

# A SEMI-STRUCTURED INTERVIEW TO STUDY THE FACTORS CONTRIBUTING TO OBESITY AMONG MALAYSIAN SECONDARY STUDENTS

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## Abstract

The prevalence of obesity among Malaysian secondary school students is increasing gradually. NHMS 2019 reveals that 29.8% children of the age five to 17 years have excess body weight. Prolonged energy imbalance which is caused by high calorie diet consumption and physical inactiveness, could lead to excess body weight. Despite several measures and initiatives, the prevalence of obesity among Malaysian secondary students is hiking up, presumably due to some reasons. Hence, this qualitative study is carried out to investigate the factors contributing to obesity among Malaysian secondary students. A semi-structured interview was conducted incorporating the students, parents, teachers and health officials, after obtaining a written consent. The study shows factors such as environment, existing health condition, dietary pattern and sedentary lifestyle could contribute to obesity.

**Keywords:** Obesity, Factors, Semi-structured interview, Secondary school students.

## Introduction

The prevalence of overweight among teenagers has increased for about 10% from the year of 1997 to 2007 (Rezali *et al.*, 2016). The Star Online had reported that Malaysia had the greatest number of obesity cases documented among the Asian countries, with 49% women and 44% men being obese. NHMS 2019 confirms that 29.8% children of the age five to 17 years old have excess weight, with 14.8% of them being obese. In 2011, the percentage of obese children was only about 3.9%, but sadly it has increased threefold since then with an alarming current rate (The Star, 2020). Obesity is a chronic condition caused by sequences of intricate interactions between the environment and human gene. One of the precursors of such interactions is the prolonged imbalanced state of energy, which may result due to an excessive consumption of high

calorie foods accompanied with physical inactiveness. Physical inactiveness may lead to less energy output, thus less energy expenditure compared to the amount of food intake (Aien & Alam, 2004).

## Literature review

An extended state of energy imbalance may be caused by the act of consuming excessive high-calorie foods and engaging in insufficient physical activities (Aien & Alam, 2004). The existence of obesity can be linked to the passing on of genes, notably those coding for obesity through hereditary factors, since obesity appears to be more widespread in specific families or ethnic groups. There are 80% odds that a child

will be overweight if both of their parents are obese (Aien & Alam, 2004). Environmental factors such as lifestyle and eating habits may frequently interact with genetic factors. Due to its higher calorific value compared to proteins and carbohydrates, dietary fat may play a significant role in the development of obesity because it causes an excess of unneeded energy to be stored as body fat (Aien & Alam, 2004).

In addition to an imbalance in energy intake, hereditary abnormalities, medications, and hormonal issues can all contribute to the development of obesity. The main genetic factors contributing to obesity are conditions like Prader-Willi syndrome, pseudohypoparathyroidism, Laurence-Moon-Biedl syndrome, Cohen syndrome, Down syndrome, and Turner syndrome (Schwarz, 2015). The major hormonal causes of obesity are growth hormone deficiency, growth hormone resistance, hypothyroidism, leptin deficiency or resistance to leptin activity, glucocorticoid excess (Cushing syndrome), precocious puberty, polycystic ovary syndrome, and prolactin-secreting tumours (Schwarz, 2015). Patients who take drugs namely glucocorticoids, sulfonylureas, phenelzine, oral contraceptives, risperidone, and clozapine are more likely to become obese (Schwarz, 2015).

The predominant risk factors for childhood obesity include genetics, antepartum and perinatal influences, postpartum effects, parental restrictions, desk-bound behaviour, physical inactivity, and increased intake of high-calorie foods. The melanocortin 4 receptor (MC4R) and the FTO (fat mass and obesity-associated) gene are two of the genes that cause childhood obesity (Vos & Welsh, 2010). High consumption of high energy dense foods may trigger the existence of these genes. Yet, environmental factors like physical inactivity have been proven to aggravate the genes (Vos & Welsh, 2010). One of the natural risk factors for the development of obesity in children was the elevated pre-pregnancy or pregnancy BMI among their mothers. The fat metabolism of a foetus that is conceived by an overweight mother is altered leading to obesity (Vos & Welsh, 2010). Children who are small for gestational age (SGA) are particularly vulnerable

to the postnatal effects of rapid weight gain and the later onset of obesity.

The restraining of certain foods by parents may subtly interfere with the children's regular eating habits, increasing their BMI in later childhood or adulthood (Vos & Welsh, 2010). Today's youth exhibit sedentary behaviour, preferring to spend their leisure time watching television shows, playing video games, browsing numerous websites on the internet, and interacting with electronic devices (Vos & Welsh, 2010). Unfortunately, this physical inactiveness may raise the likelihood of childhood obesity. Increased consumption of calorie-rich sweeteners such as those in chocolate, soda, snacks, and other high-calorie meals may also increase the prevalence of obesity (Vos & Welsh, 2010).

## Methods

The study incorporates five teachers, parents, students and health officials. They were interviewed to gain further insights on the factors contributing to obesity among Malaysian secondary school students. The parents, students, and teachers were selected from one of the private schools in Negeri Sembilan. The health officials who have volunteered themselves for the study, were from the private medical healthcare facilities in Negeri Sembilan. The semi-structured in-depth interview method, which was adapted from DeJonckheere & Vaughn in 2019, were divided into nine steps, starting with (1) determining the purpose of the study (2) choosing participants for the case study (3) discerning ethical issues (4) making logistic preparations for the study, such as selecting suitable interview subjects, time, location, equipment and obtaining informed written consent, (5) creating the interview guide, (6) building rapport and trust, (7) conducting the interview in private at a convenient time and location, (8) reflecting during and after the interview and, (9) using thematic analysis to further analyse the data. The method used for the thematic analysis of the qualitative interviews was adapted from Maguire and Delahunt, 2017. The thematic analysis consists of six stages, including (1) familiarising with the data by reading and re-reading the

transcripts and noting down some initial thoughts based on the transcripts, (2) generating initial codes by analysing each segment of transcripts that is pertinent to the research question, (3) searching for themes whereby a pattern that is significant to the research question is identified, (4) reviewing themes whereby the research question is clarified, (5) defining themes and creating thematic map, and (6) preparing the report.

## Results and Discussion

### Profile

Five medical practitioners, students, teachers and parents respectively, took part in the semi-structured interview. Key Informant 1 (Nickname - Dr Nick), Key Informant 2 (Nickname - Dr Ella), Key Informant 3 (Nickname - Dr Tim), Key Informant 4 (Nickname - Dr Sarah) and Key Informant 5 (Nickname - Dr Bern) are medical practitioners who are currently working in a private medical centre. Key Informant 6 (Nickname - Mawar) is a primary school teacher with 10 years of teaching experience. Key Informant 7 (Nickname -Tanjung), is a teacher cum school counsellor with 10 years of working experience, both as a counsellor and a teacher. Key Informant (Nickname - Elsa) is a science teacher with more than 5 years of teaching experience. Key Informant 9 (Nickname -Amy) and Key Informant 10 (Nickname -Anna), are the teachers with 6 years of teaching experience. Key Informant 11 (Nickname - Jenny), Key Informant 14 (Nickname – Cindy), Key Informant 16 (Nickname – Merry), Key Informant 17 (Nickname – Jane) and Key Informant 20 (Nickname – Sally) are the parents. Key Informant 12 (Nickname – Ethan) is a 17-year-old student. Key Informant 13 (Nickname – Chan), Key Informant 15 (Nickname – Mark), Key Informant 18 (Nickname – Jess) and Key Informant 19 (Nickname -Wick) 16 year-old students.

