for fear of deportation and/or an inability to communicate well in a foreign language. Furthermore, issues of harassment are common, especially for female domestic workers, who may be subject to physical abuse, psychological abuse, and/or sexual exploitation. However, migrants' precarious status makes seeking protection from police a frightening prospect, so they often must decide between fleeing the situation or continuing to endure the abuse.

Migratory behavior has diversified over the years, from predominantly permanent relocation to a new country to short-term, long-term, circular, and/or internal migration, commonly from rural to more developed urban areas. Some migrants arrive at their destination with legal status because they have visas or and 'green cards'. Others cross borders irregularly and may ask for asylum once they arrive. Some are refugees who, fleeing violent situations, are placed in camps and supported by international organizations. Many migrants are simply seeking a way to support their family by sending money home.

This paper examines how individuals' and their home country's desire for remittances – money sent home to pay for goods and services – pushes people to migrate. We focus on migration from Sri Lanka and from Nepal as case studies. We argue that unless care is taken, the desire for remittances from migrants and from their governments can lead to health risks and human rights violations. Especially since this type of migration is mostly temporary, policies and norms in destination countries do not always safeguard the rights of these migrants. With increased restrictions to migration, fear of seeking assistance or reaching out can exist. We further discuss what the governments of Nepal and Sri Lanka have done to reduce the human rights violations of migrants seeking work abroad and suggest further actions that could be taken to ameliorate some of the problems that arise from seeking remittances to support one's family at home.

Push Factors for Migration

Unemployment, under-employment, violence, global warming, and the desire for remittances are a few of the many factors that are leading to an increase in migratory behavior. In addition, migration is driven by high rates of inflation in lower and middle income countries (LMIC). It is predicted that with increase in global warming, people will continue to be pushed out of their home country due to drought and natural disasters. The popular media depicting the lives of the middle and upper class in the core industrialized nations further serve as commercials drawing migrants to more developed countries with unrealistic expectations. Furthermore, today's development in transportation, infrastructure and technology have helped facilitate this rise in migration with quicker electronic and physical access to these foreign countries.

The need for an income to support family members push people to migrate abroad. When there are few work opportunities at home, migrants are much more likely to seek work and earn money abroad, which they can send home for family support as remittances. Generally, migrants are able to send money to support their families' day-to-day costs, but they do not commonly earn enough money to send home for investments or to build up wealth. Simply, this desire to send such funds to their family at home propels most of the 200 million migrant workers to leave home. Not only do families at home live off the funds sent from abroad, but LMIC governments depend on this money as an important source of their foreign exchange and development.

Vulnerability of Migrants

The recent increase in migration has been accompanied by increasing hostility towards migrants. Xenophobia or dislike of "others" arises from a number of fears. One common fear is that migrants are willing to work jobs for less than the minimum wage, possibly "taking" those jobs away from citizens. However, these low paying jobs the migrants are working, such as farm laborers or care givers, are commonly jobs that the host population does not want. Other fears are similarly unfounded, such as fears that migrants are heavily involved in crime or are agents of disease, threatening the health of citizens in the host country. In actuality people who migrate tend to be young and healthy. (McDonald, J, 2004) This xenophobia and hostility towards migrants threatens their lives and well-being. For example, migrants risking their lives traveling by sea to Europe in unseaworthy crafts are frequently being turned back to sea.

Although migrants are not welcomed by the core developed countries, migration to these countries will not stop. Currently 3-4 percent of the world's population is a migrant, and international migration has increased from 173 million people in 2010 to 244 million in 2017 (Lancet, 2018). Part of the reason for the increase is lack of employment at home. There is great competition for entry-level jobs in LMIC countries. Most workers are not prepared for employment that is considered middle income in their host country because LMIC offer little or no training for technical skills required for these higher level occupations. Those few who do manage to get a higher-level education are likely to migrate abroad to seek work opportunities with higher salaries that they see as comparable with their education, contributing to the brain drain from LMIC.

Migrant workers have contributed to the development of their home country and also that of the destination country. They take jobs that nationals typically do not want to do and have filled a potential void that could have otherwise existed in the labor market (OECD/ILO, 2018). Despite their

role, they are a highly vulnerable demographic due to labor exploitation, abuse, and lack of access to basic services. As many of the workers come from rural populations, the decreased literacy rate and lower awareness of possible resources or protections leads to even more vulnerability within this population.

