Meeting Report
International Meeting on Healthy and Tobacco Free Tokyo as Consequence－Legacy of Tokyo 2020 Olympics and Paralympics－

Tokyo hosted the first Olympic games in 1964 when the country was in the process of economic growth. In 2020, Tokyo is going to host the second Olympics and Paralympics, when the country is experiencing low birthrate and population ageing. The demographic, socio-economic and technological changes during the intervening years mean that the 2020 Games will have different contexts, expectations and legacies compared to 1964. To host the Games successfully, various medical preparedness such as disease controls and acute care are already being planned. This meeting aimed to discuss how to improve health for everyone and suggest what new legacies should be planned for the future. The symposium was attended by over 200 persons from Japan and overseas.
The program, abstracts, biographies and list of Executive Committee Members are annexed as Annex 1, 2, 3 and 4 respectively. (alternatively web link)

Greetings

Representatives of the co-organizers and special guests delivered four messages.

Dr. Haruo Ozaki, President of Tokyo Medical Association (TMA) appealed for passing the legislation in Tokyo to control tobacco smoking, aiming to prevent passive smoking. In 2010, IOC and WHO signed an agreement to promote tobacco-free Olympic Games. It has become a tradition that host cities incorporate measures to achieve a tobacco-free city as a mean to prevent passive smoking. The TMA earnestly appeals to realize this tradition of the Olympic Games and to make smoking-free Tokyo a legacy of the 2020 Games. He urged appropriate legislations to be passed at the Tokyo Metropolitan Assembly.

Dr. Yoshitake Yokokura, President of World Medical Association (WMA) and President of Japan Medical Association (JMA) talked about the challenges Tokyo faces in preparation of the Games and what legacies should be left behind. During the first Tokyo Olympics, Japan had a young population with around 6% of aged population. The 1964 Olympics stimulated growth of the sports population, and the “Sports for all” movement was one of the legacies from the Games. In 2020, Japan has an aged population of 29%. One of the legacies that can be envisaged is to promote health and social participation through sports for the super-aged population, which may contribute to prolong the healthy life expectancy. There are many challenges in terms of health preparedness for the Olympics. Apart from preparedness for epidemics and natural disasters as well as prevention of heat stroke, tobacco-free Olympics and Paralympics has to be realized. The JMA has been active in promoting a tobacco-free society as a preventive measure against passive smoking for all people in Japan. Together with experts involved in the London Olympics and Rio de Janeiro Olympics, it would be a great opportunity to discuss how to make health promotion a legacy of the Tokyo Olympics 2020.

Ms. Yuriko Koike, Governor of Tokyo, delivered a message of greeting. Ms. Koike proposed two legacies from the 2020 Tokyo Olympics and Paralympics; health and diversity. For diversity, promoting the inclusion of disabled persons in sports and all aspects of the society is especially important; in other words, to create a disabled-friendly environment. One example is to make Tokyo a barrier-free city. Ms. Koike pledged to realize tobacco-free Olympics and Paralympics as requested by IOC and WHO. At national level, the Ministry of Health, Labour and Welfare has proposed legislation to prevent passive smoking, and these proposals are being debated. At the metropolis level, smoking will be banned inside the Tokyo Metropolitan Government Building from April. The Tokyo Government is having consultations with municipal governments to strengthen measures to prevent passive smoking.

Mr. Kentaro Asahi, Member, House of Councilors, participated in the 2008 Beijing Olympics and the 2012 London Olympics as a member of the beach volley ball team. He believes that the Olympic and Paralympic Games have the potential to act as a catalyst for changing national policies and direction. As the Olympic and Paralympic Games draw a global audience of over 4000 million people, a clear message of the Tokyo Olympics has to be announced to the world by 2020. In 2010, the WHO and IOC together signed an agreement with four pillars: tobacco-free Olympic Games, promotion of healthy lifestyle choices including physical activities, prevention of childhood obesity, and sports for all. The original goal of the Olympic Games was to bring peace and a better world to mankind. As the Games evolve, health has become an integral part of the Olympics. This meeting provides a forum for the transmission of messages generated by medical and health experts to the sports world.

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- ## Keynote Lectures

Chaired by **Toru Kakuta,** *Vice-President, TMA*

Three keynote lectures were presented.

Keynote Lecture 1
Can Hosting the Olympics and Paralympics Improve Health for the Host City? Lessons from London 2012 Olympics and Paralympics
Brian McCloskey CBE, *WHO Collaborating Centre for Mass Gatherings and Global Health Security, Public Health England, UK.*

Professor McCloskey led the public health services for the 2012 London Games. First of all, he gave the following key messages for the Tokyo Olympic and Paralympic Games. 1. Tokyo should prepare now to ensure the 2020 Games are successful, safe, and healthy. 2. Tokyo should also plan to ensure a lasting legacy of improved health and health systems after the Games. 3. Plan the legacies today because tomorrow will be busy.