### Environmental Factors

Inconsistent or ineffective programme implementation, easy access to unhealthy food, peer influence, inadequate obesity education or exposure, influences of online platforms, media influences, parents and family, parents' attitude, pandemic, availability of fast-food restaurants, stress, mindset, ineffective means of communication, lack of technology infusion while creating awareness, lack of facility, lack of fund, economical constraints, freedom of choice, socio-economic status, social media influence, school culture, advanced technology, workload, ineffective National Physical Fitness Standards for Malaysian School Students (SEGAK) implementation, society, students' attitude, advertisements through social media, climate, Malaysian cuisine, home food delivery service, lack of obesity promotion and the existence of fast-food advertisement banners along the roadside, are some of the environmental factors that could contribute to obesity among the secondary school students.

No programmes are actually carried out consistently to curb obesity among the secondary school students. Amy has stated *“There is no specific programme to promote healthy foods in schools.”* We have lots of programmes to combat obesity among secondary school students, but implementers are not consistent with those programmes. Some programmes reach its peak of interest for certain days or weeks after its initiation, but sooner or later, they get tapered off. People tend to forget about the programmes carried out when they lose touch, because these programmes are not followed up or carried out consistently. Nevertheless, when new programmes keep emerging with limited connections with the other programmes implemented earlier, it becomes challenging for the students to keep track or to adapt. They become puzzled or confused on what they need to pursue. Tanjung has stated

*“They do have a lot of programmes but there is no consistency in implementing those programmes. They give certain programmes and then they will only talk about it like only for a few days or*

*maybe a few weeks and then after that, it dies down.... The exposure that our students get is not that enough, because they keep on changing, and they get confused.”*

Unhealthy foods are increasingly becoming accessible to secondary school students. There are so many restaurants or food outlets that sell unhealthy foods. Some of them operate for 24 hours. With these restaurants operating for 24 hours, students could access these restaurants at any time they want, so long they feel hungry. 24 hours restaurants can also allure some students to eat supper after their dinner. Merry has stated

*“If there are 24-hours restaurants operating, students can eat their supper after their dinner. Some stalls are also open for 24 hours. Students can eat anytime they want.”*

There are quite a number of food outlets located in the vicinity of residential areas. Some of these outlets sell unhealthy foods, giving more options for secondary students to purchase and consume unhealthy foods. Nevertheless, some of these outlets provide an exceptional home food delivery, whereby the foods are delivered to doorsteps with just a call, or a few clicks on a phone. Cindy has stated *“Some fast-food restaurants are very close to houses. They provide good food delivery system too.”* There are also some food outlets, shops or restaurants located in the vicinity of schools. If unhealthy foods are sold there, then this would provide an easier access for students, to buy and eat unhealthy foods. Students can get addicted and attracted to unhealthy foods especially when they are easily obtainable. They will look forward to buy unhealthy foods if not every day, maybe for most of the days. Dr Sarah has stated

*“Then there are school shops and also fast-food restaurants in the school area. Normally the kids will definitely buy more and the kids maybe will look forward to it.”*

Peer influence plays an important role too. Some fast-food restaurants market their product in a very attractive way. They design and come up with new and attractive menus. Most of the time, the foods are marketed towards younger generation. The teenagers basically share common thoughts and ideas. When they are at school, they discuss about new menus that they try, and they recommend to their peers. Such peer influence could be strong especially among secondary school students, as they spent most of their time at school. Dr Nick has stated

*“You see marketing side, especially fast-food chains, you know, all this keeps on pushing with new menu and everything. All these are marketed towards young adults or young generation. This will definitely cause obesity, because I can imagine scenario where, you know, friends in school ask...Hey, have you tried the new menu already?”*

Peers influence each other. Students’ emotions and day-to-day decisions are influenced by their peers. They spent most of their time with their friends. They get devoted to their friends’ ideas, suggestions and recommendations despite their parents’ advices. Some parents may advise on healthy eating but the students might ignore those advices. They value what their peers say most often, compared to the advices given by authoritative figures. Dr Ella has stated

*“The friends around them, they affect their emotions. They affect their decisions. Friends in school, are actually where they spend most of the time with, compared to family at home. A lot of times they would rather believe what their friends say, rather than they believe what their parents say. “*

Peer influence may cause both negative and positive impacts towards obesity among the secondary school students. Some secondary school students may have their own cliques or groups where they hang out most often. If these

groups foster good positive reinforcement practices towards reducing or maintaining body weight, then there could be a possibility where everybody is influenced positively to keep their body weight at the desired level. They can even influence each other, to carry out physical activities or exercises to keep their body healthy and fit. Negative influence on the other hand, might influence secondary school students in a different way. Some groups of students hang out together or join a community that foster negative habits such as playing online games, living a sedentary lifestyle and consuming high calorie diet. These groups of students may hang out together gathering at coffee shops, karaoke centres or bubble tea shops. As such, they will eat unhealthily, causing a negative impact to their body weight and health. Dr Tim has stated

*“For example, among peers, suppose secondary school age is one of the ages, where students tend to have many options like Google and more. They actually give some sort of reinforcement or suggestion for them, to actually try to reduce the obesity. There will be more on the positive reinforcement. Like they have groups, those obesity kids where they actually will try to have positive reinforcement by one another, to do exercise and all these things, that will be the positive influences. Negative influencers, I think will be more towards the joining of group community for games, online games and the sedentary lifestyle, the consumption of high diet, high calorie diet intake because they go for gathering. And gathering usually was done in coffee shop, karaoke shop or even the tea shop like bubble tea shop now.”*

Secondary school students are bound to peer pressures. They get easily influenced by their peers, be it the eating habit or how they lead their life. Some students tend to tease their peers in order to get them to follow their eating habits and lifestyle. Such action might allure students to eat unhealthily or being physically inactive, in order to get approval and acceptance among their peers. This habit sharing among students can be unintentional, but it may lead to unwanted

circumstances when it comes to body weight management. Dr Sarah has stated

*“Secondary school students are very easily influenced with a peer pressure, for example, if you are eating a healthy sandwich and everyone else is eating pizza, the peers will definitely tease the teens about their weight and their health consciousness. I think there are multiple researches that already have proven that if you friend with obese people, there's a higher chance of you to gain weight over the period of time, because you'll be lightly sharing the same habit, lifestyle and also habit of eating.”*

Nevertheless, some students eat their break or lunch together with their peers. If their friends choose an unhealthy food as their meal, then this can increase their desire to try out the same food regardless whether it is healthy or not. Talking about and sharing the same kind of foods are pretty common among secondary school students. Elsa has stated *“Students sit together with their peers during break and lunch time, if one of their friends enjoy eating foods rich in fats, then it would easily influence the other friends to eat the same thing.”* Chan has stated *“We share foods among friends. When many friends sit together sharing food, I think it could influence.”*