Another concern is the legal status of the migrant worker in the country where they have sought employment. Depending on the country, they may have different legal protections, services, and restrictions. For example, in many Gulf countries, a system known as the Kafala sponsorship system ties the employee solely to a single employer, which limits the workers' freedom to a huge extent because any form of mobility or freedom for the individual is in the hands of their employer. Previous cases have reported that being under the Kafala system makes it difficult to change jobs, get required vacation days, or quit and leave the country. Furthermore, as mentioned previously, a majority of migrant workers come from low socioeconomic backgrounds and so the cost of potentially losing their jobs is much higher than for those who are educated or skilled enough to return home to equally paying employment (Malaeb, H.N., 2015). Adding to this, there is a social pressure for migrants to send regular sums of money back home due to the idealized depiction of lives in foreign countries. These factors make migrants more likely to endure poor working conditions and end up in situations where they are clearly being exploited or overworked.

Women migrants (especially from LMICs) are a demographic particularly at risk in the process of migration. Due to gender discrimination, they mainly find jobs in the informal sector that involve domestic and household work (Koser, 2016). The gender inequality and restrictive norms in the destination countries, while being a minority in the community, makes women especially vulnerable. Domestic work in households cannot be monitored extensively which have led to cases of sexual exploitation, harassment and limited access to basic services such as healthcare. Adding to that, domestic work is also not always recognized by the national labour laws which highly restricts protection of their rights by the state.

Additionally, most of the migrating demographic do not speak or understand the local language of the destination country (Sargeant, M., & Tucker,E., 2009). The inability to communicate concerns and opinions effectively or understand important instructions and information can highly affect their experiences in these countries. Having a basic grasp of the local language or assistance in communicating is integral to access health services, assistance, or speaking out against malpractice.

The Case Studies: Sri Lanka

The size of the Sri Lankan population is about 21 million, of which about 1.8 million are expatriate workers. Slightly less than half of these expatriate workers are female. In 2010, these workers earned over ten billion US Dollars. Tourism, tea export, apparel/textile, and rice/agriculture industries are the most important economic sectors of the economy. Remittances officially account for 10% of foreign exchange. However, additional funds are brought into the country through unofficial channels, meaning remittances make up an even greater percentage of foreign exchange than is officially reported by Sri Lanka. In fact, the foreign employment sector is the largest foreign exchange earner in the country. (Minister of Sri Lankan Bureau of Foreign Employment (SLBFE) (ref Daily Mirror, 2017) Tourism is the 3rd largest foreign exchange earner after the apparel industry, providing about a million jobs a year and about 2.5 million visitors per year. There has been substantial growth in

tourism since the civil war ended ten years ago. Sri Lanka's civil war curtailed foreign investment and made a heavy reliance on overseas assistance in the form of overseas development assistance (ODA). As ODA has fallen, the relative importance of private remittances has increased.

The lack of development & economic opportunities domestically has been the root cause of large-scale migration from Sri Lanka, which is largely to the Gulf states. Sri Lanka's early success in literacy and education created a cohort of professional & middle class migrants who were able to take advantage of the opportunities to migrate as part of the pre-1983 migration flows to developing countries in the West & Middle East. During the civil war, Sri Lanka continued to grow economically, but unemployment remained high, wages relatively low, and many key markets underdeveloped or were disrupted, leaving economic growth at a sub-optimal level. With such high unemployment migration becomes an even more attractive option. Most of the current Sri Lankan migrants are from the poorer, less educated segments of the population. Unless the domestic labor market is prepared to provide similar employment with similar economic benefits, people will continue to migrate for employment in other countries.

The minister of the Sri Lanka Bureau of Foreign Employment (SLBFE), states they are working to promote foreign employment of professionals and skilled workers. In addition, he reports that the great majority of migrants have raised their standard of living thus enhancing their lives.

However, at a SLBFE press conference a number of problems that migrants encountered when abroad were discussed, including

1. Social reintegration of the worker when she/he returns to Sri Lanka.

2. Disappearance of migrants in the host country

3. Host removal of passport and other papers needed for migrant to return home

4. Inability to access health care in host country and inability get medical insurance.

5. Legal barriers: requirement for exit visa must be cleared by respective employer. Employer must give consent for the employee to return home. In addition, the migrant may need clearance by host Ministry of Labor or the police

6. Women have reported sexual abuse and harassment

7. Migrants feel isolated and many are not allowed to go out of the home in which they are working without the owner's permission.

