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Photograph: Temperature checks at airport (photo credit: Dr Saveen Semage, Sri Lanka Army Preventive Medical Services) and a state of isolation/restricted access as depicted by the empty streets in Colombo, Sri Lanka used as public health strategies to combat COVID-19 in Sri Lanka

Graphic Design: Upula Vishwamithra Amarasinghe
Aims and scope

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Brief Report

Social distancing and its impact on flattening the COVID-19 curve in Sri Lanka
Sumudu Avanthi Hewage, Nuwan Wickramasinghe, Surangi Jayakody, Dulani Samaranayake, Shamini Prathapan, Carukshi Arambepola

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COVID-19: the world held at gun point

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As depicted in this issue’s cover, the world is held at gun point. The world is yet to learn whether the weapon is its true ally or enemy. A microscopic virus has put all countries – big or small, to defense. So far, almost 700,000 people have tested positive and more than 30,000 have succumbed to SARS-CoV-2. It has so far crashed economies, devastated health care systems, emptied otherwise crowded places and distanced people from their loved ones. Despite invincible disruption of the societal networks, the world is fighting back. In this fight, perhaps the most reliable armor every country has is the evidence documented by the scientific community including public health specialists around the globe who wrestled with a pandemic and three major epidemics during the 21st century, namely Swine flu (2009-10), SARS (2002-03), Ebola (2014-16) and MERS (2015-present). It is due to their untiring efforts that we are able to fight back this deadly virus with evidence-based strategies.

In the absence of a vaccine or pharmaceuticals for combating the SARS-CoV-2 to date, and limited supply of intensive-care equipment especially ventilators, non-pharmaceutical interventions are likely to dominate the public health response in the current pandemic. The two fundamental strategies identified for reducing the transmission of virus are suppression and mitigation. Both strategies essentially include a combination of interventions based on centuries-old public health principles in outbreak containment.

**Suppression** aims at reducing the reproduction number (Ro) to <1 within a geographical location, and thereby arrest the virus spread and eliminate human-to-human transmission, as it was done for Ebola and SARS outbreaks. This is the strategy adopted by China, South Korea (in the latter part of their outbreak) and Sri Lanka, to reverse the epidemic curve by reducing the case numbers to low levels and maintaining the situation indefinitely. Evidence-based interventions used comprise social distancing (including closure of schools and universities), early detection and isolation of cases and quarantine of close contacts, all of which require close supervision. The major challenge in suppression is that it requires early action well before the health systems are overwhelmed with cases, and maintenance until a definitive protection becomes available, until such time the interventions would have to continue at the cost of economic and societal life disruptions. Further, with limited transmission...
for developing herd immunity in community, there is a high possibility of the infection rebounding if the interventions are loosened. With the drop in cases, interventions could be relaxed intermittently, but measures need to be re-introduced if or when the numbers rise. In the Sri Lankan context, suppression perhaps was the best option available in the backdrop of limited capacity in the curative healthcare system for COVID-19 cases.

**Mitigation** focuses on slowing and ‘flattening’ the epidemic curve, but not necessarily reversing it. The aim is to reduce Ro but not to <1, so that cases would still occur but at a reduced speed over a longer period. This strategy intends to minimize mortality, by reducing the peak healthcare demand to protect those most at risk, e.g. severe infection, elderly and those with co-morbidities. Public health interventions comprise home isolation of suspect and mild cases, home quarantine of suspect cases living in the same household and social distancing of the elderly and others at risk of severe disease, while early case detection is not given much emphasis. Consequently, this strategy may result in mild disease in the majority (80-85%) of infected cases, with spontaneous recovery and development of passive immunity, leading to overall herd immunity to prevent future outbreaks and protect the most-at-risk populations, and lesser healthcare demand by those with moderate-severe illness. However, the results should balance-off the timing of introduction, which justifies the wait until the caseload rises to a substantial level to act.

This was the preferred initial strategy in many developed countries, including United Kingdom, USA, Italy and Spain, in view of achieving herd immunity to prevent secondary outbreaks and minimal disturbances to the economy and societal life. Unfortunately, the main aim of social distancing only of the most-at-risk populations was proven to be wrong, with irresponsible behaviour of communities, such as not heeding health warnings and continuing their daily lives. Lack of public health infra-structure geared to cater to infectious disease outbreaks as well as less experience in similar outbreaks unlike in China and Singapore, and undermining the virulence of the virus resulted in shifting the epi-centre of the pandemic from China, where it was initiated, to the Europe, and then to the USA.

Sri Lanka was one of the few countries in the world, and the first in South Asia to respond proactively to the current outbreak from an early stage. Several health and non-health interventions were found to be in place long before the cumulative case load hit 50 in the country (Figure 1).

The success Sri Lanka has achieved so far in the COVID-19 outbreak could be attributed to three driving forces: 1) The availability of a strong, well-structured public health system geared to contain infectious disease outbreaks, with epidemiologists well equipped
with knowledge and experience in applying interventions in the local context; 2) Commitment of the decision makers including the President of the country, with due recognition given to the recommendations made by the public health experts; and 3) Supportive social response by the majority of population, probably resilient following past experiences of disasters faced. All these factors seem to catalyze the expected outcomes.

The experts are discussing three possible endgames for the COVID-19 pandemic: 1) Every nation manages to simultaneously bring Ro to <1, which is highly unlikely in the given extent of the spread; 2) The epidemic leaves behind enough immune survivors to create herd immunity, so that a second wave of outbreak will not occur or may occur in a manageable scale; and 3) The world suppresses the outbreak with all intensive interventions until an effective vaccine is developed. The latter seems to be the most viable option at present yet, seems long drawn.

The world will soon learn that preparedness is not just about masks, vaccines and laboratory tests, but also on addressing policies and social determinants of health at population level. It is time that attention reverts back to public health for preserving the most precious asset known to the mankind – health.

**Further reading**


COVID-19 pandemic 2019-20

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The global scenario

The 2019-20 coronavirus pandemic is an on-going global epidemic of coronavirus disease. An outbreak of pneumonia of unknown origin was first reported on 31st December 2019 from Wuhan City in Hubei Province, China. This pneumonia was diagnosed to be due to a novel coronavirus. On 30th January 2020, the World Health Organization (WHO) declared it as a Public Health Emergency of International Concern (PHEIC). On 11th February, the virus was named as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and the disease as COVID-19. On 11th March 2020, the WHO declared the outbreak as a pandemic.

As of 22nd of March 2020, 307,341 laboratory confirmed cases were reported in over 171 countries and territories, with major outbreaks occurring in Central China, Europe, Iran, South Korea and the United States. Total deaths stood at 13,049 worldwide, while the total number of recovered cases was 86,036. Most number of cases (81,393) were reported from China, of which 3,144 succumbed to the illness. Italy reported 53,578 confirmed cases with 4,825 deaths, exceeding the number of deaths reported from China. On 13th March 2020, the WHO announced that Europe had become the new epicenter of the pandemic.

Local outbreak situation

The first confirmed case of COVID-19 in Sri Lanka was reported on 27th January 2020. The patient was a Chinese national who landed in Sri Lanka as a tourist on 19th January 2020. She was treated at the National Institute of Infectious Diseases (NIID) and discharged on 19th February 2020 on complete recovery. The second confirmed case was identified on 11th March 2020, and the total number of confirmed cases as of 20th March 2020 was 70 in Sri Lanka, with three foreign nationals. As at 22nd March 2020, three cases have been completely recovered while 78 are being managed at the NIID, and 212 symptomatic probable cases are being managed in state sector hospitals in Sri Lanka.

Figure 1. COVID-19 geographical case distribution in Sri Lanka (as of 20.03.2020)
Source: Epidemiology Unit, Ministry of Health and Indigenous Medicine
Coronavirus and the mode of spread

Corona viruses constitute the subfamily Ortho-coronavirinae in the family Coronaviridae. They are enveloped viruses with a single-stranded RNA genome, and cause diseases mainly in birds and mammals. In humans, the virus causes respiratory tract infections that can be mild such as common cold or lethal such as SARS, MERS and COVID-19.

Human to human transmission of coronavirus is primarily through contacts via droplets generated by coughing and sneezing. In addition, the spread can occur when two people are in close contact with one another, i.e. within about 6 feet. The droplets can land in the mouth or nose of people who are nearby or possibly be inhaled into the lung. The virus is also thought to be transmitted via contaminated surfaces or objects. Patients are thought to be most contagious when they are most symptomatic. However, the spread is also possible during the asymptomatic or incubation period. The coronavirus is thought to be highly contagious and evidence from all over the world show a sustainable spread in the community (community spread).

Clinical profile of COVID-19 cases

Fever, dry cough, myalgia, fatigue and shortness of breath are the frequently complained symptoms among cases with COVID-19. Other less commonly reported symptoms include sore throat, headache, cough with sputum production and haemoptysis. Some patients have reported gastro-intestinal symptoms such as diarrhoea and nausea prior to the onset of respiratory symptoms. The course of fever among patients with COVID-19 is not yet fully understood; with cases reporting prolonged as well as intermittent fever.

Clinical presentation of the reported cases varies in severity from asymptomatic or mild illness to severe or fatal illness. Some reports suggest the potential for clinical deterioration during the second week of the illness. The median interval between presentation and developing dyspnoea is 8 days with a range of 5-13 days.

Majority of the cases (80%) are found to have mild symptoms with complete recovery. Of the remaining 20%, 15% are predicted to have severe disease and 5% will be critically ill. Approximately 20-30% of hospitalized COVID-19 patients have required intensive care for respiratory support, and these critically ill patients were more likely to be older and have an underlying medical condition. Among the critically ill patients admitted to intensive care units, 11-64% have received high-flow oxygen therapy while 47-71% received mechanical ventilation. Some patients (4-42%) have required advanced organ support with endotracheal intubation and mechanical ventilation. Other reported complications include cardiac injury, arrhythmia, septic shock, liver dysfunction, acute kidney injury and multi-organ failure.

Risk factors for severe illness are not yet clear, although older patients and those with chronic medical conditions are thought to be at higher risk. Case fatality rates are observed to increase with age linearly. Patients reporting no underlying medical condition had an overall case fatality of 0.9%, while the same for patients with co-morbidities was as high as 10.5% for those with cardiovascular disease, 7% for diabetes, and 6% each for chronic respiratory disease, hypertension and cancer. Case fatality for patients who developed respiratory failure, septic shock or multi organ failure was 49%.

Limited information is available about the clinical presentation, course and the risk factors for children and pregnant women. Of the confirmed patients with COVID-19 in China as of February 11th 2020, only 2.1% were aged less than 20 years, and so far, no deaths had been reported among those less than 10 years. Available limited evidence reports fever, cough, congestion and rhinorrhoea to be the commonest presenting symptoms among paediatric cases.

The case fatality risk estimates for COVID-19 differ according to the geographical location. Adjusted case fatality rates (95% confidence interval) are estimated to be 3.5% (3.3-3.6%) in China, 0.8% (0.6-0.9%) in China excluding Hubei Province, 4.2% (2.6-6.9%) in other 82 countries and 0.6 (0.2-1.6%) in cruise ship in Australia.

Investigation and management of COVID-19 cases

The Epidemiology Unit of the Ministry of Health and Indigenous Medicine, Sri Lanka introduced a case definition for clinically suspected cases and confirmed...
cases. Clinically suspected cases were defined as a) a person with acute respiratory illness (with cough, shortness of breath, sore throat) with a history of fever (at any point in time during this illness), returning to Sri Lanka from any country within the last 14 days OR b) a person with acute respiratory illness and having been in close contact (a person staying in an enclosed environment for more than 15 minutes, e.g. same household/workplace/social gathering/travelling in the same vehicle) with a confirmed or suspected COVID-19 case during the last 14 days as prior to the onset of symptoms OR c) a patient with severe acute pneumonia (critically ill and not explainable by any other aetiology) regardless of travel or contact history as decided by the treating consultant. A confirmed case is described as a person with laboratory confirmation of COVID-19, irrespective of the clinical signs and symptoms. All patients falling into the category of a suspected case of COVID-19 are to be admitted and transferred by ambulance to the closest designated state hospital for confirmatory testing and management. These instructions are to be applied in all hospitals including those in the private sector.

For initial diagnostic testing for COVID-19, upper respiratory nasopharyngeal swabs are preferred. Collection of sputum is only recommended for patients presenting with a productive cough. Induction of sputum to collect samples is not recommended. Oropharyngeal swabs are of lower priority. For those receiving invasive mechanical ventilation, a lower respiratory tract aspirate or bronchoalveolar lavage samples could be taken. Collected samples should be stored at 2-8°C for up to 72 hours after collection. Samples are tested for reverse transcription polymerase chain reaction (RT-PCR).

The most common laboratory abnormalities among the COVID-19 cases include leukopenia, leukocytosis, lymphopenia and elevated alanine aminotransferase and aspartate aminotransferase levels. Thrombocytopenia was also seen in a minority of cases. Radiographic changes of the lungs include bilateral involvement of lungs in most patients with multiple areas of consolidation and ground glass opacities.

As the majority of cases would be self-limiting mild cases, hospitalization of all cases may not be required. However, clinical signs and symptoms may worsen with progression to lower respiratory tract disease in the second week of the illness. Therefore, it has been decided to admit all patients to be monitored carefully in a hospital setting. No specific treatment for COVID-19 is currently available, although several clinical trials for drugs and vaccines are being undertaken in many developed countries. Clinical management include prompt implementation of recommended infection prevention and control measures and supportive management of complications, including advanced organ support if indicated.

It is recommended to avoid corticosteroids, and emerging evidence displays progression of the disease among patients who are treated with non-steroidal anti-inflammatory drugs.

**Prevention of infection with SARS-CoV-2**

Basic hand hygiene is the most effective preventive measure against the infection with SARS-CoV-2. Frequent hand washing with soap and running water for 20-40 seconds, avoid touching the nose, mouth and eyes and using a tissue or the inner elbow while sneezing or coughing and safe disposal of the tissue are recommended. In addition, social distancing and avoiding crowds are important to prevent getting infected with the virus. When in contact with other people, maintaining at least one-meter gap between two people and not shaking hands or hugging another person to greet should be done. Zero touch with other people and minimal touch of other surfaces and objects followed by standard hand washing practices minimize the risk of contracting the virus.

**Health sector preparedness and response to mitigate the outcomes of the outbreak in Sri Lanka**

The Ministry of Health and Indigenous Medicine, Sri Lanka had been vigilant from the very early stages of the COVID-19 outbreak in China. Together with important stakeholders like the Sri Lanka Army, Sri Lanka Police and Sri Lanka Civil Aviation Authority, the Ministry of Health established a multi-disciplinary National Action Committee to coordinate preventive and management measures to ensure that healthcare
and other services are well-geared to serve the general public of the country. As responses to the outbreak, the Ministry of Health focused on early case identification and management, isolation of cases, contact tracing, quarantining of suspected persons and risk communication and wide awareness of the general public on preventive measures.

Since the initial period of the outbreak in China, all passengers are being screened at all ports of entry into the country, as a measure of early case detection. During the initial phase of the outbreak, all passengers arriving in Sri Lanka from China were traced back and were requested to be subjected to mandatory self-quarantine for a period of two weeks. Construction sites were visited by the preventive health staff to educate the Chinese nationals and follow them up. Screening all the passengers entering the country continued in an escalating manner, until all international airports in the country were closed on 19th March 2020. The global situation of the outbreak was closely monitored to take necessary actions, and as the outbreak was exponentially growing in Italy, Iran and South-Korea, the passengers coming from those countries were subjected to a mandatory quarantine period of 14 days at state established quarantine camps. All the other passengers were informed to self-quarantine and to contact the area medical officer of health (MOH) if they develop symptoms suggestive of the coronavirus infection. The contact details of the arriving passengers were documented and distributed to the respective MOH areas for follow up.

Thirty state hospitals were identified and prepared to manage suspected and confirmed COVID-19 cases. The hospitals were provided with personal protective equipment while instructions for primary care physicians were disseminated on triaging the patients at the out-patient departments, admission of required patients, inward management including obtaining samples for investigations, continued care for test positive patient and transferring confirmed cases to the NIID. Case management guideline for confirmed cases was prepared in collaboration with the Ceylon College of Physicians and were made available for the designated treatment centres. Laboratory facilities were established to perform required virology testing to diagnose cases. Initially, only the state hospitals were permitted to perform the RT-PCR diagnostic test for suspected patients. Later, the permission to perform the test was given to private laboratories under strict regulations.

Figure 2. Primary care assessment of suspected COVID-19 patients

*Source: Epidemiology Unit, Ministry of Health and Indigenous Medicine*
The preventive health teams are given the task of tracing close contacts of all confirmed cases. District consultant community physicians, regional directors of health services, regional epidemiologists, medical officers of maternal and child health, medical officers of non-communicable diseases, public health inspectors, health education officers and many others are involved in this team effort. Traced contacts were advised on mandatory self-quarantining for 14 days period and health advices were given to contact the area MOH if they develop suggestive symptoms. In addition, the Epidemiology Unit in consultation with relevant experts prepared information such as guidance for workplace preparedness for COVID-19, instructions to flights from China and information leaflet for school children, to mitigate the effects of the infection on the society.

Electronic and printed media are being widely used to educate the general public on measures to reduce the transmission of the virus. Hand hygiene practices, cough etiquette, zero touching of persons, minimum touch of surfaces and objects, and social distancing were advised as recommended measures. In addition, relevant non-health authorities were provided with technical advises such as banning large scale public gatherings and closure of schools and universities and granting leave for non-essential work force.

Continued efforts to practice recommended preventive and mitigatory measures by the general public to prevent the community transmission of the infection and untiring efforts of the preventive and curative health sector staff will pave the pathway to control the COVID-19 outbreak effectively in Sri Lanka.

References


Preventing colorectal cancer in Sri Lanka: step forward

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Introduction

Cancers, which origin from the caecum, ascending colon, transverse colon, descending colon, sigmoid colon, recto-sigmoid junction and rectum are included as colorectal cancer and has been recognized as a major cause of mortality and morbidity throughout the world (1).

Global burden of colorectal cancer

Globally, colorectal cancer is ranked as the third most common cancer in men (age standardized rate (ASR) of 23.6/ 100,000 population) and the second in women (ASR of 12.8/ 100,000 population). As shown in Figure 1, it is the fourth common cancer among both sexes worldwide (2).

![Figure 1. Estimated age standardised incidence rates of cancer in 2018, worldwide among both sexes, all ages](https://orcid.org/0000-0001-6146-9767)
When considering mortality, globally, colorectal cancer was the second leading cause of cancer deaths in 2018 among both sexes (2).

Figure 2. Estimated age standardised mortality rates of cancer in 2018, worldwide among both sexes, all ages

Source: GLOBOCAN 2018, International Agency for Research on Cancer, WHO

Colorectal cancer in Sri Lanka

Though considered as a disease in the West, the incidence of colorectal cancer in Sri Lanka has increased markedly in recent years. The latest data (2014) indicate that colorectal cancer is ranked as the fourth common cancer among men (ASR of 6.9/100,000 population) and the fifth among women (ASR of 6.9/100,000 population) (3). The incidence of colorectal cancer has reported an alarming increase, when considering its change over the years (Figure 3).

Figure 3. Age standardised incidence rates of colorectal cancer 1985-2010

Source: Cancer incidence data 2010, National Cancer Control Programme, Ministry of Health, Sri Lanka
Colorectal cancer prevention

Despite being one of the leading causes of morbidity and mortality worldwide, colorectal cancer is a preventable disease. Several genetic, environmental and lifestyle related risk factors are identified in the pathogenesis of colorectal cancer (Table 1), while many studies have also established a number of protective factors against its development.