Some students influence others to stay physically inactive. They tend to play video games together. They share common habits and these habits can be infectious. If the habits are unhealthy, then more secondary school students will be having unhealthy lifestyle and habits. Jane has stated *“Teenagers nowadays don't like to exercise. They play games together using their phones.”*

Another important environmental factor that can contribute to obesity, is lack of education and exposure related to obesity. Students are aware that they are obese or overweight, but what they are not sure about, is the long-term complications that they might face in the future, if they do not manage obesity or overweight issues. Not only

the students, the parents are also unaware. Lack of exposure and education may lead to this lack of awareness. Without adequate knowledge on obesity and its complications and side effects, one could not see the usefulness or meaningfulness of keeping their body weight at an optimum level. Dr Ella has stated

*“Unfortunately, they have no awareness at all. I mean, they know that they are overweight, they know that they are obese, but what they do not know, are the complications of obesity, they do not know that, in long-term an obese individual can actually have bad effect on the heart, the ovaries for female you know, on the hormones. And on the liver as well. The parents themselves also don't know, which is why they don't have the knowledge of the side effect, the complications of obesity.”*

Not only the students, but the teachers do not have enough exposure as well. If the teachers are not aware of obesity and its complication, they definitely could not educate their students. If the school community itself is not emphasising on the negative impacts and consequences that obesity has on society, then the students might not be aware too. This may lead to serious consequences later on, in the lives of the students. Dr Bern has stated

*“Definitely if the teacher in school or the peers don't have an awareness of these, that means they will not talk about it. That's the consequences if the school doesn't promote or raise this kind of awareness of obesity to the students. They will face the consequences in the late 20s or 30s only.”*

If some claim that the students are exposed to obesity issues at school through their curriculum, then maybe there is not much emphasis given to it. This could cause the number of obesity cases to increase among the secondary school students. By teaching the students about obesity, without mere emphasis on its good implications, might end up in a situation where students virtually learn nothing. Mawar has stated *“Students are*

*exposed but not much emphasis is shown to this. They just learn what they have in their syllabus but they did not know the good implications of what they learn.”*

Schools have to expose students about obesity and its long-term effects, complications and health issues. If schools show less interest to it or ignore it, then the students will be victimised. They will not be well educated on obesity. Students need constant reminders and they need someone to point things at the right direction to them. Otherwise, they will ignore their responsibilities. Self-actualisation or self-realization only works with constant motivation. Students require verbal reminders to realise certain things. The long-term effects of obesity have to be reminded constantly to the students through formal education at school. With enough exposure and education at schools, students will be more self-directed, as their understanding in relation to obesity enhances. Anna has stated

*“Students, these days especially, if you don't tell them, they sometimes don't bother about it. If the school talks about it more, it might come to their realization and they might actually want to do something about it, if you talk about their long-term effects and how it will affect them, you know, in their health-wise, in their life as well.”*

Physical Education is meant to teach students about obesity and its negative implications to health. Apparently, during physical educations in schools, students are not being exposed to obesity theoretically. They just carry out sport activities as instructed by the physical educators. Physical activities without a visible connection to the theory underpinning it, might lead to a lack of understanding among the students. Without understanding things clearly, students might not find what they are learning during physical education impactful, useful and meaningful. Jess has stated *“But during physical education (PE) lessons, we just carry out physical activities in sports complex. The PE teacher does not really teach about obesity.”*

It is quite unfortunate to say that some of the programmes implemented to curb obesity among secondary school students are rather ineffective. Effective implementation is the key to success when it comes to any programme. If the programmes implemented are not attractive to the minds of the younger generation, then the probability for the programme to fail is higher. Programmes implemented should be able to correct students' mindset by changing their thinking and behaviour pattern. With active understanding and change of mindset, students would be able to put right things into practice. If the ideas shared are agreed mutually between the implementers and the students, then there is no need to force the students to lead a healthy lifestyle. They will be fully aware on what to do best to keep their body healthy. With such effective implementation, the programmes could benefit thousands of students, when the information spread by word of mouth. Dr Tim has stated

*“Obesity prevention can be properly done if the programmes and plans and policy that we have so far was implemented, but implement it in more effective way. And more attractive way, and the correction of mindset in the young will be the key, we can't always push them. It's always the thought first, you need to have an idea planted inside them, if they agree and then what they want to do about it, then you no need to force them. And they will even help us promote the ideas.”*

Dr Sarah has stated *“I think also with the programmes coming up, we need to ensure that it is executed well as well, because there are many programmes that we actually don't know if it really existed because it's not carried out.”* Government had implemented many policies to curb obesity among secondary school students, but unfortunately these policies did not reach the audience due to ineffective implementation and follow-up. Some policies are muttered but remain unclear or implicit for some. Dr Bern has stated *“Despite we've got all these policies. And I don't think all these policies actually conducted*

*properly. I don't think we ever heard of some of the policies.”*

Online tools could also influence students in a way. Some online platforms share information about unhealthy foods through videos. Online video watching is quite common among secondary school students. The more they watch unhealthy foods online, the more they get attracted to it. Sometimes, it is hard to break the chain of connection as these online platforms act as a strong influencer, alluring students to eat unhealthy foods. Dr Ella *“I mean online and videos are very easily accessible. A lot of food videos can be seen online and maybe through that, people, they actually don't choose healthy foods.”*

Mass media plays an important role in contributing towards obesity among secondary school students. At times, there are advertisements in televisions or radios in which unhealthy foods or fast-foods are being advertised. The promotion of fast-foods for an instance, is too attractive to be denied. Such advertisement through mass media could tempt the students to eat unhealthy foods. It is quite challenging for students to deny fast-foods or unhealthy foods, thus it increases their urge to consume these unhealthy foods. Tanjung has stated

*“I think the media is also play a biggest role in influencing the secondary school students, like, for example, when they are promoting certain food that is not healthy, it is so tempting and a bit hard for them to reject the food, it is encouraging them and making them want to eat those foods.”*

Not only the banners of fast-foods advertisement along the roadside, but some social media advertise on fast-foods too. This might attract the students to eat them more. Ethan has stated *“There are so many banners advertising fast-food at the roadsides. They also advertise in social media if any new meals are introduced in KFC or*

*McDonalds.*” Some fast-foods advertisement banners are hanged along the roads in visible areas. When the secondary school students pass by these roads, they tend to be more attempted to purchase and eat these fast-foods. At times, they urge their parents to buy those fast-foods as they see those banners on their way to or from home. Sally has stated *“There are so many attractive banners along the roadside and my children always get to see these banners as we pass by.”*

Parents and family play an important role as well in contributing to obesity among the secondary school students. Children do spend some time at home. Hence, parents and other family members need to take their responsibility in educating the students at home. Lack of education in family may lead to poor understanding, as the students need to get monitored and taught at home too. Dr Ella has stated *“It's always from the family because most of the time the children will be at home. It is very important for the parents, or the adults in the family to explain, to educate and create awareness on obesity.”*