8. Many migrants don't feel protected by SLBFE

The Sri Lankan government has responded to the problems of their migrants in a variety of ways, including the establishment of government sponsored safe houses where migrants can stay until they can safely return home. If a Sri Lankan migrant wishes to return to Sri Lanka they must inform the Sri Lankan embassy, which can help them make the necessary arrangements. The government reports that they have been developing a mechanism to ensure the safe and dignified return and reintegration of migrant workers including the development of a social security scheme for migrant returnees.

Because social reintegration has been found to be particularly a problem for low skilled workers, a sub policy has been drafted to reintegrate low skilled workers back into their community.

The human rights of children are also at risk, in part due to the risk for remittances. The government is also concerned about the family members of migrant workers, with a special focus on their children and have established is a program of skills development and career counseling for migrant workers' children. Protection of children younger than 5 who are particularly at risk is established by safeguarding the family unit through restricting their mothers from migrating. Women migrating to work as domestic aids or care-givers must fill out a form which is forwarded to the Divisional secretary to evaluate. Another policy focused on fathers was instituted also to protect young children. Migrating men must provide a confirmation statement on family welfare. Fathers of children under age 5 must provide a statement ascertaining the safety and welfare of his children. Included in the statement is declaration of who will be caring for his children and how their welfare needs will be supported.

It is not uncommon for agencies that recruit people to work abroad to take financial advantage of their recruits. The government is trying to exercise some control over those working overseas and the agencies recruiting them. Currently regulations state that whomever migrates for work in a foreign country must register with SLBFE, including those with employment skills. Recruitment agencies are also required to register with SLBFE. Before migrating, a migrant must register every related document with SLBFE, including the employment contract. This puts Sri Lankan authorities in a stronger position to protect the worker. The Minister of the SLBFE claims only 2-3% of the foreign workforce experience trouble abroad, and says that most encounter trouble because they did not participate in this government registration process before leaving Sri Lanka. Unfortunately, many migrants end up unregistered because they were recruited by unregistered agencies, which not only lack any government oversight but also charge excessive fees.

Nepal

In Nepal, remittance inflow was first observed when Nepalese youth were recruited for the British Indian Army during World War I. As they were deployed to different foreign countries, they sent the money received for their service back to Nepal to support their families. With the rise of globalization in the 1980s, a large number of the Nepalese population began leaving Nepal to find jobs in the Southeast and Fareast Asia (Seddon, 2005). This emigration rose further with movement towards the Gulf countries after democracy was restored in Nepal in 1990 and the process of obtaining a passport was made easier for everyone. In 2011, the percentage of the population who were migrants increased to 7.4 % (Shrestha, 2017). With this high level of migration, remittances now make up a key portion of the country's economy, contributing to almost 30% of Nepal's GDP (2018). The nation currently places third among countries with the highest proportion of their GDP coming from remittances (ILO).

Many Nepali households largely depend on foreign-earned income through migration for daily sustenance and household finances such as food and education (Bhandari, P., & Chaudhary, I. (2017)). The country recognizes this, and has maintained an open border with India to ease movement of people and money. They also have bilateral agreements with Gulf and other frequented destination countries. Nearly 10% of the population works abroad, with 1600 nationals leaving the country

everyday (this does not include the people working irregularly) (OCHR,2018). A large percentage of migrant workers from Nepal come from low socio-economic backgrounds and do not have adequate access to education or other opportunities to attain higher-paying jobs within the country. Their need to support their family, and the lack of higher-paying job opportunities in Nepal, and news about better-paying opportunities abroad push them to pursue migration. Most Nepali migrant workers have semi-skilled or low-skilled jobs, such as construction, manufacturing, or domestic labor. Local recruitment agencies arrange and connect potential workers with such jobs but individuals can pay up to $1300 in recruitment fees, paper work, and medical requirements. Migrants may also seek personal loans from local moneylenders or relatives to cover these fees, as they believe that their jobs will eventually earn them more abroad than if they remain in Nepal. Several workers have found, however, upon arrival in their host country that their promised jobs are not there, leaving many unable to payback their loans on time and in a 'debt-trap'.