Table 1. Risk factors for colorectal cancer

<table>
<thead>
<tr>
<th>Modifiable risk factors</th>
<th>Non-modifiable risk factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red meat</td>
<td>Increased age</td>
</tr>
<tr>
<td>Excess alcohol</td>
<td>Male sex</td>
</tr>
<tr>
<td>Smoking</td>
<td>Family history/known genetic risk</td>
</tr>
<tr>
<td>Obesity</td>
<td>Inflammatory bowel disease</td>
</tr>
<tr>
<td>Lack of dietary fibre</td>
<td></td>
</tr>
<tr>
<td>Lack of physical activity</td>
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Identification of these risk factors and subsequent lifestyle modifications can aid in primary prevention of colorectal cancer. However, several cohort and case-control studies investigating the risk factors of colorectal cancer have shown geographical variation. With regards to Sri Lanka, though colorectal cancer is considered a disease of public health importance, there has been no evidence on its risk factors, highlighting the necessity of local evidence which could be applied as primary prevention strategies. On the other, colorectal cancer can largely be prevented by early detection and removal of adenomatous polyps, where survival becomes significantly better when it is diagnosed at an early stage, highlighting the importance of screening.

Colorectal cancer screening

Secondary prevention via screening has shown to be one of the controversial areas in digestive diseases. The potential for reducing the burden via early detection has become significant due to the slow progression of the disease from detectable precancerous lesions and improved prognosis of patients diagnosed at early stages. There are mainly two goals in colorectal cancer screening programmes. One is to identify and remove precancerous polyps, and thereby reduce its incidence, while the other is to detect disease at an early stage when curative therapy is most likely possible and thereby reduce its mortality.

The argument of colorectal cancer screening is based on the survival rates, which are based on the stage of disease at the time of diagnosis. The five-year survival of an early stage colorectal cancer which has not extended beyond the bowel wall is seen in more than 90% of the patients. However, it decreases up to 60% for patients with tumours with lymph node involvement; and to less than 10% with metastases, highlighting improved survival with early detection and treatment (4).

It is noted that the global incidence and mortality rates of colorectal cancer have significantly declined in the past few decades. This trend is mainly attributed to the adoption of effective screening programmes (5), based on flexible colonoscopy (FS), guaiac-based fecal occult blood test (gFOBT), faecal immunochemical test (FIT) and computed tomographic colonography (CTC).

The FS screens for adenomas as far as in splenic flexure. Randomized trials show favourable results (6-7), with risk reduction of 18% in incidence and 28% in deaths related to colorectal cancer (8). Further, FS has a higher detection rate of advanced neoplasia...
compared to gFOBT or FIT, but a lower specificity and sensitivity than colonoscopy for both advanced adenomas and neoplasm (9). Colonoscopy is considered the gold standard for colorectal cancer screening, which could detect and resect neoplasia and precancerous lesions across the entire large bowel. It is relatively safe with recent data suggesting less than 1 per 1000 perforation rate. However, currently there is proof only from observational studies of its superiority over FS in terms of mortality reduction, while cohort studies showing reduction of colorectal cancer incidence up to 90% has been noted only in symptomatic patients (10). On the other, gFOBT is an inexpensive, simple and widely available test, which demonstrates a relative reduction in colorectal cancer mortality by 15% (11). Globally, five countries have established gFOBT based screening programs but show lesser uptake (12), most likely due to the nature of the test procedure itself (12). This has resulted in moving to FIT-based screening, which is simpler and easier with fewer fecal samples required. Trials show that FIT has a greater sensitivity for detecting advanced adenomas and colorectal cancer than gFOBT (13). Further, CTC is a rapid radiographic non-invasive imaging test, which requires no sedation and has lower procedural risks compared to colonoscopy (14), but lacks data on its impact on colorectal cancer incidence and mortality. In most countries, colonoscopy is used as the second step in screening after FS or gFOBT (with gFOBT or FIT), as a cost-effective measure for cost and resource constraints (15).

Risk prediction in colorectal cancer

Despite the wide range of screening options available that could noticeably reduce the risk of colorectal cancer associated mortality, screening rates remain around 60% since 2010 (16) creating a dilemma in adopting screening programs for colorectal cancer in many countries.

The effectiveness of screening programs could be jeopardized by a multitude of complex factors. These include elevated cost, lack of proper education regarding colorectal cancer, under appreciation of the benefit of screening, a sense of fatalism or simply fear of the screening tests (17). Especially in low-resource settings, it is affected by lack of accessibility, limitations of test performance and sub-optimal screening compliance, which may subsequently result in marked variation in the colorectal cancer incidence and mortality globally (18). Furthermore, the lifetime risk of having colorectal cancer even in a Western country is about 5% in the population (19). Thus, screening for colorectal cancer would benefit only this 5%, whilst the remaining 95% would have to undergo this invasive high cost procedure with no personal gain (4). This evidence suggests that it is more efficient to offer colorectal cancer screening using colonoscopy or flexible sigmoidoscopy to high-risk population groups rather than to all as a routine screening test (20). This has prompted many countries to explore the use of high-risk screening for colorectal cancer with appropriate risk stratification of individuals (21). If risk-stratified cancer prevention is to be implemented, it requires risk assessment tools that can be used in primary care to identify those most likely to benefit from this intervention (22). Of such tools, risk prediction models which are simple and can be applied in a community setting by a trained person are considered as useful (23).

Prediction of colorectal cancer risk in Sri Lanka

Samarakoon et al. (2017) conducted a comprehensive scoping review on the available risk models and scores for colorectal cancer, and thereby identify the need for further improvement (24). Out of the 58 risk prediction models identified, most had been developed for advanced colorectal cancer. Most of the articles reviewed were cross-sectional or cohort studies. Statistical methods such as multiple logistic regression was used by a majority, while few have incorporated non-statistical methods such as consensus method and extracting data from published literature. The models have considered 77 different risk factors excluding the genetic variants. Thus, the currently available models have the potential to stratify the general population into risk categories; and allow screening and preventive strategies to be targeted at those most likely to benefit, while leaving those at low risk unexposed to the adverse effects of screening programs.

Clear evidence on its high burden and better survival associated with early detection using colonoscopy or flexible sigmoidoscopy signifies that Sri Lanka will benefit from introduction of a cost effective and affordable screening programme for colorectal cancer. However, being a low- and middle-
income country, Sri Lanka cannot afford to initiate a national screening program for all above 50 years of age, thus provides flexible sigmoidoscopy or colonoscopy for diagnosing colorectal cancer in patients with symptoms. As an alternative, evidence suggests that a two-step process where population groups at risk of colorectal cancer can be identified using a risk prediction tool is more effective. For this purpose, a risk prediction tool needs to be developed based on the knowledge on country-specific risk factors, in order to stratify and identify those ‘being at risk’ for whom the colonoscopy or flexible sigmoidoscopy are offered subsequently.

Risk prediction modelling is a mechanism which estimates the probability of an individual having a certain condition based on the presence of multiple risk factors (23). When developing such risk prediction models, obtaining country-specific accurate risk estimates for genetic, environmental and behavioural factors and clinical biological markers identified via cohort or case-control studies is vital (25). Incorporation of variables from published data and expert opinion is another method of selecting the risk predictors (26).

Country-specific risk factors for colorectal cancer

Samarakoon et al. (2018) further conducted a case-control study among 325 participants (65 incident colorectal cancer cases, 130 hospital and 130 community controls) in five major health care institutions and communities in areas with high incidence in Sri Lanka. Behavioural, genetic and co-morbid risk factors were assessed through an interviewer-administered questionnaire. Risk factors were evaluated using bivariate and multivariate logistic regression. The results showed that the frequent consumption of red meat (adjusted odds ratio (aOR)=3.06; 95% CI=1.26, 7.43) and deep fried food (aOR=2.54; 95% CI=1.22, 5.39), hypertension for 10 years (aOR=3.3; 95% CI=1.3, 8.6), colorectal cancer (aOR=4.91; 95% CI=1.7, 14.18) and other cancers (aOR=3.0; 95% CI=1.14, 7.81) among first degree relatives and age >50 years (aOR=2.6; 95% CI=1.1, 5.9) were significant risk factors compared to hospital controls. Frequent consumption of deep-fried food (aOR=4.2; 95% CI=1.7, 10.1), being an ever smoker (aOR=3.2; 95% CI=1.1, 9.3), a current or former drinker (aOR=5.4; 95% CI=1.1, 27.8) and hypertension for 10 years (aOR=5.1; 95% CI=1.7, 15.6) were risk factors compared to community controls (27).

Development and validation of a country specific risk prediction model

Samarakoon (2016) developed a risk prediction model to estimate the risk of an adult developing colorectal cancer, which was based on the logistic regression model and expert opinion; and further refined with receiver operator characteristic (ROC) curve performance. Assessment of the criterion validity and reliability of the model was performed using a case-control design utilizing 65 colorectal cancer new cases and 65 hospital controls aged 30 years or more using an interviewer-administered questionnaire. A risk score was developed for the risk prediction model, by assigning a weighted score for each predictor included in the model. The adjusted ORs were taken as the weighted scores for these predictors, while the other weighted scores were decided based on the pooled OR from meta-analysis from other published literature (28). Table 2 shows the validated risk prediction model with the assigned categories and scores.

The developed and validated model consists of eight predictors with an area under the curve of 0.849 (95% CI=0.8, 0.9; p<0.001). The model demonstrated a sensitivity of 76.9% (95% CI=66.7, 87.1), specificity of 83.1% (95% CI=74.0, 92.2), positive predictive value of 82.0% (95% CI=72.3, 91.6) and negative predictive value of 79.3% (95% CI=68.5, 88.0) with positive and negative likelihood ratios of 4.6 (95% CI=2.6, 7.9) and 0.3 (95% CI=0.2, 0.4); and Kappa coefficient of 0.88 with respect to test re-test reliability.

This model, proven to be valid and reliable among adults aged 30 years and above can be easily administered in a community or a clinical setting by a trained person. It consisted of eight closed-ended questions that can be readily answered by a person when administered through an interviewer. The scoring system to identify those ‘at risk’ is indicated in the tool for easy use, thus suitable as a screening instrument in Sri Lanka.
Table 2. Validated risk prediction model with the assigned categories and scores

<table>
<thead>
<tr>
<th>Predictor variable</th>
<th>Categories</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Less than 50 years</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>50 years or more</td>
<td>3</td>
</tr>
<tr>
<td>Frequent consumption of deep-fried food (3 times or more) per week for the period of last 20 years and beyond</td>
<td>Rare or never: less than 3 times per week or never</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Frequent: 3 or more times per week</td>
<td>2</td>
</tr>
<tr>
<td>Frequent consumption of red meat (3 times or more) per week for the period of 20 years and beyond</td>
<td>Rare or never: less than 3 times per week or never</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Frequent: 3 or more times per week</td>
<td>3</td>
</tr>
<tr>
<td>Diagnosis of colorectal cancer at or before 60 years among first degree relatives</td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>5</td>
</tr>
<tr>
<td>Diagnosis of other cancer at or before 60 years (breast, endometrial, ovary) among first degree relatives</td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>3</td>
</tr>
<tr>
<td>Personal history of intestinal polyps diagnosed before 10 years (histologically confirmed)</td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>3</td>
</tr>
<tr>
<td>Personal history of hypertension for more than 10 years (medically confirmed)</td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>3</td>
</tr>
<tr>
<td>Diagnosis of inflammatory bowel disease before 10 years (histologically confirmed)</td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>25</td>
</tr>
</tbody>
</table>

Prevalence of the population ‘at risk’ of developing colorectal cancer in Sri Lanka

Samarakoon et al. (2017) also estimated the prevalence of population at risk of developing colorectal cancer based on the validated risk prediction model developed for Sri Lanka.

A community-based cross-sectional, descriptive study was conducted among a representative sample of 811 adults aged 30 years and above in the districts of Colombo and Gampaha, selected using a multi-stage cluster sampling technique. The validated risk prediction model was used in the form of an interviewer-administered questionnaire. The prevalence of those ‘at risk’ of colorectal cancer was assessed based on the validated cut-off score, while they were further divided as ‘moderate’ and ‘high’ risk based on cut-off values agreed upon by the experts.

The age-adjusted prevalence of those ‘at risk’ was 12.5% (95% CI=12.3, 12.7). Age-adjusted prevalence of those at ‘moderate’ and ‘high’ risk were 11.8% (95% CI=11.6, 12.0) and 0.72% (95% CI=0.7, 0.8), respectively. The high prevalence indicates the public health importance of the problem and the necessity for screening for colorectal cancer in Sri Lanka. The prevalence also highlights the logistical difficulties in offering the follow-up diagnostic colonoscopy examinations for those screened positive. Considering the logistic difficulties in offering follow-up diagnostic colonoscopy examinations for all, the study recommends that those found to be at ‘high-risk’ to be referred for colonoscopy (29).
Future perspectives and recommendations

Addressing dietary risk factors for colorectal cancers, mainly long-term frequent consumption of deep-fried food and red meat is recommended as a primary preventive measure. Noting that these foods are discouraged in the existing national dietary guidelines and school canteen policy, the evidence recommends strengthening their implementation. Furthermore, other co-morbid conditions such as hypertension, should be addressed by measures to prevent such conditions. Adopting healthy lifestyles, specifically healthy dietary practices of less salt and more fiber can be considered as specific recommendations, which can be strengthened in primary care setting.

Sri Lanka offers free healthcare services and has initiated healthy lifestyle centres (HLCs) at the lowest level of primary care institutions since 2011 to offer adults structured non-communicable disease screening (30). More than 900 such centres are distributed throughout the country at present. The main service objective of HLCs is to reduce the risk of NCDs of 40-65-year-old adults by early detection of risk factors and to improve the access for specialized care of those found to be at high-risk.

With the availability of a local risk prediction model, the scope of HLC can be extended for early detection of colorectal cancer in Sri Lanka. This prevalence of being ‘at risk’ denotes the burden of colorectal cancer on the health system in future. Such an initiation should be accompanied by informing the general public about the importance of getting their risk estimated, so that they could undergo FS or colonoscopy examination if required to diagnose the condition early, enabling successful treatment. With regards to persons identified as being ‘at risk’, they should be directed for diagnostic colonoscopy examination and further management, while those at ‘moderate risk’ should be advised on simple screening tests such as FOBTs or modifying the risk factors at primary care level. A further step in introducing a screening program in Sri Lanka is establishing a referral system for those ‘at risk’. This information would form the basis to advocate for a policy decision to evaluate the need for a screening program among the high-risk population during HLCs in Sri Lanka.

References


Maternal satisfaction on postnatal and neonatal care of babies treated for neonatal sepsis in secondary and tertiary care hospitals of a district in Sri Lanka

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Abstract

Introduction: Patient satisfaction is considered to be a vital component in the evaluation of the quality of care.

Objectives: To describe the maternal satisfaction on care received by the neonates and mothers during their stay in the secondary and tertiary care hospitals in a district of Sri Lanka

Methods: This was a descriptive study conducted among 235 postpartum mothers of neonates who were treated for sepsis in the neonatal intensive care units. An interviewer-administered questionnaire was used to assess maternal satisfaction regarding the care received by the mothers (20 items) and neonates (20 items). The mothers were also requested to make suggestions for improvement. The questionnaire was administered on the day of discharge from the hospital. Overall satisfaction scores for maternal care and neonatal care were calculated separately and was considered satisfactory if it was more than 75% of the total score.

Results: The overall mean satisfaction score for maternal care was 84.2 (range 49-100) and for neonatal care, it was 94.0 (range 52-98). Majority of the mothers were satisfied with the maternal care (n=208; 88.5%) and neonatal care (n=220; 93.6%). The majority were satisfied regarding the breastfeeding counselling (n=224; 93.3%), information on the treatment their neonates received (n=227; 94.6%) and investigations of the neonates (n=196; 81.7%). A higher percentage also recommended the obstetric unit to others as a favourable place (n=224; 93.3%) and preferred to return to the same unit for neonatal care for any future episode of illness (n=227; 94.6%).

Conclusions: The overall maternal satisfaction regarding the neonatal and maternity care was high. There was a gap between the needs and provision of healthcare.

Key words: intensive care, neonatal, postnatal, quality, satisfaction, sepsis
Introduction

Patient satisfaction is considered to be a vital component in the evaluation of the quality of healthcare (1). Therefore, maternal satisfaction towards healthcare can be used as a good proxy measure for assessing the quality of care provided for their neonates. The main concern of healthcare service providers is to deliver the best available medical services from a technical point of view (2). The social and humanities aspects of healthcare have also been much emphasized in relation to patient-centred approach. Patients, while expecting the best technical services, are also concerned about the manner in which the services are delivered as well as the setting in which they are provided (3-4). The dignity and other interpersonal aspects of the service is the vehicle by which technical care is implemented and on which its success depends (3). Parent satisfaction on healthcare was associated with the improvement in their children's clinical status and understanding of the information given by healthcare workers (5). Several studies have focused on maternal satisfaction on neonatal care (6-7). There is evidence that increasing knowledge on medical care results in parents being more confident about the sick child's situation and subsequently feeling more secure. Conversely, parental anxiety can have reverse effects resulting in fearful and anxious patients (8).

Although there has been delivery of free healthcare to every person in Sri Lanka by successive governments since independence, it is important to evaluate the satisfaction of service delivery from time to time. We have creditable health indices in comparison with other countries with relatively low per capita income (9). In an era where the public concern on social and humanities need is regarded equally important, patient satisfaction surveys are important to further enhance the quality of health services. While improving the satisfaction rarely creates a strain on the available scarce resources, dissatisfaction of the services could lead to poor utilization of health services. Only minimal finances are necessary to improve satisfaction on various components of the healthcare system. It is the awareness of the service providers that needs to be addressed in order to improve the way the patients are treated and the setting in which they are treated.

There had been an increasing emphasis on the use of patient satisfaction surveys to gather information providing consumer views, which can be used to influence policy and service development. In the public sector, quality measures function as a direct measure of accountability as well as providing information to hospitals about the areas for improvement. The objective of the study was to describe maternal satisfaction on care received by the neonates and mothers during their stay in the secondary and tertiary care hospitals in a district in Sri Lanka.

Methods

A descriptive cross-sectional study was conducted in four hospitals in the district of Gampaha, namely Colombo North Teaching Hospital (CNTH), District General Hospital Gampaha (DGHG), District General Hospital Negombo (DGHN) and the Base Hospital Wathupitiwala (BHW) from August 2010 to January 2011. The study setting included the hospitals where there are neonatal intensive care units (NICU). There are five NICUs. The study population comprised mothers with neonates diagnosed of sepsis. We recruited 240 mothers consecutively from the above hospitals during the study period. This was a component of a larger study (10).

Maternal satisfaction with various aspects of care provided through the government health services were assessed at the discharge of the neonates from the hospital. An interviewer-administered questionnaire (IAQ) was used for data collection. It consisted of two parts. One was on the socio-demographic, maternal and neonatal factors. Second was on the maternal satisfaction regarding the care received in the postnatal wards and the neonatal care in NICU. In addition, there were two open-ended questions where the participants were asked to give three recommendations to improve satisfaction regarding care provided to mothers and neonates.

The draft questionnaire was prepared by reviewing similar studies in local and international level (11-15). The original questionnaire was prepared in English and translated into Sinhala language and was discussed with an expert panel. The questionnaire included 20 items referring to the satisfaction of mothers on neonatal care; 20 items referring to the care received by mothers after admission to the hospital for delivery of the neonates; and a few items referring to the socio-demographic, maternal and neonatal factors. The
satisfaction of mothers on neonatal care was categorized into five domains, namely the information they received regarding their neonate’s illness; skills of the staff and the time they spent with the neonate; communication with mothers; kindness of the various categories of staff when providing services; and mothers’ recommendation of the institution the child would stay in future admission. The satisfaction of mothers on maternal care was categorized into six domains. They were physical and sanitary facilities; diet and drinking water; kindness of staff; breastfeeding counselling; information and communication; and respect and recommendation of the institution for maternity care for future admissions. Each statement on satisfaction had a 5-point Likert scale ranging from ‘highly satisfied’, ‘satisfied’, ‘neither satisfied nor dissatisfied’, ‘dissatisfied’ and ‘highly dissatisfied’. Marks were allocated from 5-1 according to the descending degree of satisfaction for each statement.

Assessment of content validity of the IAQ was carried out by an expert panel. All the experts agreed upon the appropriateness of content to measure the satisfaction of care, relevance in the local context, and appropriateness of the words used. The questionnaire was pre-tested at the Base Hospital Avissawella for feasibility and appropriateness. The reliability was assessed employing test re-test method by re-administering the IAQ in 10 randomly selected mothers who participated in the study. Results of test re-test reliability of the selected variables were assessed using Kappa, showing a minimum score of 0.60 and good agreement.