Nevertheless, if a member of a family chooses to eat an unhealthy food, then it becomes a family tradition. Everyone in the family is more likely to follow the same eating habit as well. Dr Sarah has stated *“The main reason is the family eating habit as well. If the parents are obese, likely the children can be obese too, because they're sharing the same type of eating habits.”*

Some grandparents for an example, feed their grandchildren with whatever they wanted. These grandparents coming from old days, would encourage the secondary school students to eat more in order for them to put on more weight. These grandparents have perception that the stouter the child gets, the healthier he or she is. Having this in mind, the grandparents tend to feed their grandchildren with more food. If the foods consumed exceeds their daily needs, then they will gain their weight. Tanjung has stated *“Maybe some of the family, they have their grandparents at home, asking the teenagers to eat more, they*

*always say that they don't eat enough. So, keep on feeding and give a lot of food.”*

Some parents pamper their children too much, buying them whatever they need to eat regardless whether it is healthy or not. Parents understand that they have to monitor their children's eating habit at home. But in reality, some parents do buy and provide junk foods for their children. Tanjung has stated *“Parents nowadays, tend to pamper their children, too much. And then some of them just keep feeding their child with junk food, because they know their kids like them so much.”*

Parents' attitude is another factor that could contribute to obesity among secondary school students. Parents are not playing their roles effectively in monitoring their children. The parents did not monitor their children's diet or even encouraging their children to carry out physical exercises outdoor. Some parents would buy ICT tools for their children causing them to be physically inactive. Dr Bern has stated *“Most parents didn't play a very good role in watching out obesity problem, by maybe control the diet, by bringing them out for some sports, encourage them to play sports instead of just playing the games on IT products.”*

Pandemic had caused an interruption in most of the programmes. Nevertheless, many programmes did not take off because of the pandemic. Dr Sarah has stated *“I think because of the COVID-19 pandemic for two years, a lot of the programmes interrupted and there were no new programmes introduced.”*

Availability of fast-food restaurants could also contribute to obesity among secondary school students. The number of fast-foods restaurants in Malaysia is increasing for the past few years. As such, more students can access the fast-food restaurants for food. Elsa has stated *“The availability and accessibility of fast-foods outlets. Fast-foods are blooming faster in Malaysia.”* Busy lifestyle and hectic living conditions cause



more people to buy fast-foods for their meal instead of cooking healthy foods by themselves. Chan has stated *“When we are busy and have no time to cook, we used to go to these fast-food restaurants.”* Nevertheless, the fast-foods are very attractive, come in varieties and delicious, leading to more secondary students eating them for their main meals. Mark has stated *“Fast-food restaurants can cause the obesity cases to increase. Nowadays, lots of people enjoy eating fast-foods because they are tasty.”* These fast-foods contain additives making them more delicious. As such, more students would buy and eat them regularly. Fast-foods tend to increase the students’ desire to eat them more. Jane has stated *“Fast-foods have additives that make the foods very delicious. These delicious fast-foods attract children to eat more. It increases children’s desire to eat the fast-foods.”*

Stress apparently can contribute to obesity too. Continuous stress would lead to depression and affects psychological emotions. Individuals with such instabilities, would choose to live unhealthily as a stress coping mechanism. They would eat more and do fewer physical activities to alleviate stress or to calm themselves. Dr Tim has stated *“Those who have depression or psychological emotion, those who are having stress, they actually have this tendency to lead to unhealthy lifestyle, with subsequent physical inactivity, and the obesity sets in later on.”*

Secondary school students are stressed with their academic burdens. They have examinations and these responsibilities stress them too much. Some students would have binge eating disorder or other disorders like bulimia nervosa to reduce stress. These disorders would eventually lead to obesity. These continuous forms of stress tend to reduce the students’ self-esteem and confidence. When they lose their confidence, some choose to eat more energy dense food to boost their esteem. Dr Sarah has stated *“The academic stress from the secondary school. We do know that when they are too stressed, there may be like, mental problem, mental health issues, such as binge eating or bulimia nervosa.”* Anna has stated *“Whenever*

*someone feels stressed, they will start eating more. They tend to go for more sweet stuff. Their self-worth and self-esteem tend to go down, making them to eat more.”*

Mindset could be another factor that could contribute to obesity among secondary school students. Some students are not keen to join any awareness programme denying its significance. There could be thousands of programmes, but participating in those programmes depends on individual needs, desire and interest. Regardless of how many programmes we have, if one chooses to not change his lifestyle and dietary pattern for good, then the programmes implemented will be most probably ineffective. People tend to get more obese although many initiatives are put in place. Individual mindset topped up with adequate effort is more or less necessary to curb obesity. Without a proper mindset, any programme initiated would eventually fail. Amy has stated

*“Government is doing a lot of programmes. But this depends on the individual itself. If one is not aware, we cannot help them even though with thousands of programmes. If we ourselves do not want to change our lifestyle or diet pattern, no matter how many programmes you do, surely it will lead to obesity. Individual’s efforts play an important role.”*

Communication plays an important role in ensuring any programmes, policies or plans to be successful. The ideas disseminated through such programmes, policies and plans might not be appropriate for different age groups. Information shared should however meet individual understanding capacity, as such the individuals involved will comprehend the message shared effectively. Communication between secondary school students and the implementers gets distorted at times, leading to inaccurate understanding. Without understanding obesity appropriately, secondary school students might not be able to apply the knowledge gained into practice. Dr Tim has stated *“Mode of delivery of*

*the programmes, plans and policies, may not be very suitable for the current age population. The communication between one doctor to a patient in secondary school was getting more difficult compared to previous days.”*

An awareness programme would be very much successful if technology is infused in the programme. Secondary school students being teenagers are more inclined towards technology. Hence, programmes targeting this age group should apply relevant and latest technology to attract them. Teenagers prefer social media, but most of the programmes are not utilising this platform to create awareness. Simple text messages or online video postings might attract students' attention to learn more about obesity. Some programmes which are carried out physically using face-to-face sessions, seminars or workshops might bore the students. With ICT infused programmes, the participation of secondary school students will be more likely to increase, leading to better programme outcome. Dr Tim has stated *“Due to technology wise, they're actually more comfortable with social media. They prefer more texting messaging or even just viewing daily video like from TikTok. Physical face-to-face workshop, that one for them will be less effective.”*

Some schools do not have enough facilities for physical activities. Without enough equipment or facilities for physical activities, we might deprive students from being involved actively in physical exercises. Dr Sarah has stated *“The school facilities for the physical activities, is it complete or not. It is not complete, then maybe, they're getting fewer physical activities.”* People who live in apartments might also lack in terms of facilities that are required for physical activities. Dr Sarah has stated *“You're living in an apartment or flat, And I think those are the bigger factors as well if they don't have enough facilities.”*

