World Health Organization
REGIONAL OFFICE FOR Europe

A SYSTEMS APPROACH TO MEAL DELIVERY APPS (MDAs)

WHO EUROPEAN OFFICE FOR THE PREVENTION AND CONTROL OF NONCOMMUNICABLE DISEASES

Background

Meal delivery apps (MDAs) are an online system that allow customers to order the delivery of food or drinks, including alcohol, for consumption. The rise in MDAs coincides with the growth of digital food environments: the online settings through which the flow of information and services that influence people's food, nutrition and alcohol consumption choices and behaviour are directed *(1)*. This includes social media, digital health promotion interventions, digital food and alcohol marketing, and online food and alcohol retail. Digital environments influence the access, availability and desirability of foods and drinks. They represent an interface through which people interact with the broader food system.

MEAL DELIVERY APPS (MDAs) ARE AN ONLINE SYSTEM THAT ALLOW CUSTOMERS TO ORDER THE DELIVERY OF FOOD OR DRINKS, INCLUDING ALCOHOL, FOR CONSUMPTION

MDAs have existed in the WHO European Region since 2000 and are now the most common form of food delivery *(2)*. Meals are delivered from food and alcohol production and retail outlets to private residences and offices by couriers using bicycles, motorbikes and cars. Most MDAs function as aggregator apps, offering access to multiple outlets through a single online portal. Aggregator apps consist of both web services and mobile apps *(3,4)*. These apps promote two-way communication between the consumer and the food or drink outlet by using interactive communication tools such as push notifications (clickable pop-up messages that appear on a user's browser) and location-based offers to drive up subsequent orders. Furthermore, many apps have the capacity to collect a large volume of data on consumers, including browsing history. This allows the apps to create targeted advertising for consumers. For example, if a user prefers ordering pizza, they may be targeted by deals and offers for pizza or by a particular pizza outlet.

Due to their relative novelty, MDAs currently remain unregulated in the WHO European Region. Many of the regulations that apply to food service outlets in the physical world, such as calorie labelling or indications that a business complies with food safety regulations, have yet to be applied to MDAs. There are already indications that this will change in coming years. For example, the United Kingdom Government has imposed a regulation that will require food services outlets with more than 250 employees to provide calorie labelling on their meal items *(5)*. Calorie information must be displayed for the customer at the so-called point of choice. Aside from physical menus, this includes digital menu screens, online menus, order and pay apps, and food delivery platforms. This regulation will come into effect in April 2022.

While the provision of information to the end consumer is an important starting point, there are many components of MDAs that require attention in order to make this a healthy, safe and sustainable part of the wider digital food environment. Some of these aspects include health, environmental and labour issues. As well as posing several challenges, MDAs also offer opportunities to accelerate progress in many areas in which public health has previously struggled.

This factsheet will explore a systems approach to MDAs and investigate the various entry points that can improve health and nutrition outcomes of digital food environments.

A systems approach to MDAs

A systems approach to MDAs allows for the development of systemic and long-lasting recommendations and interventions to improve population nutrition, sustainability, safety and productivity. A systems approach takes into account all the elements of MDAs, their relationships and it considers all the social, environmental and economic impacts *(6)*. When trying to improve a system, we can start by investigating the entry points to change. These are the various points of intervention where strategic changes can be made in order to tackle the challenges at hand. Some of the main entry points include nutrition, physical activity, waste management, food safety and the workforce. Entry points do not identify solutions. Instead, they force broad and innovative thinking about the mechanisms that can be used to solve complex problems. The entry points that shape our food choices need to be identified and addressed in order to pave the way for a sustainable food environment.

The impact of MDAs on nutrition

MDAs, like all aspects of digital food environments, are influencing how people access and order foods. While exact figures are not known, the SARS-CoV-2 (COVID19) pandemic has greatly increased the expansion of MDAs as well as their popularity. This trend is expected to continue well after the pandemic has subsided. The nutritional composition of delivery foods is of concern, as research has found that most foods prepared away from home are often associated with high levels of calories, sugar, saturated fat and salt *(7)*. The food environment is commonly acknowledged as a key element shaping food decisions as well as being a driver of noncommunicable diseases (NCDs) globally. Of the six WHO regions, the WHO European Region is most affected by NCDs, with alcohol, overweight and obesity contributing largely to the burden *(8)*. Cardiovascular diseases, type 2 diabetes, cancer and other NCDs are the cause of 90% of all deaths in the Region *(8)*. Increasing access to healthy foods and meals in the digital food environment is, therefore, an important component of reducing NCDs in the Region.

IN 2007, THE PREVALENCE OF OVERWEIGHT RANGED FROM 32% TO 79% IN MEN AND 28% TO 78% IN WOMEN IN MEMBER STATES OF THE WHO EUROPEAN REGION (*9*).

Similarly, round 4 of the Childhood Obesity Surveillance Initiative (COSI) examined the prevalence of thinness, overweight and obesity among children aged 7–9 years (**Fig.1**).