All the mothers were asked in an open-ended question to offer three recommendations to improve the maternal and neonatal care in the hospitals. The answers given were clustered under the following categories for neonatal care: to improve the facilities which are not currently available, to further improve of currently available services and to improve the physical facilities. The recommendations for improving maternal care were categorized as follows: to improve sanitary facilities such as toilet facilities and (increase) the number of dust bins, to improve service facilities such as increasing the availability of essential equipment and the availability of medicine like prostaglandin pessaries, and to improve non sanitary physical facilities such as mosquito nets and adequate space for breastfeeding.

Two pre-intern medical officers were trained as data collectors. Informed written consent was obtained from all the participants.

Data analysis

Data entry and analysis were done by using Statistical Package for Social Sciences (SPSS) version 16. The individual item satisfaction was calculated as a proportion of each item of satisfaction. The answers of ‘highly satisfied’ and ‘satisfied’ were amalgamated as ‘satisfied’ for this purpose. Answers of ‘neither satisfied nor dissatisfied’, ‘dissatisfied’ and ‘highly dissatisfied’ were amalgamated as ‘dissatisfied’. Overall satisfaction score was calculated and more than 75% was taken as satisfaction.

Results

Five mothers did not respond to the questionnaire, giving a response rate of 98%. The largest number of neonatal sepsis was reported from the CNTH (n=72; 30.0%); DGHG (n=73; 30.3%); DGHN (n=54; 22.5%) and BHW (n=36; 15.2%). Distribution of maternal and neonatal factors are described in Table 1. The highest proportion (n=89; 37.1%) of study participants belonged to 26-30 years of age; were Sinhalese in ethnicity (n=224; 93.3%); and had passed General Certificate of Education (GCE) Ordinary/ Level (n=103; 42.9%).

Maternal satisfaction on maternal care

The satisfaction on sleeping facilities and the toilet facilities provided by the hospital was stated by 78.4% and 69.9% of mothers, respectively. Of them, 91.2% had not taken the diet supplied by the hospital. Those who took the diet from the hospital were 100% satisfied with it. The mothers who were entitled for a diabetic diet or any other specified diet had taken the hospital diet. Only 8.3% mothers had taken drinking water provided by the hospital and all of them were satisfied with it. A majority of mothers (93.3%) were satisfied regarding the breastfeeding counselling and management (Table 2). The satisfaction of mothers on the kindness of the consultant was 92.5%, medical officers 93.3%, nursing officers 91.6% and minor staff 86.7%. A majority (93.3%) of mothers were satisfied with their obstetric unit and they recommended the same unit for others as a favourable place (Table 2).
The overall mean satisfaction score for maternal care was 84.2 (range 49-100). The vast majority (n=208; 88.5%) of the mothers were satisfied with the maternal care received during their hospital stay.

**Maternal satisfaction on neonatal care**

A majority (94.6%) of mothers were satisfied with the treatment their neonates received, whereas 81.7% mothers were satisfied with the information given on investigations. Practice of the staff of introducing themselves to the patients is a new concept in Sri Lanka and 95.8% of mothers were dissatisfied with it. The satisfaction regarding the support given to the baby and the mother when needed was 93.8% and 95.4%, respectively. The communication domain also received high scores by a majority of the mothers; for opportunity to ask questions (95.4%) and understanding of explanations given by the staff (90.4%). Hundred and ninety-three (80.4%) mothers were satisfied with the kindness of consultant and junior medical officers, nursing staff and minor staff (90.0%, 94.0% and 92.9%, respectively). The majority of mothers (95.8%) recommended admission of another child to the same unit, whereas 94.6% of them preferred to return to the same unit for future illness (Table 3). The overall median satisfaction score for neonatal care was 94.0 (range 52-98). The vast majority (n=220; 93.6%) of the mothers were satisfied with the neonatal care.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Table 1. Distribution of maternal and neonatal characteristics (N=235)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Type of the hospital</strong></td>
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<td></td>
</tr>
<tr>
<td>Tertiary care</td>
<td>90</td>
<td>38.3</td>
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<tr>
<td>Secondary care</td>
<td>145</td>
<td>61.7</td>
</tr>
<tr>
<td><strong>Presence of bad obstetric history</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>55</td>
<td>23.4</td>
</tr>
<tr>
<td>Absent</td>
<td>180</td>
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<tr>
<td><strong>Mode of delivery of the baby</strong></td>
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<td></td>
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<tr>
<td>Normal vaginal delivery</td>
<td>124</td>
<td>21.8</td>
</tr>
<tr>
<td>Instrumental delivery or caesarean section</td>
<td>111</td>
<td>26.1</td>
</tr>
<tr>
<td><strong>Number of days in hospital</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10 days</td>
<td>103</td>
<td>52.7</td>
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<tr>
<td>≥10 days</td>
<td>132</td>
<td>47.3</td>
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<tr>
<td><strong>Maturity of the neonate</strong></td>
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</tr>
<tr>
<td>≥36 weeks</td>
<td>189</td>
<td>81.1</td>
</tr>
<tr>
<td>&lt;36 weeks</td>
<td>44</td>
<td>18.9</td>
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<tr>
<td><strong>Sex of the neonate</strong></td>
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<td></td>
</tr>
<tr>
<td>Male</td>
<td>34</td>
<td>14.5</td>
</tr>
<tr>
<td>Female</td>
<td>101</td>
<td>85.5</td>
</tr>
<tr>
<td><strong>Birth weight of baby</strong></td>
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<td></td>
</tr>
<tr>
<td>≥2500 g</td>
<td>162</td>
<td>69.0</td>
</tr>
<tr>
<td>&lt;2500 g</td>
<td>73</td>
<td>31.0</td>
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<tr>
<td><strong>Age of onset of the sepsis of neonates</strong></td>
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<td></td>
</tr>
<tr>
<td>Early onset &lt;72 hours</td>
<td>160</td>
<td>68.0</td>
</tr>
<tr>
<td>Late onset ≥72 hours</td>
<td>75</td>
<td>32.0</td>
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</table>
Table 2. Maternal satisfaction on the services received by mothers during hospital stay (N=235)

<table>
<thead>
<tr>
<th>Description of the services</th>
<th>Satisfied</th>
<th></th>
<th>Dissatisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Physical and sanitary facilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Sleeping facilities provided</td>
<td>188</td>
<td>78.4</td>
<td>47</td>
</tr>
<tr>
<td>• Toilet facilities provided</td>
<td>167</td>
<td>69.9</td>
<td>68</td>
</tr>
<tr>
<td>• Cleanliness of the floor of the wards</td>
<td>194</td>
<td>80.8</td>
<td>41</td>
</tr>
<tr>
<td>• Other facilities provided</td>
<td>180</td>
<td>75.0</td>
<td>55</td>
</tr>
<tr>
<td>• Physical appearance of the wards</td>
<td>207</td>
<td>86.3</td>
<td>28</td>
</tr>
<tr>
<td>Food provided by the hospital</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Diet provided</td>
<td>16</td>
<td>6.7</td>
<td>0</td>
</tr>
<tr>
<td>• Drinking water</td>
<td>20</td>
<td>8.3</td>
<td>0</td>
</tr>
<tr>
<td>Kindness of staff</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Consultant</td>
<td>222</td>
<td>92.5</td>
<td>13</td>
</tr>
<tr>
<td>• Medical officer</td>
<td>224</td>
<td>93.3</td>
<td>11</td>
</tr>
<tr>
<td>• Nursing officers</td>
<td>220</td>
<td>91.6</td>
<td>13</td>
</tr>
<tr>
<td>• Midwives</td>
<td>229</td>
<td>95.5</td>
<td>6</td>
</tr>
<tr>
<td>• Other staff</td>
<td>208</td>
<td>86.7</td>
<td>27</td>
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<tr>
<td>Breast feeding counselling</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>• Explanation on breast feeding</td>
<td>224</td>
<td>93.3</td>
<td>11</td>
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<tr>
<td>Information and communication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Opportunity to ask questions</td>
<td>228</td>
<td>95.4</td>
<td>7</td>
</tr>
<tr>
<td>• Understanding of explanations given</td>
<td>219</td>
<td>91.3</td>
<td>14</td>
</tr>
<tr>
<td>• Time spent on explanations</td>
<td>230</td>
<td>95.8</td>
<td>5</td>
</tr>
<tr>
<td>• Reassurance, counselling and management</td>
<td>216</td>
<td>90.8</td>
<td>18</td>
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<tr>
<td>Respect and recommendation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Respect shown towards mother</td>
<td>230</td>
<td>95.8</td>
<td>5</td>
</tr>
<tr>
<td>• Return to same ward and hospital for next episode of illness</td>
<td>224</td>
<td>93.3</td>
<td>11</td>
</tr>
<tr>
<td>• Recommendation to another mother as a favourable place</td>
<td>225</td>
<td>93.8</td>
<td>10</td>
</tr>
</tbody>
</table>

1. 219 mothers did not take diet provided by the hospital; 2. 214 mothers did not take water provided by the hospital
Recommendations of the mothers to improve neonatal care in the hospitals

Of the mothers (n=106; 44.2%) of babies with neonatal sepsis, the majority mentioned that the facilities for investigations should be improved as some investigations were done at private sector laboratories (Table 4). For example, almost all C-reactive protein tests were done at private sector laboratories. A large proportion of mothers (n=73; 30.4%) recommended that the availability of medicine be increased as they had to buy some of the antibiotics out of pocket. Thirty-three mothers (13.8%) suggested that the facilities for fathers to stay with their neonates for a longer period of time should be increased. Ten mothers (4.1%) pointed out the need for more facilities for low birth weight/ premature neonates while eight (3.3%) stated...
that there should be more facilities to obtain information regarding the neonate’s condition (keep a receptionist during visiting hours). The majority of mothers (n=84; 35%) expressed the need for regular training for infection control practices and providing health education. Forty-four mothers suggested increasing the number of junior medical officers. Five percent (n=12) of the mothers suggested proper training of medical students before handling mothers and babies (Table 4). A large proportion of mothers (n=104; 43.4%) mentioned that the NICU is not situated close to the postnatal ward and that they found it difficult to walk this distance from the postnatal wards. Forty-eight mothers (20%) suggested establishing mother-baby units to keep mother and baby together when they are sick (Table 4).

Table 4. Recommendations of mothers to improve the quality of neonatal care (N=235)

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introducing currently non-available facilities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Improve the facilities for investigations like C-reactive protein</td>
<td>106</td>
<td>45.1</td>
</tr>
<tr>
<td>• Increase the availability of high cost medicine</td>
<td>73</td>
<td>30.1</td>
</tr>
<tr>
<td>• Increase facilities for fathers to spend more time with their neonate</td>
<td>33</td>
<td>14.0</td>
</tr>
<tr>
<td>• Increase facilities for low birth weight/ premature neonates</td>
<td>10</td>
<td>4.2</td>
</tr>
<tr>
<td>• Increase the facilities to get information regarding the neonate’s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>condition (keep a receptionist during visiting hours)</td>
<td>8</td>
<td>3.4</td>
</tr>
<tr>
<td>• Non-response</td>
<td>5</td>
<td>2.1</td>
</tr>
<tr>
<td><strong>Improve the currently available services</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Regular mechanism for mothers to train on infection control / at least on hand washing</td>
<td>84</td>
<td>35.7</td>
</tr>
<tr>
<td>• Increase availability of medical officers</td>
<td>44</td>
<td>18.7</td>
</tr>
<tr>
<td>• Staff should get more precautions on infection control</td>
<td>41</td>
<td>17.4</td>
</tr>
<tr>
<td>• Small hospitals should develop more for deliveries</td>
<td>27</td>
<td>11.5</td>
</tr>
<tr>
<td>• Medical students should train before handling mothers and babies</td>
<td>12</td>
<td>5.1</td>
</tr>
<tr>
<td>• Special training to staff on premature and low birth weight</td>
<td>8</td>
<td>3.4</td>
</tr>
<tr>
<td>• Increase number of minor staff in the labour room</td>
<td>8</td>
<td>3.4</td>
</tr>
<tr>
<td>• Non-response</td>
<td>11</td>
<td>4.7</td>
</tr>
<tr>
<td><strong>Improve physical facilities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Arrange to reduce the distance to NICU from postnatal wards or provide more beds for postnatal mothers closer to NICU</td>
<td>104</td>
<td>44.2</td>
</tr>
<tr>
<td>• Keep mother and baby together as far as possible / improve mother baby units</td>
<td>48</td>
<td>20.4</td>
</tr>
<tr>
<td>• Establish a dining area / room for mothers</td>
<td>31</td>
<td>13.2</td>
</tr>
<tr>
<td>• Arrange the sitting space for feeding mothers</td>
<td>22</td>
<td>9.4</td>
</tr>
<tr>
<td>• Evacuate the mosquito breeding sites from the hospital</td>
<td>11</td>
<td>4.7</td>
</tr>
<tr>
<td>• Improve the cleanliness of NICU</td>
<td>5</td>
<td>2.1</td>
</tr>
<tr>
<td>• Limit visitors to NICU / mother baby units</td>
<td>5</td>
<td>2.1</td>
</tr>
<tr>
<td>• Supply of mosquito nets for mothers in the NICU room</td>
<td>3</td>
<td>1.2</td>
</tr>
<tr>
<td>• Non-response</td>
<td>1</td>
<td>0.4</td>
</tr>
</tbody>
</table>
A large proportion (35.4%) of mothers recommended that the cleanliness of toilets be improved; and the number of toilets be increased, whereas 20.4% of mothers recommended the improvement of the cleanliness of the postnatal wards. The majority of mothers (33.3%) recommended that the availability of medicine and equipment like cannulas be increased. Sixty-seven (27.9%) mothers suggested training the minor staff regarding patient care. Fifty mothers (27.9%) recommended that the number of visits to the postnatal wards by the consultants should be improved. Seventy-five mothers (31.3%) mentioned being pestered by the stray dogs and cats in the wards. A large proportion of mothers (22.9%) also mentioned that the number of beds were not enough in the postnatal wards (Table 5).

Table 5. Recommendations of mothers to improve quality of maternal care (N=235)

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>To improve sanitary facilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Improve the cleanliness of toilets / number of toilets</td>
<td>85</td>
<td>36.1</td>
</tr>
<tr>
<td>• Clean the postnatal wards more frequently</td>
<td>49</td>
<td>20.8</td>
</tr>
<tr>
<td>• Increase the number of dust bins in the toilets</td>
<td>44</td>
<td>18.7</td>
</tr>
<tr>
<td>• Regular training of mothers on discarding sanitary pads</td>
<td>43</td>
<td>17.3</td>
</tr>
<tr>
<td>• Increase number of commodes / showers</td>
<td>10</td>
<td>4.2</td>
</tr>
<tr>
<td>• Non-response</td>
<td>4</td>
<td>1.7</td>
</tr>
<tr>
<td>Improve the service facilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Increase availability of essential equipment like cannulas/urinary catheters</td>
<td>80</td>
<td>34.0</td>
</tr>
<tr>
<td>• Train minor staff to care for patients</td>
<td>67</td>
<td>28.5</td>
</tr>
<tr>
<td>• Regular visits to postnatal section by consultants to increase care of postnatal mothers</td>
<td>50</td>
<td>21.3</td>
</tr>
<tr>
<td>• Increase availability of medicines like prostaglandins</td>
<td>16</td>
<td>6.8</td>
</tr>
<tr>
<td>• Non-response</td>
<td>4</td>
<td>1.3</td>
</tr>
<tr>
<td>To improve non sanitary physical facilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Need solution for the problem of stray dogs and cats</td>
<td>75</td>
<td>31.9</td>
</tr>
<tr>
<td>• Insufficient number of beds in the wards</td>
<td>55</td>
<td>23.4</td>
</tr>
<tr>
<td>• Postnatal wards/ mother and baby wards are too warm</td>
<td>43</td>
<td>18.3</td>
</tr>
<tr>
<td>• Flies are all over the wards</td>
<td>19</td>
<td>8.0</td>
</tr>
<tr>
<td>• Mosquito problems and the supply of mosquito nets</td>
<td>11</td>
<td>4.7</td>
</tr>
<tr>
<td>• Breast feeding place is not adequate/privacy is not maintained</td>
<td>11</td>
<td>4.7</td>
</tr>
<tr>
<td>• Beds are too high in the postnatal wards</td>
<td>9</td>
<td>3.8</td>
</tr>
<tr>
<td>• Non-response</td>
<td>10</td>
<td>4.2</td>
</tr>
</tbody>
</table>
Discussion

Maternal satisfaction for maternal care

We found 88.5% of the mothers were satisfied with the care provided to them in obstetric wards. One Sri Lankan study (12) found that 98.4% of mothers were satisfied with the total maternity care provided by the primary care hospitals in Kalutara District. Another study (16) conducted in Nepal reported that 89.9% of mothers were satisfied with the delivery of service while in Ethiopia, it was 87.2% (17).

In the present study, the satisfaction of mothers regarding toilet facilities were 69.9%. A Sri Lankan study (12) reported that 76.2% of mothers were satisfied with the sanitary facilities provided during their hospital stay while another study (13) found that only 35% of mothers were satisfied with the toilets and water supply of the maternity wards in Puttalam District. A study conducted in Nepal reported that 74% mothers were satisfied with the cleanliness of toilets (16). The proportion of mothers satisfied with the cleanliness of the maternity wards was 86.3% in the present study and it had been 70.4% in Puttalam District and 96.8% in Kalutara District. The present study revealed that satisfaction of the physical appearance of wards was 86.3% and according to another study (13), it was 28.7%. Another study in Serbia (18) found that maternal satisfaction on sanitary facilities was 44%. The differences in satisfaction between local studies regarding cleaning, appearances and cleanliness of the wards may be due to the current policy of sanitation in health institutions. In the past, maintenance of cleanliness of government hospitals was done by government sanitary workers. At present, this is done by private sector cleaning services at almost all the government hospitals. This may be the reason for improvement of satisfaction on sanitation and cleaning than the earlier studies.

Ninety one percent (91.2%) of mothers were satisfied with the level of communication of healthcare staff. One study conducted in primary care hospitals (12) reported that 99.45% of the mothers discussed and communicated their problems with the midwives. In the present study, with regard to the opportunity to ask questions, 93.4% responded positively. In tertiary care hospitals, the staff is usually busy and there is a considerable workload whereas in the primary care setting they may have the time to talk to the patients as the number of patients may be less.

Maternal satisfaction regarding breastfeeding promotion and counselling in the present study was 93.3%. A study (13) conducted in 2004 reported that the assistance given to breastfeeding mothers was 12.3%, indicating poor satisfaction. This sizeable difference between the two studies may be due to the number of training programmes carried out by the Ministry of Health on breastfeeding promotion and counselling for midwives and nursing officers during the previous years with the implementation of the policy on exclusive breastfeeding for six months. In Serbia, a study (18) found that 65.4% of mothers were satisfied regarding breastfeeding assistance and counselling. In Nepal, 81.4% of mothers were satisfied about the information given on breastfeeding (16).

Considering the kindness of health staff, the mothers’ satisfaction regarding consultants were 92.5%, doctors 93.6%, nursing officers 92.5%, midwives 95.8% and other staff 86.7%. In Greece, a study (5) found the politeness of doctors and nurses to be 94.6% and 89.3%, respectively.

Maternal satisfaction on neonatal care

We found that 93.6% of the mothers were highly satisfied with the neonatal care received. A review (19) also concluded that a vast majority of the parents were highly satisfied with the care received in the NICU. In contrast, one study (20) concluded that the overall level of maternal satisfaction was sub-optimal with the care received in an NICU.

Eighty four percent of mothers were satisfied with the information received regarding their neonate's illness, investigations and treatment. In Greece, a study (5) revealed the maternal satisfaction on provision of information about child’s illness to be 94.8%; understanding of given information was 85.4%; and the treatment received by neonates was 94.6%. According to another study (21), maternal satisfaction on the treatment they received in the tertiary care hospital in Sri Lanka was 91.1%. A study conducted in India (22) also reported that 56% of the parents were completely satisfied with information given by the staff.
A vast majority of the mothers (88.4%) were satisfied with the competencies of the healthcare staff. One study (22) reported that 82% of parents were completely satisfied with the care provided by the staff. However, the healthcare staff introducing themselves before corresponding with the patients is not usually practiced in Sri Lanka. Therefore, the satisfaction on that item was indicated as a highly dissatisfied (92%). One study (16) reported that 85% of mothers were satisfied with the warm welcome given by the staff upon admission.