Some schools did not have enough funding from authorities or management, leaving them with no choice. Some schools could not afford to

purchase enough equipment for physical exercises. Some schools could not afford to have enough programmes to promote awareness on obesity among their secondary school students. Some schools would have poor infrastructure leading to lesser physical activities in schools. Healthy foods are expensive, in which some schools could not afford to provide healthier meals to the students at schools. Nevertheless, some schools do not emphasise on the importance of physical education in schools. At times, physical education lessons will be replaced with other lessons involving core subjects. Dr Sarah has stated *“There's some lack of funding for nutrition and physical activity, programmes and poor physical activity infrastructures in the schools. They often replace the PE lessons with other replacement lessons.”*

Economical constraints leading to high food costs, especially those involve healthy meal preparation, may cause certain schools to provide low-cost high energy diet with low nutritional value. Daily consumption of foods with low nutritional value may lead to obesity. Dr Sarah has stated *“We understand that more school lunches, they actually rely heavily on the high energy, low nutrition value food because it's cheaper.”*

Secondary school students are adolescents and they are given the freedom of choice. They can choose to lead their life in the way that they desire. There is not much restrictions on how they eat or on how they spend their time daily. When students become independent, they will choose foods based on their interest. At times, they choose unhealthy foods that are popular. Most of the time, these students opt for junk foods and fast-foods. Dr Sarah has stated *“When the children start to become more independent, they can choose their own food. They tend to choose fancy foods that home don't normally provide like fast-foods, or junk foods.”* Secondary school students are given pocket money in which they can spend as they wish. They can even buy unhealthy foods and drinks, such as carbonated drinks or fried foods on daily basis, provided they

have enough money. Cindy has stated *“Secondary students usually have pocket money and they can buy whatever they wanted to eat. They can even choose to take soft drinks and fried chicken every day during the school hours.”*

Low or middle socio-economic status might contribute to obesity among secondary school students. Socio-economic status is linked with the food choices available. Those with low or middle socio-economic status, will have lesser choice to healthier food options. Nevertheless, their residential areas could also lack in terms of facilities to promote physical activeness among the residents. Hence, our socio-economic status indirectly defines our diet pattern and lifestyle. Dr Sarah has stated *“Low socioeconomic status, I mean, they have limited choice of healthy food as well. If you are from like low or medium socio-economic background, maybe your place of living is not a suitable for physical activities.”*

School culture could also contribute to the increasing prevalence of obesity among secondary school students. Most schools promote the importance of academic achievement and attainment among the students. Such culture that neglects the necessity of non-academic achievement, might reduce the interest and perseverance among students to maintain their health. Academic results are prioritised and students are given more coaching and guidance on how to improve their academic results. Very few attempts are taken to cultivate healthy and active living among the students. School culture moulds the students, and a positive school culture impacts students' growth positively. Schools should promote on the importance of healthy and balanced diet, as well as the importance of daily physical activities. Some schools are not emphasising much on obesity unless it causes serious problems. Dr Bern has stated *“They actually spend most of the time in just helping the students to improve their academic result. Instead of like helping them to keep themselves healthy, by taking a good and healthy diet, balanced diet or some physical exercise.”*

Advancement of technology could be another contributing factor towards obesity. Some latest technologies are designed to attract the secondary school students. One of these are the gadgets like smart phones. Students are addicted to these devices, and tend to spend more time with these devices rather than going out for a physical exercise. With more time spent on these 21<sup>st</sup> century tools, less time is spent on moving the body physically through activities like playing basketball, football or any other outdoor games. Dr Bern has stated *“I think because now, with the advancement of technology, they tend to, like get attracted by all these things instead of physical activities.”*

Parents' workload could be another reason that could contribute to obesity among secondary school students. During this era, most of the parents are working and they are quite burdened with their workload. Hence, they tend to ignore their children unintentionally. They do not have enough time to bring their children out for a physical exercise, right after their work. They could be very tired with their workload and they did not encourage their children to be physically active. At times, they do not have time to encourage their children to be involved in sports events. Due to the parents' busy lifestyle, they tend to provide other alternatives for their children to keep them busy during their leisure time. Some parents tend to provide gadgets to their children to avoid being nagged from the children. Dr Bern has stated

*“In this era, most of the parents are working, they are burdened with workload, they tend to ignore their child's physical activity. They will not like encourage them to join the school sports or even like bringing them out for some physical activity. When the child asks for something maybe they want, an iPad or they want a laptop, they just buy the so-called technology to them and just let them be.”*

Ineffective SEGAK implementation could be another contributing factor towards the

occurrence of obesity among the secondary school students. SEGAK is carried out in schools merely for data collection and storage. The data is stored and not being followed up by either the school or the students. Nevertheless, SEGAK is not carried out consistently to monitor students' fitness and health. Nonetheless, SEGAK is not a physical fitness programme whereby students carry out physical activities constantly on a daily basis. SEGAK is indeed a measurement tool that serves its purpose to collect students' fitness level, with no seminars, campaigns, talks or programmes carried out based on the results. Tanjung has stated

*“I would say SEGAK is not really effective because I think most of the school, they sort of like doing SEGAK for the sake of data operation, it's just to key in the data and then after that they are done, they don't really like to do it consistently.”*

Ethan has stated *“We carry out some physical tests during SEGAK test, but no follow up action after that.”* Merry has stated *“SEGAK does not really help, I think. SEGAK is not an exercise programme where students practice every day. It is only a form of measurement taken at schools. No seminars, campaigns or talks conducted at schools after that.”* Wick has stated *“We do SEGAK. Yes, we record the BMI like an ordinary procedure. We do not do much with the results. Nothing was done after that. It is just a test.”*

Society has significant impact on the number of obesity cases among secondary school students too. Some people knowingly sell unhealthy foods, although they know it is quite devastating for the students. Earning money becomes more important among some people in our society. With money earning in mind, they tend to sell unhealthy foods that would attract students more. Despite guidelines, they tend to ignore their responsibilities in providing healthier food options to the students. Tanjung has stated

*“It's like, for example, the canteen operator. They know that they're not supposed to sell certain things, but at certain point of time, you know, sometimes certain canteen, they will still sell only for that period. Lack of awareness among not only the canteen operators, but also outside of the school, sometimes, you know, in government school, they have people who are selling outside of the school, the ice creams, they sell junk food and pickled foods.”*

Some students' attitude could be a reason for them to gain weight. These students could be aware of the negative impacts of unhealthy diet consumption and inactive lifestyle, but they still opt for those choices. Elsa has stated *“Students are aware. Unfortunately, it is not the case. It does not change them. They know it but still, they will eat and enjoy the unhealthy foods and be less physically active.”* Government does a lot to create awareness among secondary school students, on how to lead a healthy lifestyle through various initiatives. Some suggestions are provided through such awareness programmes, but unfortunately, students are taking things for granted. They tend to ignore those important suggestions. They like trying new things whether it is healthy or not. Amy has stated *“Yes, government do some awareness programmes related to obesity, but I feel that the secondary students are not taking into consideration the suggestions given through these programmes. At this age, they will try everything.”* Students' self-realisation is very important. They should have a good attitude or self-discipline while following the recommendations and suggestions given through the obesity awareness programme. They should be able to control and monitor themselves. If not, the programme would be less successful. The success or failure of a programme does not completely depend on the implementers, but also the students. Anna has stated *“It is also part of the kid as well, if they don't want to do it, if they are not bothered and just not going to do it, realisation is not actually triggered there. They will think that it's just a programme or just a plan.”* Jenny has stated *“These students must have a self-control and the parents have to monitor them too.”* Some students partake in some obesity

prevention programmes, but if they do not have self-discipline, then the positive effect of such programmes will be closer to none. Students have to be consistent and should continue their efforts without giving up. Wick has stated *“Some students take part in obesity programme, if they are not consistent then there will be no effect. Some students just do things for one or two day and then, they give up. They won’t continue doing the activities.”*