The challenges of mass gatherings are manifold. They are large in scale and highly complex. There is usually very strong political interest because of the national pride. As the gathering takes place, there will be many media personnel who will report the events and also what goes wrong. Finally, there will be new partners who are totally different to the usual working counterparts, for example, the sponsors. A challenge unique to the Olympics is that there is more focus on healthcare for the athletes than on public health.

At the London Games, the planning committee put priority on public health at the negotiation table, and planned this as one of the legacies of the London Games. Mass gathering is an opportunity for health system strengthening. At the London Games, the following opportunities were identified: physical activity; tobacco control; alcohol and safe drinking; sexual health; inequalities including gender, ethnicity and disability; and community involvement.

London was a no-smoking city even before the Games, but the health administration used the Games to reinforce the message and intensified the efforts to make London an entirely smoke-free city. The goal of the London Games was to promote physical activity, which would have great health and economic benefits. The "Go London! The legacy of better health for Londoners" reported by the National Health Service (NHS) listed three main components: healthy Londoners, healthy NHS, and the Games inspired. The activities included involving the people, working with the health service provider, and making 2012 a special year. Sexual health was one of the main focuses with plenty of publicity, health education, screening for HIV, free supply of hormonal contraception, and HIV prevention campaigns at events sites. Activities to promote community involvement include the cardiopulmonary resuscitation (CPR) training program for London 2012 volunteers, child immunization program, and breastfeeding initiative for babies born in 2012.

The legacies planned and delivered at the London Games were at three levels: infrastructure, better health choices, and better cross-agency working. Infrastructures for public health included new or enhanced disease surveillance systems, diagnostics, and response systems. A community care clinic was built in the Olympic village, which now serves as a primary health center for the district. The Olympic Park was reopened in 2014, visited by more than 10 million people. The athletes' village has been transformed to residence and now home to more than 6000 people. For the legacy of better health choices, increase physical avidity was realized by capital investments in community sports facilities and Paralympic sports. A change in attitudes to disability is evident from an increase of over 222,000 disabled people engaging in sports compared to 2005. The most successful outcome is the positive approach to community volunteering, with 1 million people engaged in London's volunteering program. Volunteering is now a common practice in London. As a consequence, London was voted the European Volunteering Capital 2016. As for the legacy of better cross-agency working, at the community level, London 2012 inspired and enabled working with different partnerships, such as immunisation partnership with Sanofi Pasteur. At national level, London 2012 encouraged better partnership working on health between government ministries, between sport and health funding agencies, and produced stronger cross government "joined up" policy on physical activity.

From the experience of the London Games, the Olympic and Paralympic Games can improve health of citizens and health systems, but the organizer has to plan what legacies are desirable and how to deliver them, and try to measure them later.

Keynote Lecture 2
Lessons from Rio 2016 Olympics and Paralympics, Regarding the Consequences on Health Promotion of General Population
Marcia Castro, Professor of Demography, Department of Global Health and Population,

Harvard T.H. Chan School of Public Health

Health legacy of the Olympic Games is defined as the sustainable and positive health impacts on the host city or country associated with the hosting of the Olympic Games. When Rio de Janeiro planned the Olympics, the organizers had the following legacies in mind: strengthening of democracy, socioeconomic development, improvement of Brazil's performance in sports, and urban development. What was strikingly missing was health.

Planned legacy and its outcomes can be illustrated using urban development in Rio as an example. The biggest investment (55% of the budget) during the Games was on urban mobility: new high-quality trains, new subway stations, and bus routes were constructed. However, the outcome of this legacy was greatly affected by the economic crisis that hit Brazil after the Games, resulting in 70% cut in the budget of the Secretariat of Transport in Rio de Janeiro. As part of austerity measures that followed the crisis, 70 bus lines were eliminated, and 41 lines were rerouted or shortened, leading to a drop in passengers using public transport. A study assessing who benefited from the public transport network to go to work or to high school showed that only high-income communities with very limited geographic distribution benefited, while all the low-income communities had limited access. Therefore, this legacy has not achieved the objectives of eliminating inequality in urban mobility.

In terms of health, the infrastructure built or renovated for the Games have remained. All the equipment and technology acquired for the Games have been redistributed (many sent to major emergency hospitals in the city). Regarding health personnel, there was no increase in the workforce, because people who were hired as temporary workers during the games were not retained.