Satisfaction with the opportunity to ask questions when they provide paediatric care in the present study was 94.5%. One study (13) found that 47.9% of mothers expressed their satisfaction regarding the opportunity given to them to clarify their doubts regarding the care of the newborn which was a low figure compared to other studies. A study (22) conducted in India reported that 70% of the parents were completely satisfied with the information given during the time of discharge.

A higher proportion of mothers were satisfied with the kindness of staff and comprised 80.4%, 90.0%, 94.6% and 92.9% of consultants, medical officers, nursing officers and minor staff, respectively. Another Sri Lankan study (13) found that it was 95.1% for medical officers and 92.6% for nursing officers in Puttalam District. De Silva (21) revealed that 98.6% of mothers were satisfied with the doctor’s attitude towards their sick child. In contrast, an Indian study (22) demonstrated that the majority of the parents were not completely satisfied with the empathic attitudes of the staff. Even in England, the mothers were more content when their neonates were examined by midwives rather than by senior house officers (23). In the present study, 94.6% mothers said that they would come back to the same institution for any future episodes of illness of their children. This showed the confidence the clients had on the government health services. Further according to De Silva et al. (1996), 77% of mothers mentioned that they would come back to the same institution for any future illness (21). However, the comparison based on a composite score of satisfaction is not appropriate, as the number of items for assessing satisfaction, the scope of the items, scoring methods and determining the cut-off level to define satisfaction are different across the studies.

Moreover, patient’s expectation had been considered as primary in determining the level of satisfaction. Patients with lower expectations were more easily satisfied (24).

Measuring the satisfaction on care is a challenging task as people tend to give positive responses to questions that were asked about their views on medical care. Brown et al. (1994) in Australia expressed (25) that in surveys, more than 80% state that they are satisfied when questioned and state the same for overall rating of care as well. As these interviews were conducted in the hospital premises, mothers may have reported more positive perceptions of the services and greater satisfaction than they actually felt. This is because they are reluctant to express dissatisfaction to a certain degree. This in turn leads to a degree of underreporting of deficiencies and dissatisfaction regarding care. This issue was highlighted by the previous authors (23) and this underreporting was minimized in the present study by carrying out an exit interview. Furthermore, interviews were carried out in a place where there was no access to healthcare workers. We were also unable to assess the associated factors for satisfaction of the mothers as the vast majority of the mothers in our study were satisfied, the sample size for the dissatisfied group was not adequate for statistical analysis.

According to our study, there is a gap between the needs and available facilities. Most of the mothers stated the need for drugs and laboratory facilities for the proper management of the neonates. In addition, welfare facilities including beds for mothers are also essential for maintaining physical and mental wellbeing of the mother. Medical administrators should seriously consider these factors for improving the quality of neonatal care.

Conclusions & Recommendations
The overall maternal satisfaction regarding the neonatal care and maternity care was high. There was a gap between the needs and provisions of healthcare in relation to technical and administrative concerns. New customer service strategies for better public relations are to be introduced to government healthcare workers. Short training courses for the undergraduates and nursing students as well as in-service training for
all categories of staff regarding soft skills such as communication and empathy are also to be introduced.

Public Health Implications

The overall maternal satisfaction regarding the neonatal care and maternity care was high. There was a gap between the needs and provisions of healthcare in relation to technical and administrative concerns. Obtaining regular feedback from the mothers and activate accordingly may improve the gaps in provision of healthcare. Short training courses for the undergraduates and as well as in-service training for all categories of staff regarding soft skills are also to be introduced.

Author Declarations

Competing interests: The authors declare that they have no competing interests.

Ethics approval and consent to participate: Ethical clearance was obtained from the Ethics Review Committee of the Faculty of Medicine, University of Kelaniya. Administrative clearance for the data collection was obtained from the Regional Director of Health Services of Gampaha District and directors of the relevant hospitals prior to data collection. Prior approval was obtained from the consultants in charge of the Gynaecological, Paediatric, and postnatal wards, and the NICU.

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Author contributions: CJ participated in the design of the study, coordinated data collection, performed the statistical analysis and helped to draft the manuscript. CA participated in the design of the study, performed the statistical analysis, interpreted the data and drafted the first version of the manuscript. Both authors read and approved the final manuscript.

References


Health and nutrition related claims of non-alcoholic beverage labels in supermarkets: their compliance with Sri Lanka Food Labelling and Advertising Regulations

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Abstract

Introduction: The main legislation governing food labelling in Sri Lanka is the Food Act which is implemented by health authorities. Food labels provide information to help consumers make healthier and safe food choices.

Objectives: To assess the compliance of health and nutrition claims of labels of non-alcoholic beverages with food labelling regulation

Methods: A descriptive cross-sectional study was carried out in all 18 supermarkets in the Kandy Municipal Council Area. Non-alcoholic beverages were assessed. A judgmentally validated pre-tested checklist containing provisions of the labelling regulation was used as the study instrument. Data collection was done by four trained data collectors.

Results: Of the 214 beverages assessed, 5.1% (n=11) did not have the common name in two languages. Claims or pictures to the effect that the beverage is recommended by medical practitioners or a professional association was present in 8.1% (n=19). Of the 56 milk products and health drinks, 8.9% (n=5) made claims that dietary fats benefit heart patients. Claim of food being an aid for slimming or weight reduction was found in 14% (n=9) of the 64 milk products, health drinks and green tea surveyed. Of the 36 beverages which made special claims, 30 (83%) did not have declarations that the natural food items also have the same characteristic.

Conclusions: Labels of considerable proportions of beverages contravene the provisions of the food labelling regulation, indicating the importance of proper implementation of the regulation.

Key words: food Legislation, food label, nutrition claims, beverages
Introduction

External factors such as labelling regulations, pre-packaged food labelling information and pre-packaged food product attributes influence consumers’ decision making in purchasing a product. Food Act No.26 of 1980, subsequent amendments and regulations made under the Food Act are the main legislations governing food safety and hygiene in Sri Lanka (1-3). Labelling and advertising are currently governed by Food Labelling and Advertising Regulation 2005 (4). The provisions of these enactments stipulate that food items have to be properly labelled before being sold in the market. These regulations apply to food locally produced as well as imported food. The Ministry of Health is responsible for implementing the food legislation to ensure that food sold in Sri Lanka is safe and wholesome. The Director General of Health Services is the Chief Food Authority.

At present, more and more pre-packed food items are entering the market. The food items may vary from locally manufactured food items to imported ones. The growing consumer demand necessitates that adequate information about the food product is provided and that it is communicated through product labels. The food industry faces a challenge in providing required information abiding to the regulations on labelling of the country. In addition to providing information, the food label plays a dual role of attracting the consumer to the food product and convincing the consumer to purchase a certain food item.

Food labels provide information to help consumers make healthier and safe food choices. Furthermore, these labels could potentially provide false misleading information to the consumer which in turn could bring about harmful effects to the consumers amounting to a criminal offence under the Sri Lankan Law (1). The aim of this study was to assess the compliance of health and nutrition claims of labels of non-alcoholic beverages with food labelling regulations in supermarkets in the Kandy Municipal Council Area. Kandy consists of a population of 1.2 million. The Kandy city was selected since there are many supermarkets and many consumers patronage the supermarkets.

Methods

All supermarkets within the Kandy Municipal Council limits were included in the study sample of this descriptive cross-sectional study. There was a total of eighteen supermarkets. Non-alcoholic beverages were considered as the study unit and all non-alcoholic beverages were included in the sample. Once the data collection was completed, the product brand was compared, and duplicated brands were removed. Altogether 214 beverages were taken for analysis.

A pre-tested checklist containing requirements of food labelling and advertising regulation was used as the study instrument. Information on the label was divided as that given in the ‘main panel’ and ‘other panels’. Main panel means the part of a label that is most likely to be displayed, presented, shown or examined under customary conditions of display for retail sale, and shall not be less than 20% of the total surface area excluding the bottom of the package or container. Other panels include panels other than the main panel (4). Information in the main and other panels was considered as mandatory information. The main panel should contain the common name of the contents at least in any two of the three languages in bold face type, brand or trade name if any, in any one or more of the three languages in a manner that shall not mislead any person, the net contents of the package or container expressed by the international symbols ‘g’ or ‘kg’ in the case of solids, ‘ml’ or ‘l’ in the case of liquids, and if packaged in liquid medium, the net drained weight expressed as ‘g’ or ‘kg’. The following declarations can be either in the main panel or any other panel in any one or more of the three languages; any permitted names of food additives or INS number as prescribed by regulations; instructions for storage or use; the name and address of the manufacturer and packer or distributor in Sri Lanka; the batch number or code number or a decipherable code marking; the date of expiry; the date of manufacture; the name of places where food is imported in bulk and repacked; the date of manufacture and the date of repacking; a complete list of ingredients used in such food by their common names in descending order of their proportions; the country of origin in case of imported food; and any other declarations stipulated under the regulation (4).

The above regulation was reviewed by investigators, and the potential items to be included in the study tool were listed. For the purpose of data collection, these items were categorized under four domains: main panel, other panel, nutrition information...
and the specific requirements/restriction on labelling. This list was sent to a panel of experts and its face validity, content-validity and consensual-validity were ensured (5). After the adjustments which were done based on the expert panel, the checklist consisted of four main sections. Section 1: Main panel – common name, brand name, net content, requirements of the size of letters, etc., Section 2: Other panel – permitted food additives name/INS No, instructions for storage, name and address of the manufacture, packager/distributor in Sri Lanka, batch no/code, date of expiry, list of ingredients in common names, in descending order, etc., Section 3: Nutrition information – energy values, amount of nutrients, and Section 4: Specific requirements/restrictions on labelling.

The printed information in the entire package or container was considered for this study. Medical officer of health (MOH) is an authorized officer under the Food Act. Data collection was done by four trained data collectors who have work experience as MOH. Hence, the data collectors have experience in assessing food labels for compliance to the provisions of the Food Acts and Food Labelling and Advertising Regulation. The components of the data collection tool were discussed during a training session which included pretesting in similar supermarkets in the Kegalle District.

**Results**

Of the 214 beverages assessed, 68 (31.7%) complied to all the provisions and 5.1% (n=11) did not have the common name in two languages. All the labels contained the name and address of the manufacturer/distributor. Date of expiry was not present in 2.8% (n=6). List of ingredients in common names in prescribed format was available only in 64% (n=137) of the labels (Table 1).

Table 2 depicts the characteristics related to the compliance of specific requirements on health claims. Claims or pictures to the effect that the beverage is recommended by medical practitioners or a professional association was present in 8.1% (n=19). Of the 56 milk products and health drinks, 8.9% (n=5) made claims that dietary fats benefit heart patients. Claim of food being an aid for slimming or weight reduction was found in 14% (n=9) of the 64 milk products, health drinks and green tea surveyed. Of the 36 beverages which made special claims, 30 (83%) did not have declarations that the natural food item also has the same characteristic.

### Table 1. Compliance of the main and other panel

<table>
<thead>
<tr>
<th>Item</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common name in two languages</td>
<td>203 (94.9)</td>
<td>11 (5.1)</td>
</tr>
<tr>
<td>Common name not less than 1/3 size of the brand name letters</td>
<td>193 (90.2)</td>
<td>21 (9.8)</td>
</tr>
<tr>
<td>If food additives present name/INS No</td>
<td>115 (62.2)</td>
<td>70 (37.8)</td>
</tr>
<tr>
<td>Name and address of the manufacture, packager/distributor</td>
<td>214 (100.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Batch No./Code No.</td>
<td>214 (100.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Date of expiry</td>
<td>208 (97.2)</td>
<td>6 (2.8)</td>
</tr>
<tr>
<td>Date of manufacture/expiry in correct format</td>
<td>203 (94.9)</td>
<td>11 (5.1)</td>
</tr>
<tr>
<td>List of ingredients in common names in prescribed format</td>
<td>137 (64.0)</td>
<td>77 (36.0)</td>
</tr>
</tbody>
</table>
Compliance of specific requirements on nutritional claims is summarized in Table 3. All 23 beverages claiming for enriched food did so when beverage did not contain “added nutrients in addition to what are naturally contained in the beverage”. Claims of a fortification when a nutrient was a natural constituent of the beverage were seen in 69.2% (n=18) of the beverages claiming fortification. 82.9% (n=29) of beverages which made claim as an energy provider made so when required energy was not provided by the beverage. Low fat and fat free claims were made when having fat levels above the stipulated values by 73.3% (n=11) and 75% (n=8) of beverages who made such claims respectively.

### Table 2. Compliance of specific requirements on health claims

<table>
<thead>
<tr>
<th>Item</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Claims or pictures to the effect that the food is recommended by medical practitioner, professional association</td>
<td>195 (91.1)</td>
<td>19 (8.9)</td>
</tr>
<tr>
<td>Claims made that dietary fats are protective against heart disease or benefits heart patients¹</td>
<td>51 (91.1)</td>
<td>5 (8.9)</td>
</tr>
<tr>
<td>Claims of food being an aid for slimming, weight control or weight reduction²</td>
<td>55 (86.0)</td>
<td>9 (14.0)</td>
</tr>
<tr>
<td>Beverage making special claims have declarations that the natural food item also has the same characteristic³</td>
<td>30 (83.0)</td>
<td>6 (17.0)</td>
</tr>
</tbody>
</table>

¹milk products and health drinks; ²milk products, health drinks and green tea; ³beverages making special claims

### Table 3. Compliance of specific requirements on nutritional claims

<table>
<thead>
<tr>
<th>Item</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Claims on enriched food made only when beverage contain added nutrients in addition to what is naturally contained in the beverage¹</td>
<td>0 (0.0)</td>
<td>23 (100.0)</td>
</tr>
<tr>
<td>Claim for fortified food is not made unless any nutrient added is not a natural constituent of the beverage²</td>
<td>8 (30.8)</td>
<td>18 (69.2)</td>
</tr>
<tr>
<td>Claim for carbohydrates, fats, vitamins or minerals made when recommended daily consumption provides 5% of daily requirement stipulated under Schedule IV of the regulation³</td>
<td>9 (25.0)</td>
<td>27 (75.0)</td>
</tr>
<tr>
<td>Claim for food as an energy provider is not made unless that food provides 300Kcal or more per day and a declaration of energy content in K.cal per 100g of food</td>
<td>6 (17.1)</td>
<td>29 (82.9)</td>
</tr>
<tr>
<td>Claim for low in fat is made only when that food contains not more than 3 g per 100g solids or 1.5 g per 100 ml liquids</td>
<td>4 (26.7)</td>
<td>11 (73.3)</td>
</tr>
<tr>
<td>Claim for free in fat is made only when that food contains not more than 0.5 g per 100g solids or 100 ml liquids</td>
<td>2 (25.0)</td>
<td>6 (75.0)</td>
</tr>
</tbody>
</table>

¹beverage claiming enriched food; ²beverages claiming fortification; ³beverages claiming carbohydrates, fats, vitamins or minerals; ⁴beverages claiming as an energy provider; ⁵beverages claiming low fat content; ⁶beverages claiming fat free
Discussion

This is the first documented study done on non-alcoholic beverages in supermarkets of a major municipality where a large variety of beverages locally manufactured as well as imported that is sold in Sri Lanka are available. The findings of this study reveal the current status of the implementation of labelling regulation with regard to non-alcoholic beverages, which would be useful for health authorities to take measures to rectify the identified gaps in the implementation. Food label acts as a medium that carries information about the product. It provides the consumer of the characteristics of the packaged food item (6). Information provided in the label and the level of education of the consumer have a positive effect on selection of right food and protect the consumer from health risks associated with food products (7).

The present study revealed that all labels contained the name and address of the manufacturer/distributor. Further a majority of labels complied with the key general requirements of the Food Labelling Regulation in the main information panel. A label should at least contain information such as product name, contact details of the manufacturer or distributor, information on nutrition and the net content (8-9).

Nutritional content such as sugar, salt, fat, and carbohydrates in a label will give the consumer a chance to keep a track on different nutrition contents of the product. Health claims in labels can be used by the consumers to identify risk or beneficial factors to one’s health (10). The information in the label helps the consumer to make informed decisions when purchasing a food product. This is a key reason to have a nutrition information panel in a label. The consumer can decide on a balanced healthy diet based on the information provided in the nutritional panel.

Information on the label is used by the consumer in choosing the food item. The current society is health conscious than ever before. With the lifestyle changes such as sedentary lifestyle, people are concerned about the calorie intake. They are well-informed on risk factors of common non-communicable diseases, such as hypertension, diabetes mellitus, cancers, etc. Certain food containing high salt, sugar and processed foods can have a direct impact on non-communicable diseases. Due to this awareness, the consumer would demand information on nutritional content of the food item to be consumed. Hence, the label plays the role of the key informant to the consumer. An Australian study revealed that the age and health consciousness had an impact on reading of the label (11).

The present study sheds light on the value of timely review of the food legislations in Sri Lanka. The Sri Lankan Food Act, No. 26 of 1980 and the regulations thereunder, provide the legal requirements for food labelling in Sri Lanka. Nutritional labelling was not compulsory until 2003. This indirectly resulted in the local food producers having to compete with imported food products which contained nutritional labels providing nutritional information to the consumer (12). In 2003, a new Regulation (Food Labelling and Advertising Regulations) was enacted making compulsory inclusion of nutrition content in the label. This regulation was amended in 2005 further strengthening the labelling requirements of food products.

A review on public perception on using labels by Philip et al. (13) reported that 50% of UK citizens read food labels. The size of the label, size of fonts, the language used in the label have an impact on consumers using the labels. Certain labels provide a large amount of information than what a consumer can process and is considered as ‘information overload’. An Australian study revealed that labels of half of the products contained nutrition related claims. Of the nutrition claims, 12.9% violated the labelling regulations. This was especially seen in voluntary code of practice (14).

This study was confined to the supermarkets and did not include the local trade establishments which may contain beverages which the supermarkets do not accept for sale due to quality/standard issues. These beverages may not be labelled conforming to the labelling regulation. This is a limitation of this study. To minimize any bias resulting from this, the findings were not generalized to all trade establishments, but only to the supermarkets in Kandy Municipal Council Area.

Conclusions & Recommendations

The findings of present study revealed that a majority of health and nutritional claims violated the existing legislative provisions on food labelling in
relation to many aspects. The consumers are potentially misled with inaccurate information provided through the labels. There were serious violations where the consumer was misled indicating that the beverage was recommended by medical practitioners and has dietary benefits for illnesses and other health benefits. A majority of special claims did not declare that the natural food also has the same characteristics. The relevant officials responsible for the implementation of the labelling regulation should take serious note of these violations and should take remedial steps to ensure correct information is given to the consumer through food labels.

Public Health Implications

Existing legislative provisions on food labelling were violated by a majority of health and nutritional claims; and the consumers are potentially misled with inaccurate information provided through the labels. The Ministry of Health being the main authority on food safety, should take steps to ensure correct information is given to the consumer through food labels.

Author Declarations

Competing interests: The authors declare that they have no conflicts of interests in this study.

Ethics approval and consent to participate: The Ethics Review Committee of the Faculty of Medicine, University of Peradeniya granted ethical clearance.

Funding: Self-funded

Acknowledgements: We would like to thank all the managers of supermarkets in Kandy Municipal Council Area for the facilitation of data collection.

Author contributions: All the authors were involved in the conceptualization of the study. MA, SW, BM, PK coordinated data collection, performed the statistical analysis, interpreted the data and were involved in the drafting and editing of the manuscript. DF, RS, YF, CD were involved in data collection and drafting of the manuscript. All authors read and approved the final manuscript.

References

Abstract

Introduction: Asthma affects an estimated 300 million people worldwide. Low rates of compliance with medication pose a major challenge to effective management of the disease. The high medical and social costs of poor compliance and the apparent lack of effective methods for dealing with it have stimulated interest in this complex issue.