Malaysian tropical hot climate can seemingly urge students to consume unhealthy foods like ice creams. Ice creams are used to alleviate thirst and to cool the body off. But it contains high amount of sugar, hence more consumption of ice creams could lead to obesity. Chan has stated *“Our hot climate will attract people to eat ice creams to cool down themselves. Ice creams contain high amount of sugar.”*

Malaysia has rich cultural diversity with various types of delicious cuisines. Most of Malaysian cuisines are rich in fats and carbohydrates. Some common cuisines taken by Malaysians are like *“Nasi Lemak”* or *“Roti Canai”*. These foods contain high amount of fats and carbohydrates and are seemingly causing unbalanced diet consumption among us. Cindy has stated *“Malaysian food is rich in carbohydrate and fats compared to other countries. In Malaysia, we sometimes eat Nasi Lemak with fried chicken, fried noodles, Roti Canai. These foods are not balanced diet. Roti Canai only contains fats and carbohydrates.”*

Malaysia is also well known for food delivery system. This is becoming increasingly popular among the Malaysians. With such a simple and user-friendly food delivery system, any food could be ordered instantly and it will be delivered to the customers conveniently. Such satisfaction increases the urge to order more foods through home delivery system. Jess has stated *“Nowadays we have food delivery. We are becoming very lazy. We just simply order foods by pressing a button, then the foods are delivered to our door step.”*

One of the important contributing factors towards obesity among secondary school students, is the lack of promoting efforts by relevant authorities when it comes to the plans, policies and programmes. With less promotion, these initiatives become less evident, making people to be less aware of various government initiatives. When they know less about such policies, they tend not to understand the efforts very well. Without properly understanding it, the application might fail. Jess has stated *“Even though there are so many programmes and policies, these interventions are not promoted well. People are not aware of such policies. Lack of promotion, I would say.”*

### Health Related Factors

Unrevised BMI standards, genetic predisposition, mutation, metabolic disorders and genetic disorders are some of the health-related factors that could lead to obesity. BMI standards should be revised constantly to accommodate the changing trend of life. Old standards might be inapplicable for the current context in relation to obesity diagnosis. Old BMI standards could alter the BMI interpretation leading to inaccurate obesity identification and management. Dr Nick has stated *“Maybe we use our old standards for BMI. Perhaps you might have to revise the BMI standards. I think all these are relevant in this context.”*

Genetics and family history has a strong relationship with the occurrence of obesity. The genes coding for obesity might be passed down through the hereditary line. If one of the family members are obese, then that could act as a risk factor to cause obesity among the other family members. Dr Ella has stated *“Genetics are usually because of hereditary, that means it is actually passed down generations. Family history will increase the risk of obesity.”* Dr Bern has stated *“Obesity actually runs into family as well. This means if your father or mother is obese, then there is a very high chance for their child to be obese as well.”* Students do inherit some characteristics from their parents. There could be some genes contributing to obesity, but again

these genes are triggered by poor lifestyle and unhealthy eating habit. Some might have the genes contributing to obesity, but they might not develop into obesity if they lead their life, living a healthy lifestyle. Hence, unhealthy diet and inactive lifestyle would trigger the genetic predisposition of obesity. Amy has stated

*“Students do inherit genetic characteristics from their family. They could have the genes that contribute to obesity in their body, and if they do not control their diet, then they may develop into overweight and obesity. Let say the parents are obese, if the child practices healthy lifestyle, he might not develop into obesity.”*

Some mutational disorders could lead to obesity. Klinefelter syndrome is a mutational disorder, and one of the symptoms of this disorder is excess body weight. Mutation in our DNA strands could lead to such syndrome. Dr Ella has stated *“There are like some common syndromes such as Klinefelter syndrome, you know, the mutation in our DNA strands. That could, you know, cause obesity.”*

Some metabolic disorders such as diabetes mellitus could lead to obesity among the secondary school students. Diabetes mellitus is a chronic disease that can be classified into type 1 or type 2. Although in the previous years, type 1 is more common among the secondary school students, but now apparently the type 2 diabetes mellitus is gaining an equal momentum. With type 2 diabetes mellitus setting in, body metabolic processes are affected leading to obesity. Diabetes mellitus is said to have a strong relationship with obesity. The students who suffer from diabetes mellitus is more likely to develop obesity. Dr Tim has stated

*“Those patients who are secondary school students. The old teaching will be mentioning type 1 being the most common type but unfortunately, we do notice now type 2 is more common which is the metabolic related disorder*

*and diabetes mellitus type 2 has very strong relationship with obesity.”*

Some genetic disorders like Prader-Willi syndrome could lead to obesity, although it is not the main factor causing someone to suffer from obesity. Dr Tim has stated *“For an example, Prader Willi, but I don't think that one is the primary factor contributing to obesity.”*

### **Dietary Factors**

Unhealthy eating habit among secondary school students, unhealthy diet served in the school canteens and unhealthy food preparation at home could lead to an increasing prevalence of obesity cases among the secondary school students. Diet plays an important role contributing towards obesity. Most people are not fully aware of their daily calorific requirement. Some do not even know how to calculate their own calorie needs. This was apparent when they come for health screening and was questioned about their daily calorie intake and needs. Those who are overweight or obese, came to understand that their BMI value is not at an acceptable level through health screenings. It is quite surprising though, to know that these individuals are not aware of how to calculate their daily calorie intake or requirement. Malaysian diet contains less fibre, and this can contribute to obesity. At times, there is no balanced proportion of protein source, vegetables and fruits. These kinds of diets could lead to weight gain. Dr Nick has stated

*“Diet plays a very big part to obesity. I think a lot of people doesn't even know how to roughly calculate the calories. I do a lot of screening in my clinic, I do a lot of blood tests in my clinic and most of my patient, if we really calculate the BMI, most of them would fall under overweight, or obese categories, and you'll be surprised, a lot of them doesn't have the knowledge to, you know, calculate the calories in and out. I think the barrier of entry in order to have proper fibre rich food is something that we have to think about as well because if you make comparison with, if you*

*know you want to make comparison with European or you want to make comparison with other countries, where they put a lot of emphasis on you know, like fruits and vegetable or protein. I mean those kinds of food are the ones actually causing obesity, you know, all typical Malaysian foods like Nasi Lemak.”*