Official statistics show that majority of migrant workers from Nepal are male and that this percentage is rising in time. However, formally gathered data may be ignorant of the actual number of female workers travelling abroad for work. Nepal recently stopped allowing women from travelling to Gulf countries as domestic workers after reports about abuse and sexual exploitation were covered by the media. While it may have stopped the number of women travelling on paper, reports have stated that migration through irregular channels have risen consequently. This type of migration heightens the vulnerabilities of each individual with increased risk of trafficking, scamming, and abuse. (Pyakurel, Uddhab Pd. ,2018). The travel ban on women who plan to work as domestic workers has pushed them to use informal channels through brokers and agencies. This has placed additional financial burden, such as high broker fees, and greater risk for exploitation and mistreatment. Furthermore, many women are prevented from visiting their family in Nepal for years, due to fear of being unable to return to their jobs in their host country.

This calls for the need to prioritize migration issues as a concern for the nation. With the economy's large dependence on remittances, the government must take steps to assure that migrant workers have the correct skill set, knowledge, and training to make their experience safe, secure, and successful whilst travelling to, living in, and returning from the destination country. Furthermore, domestic development within the country is fundamental to improve labor conditions at home and ensure security to its citizens. With better investment in agriculture, tourism, and other industries, it is possible that country's major dependence on remittance will decrease in time, making the economy more sustainable and giving the Nepali people the choice of whether or not to work abroad.

Similar to Sri Lanka, the Nepal government has attempted to reduce the exploitation of Nepalese migrant workers. In 2015, 'Free Visa, Free Ticket' was introduced which reduces the maximum fee workers can be charged to NPR 10,000 ($96) in response to local and international pressure. Due to lack of implementation, however, numerous brokers and agencies still charge migrants much more than the official fee. For a short time, workers were banned from going to Malaysia due to high visa and medical fees specifically targeting Nepalese migrants. The ban was lifted shortly after the two countries signed a labor pact so that Nepalese migrants would not have to pay any further fees; the Malaysian employer company would be responsible for the costs of airfare, visa fees, and a medical checkup. In April 2019, the Nepal government announced the establishment of a call center in Kathmandu where workers can file complaints via various means such as phone call, Viber, email, or text messages. The call center falls under the jurisdiction of the Ministry of Labour and will assist in

problems that range from queries for aspirant migrants regarding the application process to being stranded in a foreign country.

While the government has taken steps to improve migratory problems, there continues to be exploitation in the migration process and in the destination countries. Some criticize that while the Nepali government has signed labor pacts with many countries, they fail to tackle basic and concurrent issues, such as the minimum wage for Nepalese workers. With the exceptions of Malaysia and Japan, Nepalese migrant workers have a significantly lower minimum wage compared to locals. This clearly goes against the United Nations Immigration Convention-1990 and International Labour Organization's Conventions No 97 and 143 (both agreed to by Nepal), which declare that the destination countries will not discriminate against migrant workers in paying minimum wages, including remuneration, social security, and other benefits. (Poudel, 2019). Currently, some recruitment agencies continue to overcharge the migrants and/or provide irregular channels for departure. Therefore, with such recurrent issues and the country's prolonging dependence of migrant workers' remittances, task forces specific to migratory problems need to effectively work with different stakeholders to identify the foundational problems in this domain.

Resolution to the Problem of the lure of remittances

Short-term:

Educate migrants about their rights

It is imperative that each migrant is aware of their rights before leaving home and while they are working in the destination countries. All migrant workers, regardless of their nationality or their destination country, are entitled to the fundamental human rights that protect them. Without knowledge of these rights, they will recognize situations that are exploitative or depriving them of their basic human rights, such as the right to equal pay or the right to return home if the migrant wishes. Each country's varying labor laws may provide different protections to the workers; therefore, it is important that each individual, before officially leaving for the destination country, is aware of such comprisable situations they may face. This is essential for LMICs where a large number of migrant workers are from rural populations and are not exposed to culture or laws outside their country.

Ensure a way to seek help if when rights are not respected

Each destination country where migrant workers are present should have a local embassy where migrants can go when they believe their rights are not being respected or if they feel threatened. The embassies should have a desk or team that solely focuses on migration-related issues and be reachable via phone, email, text, etc. Migrant workers should be made aware of the location of this office prior to departing for the destination country. Furthermore, mandatory workshops or orientations hosted by the embassy could familiarize both the migrant workers and the embassy staff with one another.