Objectives: To describe patient related factors influencing treatment compliance among adult asthmatic patients attending medical clinics in Base Hospital Homagama

Methods: A descriptive cross-sectional study was conducted among 374 adult asthmatic patients between 18 to 80 years, attending medical clinics. Systematic sampling method was applied to select participants. An interviewer-administered questionnaire was used to collect data. Univariate and multivariate analysis was performed.

Results: The mean age of the respondents was 52.3 (SD=11.7) years and comprised mainly females (56%). Good treatment compliance was demonstrated in 65% of the patients. Males were 1.9 times more at risk of poor compliance compared to females (OR=1.9; 95% CI=1.2, 2.9). Being younger (OR=0.3; 95% CI=0.1, 0.9) and attaining a higher educational level (OR=0.5; 95% CI=0.3, 0.9) showed significant protective effect. Clinic attendees with lower income levels were 1.8 times more likely to be less compliant compared to their counterparts (OR=1.8; 95% CI=1.1, 2.8). Perception of easy susceptibility to the disease (p=0.02), belief on severe consequences (p=0.01) and believing therapy is effective (p=0.01) were positively attributed to compliance. Erroneous beliefs of diminished effectiveness (p=0.008) and fear of dependence (p=0.006) with long-term treatment, believing asthma was uncontrollable (p=0.018), contributed to poor compliance. While forgetfulness (35.2%) affected compliance adversely (p=0.023), regular clinic attendance ensured better compliance levels (p=0.01).

Conclusions: Patients’ perceptions regarding disease and treatment play a major role in determining treatment compliance. Provision of clear rationale for treatment, consonant with patients’ perceptions of their illness and addressing concerns with regards to erroneous beliefs is of paramount importance and a timely need.

Keywords: treatment compliance, asthma, adult asthmatic patients, patients’ perceptions and beliefs
Introduction

Asthma is estimated to affect 300 million people worldwide and is a major preventable cause of morbidity and mortality (1). WHO Global Burden of Disease shows that 13.8 million disability adjusted life years (DALYs) are lost annually due to asthma, representing 1.8% of total global disease burden.

Prevalence of bronchial asthma among adults in Sri Lanka is estimated to be 20-25% (2). The annual asthma admissions and deaths in the state sector in Sri Lanka have shown a steady increase over the past decades, with asthma ranked as the second highest cause for hospitalization and admissions of 787.3 asthma cases/100,000 population and 529 deaths in 2016, identifying asthma as a major health problem in Sri Lanka (3). However, despite the availability of effective treatment, the disease burden is substantial due to poor compliance to prescribed asthma medications, especially inhaled corticosteroid (ICS) (4). Interestingly, compliance has been implicated as the single most modifiable factor that compromises treatment outcome. Even the best treatment can be rendered ineffective by poor compliance, despite all the best intentions and efforts on the parts of the health care providers.

Noncompliance to asthma medications is a widespread problem of a considerably large magnitude of patients throughout the world. Studies conducted in the USA, United Kingdom, Canada and Australia revealed that 50% of the prescription drugs for the prevention of asthma had not been taken as prescribed (5). Compliance is a complex process determined by several interacting factors. Various studies have implicated patients’ beliefs and perceptions on medication as the salient most influence on compliance.

Evidence indicate that patients evaluate and interpret medical advice in the light of their own beliefs (6). What people think, believe and attitudes they hold and how others influence them regarding a prescribed medication have a major bearing on their intention to adhere to a medical prescription (7). Consequently, if patients have beliefs which are incongruent to the physician’s prescribed regimen, or if the family or social group have divergent views regarding their illness or treatment, they are less likely to even form a willingness to intend to adhere (7).

An application of the well-known Health Belief Model describes that compliance is thought to be determined by the knowledge and attitudes of the patient (8). Patients must believe that they are vulnerable or susceptible to disease and its consequences, that they actually have it and that the consequences of the disease on their wellbeing could be serious. They must believe that by following a particular set of recommendations, the threat or the severity of conditions will be abolished or reduced. Patients have many fears and powerful negative images of medications and if measures are to be taken to improve compliance, these should be primarily based on a closer understanding of the patients' experience of their illness and medication rather than the perception and expectations of health care professionals (8).

A study conducted across five different countries in the Asian Region illustrated a sizable difference in beliefs and behaviour held by differently compliant patients. Compliance was significantly associated with patient’s self-reported understanding of the disease (p<0.01), inhaler techniques (p<0.01) and patient's acceptance with inhaler medications in terms of benefit, safety, convenience and cost (p<0.01) (4). It further revealed that compared with patients with high or medium compliance those with low compliance were less likely to report that they understood the disease well (79.2% versus 65.2%) or that they knew how well the inhalers worked (73.7% versus 53.9%) and more likely to believe that herbal medicines are safer than inhalers (12.5%).

Several studies (5, 8-9) have shown that compliance has been closely related with patient’s knowledge. Cochrane (1999), however states that noncompliance is not simply due to patients’ lack of knowledge, and therefore increasing knowledge only will not improve compliance (6). Additionally, Martini & Pannucci (1996) who studied on 20 health beliefs, discovered that not all who are aware of health measures that are beneficial will comply with it (10). Even though it is apparent that a patient’s perception and beliefs are one of the best predictors of treatment compliance, there is paucity of information regarding it locally. Therefore, the objective of this study is to assess patient related factors influencing treatment compliance among adult asthmatic patients attending medical clinic in the Base Hospital (BH) Homagama. Consequently, the results of the study will produce valuable information that will enable to not only
minimize negative clinical and economic outcomes but also to engage in further research to improve the quality of life of adult asthmatic patients in our country.

Methods

A descriptive, cross-sectional study was conducted among adult asthmatic patients attending medical and family medical clinics in BH Homagama. Adult asthmatic patients between 18 to 80 years, diagnosed as asthmatics for ≥6 months by a consultant physician with onset of asthma <40 years of age were included. Asthmatics with other diagnosed diseases with similar overlapping symptoms such as other chronic respiratory diseases including chronic obstructive pulmonary disease (COPD) and heart diseases were excluded by referring to the medical clinic book. The minimum required sample size was 374 based on an expected proportion of clinic patients with treatment non-compliance of 33% (11), 95% confidence limits, 5% precision and 10% non-response (12).

Systematic sampling was applied to select patients from the clinic register. A pre-tested interviewer-administered questionnaire was used to collect data by two trained medical officers from the paediatric ward from the same hospital. Informed written consent was obtained prior to data collection. The questionnaire consisted of sections that gathered information on socio-demographic and economic characteristics, patient related factors influencing treatment compliance that included patients’ perceptions and beliefs regarding disease and treatment. The questionnaire which was originally developed in English later was made available in both local languages – Sinhala and Tamil. A panel of experts ensured its judgmental validity. Each individual answer in the questionnaire was presented as percentage frequency to display its effect on compliance.

Treatment compliance was assessed for every patient by comparing the inhaler dosing frequency, as mentioned in the clinic book with the inhaler use frequency as stated by the patient. Patients who claimed to be taking the inhalers as it appears in the prescription were considered to have having good compliance while those whodeviated from it were considered to be having poor compliance.

All asthmatic patients attending clinics were prescribed inhaler medications (preventers/ controllers) to be used on a daily basis, which are ICS and long acting β agonist medications that are prescribed alone or in combination. They were prescribed on a twice-daily regimen. Therefore, these medications were considered to assess compliance.

Data analysis

Data was analysed using Statistical Package for Social Sciences (SPSS) version 20. The association between compliance and associated factors were determined by Chi-squared test.

Results

Of the 374 eligible patients, eight refused to give consent for participation, giving a response rate of 97.9%. Table 1 shows demographic and socio-economic characteristics of clinic patients. Most patients were above 55 years (n=176; 48.1%) and females (n=205; 56%). Mean age of the study population was 52.3 years (SD=11.7). Majority of participants were Sinhalese (n=356; 97.3%), currently married (n=291, 79.5%) and came from nuclear families (n=295; 80.6%). Considering the highest level of education one third of the respondents had passed General Certificate of Education (GCE) Ordinary Level (n=131; 35.8%) and another third had passed GCE Advanced Level (n=123; 33.6%). A considerable number were unemployed (n=84; 23%).

With regards to treatment compliance, patients adhering exactly to the prescribed dosing frequency of inhalers were considered to have good compliance (n=238; 65.0%), which consisted of the greater majority (Figure 1). Table 2 depicts the association of demographic and socioeconomic factors with treatment compliance. Being male increased the risk of poor compliance by 1.9 times compared to females (OR=1.9; 95% CI=1.2, 2.9). An average monthly income level of ≤ Rs. 25,000 was attributed to higher risk of poor compliance by 1.8 times compared to their counterparts (OR=1.8; 95% CI=1.1, 2.8). Being less than 40 years of age (OR=0.3; 95% CI=0.1, 0.9) and attaining an education beyond GCE Ordinary Level (OR=0.5; 95% CI=0.3, 0.9) showed significant protective effect. Table 3 shows the association of patient related factors with treatment compliance.
Table 1. Demographic and socio-economic characteristics of the clinic patients

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;40 years</td>
<td>41</td>
<td>11.2</td>
</tr>
<tr>
<td>40-55 years</td>
<td>149</td>
<td>40.7</td>
</tr>
<tr>
<td>&gt;55 years</td>
<td>176</td>
<td>48.1</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>161</td>
<td>44.0</td>
</tr>
<tr>
<td>Female</td>
<td>205</td>
<td>56.0</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sinhala</td>
<td>325</td>
<td>88.8</td>
</tr>
<tr>
<td>Tamil</td>
<td>17</td>
<td>4.6</td>
</tr>
<tr>
<td>Muslim</td>
<td>24</td>
<td>6.6</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never married</td>
<td>16</td>
<td>4.4</td>
</tr>
<tr>
<td>Currently married</td>
<td>291</td>
<td>79.5</td>
</tr>
<tr>
<td>Divorced/Separated</td>
<td>2</td>
<td>0.5</td>
</tr>
<tr>
<td>Widowed</td>
<td>57</td>
<td>15.6</td>
</tr>
<tr>
<td><strong>Type of family</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nuclear</td>
<td>295</td>
<td>80.6</td>
</tr>
<tr>
<td>Extended</td>
<td>71</td>
<td>19.4</td>
</tr>
<tr>
<td><strong>Educational level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No schooling</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Year 1 to 5</td>
<td>35</td>
<td>9.6</td>
</tr>
<tr>
<td>Year 6 to 11</td>
<td>42</td>
<td>11.5</td>
</tr>
<tr>
<td>Passed GCE/ Ordinary Level</td>
<td>131</td>
<td>35.8</td>
</tr>
<tr>
<td>Passed GCE/ Advanced Level</td>
<td>123</td>
<td>33.6</td>
</tr>
<tr>
<td>Higher education</td>
<td>35</td>
<td>9.6</td>
</tr>
<tr>
<td><strong>Average monthly income (Rs.)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤10,000</td>
<td>2</td>
<td>5.0</td>
</tr>
<tr>
<td>10,001-15,000</td>
<td>56</td>
<td>15.3</td>
</tr>
<tr>
<td>15,001-25,000</td>
<td>99</td>
<td>27.1</td>
</tr>
<tr>
<td>25,001-35,000</td>
<td>146</td>
<td>39.9</td>
</tr>
<tr>
<td>&gt;35,000</td>
<td>63</td>
<td>17.2</td>
</tr>
<tr>
<td><strong>Current occupation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional/ technical/sales/clerical</td>
<td>10</td>
<td>2.7</td>
</tr>
<tr>
<td>Skilled labourers</td>
<td>67</td>
<td>18.3</td>
</tr>
<tr>
<td>Unskilled labourers</td>
<td>42</td>
<td>11.5</td>
</tr>
<tr>
<td>Self-employed</td>
<td>70</td>
<td>19.1</td>
</tr>
<tr>
<td>Unemployed/housewife</td>
<td>84</td>
<td>23.0</td>
</tr>
<tr>
<td>Retired</td>
<td>57</td>
<td>15.6</td>
</tr>
<tr>
<td>Students</td>
<td>10</td>
<td>2.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>366</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Considering patients’ perceptions and beliefs regarding disease, patients who felt easily affected by asthma (p=0.02) and those who believed that asthma and its complications can pose severe consequences (p=0.01) were more compliant. Similarly, clinic patients who believed asthma was uncontrollable showed poor compliance (p=0.02). Interestingly, compliance was highest among those who were less aware on things that worsens their asthma (p=0.015) as well as on knowing how to avoid things that could worsen their asthmatic condition (p=0.01).

Table 2. Demographic and socioeconomic factors associated with treatment compliance

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Good No. (%)</th>
<th>Poor No. (%)</th>
<th>Unadjusted OR(^1) (95% CI)</th>
<th>Adjusted OR(^1) (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (in years)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;40 years</td>
<td>34 (82.9)</td>
<td>7 (17.1)</td>
<td>0.4 (0.2-0.8)</td>
<td>0.3 (0.1-0.9)</td>
</tr>
<tr>
<td>40-55 years</td>
<td>93 (62.4)</td>
<td>56 (37.6)</td>
<td>1.0 (0.7-1.7)</td>
<td>0.9 (0.6-1.6)</td>
</tr>
<tr>
<td>&gt;55 years</td>
<td>111 (63.1)</td>
<td>65 (36.9)</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>95 (59.0)</td>
<td>66 (41.0)</td>
<td>1.6 (1.0-2.4)</td>
<td>1.9 (1.2-2.9)</td>
</tr>
<tr>
<td>Female</td>
<td>143 (69.8)</td>
<td>62 (30.2)</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sinhala</td>
<td>217 (66.8)</td>
<td>108 (33.2)</td>
<td>0.5 (0.2-1.3)</td>
<td>0.4 (0.2-1.2)</td>
</tr>
<tr>
<td>Tamil</td>
<td>7 (41.2)</td>
<td>10 (58.8)</td>
<td>1.0 (0.2-0.4)</td>
<td>1.2 (0.3-5.2)</td>
</tr>
<tr>
<td>Muslim</td>
<td>14 (58.3)</td>
<td>10 (41.7)</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Married</td>
<td>190 (65.3)</td>
<td>101 (34.7)</td>
<td>0.9 (0.5-1.6)</td>
<td>1.0 (0.6-1.9)</td>
</tr>
<tr>
<td>Others</td>
<td>48 (64.0)</td>
<td>27 (36.0)</td>
<td>1.0</td>
<td>1.0</td>
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<tr>
<td><strong>Highest level of education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;GCE Ordinary Level</td>
<td>115 (72.8)</td>
<td>43 (27.2)</td>
<td>0.6 (0.4-0.9)</td>
<td>0.5 (0.3-0.9)</td>
</tr>
<tr>
<td>≤GCE Ordinary Level</td>
<td>123 (59.1)</td>
<td>85 (40.9)</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Current occupation</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>143 (66.5)</td>
<td>72 (33.5)</td>
<td>1.2 (0.3-4.7)</td>
<td>0.6 (0.1-3.1)</td>
</tr>
<tr>
<td>Unemployed</td>
<td>50 (59.5)</td>
<td>34 (40.5)</td>
<td>1.6 (0.4-6.6)</td>
<td>1.2 (0.3-5.2)</td>
</tr>
<tr>
<td>Retired</td>
<td>38 (66.7)</td>
<td>19 (33.3)</td>
<td>1.2 (0.3-6.5)</td>
<td>1.2 (0.3-5.2)</td>
</tr>
<tr>
<td>Student</td>
<td>7 (70.0)</td>
<td>3 (30.0)</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Average monthly income (Rs.)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤25,000</td>
<td>92 (58.6)</td>
<td>65 (41.4)</td>
<td>1.6 (1.1-2.5)</td>
<td>1.8 (1.1-2.8)</td>
</tr>
<tr>
<td>&gt;25,000</td>
<td>146 (69.9)</td>
<td>63 (30.1)</td>
<td>1.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

\(^1\) Significance at 0.05 level
Concerning patients’ perceptions and beliefs related to treatment; patients who believed that treatment can relieve and control symptoms were, expectantly, more compliant with inhaler medications \((p=0.01)\). Even though compliance was higher among those who were aware of the need to use inhalers during asymptomatic period to prevent further attacks of exacerbation, this association failed to show statistical significance \((p=0.7)\). However, those who perceived the need to use the inhaler medications on a regular basis showed statistically significant association with treatment compliance \((p=0.02)\). Similarly, those who were less forgetful to take medication \((p=0.02)\) and those who attended regular clinics \((p=0.02)\) showed better treatment compliance.

Respondents who felt that long-term use of medications would reduce the effect of medications as well as make them dependent, had lower compliance. The difference in both the instances showed strong statistical significance \((p=0.008)\) and \((p=0.006)\), respectively (Table 3).

### Table 3. Patients related factors associated with treatment compliance

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Good - No. (%)</th>
<th>Poor - No. (%)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patients’ knowledge, perceptions and beliefs regarding disease</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Feel easily affected by asthma</td>
<td>Yes 183 (67.5)</td>
<td>88 (32.8)</td>
<td>(\chi^2=5.319; df=1)</td>
</tr>
<tr>
<td></td>
<td>No 55 (57.9)</td>
<td>40 (42.1)</td>
<td>(p=0.02)</td>
</tr>
<tr>
<td>b) Believing asthma and its complications pose severe consequences</td>
<td>Yes 154 (70.0)</td>
<td>66 (30.0)</td>
<td>(\chi^2=5.997; df=1)</td>
</tr>
<tr>
<td></td>
<td>No 84 (57.5)</td>
<td>62 (42.5)</td>
<td>(p=0.01)</td>
</tr>
<tr>
<td>c) Know things worsening asthma</td>
<td>Yes 208 (63.0)</td>
<td>122 (37.0)</td>
<td>(\chi^2=5.883; df=1)</td>
</tr>
<tr>
<td></td>
<td>No 30 (83.3)</td>
<td>6 (16.7)</td>
<td>(p=0.01)</td>
</tr>
<tr>
<td>d) Know how to avoid things worsening asthma</td>
<td>Yes 205 (63.0)</td>
<td>120 (36.9)</td>
<td>(\chi^2=6.101; df=1)</td>
</tr>
<tr>
<td></td>
<td>No 30 (80.5)</td>
<td>8 (19.5)</td>
<td>(p=0.01)</td>
</tr>
<tr>
<td>e) Believe asthma is not controllable</td>
<td>Yes 37 (52.9)</td>
<td>33 (47.1)</td>
<td>(\chi^2=5.637; df=1)</td>
</tr>
<tr>
<td></td>
<td>No 201 (67.0)</td>
<td>95 (32.1)</td>
<td>(p=0.02)</td>
</tr>
<tr>
<td><strong>Patients’ knowledge, perceptions and beliefs regarding treatment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Believe treatment can relieve and control symptoms</td>
<td>Yes 202 (68.0)</td>
<td>95 (32.0)</td>
<td>(\chi^2=6.177; df=1)</td>
</tr>
<tr>
<td></td>
<td>No 36 (52.2)</td>
<td>33 (47.8)</td>
<td>(p=0.01)</td>
</tr>
<tr>
<td>b) Know the need to use inhalers during asymptomatic period</td>
<td>Yes 199 (65.5)</td>
<td>105 (34.5)</td>
<td>(\chi^2=0.148; df=1)</td>
</tr>
<tr>
<td></td>
<td>No 39 (62.9)</td>
<td>23 (37.1)</td>
<td>(p=0.7)</td>
</tr>
</tbody>
</table>

(Continued)
Discussion

The current study revealed that 65% of adult asthmatics have displayed ‘good’ treatment compliance. This higher level of compliance was observed, as the study was conducted in a clinic setting among patients who have asthma of significant severity requiring clinic follow-up in a secondary care level facility, as opposed to asthmatics in the community who may or may not be on medication with less severe asthma and not on clinic follow up. Therefore, generalizing the result to the entire country is limited. A study conducted in Egypt among 143 asthmatics at an outpatient clinic yielded compliance of 49% similar to what the WHO recorded as treatment compliance for chronic diseases (50%) (13). Nevertheless, this lower level may have been observed due to the fact that this study was conducted in a primary care level centre, and therefore among patients with less severe asthma. However, the present study results are in line with another study conducted locally at a clinic setting in a tertiary care hospital where the proportion of the study group with good compliance was 67% (11).