Malaysian foods are also rich in carbohydrates which can contribute to high calorie intake. Some of the Malaysian foods are sweet and could contribute to high calorie too. Some students prefer fancy drinks like bubble tea, which contains high amount of sugar. Continuous consumption of such sweet drinks for a long term could lead to an excess calorie intake. Excess calorie intake could lead to obesity, due to surplus calorie being stored in the body. Malaysian foods are always considered sweet and oily. These foods may contain high amount of fats and sugar. As such they can contribute to obesity. Dr Tim has stated *“Malaysian, most of time we practise this typical Asian diet. Asian diet is very rich in carbohydrate. For example, bubble tea, which actually have four to five sugars, this was definitely higher calorie compared to juice”*. Amy has stated *“We have oily and sugary foods a lot in Malaysia. This can contribute to obesity among secondary school students.”*

Obesity occurs when the amount of calorie intake of an individual is more than the amount of calorie output. If someone consumes more high energy dense foods but did not use that energy, then energy surplus can occur leading to energy imbalance. Imbalanced state of energy can lead to obesity. Dr Sarah has stated *“Obesity is essentially where the calorie output is lesser than the input.”*

Some students practice an unhealthy eating habit. Sometimes the diet they choose is not appropriate for their health. Their dietary pattern is altered too. Some skip their breakfast. Breakfast is an important meal for the day. Skipping breakfast will affect students' metabolic processes affecting the rate of metabolism. When students skip

breakfast, they tend to consume more during other meal hours, leading to a slower rate of metabolism. Slower rate of metabolism can affect the fat metabolic processes by reducing the amount of fats burned in the body. This altered metabolism could lead to obesity. Tanjung has stated

*“Sometimes they skip certain meals, especially breakfast, where breakfast is the most important meal. When they skip certain meal, it can affect their body metabolism level. Where when we skip certain meal and then at the other meal time, we eat a lot, then the metabolism level sort of like slowing down, something like that. It burns the fat even slower.”*

Uncontrolled fast-food consumption can lead to obesity among the secondary school students. Some examples of fast-foods like fried chicken can be detrimental to health. The chicken is deep fried and it may contain high amount of fat. Nevertheless, chickens nowadays are modified genetically to improve the quality and quantity of food production. These chickens are also fed with some chemical substances that can allow them to mature fast. These kinds of altered or modified foods can affect health leading to obesity, and could damage internal organs. Jenny has stated *“Too much of fast-food consumption can lead to obesity. Chicken used to make fried chicken, is modified to mature early using chemicals. When these foods consumed, it may affect health. This will increase body weight and affect internal organs.”*

Fast-foods contain high amount of fats and oil. Excessive consumption of fats and oil can cause obesity. Balanced diet would contain different classes of food including fats and oil, as required by the body. Balanced diet would have enough vegetables, fruits and protein sources such as meat. Balanced diet usually contains less amount of fats. Some unhealthy foods like junk foods are considered imbalanced, because they contain high amount of fats. Unhealthy drinks like carbonated drinks on the other hand, contain high

amount of sugar. Other than fats, excessive consumption of sugar may also lead to obesity among the secondary school students. Jess has stated

*“Fast-foods that contain oil and fats can cause obesity. If the diet is not balanced with no vegetables and fruits but only meat, then it can lead to obesity. If the food contains high amount of fats, then it can cause obesity. Foods like junk foods contain high fat and drinks like soft drinks have high sugar. These foods can lead to obesity.”*

Excessive consumption of snacks and junk foods can lead to obesity, as they contain high amount of calorie. High intake of calorie can lead to an excess fat deposition in the body. Excess accumulation of fats in the body can lead to obesity. Mark has stated *“Junk foods and snacks can cause obesity because they contain high calorie. When we take in more calorie, then we will be fatter.”*

School canteens are the places where students consume part of their daily meals. School canteen operators should consider the suggestions and recommendations provided by a nutritionist or dietician. The inputs from these experts are significant, as they give insights into daily calorific requirement of students. Nutritionists or dieticians not only be able to provide suggestions related to individual students' daily calorie requirement, but they may also provide ideas related to essential nutrients that should be incorporated in the meals of the students. Some foods sold in the school canteen contain high amount of carbohydrate, fats and calorie. Such foods if consumed daily, may lead to obesity. Some school canteens just provide staple foods for the students ignoring the fact, that the students are required to be provided with fruits and vegetables too. Dr Nick has stated

*“Food sold in our school doesn't have any nutritionist or dietitian input regarding the calories and necessary nutrition. High calories*

*basically can cause obesity. You know the mi goreng, bihun goreng. We take it as a staple food actually. It's full of carbohydrate, sodium. Not good for your internal organs in a long run.”*

Diet served in the school canteens plays an important role contributing towards obesity among the secondary school students. Most of the school canteens serve foods containing high amount of calorie such as fried chicken, fried nuggets, fried sausages and other fatty foods. Economic reasons such as low cost and low labour effort while preparing the foods, could lead to such foods to be prepared and sold in the school canteens. Nevertheless, some school canteens do sell drinks containing high amount of sugar. High sugar consumption can lead to a higher blood glucose level. High amount of fats and sugar can lead to obesity. Dr Bern has stated

*“Most canteens serve very high calorie diet such as fried chicken, fried nuggets, and fried hot dog. They sell a lot of sweet drinks, containing high sugar, contributing to higher glucose. This contributes to obesity as well. They are easily prepared by the canteen, and relatively cheap.”*

Foods sold in the school canteens apparently did not follow the quarter-quarter-half plate system. Not much vegetables and fruits are provided to the students. Most often, fried foods become the main option in the school canteens. If the school canteens sell such foods often, students are left with no choice other than consuming this unhealthy diet. Balanced diet is required to be sold in the school canteens, providing enough vegetables and fruits. Some school canteens do offer vegetables but it is too little. When it comes to fruits, it is rarely served together with the main meal. Fruits are required to be purchased separately. These fruits which are sold separately are quite expensive and some students might not be able to afford it. Nevertheless, Malaysian foods are rich in carbohydrate. Carbohydrates contain high calorie, hence excessive consumption of carbohydrate containing foods can lead to obesity. It has also become a trend



among Malaysians to consume rice even for breakfast. Starting a day with such high calorie diet would lead to obesity. Mawar has stated

*“Foods that are sold in canteen does not follow the quarter-quarter-plate system. There are not much vegetables. Canteens sell fried foods more. Students will buy this because they have no choice. Whatever they eat in schools could lead to obesity. More carbohydrate containing food can cause obesity. Main food choice in Malaysia is rice. At schools, students are served with Nasi Lemak in the morning. Students eat heavy meals starting from morning itself. This can lead to obesity.”*

Wick has stated

*“Food served at schools is not balanced. It is sometimes oily. Some foods are always fried. They got less vegetables and fruits. Fruits are expensive to buy. One cup of fruits costs RM 3.00. We need to buy them separately.”*

Some school canteens offer unhealthy snacks and high energy dense foods. Unhealthy snacks and high energy dense foods could contribute to obesity. School canteens are where the students consume their breakfast and lunch. Providing continuous energy dense foods during breakfast and lunch at school canteens could lead to obesity. Elsa has stated *“If a school canteen offers a lot of unhealthy snacks and high energy dense food, then it would contribute to obesity. Canteen is the place where students will buy their breakfast and lunch. Foods sold in the school canteens does not follow the Malaysian Food Pyramid too. The school canteen operators do not really look into the content of foods being sold to the students. The proportion of carbohydrates, proteins, fruits, vegetables and other nutrients, are usually not served according to the students’ calorie requirement. Less essential nutrients are usually served more than the essential ones. Amy has stated “They don’t buy according to the Food Pyramid. Students should eat carbohydrate, protein, fruits and others. But at canteen, they just*