With respect to physical activity, host cities are expected to inspire and stimulate lifestyle changes. But, the Games alone will only provide a momentum, and follow-up programs must continue after the Games. However, as mentioned above, a health legacy was not on the initial agenda of the organizers. If we consider that in Brazil the prevalence of overweight and obesity has been growing, much more could have been done as an attempt to reverse this trend – overweight in Rio de Janeiro and Brazil are not much different (55.8% and 53.8%, respectively), and neither is obesity (20.9% and 18.9%, respectively). Physical activity in Rio de Janeiro showed a minor improvement, with a slight decrease in inactive population from 15.9% in 2013 to 13.8% in 2016.

Rio was essentially a no-smoking city before the 2016 Games. Smoking control was an incredible success in Brazil. This was progressively achieved, starting with a new constitution in 1988, when a universal health system was established. In the same year, laws were enforced requiring warning messages to be printed on cigarette packages, which became more demanding as years passed. Advertisements on cigarettes were banned. Smoking prevalence in Brazil decreased from 35% in 1989 to 14.8% in 2008, and continued to decline to 8% in 2016. In 1996, many years before the Olympics, smoking was banned in every enclosed space. Therefore, smoking was naturally banned from all the Olympic venues.

Special efforts were put in place to reduce discrimination and to provide equal opportunities. For example, Brazil supported an initiative from UNAIDS and implemented a campaign called #EuAbraco, encouraging empathy and support to those living with HIV/AIDS.

During the opening of the games a strong message on the importance of a healthier environment, and of the impacts of climate change was conveyed. As part of the Athletes' Forest project, all athletes carried seeds that they planted in a small pot as they entered the stadium, and those were sent to a greenhouse. The goal was to wait until plants grew to a certain height to then be transplanted to a designated area (the Athletes' Forest). One year after the games, the plants are reaching the ideal height, but funding is needed for the project to be completed.

Non-health projects may affect socio-economic determinants of health. For example, better transportation could improve air quality, and new open spaces for leisure may improve wellbeing. However, the best time to measure these impacts, as well as how to measure them, remain as open questions.

The Paralympic Games have left a legacy. First and foremost, the example given by paralympic athletes to hundreds of thousands of people who live stigmatized by physical and mental disabilities is remarkable. Also, in 2016, right before the games, Brazil created a training center for paralympic athletes, equipped with the best technology, which is now a reference center in Brazil and Latin America.

After the Games, Brazil faced serious economic challenges. Austerity measures have resulted in budget cuts, impacting initially planned long-term projects. As a result, the momentum generated by the Olympic Games was not leveraged. There is limited evidence of sustained changes in physical activity after Olympic Games. The positive atmosphere during the Games was overshadowed by the disastrous events after the Games. In Rio de Janeiro, major setbacks in health and security were observed.

In conclusion, a major lesson is that the host city should think very carefully and very wise in deciding of what is the goal in hosting the Games, considering the demographics of the population. With the proper goals, legacies can be built to benefit the population after the Games.

Keynote Lecture 3
Legacy of Olympics and Paralympics as a Booster of Health Promotion in the Low Birthrate and Ageing Society
Haruo Ozaki, *President of TMA*

Dr. Ozaki first reviewed the basic concepts of Olympic legacy. Olympism is the fundamental principles outlined in the Olympic Charter, while Olympic legacy is the fundamental value by which the principle of Olympism can contribute to the society. In the Olympic Charter (2002 revision) Chapter 1 (The Olympic Movement) Section 2 (Mission and role of the IOC), the role of the IOC is described as "to promote a positive legacy from the Olympic Games to the host cities and host countries". Legacy can be conceptualized as a cube with three elements: positive versus negative legacy, intangible versus tangible legacy, and planed versus unplanned legacy. Our aim is to maximize the positive legacy and minimize the negative legacy.

For preparation of the 2020 Games, the Tokyo Organizing Committee of the Olympic and Paralympic Games, in which Dr. Ozaki is one of the special advisors, mainly deals with preparation. Legacy was examined by the Tokyo Olympic and Paralympic Games Bid Committee during the applicant stage. However, there is currently no committee for

legacy. Dr. Ozaki would like to see a committee set up to plan the legacies for the 2020 Olympics.