Patients’ age showed an inverse relationship with treatment compliance. Even though several studies (1, 5, 13), have shown a higher compliance in the elderly category, the current study showed highest compliance in the age group less than 40 years (82.9%) and lowest in the group above 55 years (63.1%). Several plausible explanations to poorer compliance among elderly patients include problems of vision and memory and the presence of other chronic illnesses, addition to, difficulty in mastering the inhaler technique among the elderly compared to the younger group (5). Females showed better compliance which can be attributed to

Table 3 (Continued)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Good No. (%)</th>
<th>Poor No. (%)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>c) Feel the need to use inhalers regularly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>156 (69.6)</td>
<td>68 (30.4)</td>
<td>$\chi^2=5.408$; df=1</td>
</tr>
<tr>
<td>No</td>
<td>82 (57.7)</td>
<td>60 (52.3)</td>
<td></td>
</tr>
<tr>
<td>d) Feel long term use reduces effects of medication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>30 (53.6)</td>
<td>26 (46.6)</td>
<td>$\chi^2=6.533$; df=1</td>
</tr>
<tr>
<td>No</td>
<td>208 (67.1)</td>
<td>102 (32.9)</td>
<td></td>
</tr>
<tr>
<td>e) Feel long term use makes one dependent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>29 (51.8)</td>
<td>27 (48.2)</td>
<td>$\chi^2=6.596$; df=1</td>
</tr>
<tr>
<td>No</td>
<td>209 (67.4)</td>
<td>101 (32.6)</td>
<td></td>
</tr>
<tr>
<td>f) Placing more trust on local medications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>10 (58.9)</td>
<td>7 (41.1)</td>
<td>$\chi^2=.242$; df=1</td>
</tr>
<tr>
<td>No</td>
<td>228 (65.3)</td>
<td>121 (34.7)</td>
<td></td>
</tr>
</tbody>
</table>

Practices

<table>
<thead>
<tr>
<th>Practices</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Ever smoked cigarettes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>29 (63.0)</td>
<td>17 (37.0)</td>
<td>$\chi^2=0.91$; df=1</td>
</tr>
<tr>
<td>No</td>
<td>209 (65.3)</td>
<td>111 (34.7)</td>
<td></td>
</tr>
<tr>
<td>b) Forgotten to take medications in past 2 weeks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>74 (54.4)</td>
<td>5 (42.6)</td>
<td>$\chi^2=5.144$; df=1</td>
</tr>
<tr>
<td>No</td>
<td>164 (69.2)</td>
<td>3 (38.8)</td>
<td></td>
</tr>
<tr>
<td>c) Regular clinic attendance (monthly attendance)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>195 (67.2)</td>
<td>31 (40.8)</td>
<td>$\chi^2=5.385$; df=1</td>
</tr>
<tr>
<td>No</td>
<td>45 (59.2)</td>
<td>95 (32.8)</td>
<td></td>
</tr>
</tbody>
</table>

Significance at 0.05 level
their higher health seeking behaviour which is consistent with the results of a postal survey in USA (1). Significant association of good compliance with educational level above GCE Ordinary Level (p=0.17) observed in our study is in line with many other studies (5, 8, 14). Gaude (2011) from India found that patients with higher education had regular compliance with therapy and did not default a single time (14). Those with secondary education had a default rate of 60% while patients with primary education level had a default rate as high as 71.4%.

The present study revealed that a monthly income level of less than Rs 25,000 was significantly associated with poor compliance (p=0.025). Even though a vast majority received inhaler medications from a hospital pharmacy, regularly free of charge (99.5%), clinic patients had to bear additional expenses for travelling and meals. Further, some elderly clinic attendees had to bear an additional expense of payment made for those accompanying them to clinics. Thus, even though medications were provided free of charge, the additional miscellaneous expenses incurred may have discouraged regular clinic attendance, resulting in underuse of medication contributing to poor compliance consistent with similar findings seen in another study conducted in Connecticut (15).

Considering perceptions and beliefs regarding disease and treatment that influence compliance, those who felt easily affected by asthma (p=0.024) and those who believed that asthma and its complications can pose severe consequences (p=0.014) were significantly associated with good compliance to asthma medication. These observations were commonly seen in a fairly large number of other studies (1, 5, 13, 16-17).

Interestingly, compliance was higher among those who were less aware regarding factors that cause their asthma to exacerbate (p=0.015) and how to avoid factors that make asthma worse compared to those who knew better (p=0.011). Even though studies assessing the association of knowledge about disease with compliance have repeatedly implicated higher levels of compliance with better knowledge (8-9), our study showed that the opposite was true. Being aware about factors that exacerbate asthma and knowing how to avoid factors worsening asthma make one less susceptible to the disease, and therefore experience less frequent attacks of asthma exacerbation. Thus, patients with less frequent asthma attacks tend to take asthma medications less often than prescribed, leading to poor compliance. On the contrary, those who are less aware about the triggering factors and about how to avoid an attack tend to experience more frequent exacerbations, therefore adhering to the prescribed regimen thus showing higher levels of compliance.

Patients who worried that long-term use of medications would reduce effect of medications (p=0.08) as well as those who felt that it would make them dependent (p=0.06) displayed poor compliance with statistically significant association. A study discovered that if patients were worried about diminishing effectiveness of medication over time, they were less likely to be compliant (16). Similarly, a prospective cohort study conducted among 85 adult asthmatics in Philadelphia concluded that in patients with chronic disease, the fear of dependence on long-term medications might be a negative contributory factor for compliance confirming our findings (17).

The proportion of patients who were aware regarding the use of inhaler medication during asymptomatic period was higher and their level of compliance was greater than those who were less aware. However, this difference observed was not statistically significant (p=0.7). Interestingly, the proportion of respondents who perceived the need of using inhalers regularly were greater in number and displayed higher compliance. However, in contrast, this difference indeed achieved statistical significance (p=0.02). The two factors are interlinked. Even though a girth of studies has found correlation between increasing knowledge regarding treatment need and improved compliance (5), the current study revealed that being aware of the need of the treatment solely does not motivate a patient to adhere to the prescribed therapy. Rather, it was their perception of the need of using inhaler medications that ensured compliance to the prescribed regimen. This is in line with Becker’s Health Belief Model, which stresses patients with stronger beliefs about the necessity of the particular treatment are likely to have higher compliance (10) similar to Martini & Pannucci (1996) who found that not all who are aware of the measures that are beneficial for their health will comply with these measures (10). In addition, perception of the need to use regular inhalers was reflected in their practice of regular monthly attendance to clinic.
Forgetfulness is a widely reported factor that causes noncompliance with medication (5, 18). The current study too discovered that forgetting to take medications was statistically significant with treatment compliance (p=0.02) with one third of patients forgetting to take medications in the past two weeks (n=129; 35.2%).

There were some limitations of this study. The study was conducted in a clinic setting and therefore included patients of asthma with greater severity requiring regular clinic follow up. Moreover, had the study been done in the community, patients, to some degree, may have displayed better levels of compliance by attending clinic itself compared to patients who may not have been attending clinics at all or were not on regular treatments. Even though self-reporting of compliance was objectively assessed by crosschecking with clinic records, having to rely on self-reporting to an extent was a limitation. Another limitation is inclusion of other diseases, which share similar symptoms despite adequate cautions taken.

Conclusions & Recommendations

A considerably large proportion of respondents showed good compliance to treatment (65%). Younger age, being female and a higher level of education and higher average monthly income were some of the socio-demographic and economic factors that were attributed to good treatment compliance. Patient perceptions and beliefs regarding disease and treatment critically influence compliance to asthma medications. Thus, coordinated efforts directed at providing patients with clear rationale for treatment that is consonant with their perception of the illness as well as addressing concerns borne by erroneous beliefs is of paramount importance, while compliance is highest (19).

Public Health Implications

Patients’ perceptions regarding disease and treatment play a major role in determining treatment compliance. Focus on development and implementation of an effective behaviour change communication model to improve compliance to treatment is therefore a timely need.

Author Declarations

Competing interests: Authors declare that they have no conflicts of interests.

Ethics approval and consent to participate: The Ethics Review Committee of the Postgraduate Institute of Medicine, University of Colombo, Sri Lanka granted Ethics clearance. Administrative clearance to collect data was obtained from the Regional Director of Health Services Colombo. Informed written consent was obtained from each participant prior to data collection.

Funding: Self-funded

Acknowledgements: We wish to express our gratitude to all staff and participants at the medical clinics at BH Homagama.

Author contributions: NN was the principal investigator of the study. NN & SG were involved in the concept and design of the study and analysis and interpretation of data. NN was involved in data collection and drafting the manuscript. SG revised it critically for important intellectual content and gave final approval.

References


Emotional and behavioural status and associated factors of children aged 11-16 years in children’s homes in Gampaha Probationary Division

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Abstract

Introduction: Emotional and behavioural conditions are common among inmates living in children’s homes due to the lack of love, affection and care compared to their counterparts living with parents, making them more vulnerable for above disorders.

Objectives: To describe the emotional and behavioural status and the associated factors among inmates aged 11-16 years of children’s homes in the Gampaha Probationary Division

Methods: A descriptive cross-sectional study was conducted. Sample size calculated was 294. Inclusion criteria was being conversant in Sinhala language. All eligible inmates of 14 children’s homes in Gampaha Probationary Division were recruited. Study instruments comprised self-rated Strengths and Difficulties Questionnaire (SDQ), interviewer-administered questionnaire and a checklist to extract relevant data from the records. Bivariate and multivariate logistic regression was carried out to identify associated factors for emotional and behavioural status. Probability <0.05 was selected as the significant level. The results were expressed as odds ratios (OR) and 95% confidence intervals (CI).

Results: Response rate was 100% (N=279). The prevalence of abnormal emotional and behavioural status was 26.2% (95% CI=21.1, 31.7). Problems with conduct were the highest (28.7%; 95% CI=23.4, 34.4) and pro-social problems were the lowest (3.6%; 95% CI=1.7, 6.5). Female sex (OR=2.4; 95% CI=1.2, 4.8; p=0.014), living in children’s homes for more than six years (OR=3.0; 95% CI=1.5, 6.0; p=0.003), having less than 10 friends (OR=2.2; 95% CI=1.2, 4.2; p=0.015) and keeping problems to themselves (OR=10.1; 95% CI=3.9, 26.2; p<0.001) were significantly associated with having abnormal emotional and behavioural status.

Conclusions: Observed prevalence is higher than figures from general population, which was 18.9%. Except sex, all associated factors were modifiable, thus early screening and establishing counselling services are recommended. Future research should focus on assessing all three versions of SDQ and qualitative research to identify root causes of the related problems.

Key words: emotional and behavioural status, strengths and difficulties questionnaire, inmates of children’s homes
Introduction

Emotional and behavioural problems are among the most prevalent chronic health conditions of childhood and often have serious negative consequences for a child’s academic achievement and social development (1). In any nation, children are considered as buds of that nation who will build up the future.

Childhood represents a time of critical development in mind, in part because a significant amount of brain development occurs during this period. Although childhood is generally regarded as a carefree time of life, many children and adolescents experience emotional difficulties resulting from conditions such as separation, death or debilitating illness of parents, being subjected to physical, sexual and emotional abuse, stressful situations that may result from poor educational performance and failure to achieve ambitions and inability to fulfil parental expectations. The children who have undergone physical abuse are said to have a higher probability of having emotional or behavioural disorders (2-3).

Children’s homes are defined as a place where children are cared for, if their parents are dead or if they are unable to take care of them (4). In Sri Lanka, children’s homes are run by both government and non-governmental organizations. Currently, the state-run children’s homes and probationary services come under the purview of the Department of Probationary and Child Care Services. Under the supervision of this department, 341 registered children’s homes are functioning throughout the country with 13,214 inmates living in these homes.

Commonly institutionalized ones are the children orphaned due to death of both parents or those abandoned by parents or those children who have been deprived of basic needs. The inmates in these homes lack the love, affection and care that are received by their counterparts who are more fortunate to have their parents with them to provide all the physical and emotional needs. Children living in these homes are likely to experience extremely stressful situations in relation to the reasons that lead them to be under such care, which might have a long-lasting impact on their development. Deprivation of parental love and care are likely to slow the progress in recovery of such stressful life events. The likely outcomes of the latter are psychiatric illnesses and anti-social behaviour. Article 9 of UN Convention of Rights of the Child (1989) mentions that “the child has a right to live with his or her parents unless this is deemed to be incompatible in the child’s best interests”.

Although there are many studies (5-8) done in Sri Lanka about mental health problems in children in general, less attention has been paid towards the emotional and behavioural status of inmates in children’s homes who are more vulnerable than those who are fortunate enough to grow up under the protection of their parents. Therefore, it is important that their emotional and behavioural status and the associated factors are assessed, in order to plan and implement strategies to overcome and manage these problems so that they turn out to be useful citizen who are socially interactive and in gainful employment and positively contributing towards the economy of the country. This study was done to describe the emotional and behavioural status and associated factors of inmates aged 11-16 years in children’s homes in Gampaha Probationary Division.

Methods

A cross-sectional, descriptive study was carried out in September 2013. The study setting was the Gampaha Probationary Division (one among three such divisions in the district of Gampaha). The study population consisted of inmates of children’s homes aged 11-16 years. Of the total 16 children’s homes, 15 were occupied by inmates conversant in Sinhala language. Permission to conduct the study was not granted by authorities of one home and hence the total number of homes included was 14, which housed a total of 279 inmates. The sample size was calculated by considering the prevalence of 50%, desired level of precision as 6% and 95% desired level of confidence. A further adjustment to the sample size was made considering a non-response rate of 10%, making the final sample of 294. Therefore, all 279 inmates were included in the study.

The self-administered version of Strengths and Difficulty Questionnaire (SDQ), checklist and an interviewer-administered questionnaire were used for the study to collect data. SDQ is an emotional and behavioural screening questionnaire which is applicable
to children and youth (9) ranging from 3-16 years. The Sinhala version is available freely to use as a screening questionnaire. There are three versions available, namely self-rated, teacher-rated, and parent-rated. In this study, the self-rated version (questionnaire) intended for 11-16-year-old children (9) was used. SDQ consists of five subscales: emotional, problems of conduct, hyperactivity, peer problems and pro-social scale. This has been validated by Perera (5) in Sri Lanka using a clinical group. Lukumar (6) had validated Tamil version of self-rated SDQ among general population of children; sensitivity 66.1% and specificity 93.7%. Checklist consisted of socio-demographic factors, information related to probationary status and current status of parents, which was obtained from documents related to the individual inmates of children’s homes. Interviewer-administered questionnaire consisted of behavioural factors (e.g. leisure time activities, problem solving methods) and social factors (e.g. Schooling, number of friends) of the inmates. Data were collected by the principal investigator after introducing the purpose of the study to the matrons who were in charge of children’s homes and taking informed written consent. In addition to the above, assent from the children was obtained.

Data analysis

A total of 25 items (each scale containing five items) are included on a three-point Likert response scale (‘not true’, ‘somewhat true’ and ‘certainly true’). The scores given for above responses were 0, 1 and 2, respectively with reverse scoring used according to positively or negatively worded items. The scores for each of the five scales were generated by summing up the item scores in the individual scales. The ‘total difficulties score’ ranging from 0-40 is derived by summing the total score received for the first four scales, which depict the negative aspect, whereas the last scale on pro-social behaviour is a positive aspect and therefore not included in computing the final total difficulties score. Based on this score, an individual child is categorised as: ‘normal’ (0-15), ‘borderline’ (16-19) and ‘abnormal’ (20-40). For analysis purpose, the last two categories were pooled together as ‘abnormal’.

Bivariate analysis using Chi-squared test was followed by multiple logistic regression to identify factors associated with emotional and behavioural status after controlling for confounding factors. At 5% significance level, the results were expressed as odds ratio (OR) and 95% confidence interval (CI). Goodness of fit was confirmed using Hosmer-Lemeshow Test ($\chi^2=14.63; \text{df}=8; p=0.067$).

Results

Majority of inmates were females (n=172; 61.6%); aged between 11-13 years (n=155; 55.6%) with a mean age of 13.4 (SD=1.8) years; of Sinhala ethnicity (n=267; 95.7%) and Buddhists (n=261; 93.6%) (Table 1). The prevalence of abnormal emotional and behavioural status among inmates of children’s homes was 26.2% (95% CI=21.1, 31.7). Of the four scales of SDQ score, the scale of ‘conduct problems’ had the highest prevalence of 28.7% and ‘peer problems’ the lowest prevalence of 11.8%.

<table>
<thead>
<tr>
<th>Socio-demographic factor</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>11-13 years</td>
<td>155 (55.6%)</td>
</tr>
<tr>
<td>14-16 years</td>
<td>124 (44.4%)</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>172 (61.6%)</td>
</tr>
<tr>
<td>Male</td>
<td>107 (38.4%)</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
</tr>
<tr>
<td>Sinhala</td>
<td>267 (95.7%)</td>
</tr>
<tr>
<td>Tamil &amp; Moor</td>
<td>12 (4.3%)</td>
</tr>
<tr>
<td><strong>Religion</strong></td>
<td></td>
</tr>
<tr>
<td>Buddhism</td>
<td>261 (93.6%)</td>
</tr>
<tr>
<td>Christianity, Hinduism &amp; Islam</td>
<td>16 (6.4%)</td>
</tr>
</tbody>
</table>

Mean age 13.4 years, SD = 1.8 years

The highest prevalence of abnormal total difficulties score was seen in 12 year (n=14; 33.3%) and 15 year (n=13; 33.3%) old inmates, whereas the lowest prevalence was among 11-year-old inmates (n=12; 20.0%). 33.7% of females and 14% of males had abnormal emotional and behavioural status. According to the bivariate analysis, female sex (OR=3.1; 95% CI=1.7, 5.9; p<0.001), living in children’s home for more than six years (OR=2.1; 95%
CI=1.1, 4.0; p=0.01), having less than 10 friends (OR=1.8; 95% CI=1.03, 3.1; p=0.04) and keeping problems to themselves (OR=8.2; 95% CI=3.5, 19.7; p<0.001) were significantly associated with having abnormal emotional and behavioural status.

Logistic regression analysis showed female sex (OR=2.4; 95% CI=1.2, 4.8; p=0.014), living in a children’s home for more than six years (OR=2.9; 95% CI=1.5, 6.0; p=0.003), having less than 10 friends (OR=2.2; 95% CI=1.2, 4.2; p=0.015) and keeping problems to themselves (OR=10.1; 95% CI=3.9, 26.2; p<0.001) were significantly associated with having abnormal emotional and behavioural status. Among the four factors that were associated with the latter, except for female sex, all others were modifiable.

### Table 2. Frequency distribution of the individual symptom scores of Strengths and Difficulties Questionnaire (SDQ) in the sample of inmates (N=279)

<table>
<thead>
<tr>
<th>Scale (Domain)</th>
<th>Total score</th>
<th>Cut off value</th>
<th>Normal</th>
<th>Abnormal</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer problems</td>
<td>10</td>
<td>≥06</td>
<td>246 (88.2%)</td>
<td>33 (11.8%)</td>
<td>8.3-16.2</td>
</tr>
<tr>
<td>Emotional</td>
<td>10</td>
<td>≥04</td>
<td>215 (77.1%)</td>
<td>64 (22.9%)</td>
<td>18.1-28.3</td>
</tr>
<tr>
<td>Hyperactivity</td>
<td>10</td>
<td>≥06</td>
<td>205 (73.5%)</td>
<td>74 (26.5%)</td>
<td>21.4-32.1</td>
</tr>
<tr>
<td>Conduct</td>
<td>10</td>
<td>≥04</td>
<td>199 (71.3%)</td>
<td>80 (28.7%)</td>
<td>23.4-34.4</td>
</tr>
<tr>
<td>Total Score</td>
<td>40</td>
<td>≥16</td>
<td>205 (73.5%)</td>
<td>73 (26.2%)</td>
<td>21.1-31.7</td>
</tr>
</tbody>
</table>

### Table 3. Factors associated with abnormal emotional and behavioural status (N=279)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>2.4</td>
<td>1.2-4.8</td>
<td>0.014</td>
</tr>
<tr>
<td>Male</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Number of friends</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10</td>
<td>2.2</td>
<td>1.2-4.2</td>
<td>0.015</td>
</tr>
<tr>
<td>≥10</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Duration of stay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;6 years</td>
<td>3.0</td>
<td>1.5-6.0</td>
<td>0.003</td>
</tr>
<tr>
<td>≥6 years</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Discussing problems with someone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>10.1</td>
<td>3.9-26.2</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Yes</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
</tr>
</tbody>
</table>
Discussion

The prevalence of abnormal emotional and behavioural status among inmates of children’s homes reported from this study (26.2%) was higher than that of the general population (n=379; 18.9%) reported by Perera from a research conducted on a national sample in Sri Lanka (5). This indicates that inmates of these homes are vulnerable, and therefore they are in need of special attention. In a research done in Bangladesh (10), the prevalence of emotional and behavioural status was 40.4% which is a higher rate than that reported from both studies conducted in Sri Lanka.