HIGH LEVELS OF

CALORIES

SUGAR

SATURATED FAT

AND SALT

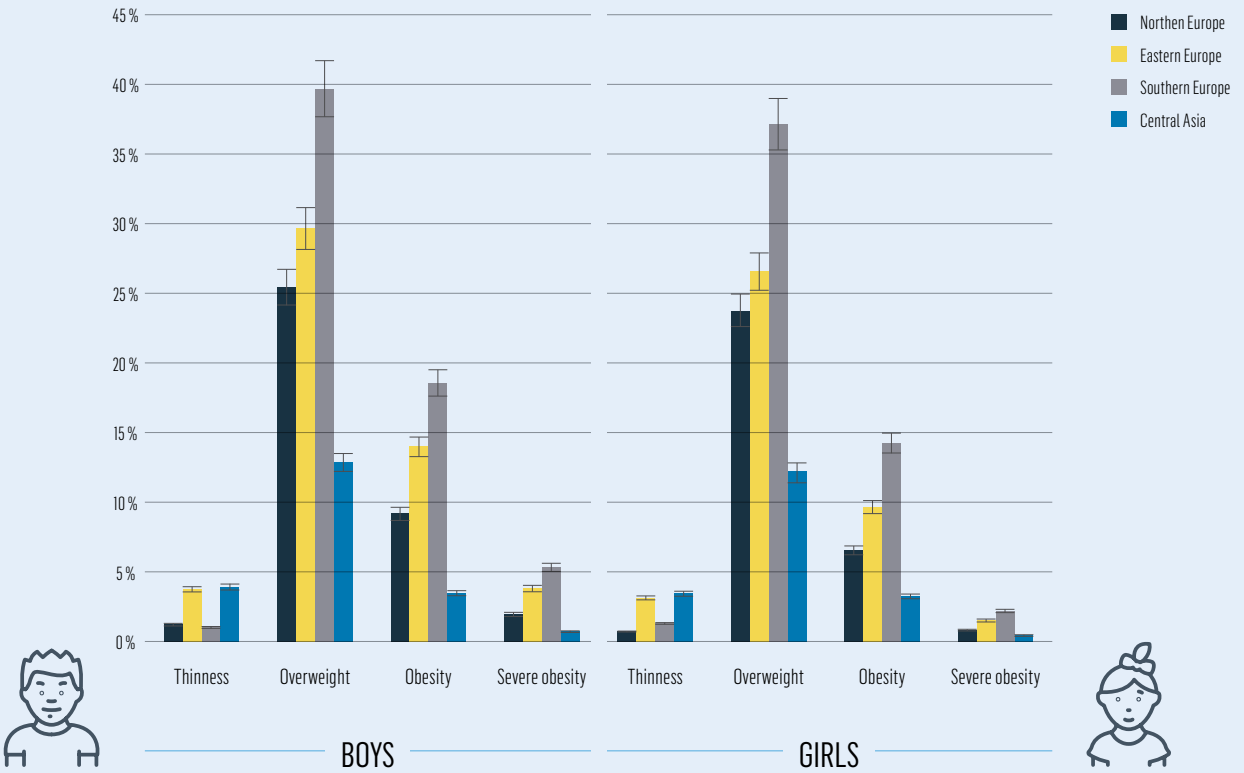
CONTIBUTE TO

CARDIOVASCULAR DISEASES

TYPE 2 DIABETES

CANCER AND OTHER NCDs

FIG.1. PREVALENCE VALUES (%) OF THINNESS, OVERWEIGHT (INCLUDING OBESITY), OBESITY (INCLUDING SEVERE OBESITY) AND SEVERE OBESITY IN CHILDREN AGED 7–9 YEARS (BASED ON WHO GROWTH REFERENCE VALUES) IN PARTS OF THE WHO EUROPEAN REGION



Source: Spinelli et al., 2021 (10).

MDAs are predominantly based on convenience, which means that people's dietary choices and eating behaviours are being led to favour fast, cheap and poor-quality food. There is also evidence that those at socioeconomic disadvantage have greater exposure to unhealthy food options, adding an element of potential inequality *(7)*. The majority of users of MDAs are young adults *(11)*; however, this demographic may change as MDAs expand in influence and reach. Portion sizes are often larger for out-of-home foods, which encourages overeating especially if the price differences between portion sizes are insignificant *(7)*.

Impact of MDAs on alcohol consumption and harms

Greater availability of alcohol is associated with higher levels of consumption and harms. Reducing availability of alcohol is considered a WHO best buy: an evidence-based, cost-effective public health intervention to prevent a nd control NCDs *(12)*. In physical settings, regulating availability includes paying attention to the number or density of premises and hours or days of opening. Interventions to reduce harm include restricting times and days of sale, limiting the number of outlets and setting a minimum legal age limit for alcohol service regardless of whether consumption

is on- or off-premises. These measures are, however, inadequately implemented in the WHO European Region, with only 10% of Member States report restricting hours for on-premises alcohol sales and 20% for off-premises alcohol sales *(13)*.