The legacies of the 1964 Tokyo Games, which include infrastructures such as Shinkansen and highways have contributed greatly to the rapid economic growth later. In the 2020, the Japanese society has changed to one of low birthrate and aging society. It is fitting to consider health as a legacy. The TMA proposes tobacco control and frailty prevention. On the other hand, the Ministry of Health, Labour and Welfare (MHLW) promotes Smart Life 21, which includes prolonging the heathy life expectancy by appropriate exercises, proper diet, no smoking, and attending health screening. The Olympic and Paralympic legacies in the era of low birthrate and aging society can be divided into pressing issues such as tobacco control, heat stroke control, and health care for foreigners; and more far-reaching issues such as raising the awareness of "Exercise is Medicine". In addition, "festival effects" are expected to foster participation and "unity in diversity" to promote inclusion of diverse people including the disabled.

In 2007, the WHO signaled the urgent need for countries to make all indoor public places and workplaces 100% smoke-free. In 2010, WHO and IOC signed an agreement to improve healthy lifestyle, including "tobacco-free Olympic Games". In 2017, WHO urged the MHLW to ban smoking in all public places, including all indoor spaces, in Tokyo. In the past Olympic Games in Beijing, London and Rio de Janeiro, legislations had been in place banning smoking in schools, medical facilities, sports facilities, offices, restaurants, and bars, with no provision for smoking rooms. On the other hand, the framework for the draft revision of the Healthy Promotion Law proposed by the MHLW (January 2018) in principle allows smoking in indoor smoking rooms installed in restaurants; allows outdoor smoking spaces in medical facilities, schools universities, and public offices; and allows use of heated tobacco while eating in designated room. These legislations obviously depart greatly from global norms. The stance of TMA is to prohibit indoor smoking in all public spaces, with no provision for smoking room, in accordance with the working guidelines of WHO Framework Convention on Tobacco Control. TMA also recommends prohibiting smoking in all indoor spaces with no provision for smoking room as a legacy of the 2020 Games.

Regarding heat stroke control, in principle all sport activities should be stopped at a wet-bulb globe temperature (WBGT) of 31ºC or above. The Ministry of Environment measured the WGBT from July to September around the Olympic venues and found that WBGT reached 31ºC in 25 days during that period. Thus, in July 2017, a committee was set up for heat stroke control to protect athletes, audience and volunteers. With the Olympics scheduled to be held on 24 July to 9 August and Paralympics on August 24 to 6 September, the heat stroke control measures will include setting up resting spaces, increasing water supply machines inside the security line, trees and convenience stores along the last mile, and temperature control in trains.

Health care for foreigners has seen many changes including increased numbers, diverse countries of origin and languages, diverse diseases, unique diseases, and medical fee payment. Tokyo has adopted various measures to support medical care for foreigners to allow them to receive appropriate care when needed and to provide them with health information in various languages. For example, a multilingual guidebook on infectious diseases has been produced for foreigners. In the clinical setting, multilingual support, interpretation services are provided. In the future, popularization of AI technology and automatic translation machine is envisaged.

Raising the awareness of "Exercise is Medicine" is an important legacy. Of the major risk factors attributing to death in 2004 published by WHO, physical inactivity was in the fourth place. In Japan, the top risk factor is smoking, followed by hypertension in the second place and physical inactivity in the third place. In Japan, over 30% of men and women in their 60s and 70s exercise regularly, because they have retired and can find time for exercise. On the other hand, few people in their 20s to 50s exercise regularly. "Exercise is Medicine (EIM)" is now a global movement. The MHLW published physical activity guidelines for health promotion, the "ActiveGuide", recommending people to exercise as a mean to extend healthy life expectancy. Specific recommendations are to start walking for an extra 10 minutes (aerobic exercise), to participate in radio exercises (stretching) in the community or workplace, and to do squatting exercise. Municipal medical associations organize EIM activities in communities with educational talks, group exercises, and other recreational activities. The aim is to increase health awareness and community participation with the goal to promote health for the whole society.

In summary, the legacies for the low birthrate and aging society would include moving towards a tobacco-free society, enhancing medical systems for heat stroke and infectious disease control, improving health care provision for foreigners, enhancing awareness of "EIM", and building a barrier-free society to include people with disabilities. These can build a momentum for the whole society to get healthier, aiming to fill the gap of healthy life expectancy. As the other speakers have emphasized, it is important that we actively define what opportunities we want from the Games and plan legacies. Medical associations are ready to lead the development of a legacy centered on health.

Session

"Olympics and Paralympics for Health of All People; Not an exclusive event for top athletes"

Chaired by **Akira Torii,** *Director of TMA*

While keynote speakers discussed the inclusion of health as a legacy of the Olympic and Paralympic Games, this session examined the association between health and sports by five panelists.