In the study done in Sri Lanka by Perera (5), the highest age specific prevalence rate (n=625; 31.1%) of abnormal total difficulties score was observed among the same age category as that of the present study. On the contrary, in the study done in Zimbabwe (11), older children reported less psychological distress than younger children (co-efficient: -0.27; 95% CI=0.5, 0.05).

In the present study, except for the hyperactivity scale, scores of other scales were higher than that of the general population reported by Perera in the study done in Sri Lanka (5), which was 4.8% for the conduct scale, 14.1% for the emotional scale and 17.9% for peer problems. The lower prevalence observed in this study may be due to the fact that the general population consists of a mix of both normal and affected adolescence, whereas the present study was focusing on a targeted group of adolescents who have been institutionalized.

Conduct problems were the commonest (n=34; 49%) reported by a study in Jordan (12) similar to the present study. Emotional problems among foster children were reported as 24% (n=67; 95% CI=19.0, 29.4) in a study done in Norway (13) which were consistent with the results of the present study (23%). In the study done in Pakistan (14), the tool used was the parent version of SDQ which was filled by foster mothers. The prevalence of peer problems for the above study was 83.9% (n=277), problems of conduct 50.0% (n=165), abnormal pro-social behaviour 47.3% (n=156), hyperactivity 12.7% (n=42) and emotional problems 9.4% (n=31). Out of three versions of SDQ (Parent rated, teacher rated and self-rated), self-rated version is used in this study. Thus, the inconsistency with regard to other studies may be attributed to individual perceptions which is strongly melded by the culture of a society.

The factors that have been considered by other researches are male sex, (10, 15) death of both parents (10, 14), longer length of stay in an institution (10, 16) and less communication with families of children who are residing in orphanages (12). There were four variables which showed a significant association with emotional and behavioural status in the present study, namely the duration of the stay of more than six years, having less than 10 friends, female sex and not discussing problems with others. The duration of stay of more than six years in the children’s homes with an OR of 3.0 for loss of parental attachment for a long period of time would cause psychological instability. In addition to this, being institutions handling a large number of children, children’s homes are places where strict discipline is maintained. Had they been at home, these regimented daily routines would be unlikely. Two other studies (10, 16) also reported that longer durations of stay in institutions are associated with psychiatric disorders. Long-term institutionalization increases the likelihood that children will grow into psychologically impaired adults (17). Hence, it is imperative that all possible measures that reduce the period under probationary care are explored.

The adjusted odds were 2.2 times higher to have an abnormal emotional and behavioural status among those inmates who had less than 10 friends in comparison to those who had more than 10. This may be attributed to the inability of inmates with psychological disturbances to interact with others. However, this is in contradiction with what was observed in relation to pro-social behaviour where 96.4% (n=269) of inmates had claimed to have normal pro-social behaviour reflecting on one’s ability to interact with others. Thus, the accuracy of information provided by the inmates in this instance remains doubtful. The children who were having more friends and getting along well with friends were related with less emotional and behavioural problems in a comparative study done in Turkey (18).

Odds were 2.4 time higher for females to have an abnormal emotional and behavioural status than males. However, Lukumar (6) found no significant association
between sex and mental health problems among school-going adolescents (OR=1.3; 95% CI=1.0, 1.7). A study done in Egypt (15), found a significant association between female children with depression (p<0.001). Contrary to the above finding, a study in Jordan (12) showed that males were more likely to have abnormal psychological scores than females (p<0.05). Similar results have been reported in studies done in Cairo (16) and Sri Lanka (6).

The odds were 10.1 (OR=10.1; 95% CI=3.9, 26.2; p<0.001) times higher to have an abnormal emotional and behavioural status among those inmates who did not discuss their problems with others in comparison to those who did. However, the wider confidence interval reflecting low precision, suggests inadequacy of the sample size even though it achieved a highly significant association. Just narrating/discussing one’s problems itself can exert a therapeutic effect by reducing the stress. In a study conducted in Turkey (18), it was revealed that children with lower problem-solving skills had higher behavioural problems.

The total eligible study participants in all the 15 Sinhala language conversant children’s homes in Gampaha Probationary Division was 319. One of the homes consisting of 40 (12.5%) inmates refused permission to be included in the study. This non-participation may have led to a selection bias which might have had an impact on the prevalence rates reported. It also impairs the ability to generalize the results to all the 15 homes which house the Sinhala conversant inmates. With regard to assessment of associated factors, confounding has been controlled by applying multiple logistic regression which may be considered a strength of the study. Being a cross-sectional descriptive study design, it is not possible to assess temporal association with regard to cause and the effect. This is considered a limitation inherent to the study design.

Conclusions & Recommendations

The findings of the study revealed a high prevalence of abnormal emotional and behavioural status among the inmates of children’s homes, compared to the general population. This finding underscores the need to establish a screening system to detect abnormal psychopathological status of inmates living in children’s home as they are a more vulnerable group. There should be a mechanism of referring these identified inmates who are having an abnormal psychopathological status to a child psychiatrist for further management. Also, provision of regular counselling services for the inmates is a timely need.

Public Health Implications

Emotional and behavioural conditions are common among inmates living in children’s homes due to the lack of love, affection and care compared to their counterparts living with parents, making them more vulnerable for above disorders. A number of modifiable factors could be addressed to prevent these emotional and behavioural conditions and can establish early screening and counselling services to reduce the present condition of emotional and behavioural conditions in the children’s homes.

Author Declarations

Competing interests: Both authors do not have conflicts of interest.

Ethics approval and consent to participate: Ethics approval was obtained from the Postgraduate Institute of Medicine. Informed written consent was obtained from the guardian and verbal assent obtained from the participants. Written permission was taken from the Commissioner of Western Province, Department of Probation and Child Care Services as well as the from the management of individual children’s home before the commencement of the study.

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Author contributions: DMS was the principal investigator and PJ was the supervisor.
References


Introduction

Globally, employee wellbeing has gained much interest and attention among policy makers and employers due to its impact on employee performance and organizational effectiveness. Hence, work settings are identified as venues for investing on employee wellbeing, disease prevention and health promotion. Wellbeing is an overarching term which encompasses both health and wellness and is characterised not only by good health or wellness but also comfort, satisfaction with one’s work and home life, personal prosperity and some measure of happiness. Therefore, wellbeing of an employee represents positive functioning of the worker rather than traditional focus on absence of ill-health and poor functioning only (1). A major challenge faced by the governments in providing occupational health and safety (OHS) services for the workforce is lack of service personnel to attend to the range of health needs in work settings. Establishment of workplace wellbeing groups and champions initiative has shown success as a sustainable and feasible solution to face this challenge (1).

Nearly half of the total global population consists of workers (3.49 billion), of which majority live in the low- and middle-income countries (LMIC) and middle-income countries (MIC). In Sri Lanka, out of the 21.7 million population, 8.64 million are workers (2-3). Moreover, many employees spend majority of their waking hours in workplaces or are engaged in work (4). Hence, focusing on employee wellbeing would firstly lead to reductions in healthcare costs from accidents and injuries, care provision, mental health issues (4) and health insurance premiums, and secondly increase employee engagement, working capacity and productivity and reduce sickness absenteeism and staff turnover. The cumulative effect of all these would facilitate organizational effectiveness and economy of the country in the long run. Also, evidence suggests the organizations where employee health and wellbeing are addressed have shown to outperform those that do not by 10% (5). Hence, greater return on investment through employee wellbeing programs have been demonstrated (5). As a result, most enterprises and organizations particularly in developed countries and large organizations in the corporate sector focus on implementing employee wellbeing programs in workplaces (1).

On the other hand, in achieving Sustainable Development Goals (SDG), governments are committed to restore health and safety of the workforce to ensure decent work (SDG 8) and health and wellbeing (SDG 3).
for all in a country (6). Adding to these, the economic and social costs due to the unacceptable levels of work-related stress and mental health problems draw urgent attention of the government on promoting worker wellbeing. However, a challenge most countries face in carrying out health and safety functions and workplace wellbeing programs is lack of human resource for carrying out such interventions at workplaces. According to the report on situational analysis of OHS in Sri Lanka 2016, lack of health and safety inspectors in divisional level for OHS was a major drawback in carrying out OH&S functions in the country (7). Employers also have a shared responsibility in initiating and continuing workplace wellbeing programs relevant to specific work settings for the benefit of the employees and thereby the organization. Organizational level initiation of such interventions would thereby provide ownership to the organization and facilitate sustainability, and also reduce the burden on the government too.

Workplace wellness programs have traditionally been focusing on individual behaviour change. However, research has revealed that organizational culture specific factors may be key determinants of the effectiveness of organization-wide interventions focusing on mental health and wellbeing. Hence addressing unique organizational needs through creation of a ‘healthy organization culture’ and adopting a participatory and non-stigmatizing approach are identified as effective systemic methods (8). It is thus essential to acknowledge the full picture of the workplace environment and impact of the employee experience by putting employees at the centre. This necessitates redesigning workplace practices particularly those of wellbeing to fit with employee interests and needs through participatory approaches. In this effort management involvement and commitment throughout is equally essential. Most notably addressing the obstacles and creating conditions for employees to practice healthy lifestyles within work settings are important (9).

Pioneering this task under the Helping Great Britain Work Well Strategy, the Health and Safety Executive of United Kingdom (UK) has introduced Wellbeing Champion Program (WCP) in workplaces as a novel approach to implement employee wellbeing programs in the UK (8-9). The wellbeing or business champions are identified as drivers to forward organizational change with the aim of producing a culture that promotes wellbeing specific to the respective work setting.

**Workplace wellbeing champions**

Wellbeing champion is a member of staff employed by an organization who is supported to design, deliver and perhaps evaluate healthy workplace programmes (8). The champion is a self-identified employee who value health and wellbeing, has a genuine interest in supporting their colleagues and want to promote a ‘grassroots’ approach to wellness programs. Hence, the crux of the role of champion is to regularly engage and empower the colleagues in activities that promote their own wellbeing.

**Wellbeing champion program (WCP)**

This is a multi-stage process (10). Identification and training of dedicated wellbeing champions is the key to success for this organization driven wellbeing program. The number of champions invited from each workplace depends on the size of the organization and the existence of varying units within the work setting. The key stages of the WCP are:

- Program development
- Resource development (e.g. identification of employee wellbeing specialists; development of training manual, information education communication material and communication messages)
- Recruitment of the champions
- Orientation training for the wellbeing champions
- Regular evaluation

**Training of wellbeing champions**

The employee wellbeing specialists from either Health and Safety Executive staff or Local Authority staff, deliver workshops for the current and new wellbeing champions to connect with available resources, offer creative and feasible methods to implement ideas (10). In addition, wellbeing champions are provided with activities and tools for them to create meaningful activities within their work groups.
However, champions are empowered with skills to develop new tools and practices along with their work members themselves, because ownership and trust are most important characteristics of program adherence.

Champions are given the autonomy to promote programs of personal and work group interest. The promotions can cover several domains of wellbeing such as physical activity, healthy diet, volunteerism, team building, social interaction, stress management, financial wellbeing and new experiences of the group. Hence, the capacity building emphasises skill development in these aspects.

**Role design of the champion**

The functions of these wellbeing champions were based on an organizational wellbeing strategy, which mainly focused on six pillars of wellbeing: social, physical, emotional, financial, work-life integration and meaning of work. Behaviour change principles and social cognitive theory provide base for a well-designed WCP, emphasising the importance of peer support and social networks for individual behaviour (9). Wellbeing champions provide a critical peer support needed to improve and maintain healthy behaviours among co-workers.

The wellbeing team is expected to create diverse, scalable, expert driven evidence-based programs to enhance employee wellbeing. An agreement with organizational leadership is obtained to provide at least 1-5 hours per month for champions to carry out activities and attend meetings during workdays. These expectations are reviewed through a supervisor agreement form. Supervisors are identified within the work setting for the champions. Clear roles and responsibilities between the supervisor and the wellbeing champions are established at the onset of the champion taking the role (9).

**Recognition and retention of champions**

Retention, recognition and evaluation of champions determine the effectiveness of this program and associated activities in sustaining it. As a measure of rewarding the champions and their supervisors, the wellbeing specialists coordinate annual recognition banquet, celebrate both champion role and the support of the supervisor. Awards are given for honours such as ‘supervisor of the year’, ‘well-being champion of the year’, ‘best well-space’ and ‘unsung hero’ (9).

**Effectiveness of wellbeing champions in promoting workplace wellbeing**

In a study carried out among 65,000 employees at a geographically and functionally diverse health care organization (1), with a 73% responsive rate; revealed presence of a wellbeing champion was significantly associated with a more favourable impression of personal and organizational wellbeing.

Combined systemic approaches working at both organizational and individual level to foster healthy organizations and sustain individual wellbeing worked particularly well if they were also participatory and followed a bottom-up approach (8).

In a forbidding economic climate, sustaining change should not rest only on a charismatic champion, but involve developing high-quality models for capacity building and embedding the practice into the system or organizational culture. Therefore, the effectiveness and sustainability will depend on employee engagement, identification of organizational culture and exploration of strengths, weaknesses, opportunities and threats within the organization for such programs (11). Public Health England in its Complete Handbook for Champions at Workplace gives five key functional areas for workplace champions (11).

### Five ways to wellbeing at work

- **Connect**
  - Talk & Listen, be there, Feel connected
- **Give**
  - Your time, words and presence
- **Take Notice**
  - Remember the simple things that give you joy
- **Keep Learning**
  - Embrace new experiences, See opportunities, Surprise yourself
- **Be Active**
  - Do what you can, enjoy what you do, Move your mood
Wellbeing Champion Programs have been proposed as a high reach strategy to enhance employee participation in broader wellness at workplace and has an impact on workplace healthy living behaviours (12). However, WCP could impact the wellbeing and satisfaction when implemented as part of a comprehensive employee wellbeing strategy. Furthermore, leadership influence is likely to be pivotal hence engaging senior management and employers in promoting activities from inception is vital (8-9).

**Conclusion**

Implementation of well-coordinated, employee centred, and organization specific structured workplace wellbeing champion programs have found to be effective in promoting personal and organizational wellbeing. In the context of lack of human resource for workplace health and wellbeing functions in Sri Lanka, possibility of incorporation of this type of evidence based effective interventions may pave path for solutions for a long-standing issue which existed in the occupational health and safety system in the country.

**References**

Flattening the epidemic curve of COVID-19 in Sri Lanka: the public health response

– A Communiqué from the College of Community Physicians of Sri Lanka

Correspondence: kapjay613@gmail.com  https://orcid.org/0000-0001-9795-4342
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The College of Community Physicians of Sri Lanka (CCPSL) is the apex professional body for the practice of public health in Sri Lanka. The CCPSL functions as a strong and informed professional body to advocate promotion and prevention of disease of the people of Sri Lanka. The CCPSL is responsive to the current and emerging public health challenges conforms to evidence-based approaches and principles.

Countries can change the course of the pandemic, if the basic public health principles are adopted as guided by the WHO based on country-specific contexts. In this respect, the CCPSL strongly advocates that the current COVID-19 epidemic in Sri Lanka be controlled through a strong-willed, evidence-based public health response.

An epidemic curve is used to visualize and to predict when new cases are reported and at what speed, during a disease outbreak such as Covid-19. It depicts the number of cases by day, week, or month in the geographical location. Epidemics follow a plot line of increasing cases, and eventually resolve, whether responding to interventions or having exhausted the supply of susceptible persons.

An outbreak progresses through the following stages:

**Stage 1:** No cases – No reported cases

**Stage 2:** Sporadic cases – One or more cases, imported or locally acquired

**Stage 3:** Clusters of cases – Most cases of limited transmission linked to chains of transmission of either being exposed to a family member being exposed (family cluster) or to neighbours or other close contacts (village clusters)

**Stage 4:** Community transmission – Cases without an epidemiologic link are common in the community

Up to date, 571,678 confirmed cases and 26,494 deaths have been reported world-wide due to Covid-19 pandemic and in Sri Lanka, there are 117 confirmed cases with only one death. We are now in stage 3 of clustering of the cases within villages. Every effort should be made to prevent progression of the disease to next level, since it would be very difficult to stop the increase of cases with community transmission beyond the current stage that we are in.
The response to any epidemic of this nature includes (Figure 1):

1. Totally containing the outbreak at a very early stage
2. Flattening the curve
3. Raising health system capacity

![Epidemic response](https://example.com/figure1.png)

**Figure 1. Epidemic response**

‘Containment’ through a comprehensive approach (first response) would still be the major objective as the cases originating from local transmission are few. We also consider ‘flattening the curve’ (second response) may be the next best to slow the corona virus spread.

**What is flattening the curve?**

Flattening the curve means to keep the patient load at any given time at a level manageable by the health services. That is to slow down the transmission of the disease so that the health services will not be saturated. Usually, it takes approximately 2 weeks from the appearance of the first few cases to the onset of a larger outbreak. This interim period is the most crucial time for timely and appropriate public health measures.

**The country response**

In the absence of a COVID-19 vaccine, any country’s aim has been to reduce contact rates in the population and thereby reduce transmission of the virus through non-pharmaceutical public health interventions. This could be achieved through two fundamental strategies:

- **Suppression** – aims to reverse the epidemic growth, reducing case numbers to low levels and maintaining that situation indefinitely
- **Mitigation** – focuses on slowing the epidemic spread — reducing peak healthcare demand while protecting those most at risk of severe disease from infection
Sri Lanka is mainly focusing on suppression of the curve, by applying a combination of public health interventions, such as social distancing of the entire population, home isolation of cases and household quarantine of their family, and school and university closures. Sequence of events is given below.

On 11\textsuperscript{th} March 2020, the first local case was identified in Sri Lanka. The reporting of a local case gave rise to the need for urgent and aggressive action and the health and non-health authorities executed a cascade of measures. The following figure depicts some of the key interventions implemented in Sri Lanka, in relation to the reported cumulative number of cases over the time (Figure 2).

Broadly, Sri Lanka implemented a whole-of-government, whole-of-society approach in the following key areas:

- Activate and scale up emergency response mechanisms
- Communicate with people about the risks and how they can protect themselves
- Find, isolate, test and treat every case and trace every contact
- Ready hospitals to protect and train health workers
- Encourage an all-of-society response and community spirit
- Implement all the non-health sector measures
The country adopted timely and evidence-based approaches for the epidemic response advocated by the WHO:

1. Emergency response mechanisms
2. Risk communication and public engagement
3. Case finding, contact tracing and management
4. Surveillance
5. Public health measures (hand hygiene, respiratory etiquette and social distancing)
6. Laboratory testing
7. Case management
8. Infection prevention and control
9. Societal response (business continuity plans and whole-of-society approach)

**The role of public health hierarchy in this epidemic response**

The CCPSL places on record the active and substantial contribution of the entire public health hierarchy from the grass root level Public Health Inspector and Public Health Midwife to the highest central level public health policy makers and administrators in various capacities and facets of the epidemic response.

This emergency is declared by the WHO as a “Public Health Emergency”. In response, under the directives of Hon. Minister of Health, Secretary, DGHS and Additional Secretary Public Health, the following preventive health teams have been in operation consistently:

- **At national level** – Deputy Director Generals Public Health, Directors in Public Health (Epidemiology Unit, Quarantine, Health Promotion Bureau, Disaster Management, Family Health Bureau), consultant community physicians, medical officers, special grade public health nursing officers and other staff supporting all the public health programmes are contributing at their highest capacity.