Provide effective pre-departure training and empowerment:

Pre-departure training is essential to ensure that each migrant workers is aware the culture, the laws, their rights, the expectations, and the reality of their experience in the destination country. While many countries make the pre-departure trainings mandatory for migrant workers, their effectiveness is questionable. Involvement by agencies from destination countries, regular monitoring and updates, presence in various geographic locations (including rural areas), and feedback sessions could make these workshops more beneficial. Partnerships with local NGOs, the government, local recruitment agencies, and foreign agencies can ensure that these workshops include holistic information and advice while allowing greater monitoring. Empowerment is another component that should not be missed during these trainings. The individuals should be aware of their full rights, protection, and worth as someone offering certain set of skills to their employer.

Promote cheaper, faster, and safer transfer of remittances:

It is expensive for migrant workers to send remittances back home due to the current global fees of '7 percent of the total amount sent' (The World Bank, 2017). This affects the amount of individual remittances sent back home and may, in the long run, increase the time the individual has to work to cover the family's expenses or needs. Such fees also push the use of irregular channels to send the money at a lower interest rate. This not only harms the receiving country's economy but further leaves for opportunities of scamming and trickery. The UN SDG 10.C is pushing to "reduce to less than 3 per cent the transaction costs of migrant remittances and eliminate remittance corridors with costs higher than 5 per cent by 2030" (UN DESA, 2019). Paired with current advancements in technology that involve online/mobile transfers, there are greater possibilities of more efficient, cost-effective, yet formal channels of money transfer.

Long-term

Reduce the dependence of LDCs and MDCs on their dependence on remittance for the acululation of foreign exchange.

The only way to reduce migration and eliminate the human rights violations and health risks associated with migration is to foster investment in the economic development of the LDCs and MDCs and to reduce the pressure from over-population in these countries. This entails investment in education, job training and job development, and family planning especially for people living in poverty and/or in rural areas. Wealthier countries such as Europe and North America and the Gulf States must finance investment needed for a viable life in the more fragile regions. Emigration to support families can be made unnecessary by adopting trade, investment, and aid policies and programs that favor the LDCs and MDCs and accelerate their economic development. In addition, an agreement on ways and policies to combat climate change must be made to maintain arable land and necessary water supplies to support farming. Such development will also attract returning migrants to bring their savings, new ideas and connections to start new enterprises within their home countries. This will in turn create more employment opportunities and establish stimulating spaces for innovation and development in the country of origin.

References

Bhandari, P., & Chaudhary, I. (2017). A calendar method of collecting remittance use data in a remittance dependent setting of Nepal. Migration and development, 6(2), 177–197. doi:10.1080/21632324.2015.1129689

Galotti, M. (2015). Migrant Domestic Workers Across the World: Global and Regional Estimates. Geneva: International Labour Organization. The Lancet

Koser, K. (2016). International Migration. A Very Short Introduction. New York, NY: Oxford University Press

McDonald J, Kennedy S Insights into the healthy migrant effect: health status and health service use of immigrants to Canada. Soc. Sci. & Med. 3004-59:1613-27

Malaeb, H.N. (2015). The Kafala system and human rights: Time for a decision. Arab Law Quarterly, 29, 307-342

OHCHR | UN human rights expert to visit Nepal to assess situation of migrants working abroad. (2018). Ohchr.org. Retrieved from https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=22605&LangID=E

OECD/ILO (2018). How Immigrants Contribute to Developing Countries' Economies. ILO, Geneva/OECD Publishing, Paris, https://doi.org/10.1787/9789264288737-en.

Poudel, U. (2019, May 09). "Basic minimum wage eludes Nepali migrant workers." The Himalayan Times. Retrieved from https://thehimalayantimes.com/nepal/basic-minimum-wage-eludes-nepali-migrant-workers/

Pyakurel, Uddhab Pd. (2018). Restrictive labor migration policy on Nepalese women and consequences. Sociology and Anthropology 6(8): 650–56

Sargeant, M., & Tucker, E. (2009). "Layers of Vulnerability in Occupational Safety and Health for Migrant Workers: Case Studies from Canada and the UK." Policy and Practice in Health and Safety, 7 (2), 51-74.

Seddon. (2005, January 01). "Nepal's Dependence on Exporting Labor." migrationpolicy.org. Retrieved from https://www.migrationpolicy.org/article/nepals-dependence-exporting-labor

Shrestha, M. (2017). Push and pull: A study of international migration from Nepal. Policy Research Working Paper No. 7965, The World Bank, Washington DC.