Lecture 1

Application of Evidence Suggested by the Sport Medicine for the Health Promotion and Well-being

Ken Nakata, *Professor, Medicine for Sports and Performing Arts, Department of Health and Sport Sciences, Graduate School of Medicine, Faculty of Medicine Osaka University*

Medicine and sports share many common features; health, wellness, physical education, exercise physiology, disease prevention, motor learning, biomechanics, and fitness. Also, "return to play" is a common theme for both. The mission of sport medicine is to enable a high level of return to play from injury or disease. For this purpose, early and accurate diagnosis, minimally invasive treatment, and safe and effective rehabilitation are required. Injury prevention has been increasingly emphasized in sport medicine, including dissemination of knowledge and guidance to athletes and coaches,

and medical check. High performance in competing sports and health care for life are also important goals.

The Japan Sports Agency and universities have initiated a research project called SRIP (Sports Research Innovation Project), which involves multiple disciplines of medicine, informatics, dentistry, engineering, sport science and nutrition. This project collects and analyzes different types of data from athletes (IoT to Athletes): sport medical and conditioning data and performance data, which is cyber analyzed into big data for use in machine learning and AI development. The output can help athletes improve performance, prevent injury, return to competitive sports after injury, and support Paralympic.

Sport is one type of physical activities. Physical activity is measured in metabolic equivalents (METs), Recently, physical activity can be monitored by activity checkers in the form of wrist band or spectacles. For example, in a soccer game, using acceleration sensors worn by athletes and laser positioning sensors installed around the soccer field, the physical activities of athletes can be tracked in real time, and various data can be generated. For example, when the physical activity in MET is displayed, it shows the changes in quantity of physical activity over time. By performing real-time feedback of daily physical activities of athletes, accurate prediction of injury and prediction of performance become possible. Another example of innovation in sports medicine is the use of AI. Their use has innovated return to play, injury prevention, high performance and health care.

The WHO measures the burden of disease by disability adjusted life year (DALY) which is calculated by: DALY = years lived with disability (YLD) + years of life lost (YLL). This concept indicates the importance of health and life expectancy. The top four global DALY risks (2009) were high blood pressure, tobacco use, high blood glucose and physical inactivity. In high income countries, physical inactivity has a higher risk of loss of health and life than high blood glucose and high cholesterol. These data show clearly the importance of physical activity for health and life expectancy.

In Japan, the Cabinet Office has proposed a new society; Society 5.0, following the hunting society (Society 1.0), agricultural society (Society 2.0), industrial society (Society 3.0), and information society (Society 4.0). In the current information society (Society 4.0), people access a cloud service (databases) in cyberspace via the Internet, and then search, retrieve, and analyze information or data by themselves. In Society 5.0, people, things, and systems are all connected in cyberspace and AI analyzes the data and feeds back to the physical space. The Osaka University group is doing research on athletes using SRIP focusing on 2020 Tokyo Olympics, using IoT and AI to predict performance and injury of athletes and preventive measures. Use of the SRIP data in Society 5.0 is expected to promote physical activity of all Japanese and to contribute to global health.

Lecture 2

Preventive Effect of Participation into Exercise Group for Healthy Ageing

Katsunori Kondo, *Professor, Social Preventive Medical Sciences, Center for Preventive Medical Sciences, Chiba University and Head, Department of Gerontological Evaluation, Center for Gerontology and Social Science, National Center for Geriatrics and Gerontology*

This presentation addressed two questions: is there is any difference in health promotion effect between exercising alone and exercising in group, and are there strategies to enhance group participation?

The Japan Gerontological Evaluation Studies (JAGES) were nationwide studies conducted in 2010, 2013 and 2016. The large-scale surveys covered 30 to 40 municipalities, and the numbers of older persons surveyed were around 200,000 to 300,000. From the data collected from these studies, the difference in rate of falling in the past one year was compared among communities with different rates of participation in exercise group. The results showed that some communities are more prone to falls; the lowest fall rate in a year was 7.4% and the highest was 31.1%. Further analysis showed a strong relationship between weekly participation rate in exercise group and rate of falling. Communities with 40% of the population participating in exercise group had lower fall rate, while those with only 10% participation had a high fall rate. Older people who living in communities with higher rate of participation in exercise group also performed better in instrumental activity of daily living (IADL) than communities with low exercise group participation rate. Communities with a higher population density have higher exercise group participation rate. This may be because facilities for exercise or sport tend to be more concentrated in densely populated communities, and it is easier to meet people interested in the same exercise. This is especially true in team sports, in which large groups have to be assembled. Further analysis showed higher proportions of people with depression and forgetfulness in communities where lower rate of participation in exercise group.