- **At provincial and district level** – The Provincial Director, Regional Director, consultant community physicians, medical officers, special grade public health nursing officer, special grade public health inspector and all Provincial and District level staff and at Divisional level the soldiers of public health led by the regional epidemiologists, medical officers of maternal and child health (MO-MCH), medical officers of health (MOH), public health nursing sisters, public health inspectors, public health midwives all other categories work as team which has shown a remarkable sense of team.

The primary medical care teams also play a critical role in preventing and early detection efforts at the grassroot level including general practitioners.

**Public health teams contribute in the following areas:**

- **Epidemiology Unit** – As the National Focal Centre of infectious diseases, the Epidemiology Unit advocates policy makers, formulate guidelines, execute a stringent surveillance on cases, contact tracing, collate data and disseminate information for the entire country. The highest-level technical guidance and advocacy on the epidemic response is originating from the Epidemiology Unit, and the success the country has achieved so far is largely due to the continued activities of the Epidemiology Unit guided by Chief Epidemiologist.

- **Quarantine Unit** – It launched an early response, starting with active screening of all travellers coming into the country with thermal scanners at all points of entry to the country. Further, they referred all sick patients for medical care, educated all passengers on preventive measures, details retrieved from returnees from suspected countries were sent to respective MOH areas. They are currently working in collaboration with armed forces in the quarantine process for returning travellers.
3. **Health Promotion Bureau** – It has implemented a pragmatic and successful media strategy using innovative modalities, and is acting as a reliable government body to take on the challenge of modifying behaviour and practices of people to face the epidemic, while counter-acting the misinformation and myths.

4. **Family Health Bureau** – It set out guidelines on pregnant mothers and children and closely coordinating with MOMCH, MOOH, PHNS, SPHM and PHM on the implementation of the activities at the ground level.

5. **Ground Level** – Early detection of cases and tracing close contacts are the evidence-based effective strategies during the early stage of an epidemic. A network of MOH staff with the guidance of Consultant Community Physicians and Regional Epidemiologists, nearly 900 medical officers of health from 357 MOH areas engage in contact tracing, surveillance on self-quarantined persons and educate general public with the active involvement of Public Health Inspectors and PHMs.

6. **Disaster Preparedness & Response Division** – This division is closely working with the public health teams.

The caseload could have been many more if not the effective interventions initiated by public health teams in traveller screening, case detection, contact tracing, early reporting, early isolation/ quarantine and mass health education coupled with other strategies were in place. The public health efforts resulted in containing the epidemic without progressing into the stage of community transmission.

**Have we done enough – what has been shown to be effective?**

The epidemic is continuing. The country has implemented a multi-faceted, multi-stakeholder and society-oriented strategies at their best to counteract the expected damage. Learning from the successes and failures of other countries which faced similar situations would be of immense help to reshaping the current strategies and introducing new modalities.

We emphasize that “China has rolled out perhaps the most ambitious, agile and draconian disease containment effort in history”.

<table>
<thead>
<tr>
<th>China</th>
<th>Sri Lanka</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Unified and effective command system</td>
<td>Early setting up the National Corona Task Force</td>
</tr>
<tr>
<td>2. Law- and science-based strategies</td>
<td>WHO guided scientific strategies backed by Police and other armed forces by enforcing quarantine act</td>
</tr>
<tr>
<td>3. Coordinated deployment of resources</td>
<td>A National Operation Centre headed by Army Commander established. Sri Lanka Army, Police and other government agencies are deployed strategically</td>
</tr>
<tr>
<td>4. 4-Earlys (Early detection / Early Reporting / Early Isolation / Early Treatment) &amp; social mobilization</td>
<td>All 4 Early’s including prevention of imported cases done. Multi-sector social mobilization implemented</td>
</tr>
<tr>
<td>5. Rapid improvement in treatment capacity</td>
<td>Expanding treatment facilities / ICU capacity. Mobilization of health staff</td>
</tr>
<tr>
<td>6. Application of high tech</td>
<td>Digital health approach in case finding and contact tracing and media strategies</td>
</tr>
<tr>
<td>7. “For the people and of the people”</td>
<td>Social mobilization with media</td>
</tr>
<tr>
<td>8. International exchange and cooperation</td>
<td>Collective work with SAARC countries and WHO</td>
</tr>
</tbody>
</table>
The following figures show interventions taken by different affected countries at different phases of the epidemic:

<table>
<thead>
<tr>
<th>Country</th>
<th>Key strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Korea</td>
<td>Early large-scale testing for Covid19 and trace contacts program</td>
</tr>
<tr>
<td>Japan</td>
<td>Strong social norms around obedience and mask wearing</td>
</tr>
<tr>
<td>Singapore</td>
<td>Strict quarantine rules and contact tracing</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>School closures, quarantine and community response</td>
</tr>
</tbody>
</table>

Source: FT analysis of Johns Hopkins University, CSSE; Worldometers. Data updated March 21. 19.00 GMT
Are we on track?

The CCPSL firmly believes that we are on the right track and that we have strategically implemented many of the interventions far ahead of other countries even without a single death being reported. However, the country needs to continue in the same path in heightened scale with appropriate new strategies. We acknowledge the strong political leadership provided by His Excellency President, Prime Minister and Minister of Health. Their commitment is in line with the Director General WHO’s call for a “Whole Government Approach”. The Army Commander’s role and contribution brought success of the total quarantine process. This could not have been achieved with only the health sector. Sri Lanka Police is ensuring law and order during the social distancing. All the other ministries, agencies and professional bodies are supporting at their highest level in the response.

The CCPSL proposals for the future challenges in the epidemic response

Sri Lanka sets an example to the entire world, with its timely and effective response to the global epidemic despite being a low- and middle-income country. This highlights the importance of investing in public health. Although, we have done so far sensibly, the CCPSL proposes following strategies to address the future challenges in the epidemic response:

1. Learn from the successes of other countries
   Success of China, South Korea and Japan and also the failures of Italy, Spain, Germany, UK and USA should be analyzed in depth and thereby, current strategies need to re-shaped. We should acknowledge the importance of;
   • a whole government approach with optimal intersectoral collaboration and coordination
   • a total system approach to manage health security (clinical services, population health, surveillance, science)
   • transparency and accountability

2. Streamline the state of isolation or restricted access instituted as a strategy
   Several issues have been encountered in the implementation of this strategy. To address the challenges, it is necessary to introduce a people-friendly intermittent relaxation of lockdown and improve social responsibility through culture change. It is imperative to strengthen non health measures such as availability of food and medicines, economic packages for all sectors affected, special care for financially vulnerable families, enforce laws to improve infection prevention and social distancing. We recommend that this strategy be reviewed after two weeks and change where necessary.

3. Personal hygiene and social distancing
   Further strengthening community mobilization and mass campaign for personal hygiene and social distancing adopting new behaviours in the outbreak context should be considered as a ‘nation at war against COVID-19’. It is crucial that we sensitize the public to their active role in the response, such as on social and physical distancing – staying home and the one-meter rule at all times including transport.

4. Sub-national and non-health sector preparedness and response plans
   Engage with key partners to update national and sub-national preparedness and response plans. Building on the existing strategic preparedness and response plan of COVID-19, exploration of possible collaboration options with the non-health sector should be undertaken.

5. Raising health system capacity and readiness
   In addressing the challenges in raising health system capacity and readiness, the aims should be:
   • preventing transmission in facilities and homes and not to overburden system
• ensure capacity to treat severe and critical patients while maintaining essential health services
• protect health workers for continued care and service

When the severity profile of COVID-19 cases is considered; 40% mild, 40% moderate (with Pneumonia), 15% severe and only 5% become critical cases. Severe patients need oxygen therapy and critical cases need mechanical ventilation. Estimated numbers requiring hospitalization based on current size of outbreak cannot be precisely predicted. At the same time, it is essential to expand the capacity of mild patient admission and to deploy/ surge medical teams from nationwide depending on the increasing case load.

6. Self-quarantine process

More stringent quarantine process for persons exposed and close contacts should be deployed. Singapore showed the success of the strict quarantine rules. Introduce quarantine for persons with fever/other symptoms, suspects and close contacts for better compliance and outcomes.

7. Protection and appreciation of key healthcare workers

Sustenance of the epidemic response is largely dependent on the active involvement of the healthcare workers. It is equally important to protect them from being victims of the epidemic itself and also to keep their morale high. This is very much needed for public health staff as their contribution has not been adequately recognized or appreciated at national level. Ultimately, they might become unsung heroes of the ongoing battle. It is important to ensure adequate supply of personal protective equipment (PPE) for all the HCW dealing with patients and in preventive sector, and also to ensure the rational use of any PPE based on Ministry of Health guidelines which was adopted from WHO guidelines.

8. Disease stigma

The CCPSL is concerned with the stigma generated on identified cases and contacts by officials and media. We, CCPSL, reiterate that stigma is harmful to people and to the outbreak response. Stigma can drive people to hide the illness to avoid discrimination, stop people from seeking health care immediately and prevent people from adopting healthy behaviours.

9. Sustaining care for the non-COVID patients

Ensuring survival of the other patients is also crucial. When the whole system is geared to protect people from Covid-19, the focus for other disease entities and non-Covid patients will be diluted. Therefore, it is essential to introduce triage systems, reserving tertiary main hospitals for non-COVID patients. Vulnerable groups include: patients with chronic diseases who need regular treatment and drugs, e.g. dialysis; critical patients such as cancer patients, and those who have to seek rare medical treatment elsewhere; pregnant women who need regular prenatal check-ups; older people, those unable to leave the house and residents of different kind of institutions.

10. Further collaborations with media on providing public awareness on COVID and getting the public mobilized to meet their obligations as responsible citizens through dissemination of authentic and evidence-based messages and information on the epidemic. There is already a successful media campaign launched by the Health Promotion Bureau. It should be strengthened by giving dedicated media time for dissemination of current epidemic information.

11. Compilation of the evidence of COVID-19 of all countries in a dynamic e-repository.

The future challenges

Epidemic response is a dynamic process and strategies may also need to change depending on the dynamics of the outbreak. The general public needs to understand this reality and have a right to know the true facts. They should develop trust on the government’s country-specific approaches and maximally support such efforts as all
the interventions are executed with a valid reason and purpose. However, both the authorities and the people need to think carefully, weigh risks in context, and pursue interventions commensurate with the magnitude of the challenge.

We are reaping the gains again of the well-structured public health system of this country bringing about astounding results in this pandemic situation. In Sri Lanka, already existing public health system consisting of a battalion of field health staff are geared for needy interventions which is seen as a feasible task and an approach immensely helping to flatten the curve.

At the same time, it should not be ignored that we may be at greater risk of exaggerated fears and misplaced priorities as history suggests. We should understand the limited evidence on epidemic progression in tropical countries like Sri Lanka. With 95 years of experience in having a strong public health system and being a tropical country; the behaviour of the epidemic will be more likely to be different to the temperate countries. As such, what may be predicted may not be applicable in unique contexts of our country.

We urge the government, community leaders, other stakeholders and general public on the need of concerted efforts to fight against the country’s worst challenge in the millennium.

At the same time, the CCPSL is happy that the Covid-19 outbreak forced an entire community to take refuge in multiple healthy behaviours which would have never been adopted with the traditional health education approaches and behaviour change. Capitalizing on the context of the Covid-19 outbreak, our long-term target is a “Healthy Sri Lanka”.

College of Community Physicians of Sri Lanka

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Brief Report

Social distancing and its impact on flattening the COVID-19 curve in Sri Lanka

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What is social distancing?

Social distancing is a non-pharmaceutical intervention that has proven over time to be an effective public health tool in controlling outbreaks that spread from person to person (1). It is implemented by maintaining a minimum recommended physical gap between two persons, so that the infectious agent cannot spread from the infected to non-infected person through droplets, and thereby reduces the number of cases during an outbreak. There are disputes regarding the optimal distance that one should maintain to effectively practice social distancing. Guideline by the Centre for Disease Control recommends a physical distance of 2 metres (2), while the World Health Organization’s recommendation is for 1 metre (3).

Public health importance of social distancing

Social distancing as an intervention is important as it may represent the only type of measure guaranteed to be available against a novel strain of influenza in the early phases of a pandemic (4). According to the evidence thus far, the main mode of transmission of the current COVID-19 outbreak is thought to be droplet transmission. A key goal of counter-acting an epidemic of droplet transmission is to decrease the encounters between the infected individuals and susceptible individuals to decelerate the rate of disease transmission. This holds valid especially for infectious agents which display a higher basic reproduction rate \(R_0\), which is defined as the number of secondary cases that one case would produce in a completely susceptible population (5).

For the SARS-CoV-2, \(R_0\) is predicted to range from 1.4 to 2.5 (6), meaning that one infected person would transmit the virus to 2.5 susceptible persons until the index case becomes symptomatic, gets diagnosed and isolated which is usually taken as 5 days (7). Using this \(R_0\), a summation formula is developed to estimate the number of new infections over time, across three scenarios:

- No social distancing practiced
- 50% of the population practicing social distancing and
- 75% population practicing social distancing (8)

Accordingly, for COVID-19, the number of persons to whom one infected person can spread the disease at no social distancing is calculated to be 2.5,
while for 50% less exposure due to social distancing, it is 1.25 and for 75% less exposure due to social distancing, it is 0.625 (Figure 1).

Figure 1. Number of secondary cases generated from a single infected person in three different scenarios of social distancing
Source: Signer laboratory, Social-distancing.com

The assumptions behind the mathematical summation presented by Signer et al. are:

1. R_0 to be 2.5
2. An infected individual to spread the virus during the median five-day incubation period before he becomes symptomatic
3. Once symptomatic, the index case to isolate and no longer infect others
4. A linear correlation between social interactions and R_0.

Application of social distancing interventions in Sri Lanka

There are numerous ways one can practise social distancing. These include,

- No handshaking or hugging
- Avoiding crowded settings like marketplaces, public transport and banks
- Avoiding mass gatherings like social events or ceremonial/religious events
- Maintaining an approximate distance of 6 feet (2 meters) from others

Social distancing invariably means zero touching of other people at all possible times. It is particularly important to maintain the distance from anyone who is having signs of illness, like coughing, sneezing or fever.

On the advice of public health specialists, the government pro-actively took drastic actions to facilitate social distancing interventions among the public to contain the spread of the outbreak in the country. These measures include,

1. Closure of schools (9) and preschools (10)
2. Closure of universities (11)
3. Prohibition of mass gatherings including festivals, sporting events and certain religious activities (12)
4. Closure of social/leisure settings like cinema (13), zoological/ botanical gardens (14) and museums (15)
5. Declaration of public holidays for the workforce (16)
6. Announcement on ‘work from home’ period for the public (17)
7. Island-wide curfew (18)
8. Cluster-isolation of some villages (19)
9. Home delivery of essential goods (20)
10. Home delivery of medicines for patients suffering from noncommunicable diseases (21)

National level interventions as given above are vital for ensuring social distancing among people. However, changes in the behaviour at individual level play a key role, especially when most of these interventions are practically difficult to be maintained for long periods of time.

Impact of application of social distancing measures in Sri Lanka

In Sri Lanka, the first diagnosed local case of COVID-19 was reported on 11 March 2020. As discussed above, social distancing measures were...
implemented immediately after in a cascading manner. Effect of these interventions on the control of the COVID-19 outbreak in Sri Lanka was estimated using Signer’s theoretical possibility.

The total number of persons who would develop the infection via the first case reported on 11 March 2020, was estimated up to the period 4 April 2020, under the three scenarios (0%, 50% and 75% social distancing), according to the summation model. Assuming this case became symptomatic 5-days (which is the median incubation period for the disease) after contracting the infection, the number of persons that this case had infected by 11 March would be 2.5. As shown in Figure 2, this number would exponentially increase every 5-days and amount to 406 infected persons by 4 April 2020, if there was no social distancing throughout the period. The corresponding estimates if individuals were practising 50% and 75% social distancing measures implemented from the very first case detection would be 15 and 2.5, respectively. However, Sri Lanka changed this trend promptly by implementing two important public health interventions by 15 March (school, pre-school and university closure and ban on public events, representing around 50% social distancing) and on 20 March (island-wide curfew representing around 75% social distancing). The blue line in Figure 2 demonstrates this change in the number infected up to 4 April 2020 via the first case, which is approximately 26, when computed according to the change in R₀ following the social distancing measures that were initiated at different time points in Sri Lanka. This may imply that by 4 April 2020, Sri Lanka was able to potentially prevent 380 persons contracting the infection from the index case, through social distancing measures. It should however be noted that these estimates have been drawn only in relation to the index case, while all other cases reported beyond 11 March 2020 had been disregarded; and will invariably be greater when the spread by subsequent cases reported are added according to the summation theory to the total number infected.

![Figure 2](image-url)
In an attempt to re-calculate these estimates according to the summation theory applied to the subsequent cases as well, Figure 3 shows that the total number who would have been infected by 4 April 2020 would be approximately 8770, if there was no social distancing. The same estimates if people were practicing 50% and 75% of social distancing were nearly 867 and 361, respectively. Figure 3 also demonstrates the number estimated to have had the infection by the same date, in relation to the main social distancing events that were implemented in Sri Lanka, which was approximately 637. When considering the actual number of reported cases of 171 by 4 April 2020, this estimate may imply that only about 25% of the infected persons have become symptomatic and consequently diagnosed as confirmed cases in Sri Lanka.

These projections give us some clues on the impact of social distancing on the reduction of infected persons in the country. However, these estimates should be interpreted with caution as \( R_0 \) is well-known to have limited practical value outside the population from which the disease data originate. Further, exact contribution of each intervention to the number prevented is difficult to be determined, all of which could be addressed by robust mathematical modelling. For this purpose, the local evidence on \( R_0 \) and the average exposure time of individuals to social distancing need to be available. It was therefore assumed that all cases were equally infectious to others during the first five days of being infected (7) and that every case reported was from an independent cluster of contacts. Further, the potential secondary cases were estimated considering the cumulative caseload reported during 5-day interval periods according to the summation assumptions.

Figure 3. Estimated number of infected persons corresponding to social distancing scenarios and interventions implemented in Sri Lanka

Note: Y axis truncated at 1000 for better visualization of the curves
Gaps in the existing knowledge

The effectiveness of social distancing depends on many factors. The \( R_0 \) of the disease in the local context, possible modes of spread of the infectious agent, median incubation period for the disease in the local setting, as well as response of the people to inflicted social distancing measures and probability of change of behaviour at individual level are a few to mention. At global level, evidence is still unclear on the exact mode of spread of the disease to recommend the exact distance to be maintained between two persons to achieve desirable outcomes, resulting in different guideline (2-3). At local level, there are serious gaps in the knowledge even on basic information such as \( R_0 \) and median incubation period of SARS-CoV-2, due to scarcity of local data.

Recommendations to overcome the challenges in Sri Lanka to contain the outbreak

Determining the \( R_0 \) as the epidemic evolves as well as the median incubation period based on local data on confirmed cases of COVID-19 and their contacts, will have major implications in evaluating the applicability of recommended social distancing interventions as well as in planning of other non-pharmaceutical interventions to lower the spread of corona virus infection in Sri Lanka.

Compared to its baseline, Sri Lanka has reported 87\%, 86\% and 78\% less mobility trends to grocery and pharmacy, to retail and recreation settings (restaurants, shopping centres, libraries and movie theatres etc) and to transit stations (public transport hubs, bus and train stations), respectively (22). However, most social distancing measures executed in Sri Lanka achieved desired results through forced distancing, but not through behaviour change of individuals. Consequently, the threat of all the desirable effects achieved through social distancing taking a U-turn once the national level implementations are lifted persists. Maintaining the effectiveness of social distancing through individual behaviour change remains the biggest challenge faced by public health specialists in Sri Lanka at present. Therefore, novel and effective strategies should be used to educate and promote desirable behaviour changes of the public at individual and family level.

Author Declarations

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Author contributions: SH drafted the manuscript and carried out all the relevant calculations on estimates. SH, NW, SJ, SP and CA were involved in conceptualization of the study, interpreted the data, and edited the article. DS reviewed and commented on the final draft.

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