*sell foods without seeing the content of food.”* Some foods sold in the school canteen contains Monosodium Glutamate (MSG) as a flavouring agent. MSG can attract students because it gives extra taste to the food served. However, excessive consumption of MSG would lead to obesity. Anna has stated *“Some of the schools use MSG. It might actually contribute to obesity.”*

Secondary school students might occasionally go to the restaurants or food outlets for their meals. Some restaurants are obviously clean and tidy. Most of the restaurants however sell foods containing high amount of fats. At times, they prepare meals using cost-effective approaches, such as using low-cost materials for cooking. Some vegetables and meat used are not fresh and of low quality. Jenny has stated *“Some restaurants are clean and tidy. Foods sold in restaurants contain high amount of oil. Students brought to these restaurants regularly. They use low-cost materials for cooking. The meat and vegetables are not fresh and not of good quality.”* We are also lacking in terms of food preparation. Ineffective food preparation method would lead to obesity. Some people might not have enough time to prepare a good meal at home. Some parents do not really cook. They tend to pack foods for their children. Outsourced foods might contain high amount of fats and calorie. Increased consumption of such outsourced foods can lead to obesity. Dr Tim has stated *“Malaysia currently lacking in terms of preparation. We don’t have a very proper meal preparation. Parents pack for their kids. Outer sourced food is with higher calorie and oil.”*

### **Sedentary Living**

Sedentary living is a condition in which someone has an inactive or unhealthy lifestyle. Inactive or unhealthy lifestyle can contribute to obesity. Most of the secondary school students are spending their time sitting and studying, or maybe they surf internet accessing social media platforms using their ICT devices. As such, their body moves less leading to an inactive lifestyle. Lack of exercise could lead to obesity. Dr Nick has stated *“Students are spending more time on studying,*

*social media or on IT and they don't really emphasise on active lifestyle, they don't do much exercise"*

Nowadays, secondary school students are more devoted to some of the latest technologies, such as phones and computers. They prefer participating in online games rather than going out for a physical games like soccer or football. Most of their games are indoor. Apparently, nowadays more online games are introduced, enhancing students' addiction towards these online games which are attractive. At schools, more teaching is done with less emphasis on physical activeness. Students give less priority to physical exercises. They gather with their friends through social media or through online games. As such, lack of physical activeness may emerge among the secondary school students leading to obesity occurrences. Dr Tim has stated

*"When we are still young, we are not attached to this technology related instrument, like phone, games. Our games are also outdoor games like soccer, football. Now, most of the games are conducted online. Less activity was being conducted, it's more on teaching, and then students playing phones with one another, and they do social media dancing which all are indoor."*

Obesity is highly related to the balance between energy input and energy output. If one chooses to eat without exceeding their daily energy requirement for the day, physical activities that are carried out for that day could increase the total energy expenditure. As such, the body will achieve a balanced energy state. Nowadays, secondary school students are not being physically active and they live a sedentary life. This will cause an energy imbalance. Some students are spending their time most often accessing, chatting or posting through social media. While they use social media to occupy their time, they tend to be less active. When they are inactive, their energy output becomes lesser than required. Physical activity apparently

reduces weight, by reducing the amount of fats stored in the body, typically around the waist. Excessive fat storage around the waist may lead to abdominal obesity. Dr Sarah has stated

*"Obesity occurs when your input is more than output. As long as they don't eat more to compensate for the extra calories they burn, the physical activeness tends to increase the total energy expenditure and help us to stay in energy balance. But then if it's an inactive, for example, like we are having a lot of social media now. Physical activity actually decreases fat around the waist, and total body fat and also slows the development of abdominal obesity."*

Physical inactiveness tends to keep your body in a static condition. When the body is inactive and static, the rate of body metabolism decreases. When the rate of body metabolism is affected, visceral fats tend to form. Excessive amount of visceral fats can contribute to obesity. Nowadays, most of the secondary school students enjoy playing phones or computers. When they play games online, they just sit at one place without moving their body too much. Lack of body movement affects the body metabolic processes, leading to an excessive visceral fat accumulation. With an increased visceral fat in the body, one could have higher BMI value indicating that he or she is suffering from obesity. Dr Bern has stated

*"When you mean physical inactiveness, your body is in, static state, this reduces the metabolism rate. Most of the visceral fat develops, and contribute to obesity. Students tend to play phones, computers and while doing all these activities, they just are static, stay there and not moving. When you reduce the body movement, you tend to reduce the metabolism rate in the body and it increases visceral fat, then contribute to the increased BMI and eventually obesity."*

Secondary school students have a different lifestyle nowadays. They prefer electronic gaming activities like e-sports or online games.

While playing these games, they tend to spend almost five to six hours sitting without physical body movements. These students might like playing football, but instead of going outdoor playing football, they play indoor e-football games. Sometimes, there would be some e-sport tournaments, carried out at an international level. Students would join this tournament because of its exciting rewards. In order to win this tournament, they tend to spend hours of practising through gadgets. Again, such practice does not encourage physical body movements, leading to inactive lifestyle. Such lifestyle can contribute to obesity if it is not managed properly. Tanjung has stated

*“They prefer e-sports and games. They just sit at one place and spend five to six hours, not moving much. They are very good in football but then it is a e-game football. Nowadays, there are a lot of e-sports tournaments, you know, international levels where they give a very good reward. Secondary school students follow and want to involve in those games, and they keep practicing to join this tournament.”*

Amy has stated *“Let say he eats a lot but never exercise, he doesn't sweat and there is no burning of fats, surely, he will develop obesity.”* Physical inactiveness can lead to energy surplus in the body. Excessive energy storage in the body, would lead to a condition in which this surplus energy is converted to body fats. These body fats are stored in the body, because they are not being burnt through physical exercises. Ethan has stated *“Physical inactiveness will cause surplus energy to be stored as fats in the body. If we do less exercise, the fats are not being burned and they get stored in our body.”* Some students sleep real late at night. When they sleep late, they tend to get hungry even after their dinner. This will lead them to eat supper. Excessive consumption of foods with an increased frequency of daily meals could lead to obesity. Mark has stated *“Some students sleep late and when they sleep late, they will eat supper at midnight. This will cause obesity.”*

## Conclusion

Obesity occurs because of energy imbalance, in which the energy input exceeds the energy output. This state of energy imbalance can be caused by factors like environment, health status of an individual, diet intake and lifestyle. Controllable factors like environment, diet intake and lifestyle should be monitored and controlled in order to reduce the prevalence of obesity among secondary school students. Hence, measures that emphasise the significance of controlling diet pattern, lifestyle and environment should be considered.

## Declaration of Competing Interest

The authors declare no conflict of interest in this current study.

## Ethics

All the participants have submitted the informed consent form.

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