However, it can be argued that the above results may show reverse causal causation (correlation $\neq$ casual relation); i.e. instead of low exercise activity causing falls, in fact falls cause low exercise activity. To verify this, a longitudinal study was conducted. In this four-year follow-up study, the more groups a person joins, the lower is the risk of receiving long-term care. When the type of group was analyzed, those who join exercise group had the lowest risk of receiving long-term care, compared to other groups such as community group, religious group, and citizen's movement group. The benefit of joining exercise group over exercising alone did not differ irrespective of the frequency of exercising.

Next, the reason why group participation has additive health benefit was examined. In one study, fewer people who joined groups had higher blood pressure. In another study, people who met friends regularly had 50% reduction in risk of diabetes compared with those who were always alone. These studies showed the importance of social participation. Laughter was shown to reduce the proportion of persons with low self-rating of health, probably again reflecting the effect of social participation. Social participation and having a social role also reduce the probably of becoming depressive, and the effect is dramatic in men. Men who eat alone had 1.5-fold increase in mortality compared to men eating with someone, irrespective of living alone or with someone. The above studies illustrate clearly the additive health benefit of social participation.

Seasonal events in local communities such as new year celebration, summer festival, mini sports day, and Christmas celebration are good strategies to encourage social participation. Participants generally report a positive attitude after participation in such events. Participation in such events often leads to joining exercise groups.

In summary, exercise is good for health, but participation in exercise group has additive health benefits. The biological, psychological and social pathways through group

participation probably lead to health. Using the Olympic and Paralympic Games as an opportunity, building a community that foster participation in exercise groups will contribute to prolong healthy life expectancy.

Lecture 3
Significance of Legacy of Olympics and Paralympics for Children

Tomoo Okada, *Professor, Nutrition and Life Science Department, Applied Bioethics, Kanagawa Institute of Technology*

On the occasion of the Tokyo Olympic and Paralympic Games, we should leave the children both tangible and intangible legacies from the Games. This can include giving children aspiration by observing the athletes doing their best at the Games, giving children a chance to enhance their ability of living, improving the environment for bringing up children, promoting parenting support, and strengthening measures for declining birth rate.

The background factors for the physical and mental problems of children in Japan are diverse. The environment of upbringing has changed dramatically, which includes decreasing playing space, ICT dependence, and sleep deprivation. Diet has changed from traditional food to fast food and soft drink. The environment of pregnancy and birth also have changed to one with low birthweight and increased Cesarean section. Mental problem among children is serious, including abuse, school non-attendance, bullying, developmental disorder, loneliness, and smoking. The diversity and complexity of these factors have made treatment very difficult. The whole society has to work together to address these factors.

Cancer prevention has to start from childhood. Tobacco smoking is a risk factor of cancer. Tobacco control in Japan is behind the global standard. As a legacy of the Olympic and Paralympic Games, introducing more stringent tobacco control legislation will protect children from passive smoking, preventing the adverse health effects of smoking include cancer.

Dependence on ICT is a serious problem in children. According to one survey, 510,000 high school children are Internet dependent. Internet dependence damages physical health and mental health, affects study and work, and impairs family and interpersonal relationship.

Athletic performance of children has decreased. After the peak in 1985, performance in 50-meter dash, standing long jump and ball throwing has declined and remained low. The causes of decline in physical strength include decrease in people's awareness of the importance of playing outdoors and sports, worsening of the environment for children, shortage of elements indispensable for sports or playing (time, space and friends), and undesirable lifestyle such as sleeping late and skipping breakfast. Indeed, the outdoor playing space has been reduced dramatically. In Yokohama, the natural space and open space have decreased to 1/20 from 1975 to 2003.

The progression of noncommunicable disease has been postulated to start from developmental origins of health and disease (DOHaD), which develops into adolescent obesity, and then to adult obesity and diabetes, progressing to cardiovascular disease, chronic kidney disease and atherosclerosis. Japan has the highest proportion (9.1%) of newborn with birthweight less than 2500 g among industrial countries. Global studies

have shown that low birthweight is associated with future DOHaD and high rate of cardiovascular disease, diabetes and hypertension.

Another legacy would be to strengthen parenting support. To support healthy development of children, continuous support from pregnancy to adolescence and then to subsequent generations is necessary. The number of child abuse consultation at the National Child Guidance Center has continued to increase since 1995. The number was 70,000 in 2012 and is over 100,000 now.

Finally, strengthening measures against declined birthrate is necessary in view of the decrease in fertility rate to 1.5.

To show the world that we have provided an environment for our children to grow healthily is a legacy that we can leave for our children.

Lecture 4

Sports and Health-from the Viewpoints of Lifelong Sports Theory and Gender Difference

Yasuko Kudo, *Associate Professor, Faculty of Sports & Health Science Department of Sports Science, Daito-Bunka University*

Survey of the proportion of people participating in sports or exercises showed a marked gender difference in 1965, the year after the first Tokyo Olympic. At that time, 58.8% of men practiced exercise or sports at least once a year compared to 36.7% of women. This gender gap narrowed slowly over the next four decades to around 10% (73.4% versus 63.7%) in 2004, and further to around 8% (84.3% and 77.8%) in 2013.

According to the 2016 data of Sasakawa Sports Foundation, 44.8% of adults and 68.6% of teenagers practice sports at least twice a week, 32.5% and 42.4% watch live sport in sport venues, and 6.7% of adults and 15% of teenagers support sport as volunteers. Sport participation is in the order of practice > watch > support.

Gender difference in sport participation can be seen across the whole age spectrum. Among adults, more men (75.6%) than women (68.8) practice sport at least once a year. In children aged 4 to 9, slightly more girls practice sport regularly. In older people aged 60 and over, while the percentage of not practicing sport is high, the percentage of practicing at least twice a week is also very high, showing the interest of older people in sport activity. The gender gap starts from around age 9 and continues all the way to age 18. Teenage boys participate in team sports such as soccer, basketball and baseball. On the other hand, teenager girls are engaged more in exercises.

Regarding watching sports, overall more men than women watch live sports, with a difference of 9% (37.6% versus 28.2%). The same trend is found in teenagers. The types of sports most watched are baseball, figure skate and soccer. Figure skate is watched almost exclusively by women.

The percentage of sport volunteering has remained relatively stable at around at 7% from 1994 to 2016. The percentage has been higher in men than in women all through the years. Although the rate of actual volunteering is higher in men, the percentage of a desire to volunteer is equally high in both men and women, indicating the potential of people volunteering when there is an opportunity. Volunteers help in everyday activities in the community or sport clubs as coaches, referees, or group operators. They also participate in sport events in the community. The percentage of people having a desire to volunteer

in these activities is high both in adults and teenagers. In one survey or people aged 18 or above, 10.2% of those surveyed express a strong desire to volunteer in the Tokyo Olympics and 9.1% in the Tokyo Paralympics. Assuming the total Japanese population to be 10.8 million, there is a potential volunteer population of around 2 million both for the Olympic and Paralympic Games. Compared to the estimation that 90,000 volunteers are needed at the Games, the number of candidates may be 20 times higher than the number needed. The age distribution of these potential candidates is highest at ages 18 and 19, decreasing as age increases. Geographical distribution is highest in the Kanto area (16.3%), but is nationwide in general. In terms of occupation, more than 30% are students, while many are employees and self-employed. The provision of employers to allow employees to volunteer in the Olympic and Paralympic Games should be considered.

People with disabilities participate in sports at a low rate. Only19.2% of the adults practice sports at least 1-3 days a month, and 60.2% do not practice any sports at all. Hopefully the Paralympic Games will improve participation of people with disabilities in sports. The types of sports or exercises that they practice, such as walking, jogging, and swimming do not differ from the general population. Regarding the main purposes of practicing sport or recreation, apart from rehabilitation in the third place, other purposes are also the same as the general adults. Around 40% of people with disabilities wish to practice sports but are not capable to doing it. Further efforts have to be made to involve these people in sports.

Japan Sports Agency recently announced a new target to increase the percentage of at least once a week sport practice in adults from 42.5% to 65%. The objectives are to increase sport practice especially in women in the 20s, and to increase participation of women as leaders in sports and as officials in sport organizations.

After the Olympics and Paralympics, the participation of Japanese in sports may change to Support > Watch > Practice. It is hoped that the 2020 Tokyo Games will act as a catalyst to encourage people to participate in sports in whatever form they desire, and most of all, to achieve a sport environment without gender difference.

Lecture 5

Exercise is Medicine－Positive Effects of Exercise on Health－

Junichiro Yamauchi, *Associate Professor, Graduate School of Human Health Science, Tokyo Metropolitan University*

The notion that exercise is good for health has existed since the ancient time. Recently research has been conducted to verify that exercise is indeed beneficial to health. Exercise improves physical and brain functions. For example, study has shown that brain activity increases in a person who is exercising than in a person who is not, which may have implications for failing memory and dementia commonly seen in the elderly people. In the aged population, health is related strongly to mobility. Once mobility is lost, health deteriorates at a fast speed. Therefore, maintaining mobility is an extremely important goal. This requires maintenance of muscles and joints especially in the legs and hip, and exercise plays a big role.

The evolution of bipedal gait in humans from quadrupedal gait in animals involved many adaptations. For example, humans are capable of maintaining constant body temperature, whereas animals such as dogs are incapable. Bipedal gait is more energy

efficient, requiring much less energy than quadrupedal gait. Arm swinging which is only possible in bipedal gait further economizes energy. Many animals such as dogs walk with only the phalanges touching the ground, while humans walk with the entire sole touching the ground. The human way of walking is more stable. Therefore, the evolution of humans to be able to walk on two legs is an adaptation that allows them to walk stably for long distance and to exercise.

In the modern society, technological advances have reduced the burden of physical movements of humans. However, although life has become more convenient, the opportunities of physical activity are drastically reduced. Physical inactivity gives rise to obesity and increases the risk of lifestyle-related diseases, and impedes independence in elderly people. The ability to move is imperative for survival, both for humans and for other animals. By exercising, bones and muscles are naturally strengthened, which are essential for building a healthy body. People living in the modern society should renew the awareness of the importance of physical activity, which is an inherent necessity of humans to survive, and actively participate in physical activities and exercises to maintain health.

Discussion

The Chair invited each lecturer to respond to his question.

Torii: Professor Nakata, you mentioned about measuring physical activities using various devices. Could you elaborate on the application of these devices not only to athletes but also to be public for health promotion, as a legacy of the Olympic Games?
Nakata: I agree that taking the opportunity of the 2020 Olympic and Paralympic Games, we should leave a positive and lasting health effect for all the people, including those who are healthy and those with diseases and disabilities. The first step is measuring physical activity. At present such studies use questionnaires, and the outcome cannot be quantified. Since many devices have been developed for athletes, they can be applied to the public as well. With cooperation from the municipalities, we are planning to collect baseline data using these devices, to be compared with the data after 2020. The study design is to minimize burden on the subjects during measurement, and data are shared and analyzed via cloud. We expect this kind of study will make great contribution to health for all people.

Torii: Professor Kondo, you talked about collecting large amount of data to improve the regional gap. Could you tell us more about what kinds of interventions are planned to prolong healthy life expectancy?
Kondo: First, we must know the situation of our own municipalities. Then we compare with other municipalities to identify inadequacies, find the reasons, and attempt to eliminate the causes. Start with interventional study, and after evaluating data, the evidence can be developed into administrative policies. The point is not to formulate a uniform approach, but made intervention proposals considering the district, its characteristics and the utilizable resources. The data that I presented can be used in these steps. I hope that the data will be used by many municipalities to provide effective services that meet the residents' needs.

Torii: Professor Okada, I heard that the Lehman financial crisis had some effect on children. What is your view on the health gap and the gap of the environment for bringing up children?
Okada: We know that a good environment has great influences on the development of children, both from the physical and mental points of view. Unfortunately, there is not much progress. I question whether there are many parents who think that children grow up in whatever environment they are in, and wonder whether appropriate support is being given to those in need. Medical personnel, especially pediatricians who look after health of children should appeal to the government or administration about creating a favorable environment for raising children. It seems that the priority has been given to the aging population. However, children who are our hope for the future should be given higher priority.

Torii: Dr. Kudo, you mentioned gender gap and regional gap in sport participation. Are there measures to narrow such gaps?
Kudo: I think an environment conducive for sports is the biggest factor. For example, people who live far away from sport facilities find it difficult to practice. Moreover, for people with disabilities, sport facilities for disabled persons are even farther away. To solve this problem, it is important to create opportunities for the whole society to exercise; i.e. render the whole society barrier-free for sports. For example, one can encourage exercising without going to sports center and use the same facilities for general people and people with disabilities. I anticipate that the 2020 Olympic and Paralympic Games will act as a catalyst for such developments.

Torii: Dr. Yamauchi, you talked about various attempts in Japan to encourage physical activity. What about the international situation? Are there things that we can learn from other countries?
Yamauchi: From the viewpoint of exercising while having fun, there are interesting examples from overseas. An example is a subway in Sweden. There was an escalator and a staircase side by side in this subway station. Many people were using the escalator, and few used the stairs. After they made the staircase into a piano keyboard with interactive sound, there was a dramatic increase in people using the staircase. This shows the importance of exercising while having fun.

Torii: Thank you very much. We bring home with the message that enjoyable and continued exercising is the key to maintain health.

Finally, the meeting was closed by Dr. Toru Kakuta, Vice-President of TMA.