Alcohol that is delivered to private residences and workplaces may often be cheaper to purchase than would be the case in on-site sales settings, and this increased affordability can lead to increased consumption and harm. Apps are often designed to encourage people to add alcoholic beverages to their meal. Consumption at home removes the controls that might usually be implemented in hospitality contexts. There is evidence that home deliveries may increase alcohol consumption *(14)*, as well as making it easier for minors to purchase alcohol *(15)*. There is also emerging evidence that online ordering for alcohol delivery has been associated with increased alcohol consumption during COVID-19 restrictions *(16)*.

Expansion of availability into online settings via MDAs creates new and complex challenges for policy-makers concerned about alcohol use and harms. However, more research is required to improve understanding of online alcohol sales and how best to regulate them.

The impact of advertising on MDA use

Advertising on digital platforms, such as MDAs, may lead to increased consumption of unhealthy foods and alcohol, as well as encourage unhealthy eating habits and social behaviours, including violence related to alcohol consumption *(17)*. For example, a 2021 study in the Norwegian digital marketing landscape found that eight out of 10 food and drink advertisements aimed at children in Norway violated WHO guidelines and promoted unhealthy nutrition *(18)*. Other studies found that advertisements for package deals or loyalty discount rewards for reaching a certain amount of orders can encourage the overordering and overconsumption of foods *(19,20)*. Exposure to alcohol marketing in any context affects the onset of alcohol use, as well as the frequency of drinking and drinking patterns, especially among young people *(21)*. Despite the existence of many policies and programmes, research shows that children and adolescents are still increasingly exposed to advertisements for unhealthy products *(22)*. In response to this, WHO has developed a tool, the CLICK framework, to support Member States in monitoring digital marketing of unhealthy products to children *(22)*. As this sector is new and evolving, government policies promoting healthy diets, such as policies for front-of-pack labelling, reformulation and marketing, do not apply to the out-of-home food sector. While regulations currently exist for how data should be presented in search engines, restaurants are able to pay to promote their products in order to achieve priority in online searching. MDAs are a prime example of why digital environments need to be regulated in order to harness opportunities to promote healthy and sustainable nutrition options and to prevent increased consumption of unhealthy foods and alcohol and the associated harms.

ADVERTISING ON DIGITAL PLATFORMS, SUCH AS MDAS, MAY LEAD TO INCREASED CONSUMPTION OF UNHEALTHY FOODS AND ALCOHOL, AS WELL AS ENCOURAGE UNHEALTHY EATING HABITS AND SOCIAL BEHAVIOURS, INCLUDING VIOLENCE RELATED TO ALCOHOL CONSUMPTION

MDAs offer opportunities to improve nutrition

While MDAs pose challenges to public health, they also present an opportunity to deliver interventions to improve public nutrition. As diet is a major modifiable risk factor for NCDs, MDAs should be utilized to promote healthy eating habits and decrease the consumption of unhealthy foods and alcohol. Research shows that consumers are willing to alter their usual eating times when incentives are offered *(23)*. Therefore, MDAs have the capacity to influence which type of meals are incentivized during popular dining times. Furthermore, the WHO European Office for the Prevention and Control of Noncommunicable Diseases (WHO NCDs Office) is currently engaging in projects that extract menu and nutrition information from restaurant menus using machine-learning techniques. By better understanding the kinds of food and beverages on offer, as well as the geographical coverage of meal delivery services, the project ultimately aims to raise awareness about the digital food environment among policy-makers and the public health community at large.

Impact of MDAs on the environment

MDAs are not only modifying dietary behaviour, they are also impacting the environment. Some of the major environmental concerns include increases in waste, air pollution and electricity use.

Packaging waste

The most prominent form of waste resulting from MDAs is the increase in volume of plastic waste from food packaging and cutlery *(22)*. Municipalities throughout the WHO European Region as well as other regions across the world have struggled with the rising amount of municipal waste *(25)*. Research shows that consumers are more likely to order from MDAs when they perceive greater health-related risk in accessing the physical food environment *(26)*. The COVID-19 pandemic has, therefore, exacerbated this issue, as both consumers and providers preferred single-use packaging over reusable packaging for hygiene purposes.

Food waste

Many consumers throw away food ordered through MDAs rather than save leftover food for other meals *(24)*. As many MDAs set a minimum value for orders, this means that many consumers order more food than they need, increasing the amount of food waste *(24)*. Greater portion sizes associated with MDAs are also associated with increased food waste *(7,24)*. Food waste is also increased in workplace as many people do not want to carry leftovers home.

HIGH LEVELS OF

PACKAGING WASTE

FOOD WASTE

AIR POLLUTION

ELECTRICITY USE

Air pollution

Delivery is generally made by motorcycles or cars, which generates exhaust fumes *(24,26)*. With this in mind, some food delivery platforms are trying to reduce their impact by increasing the use of bicycles and electric bicycles. It should, however, be noted that there is also the issue of waste from the spent lead-acid batteries from electric bicycles, which pose a threat to both human and environmental health if disposed of improperly *(24)*. Additionally, increased use of electric bicycles will increase electricity usage; however, they remain a more environmentally sustainable option than cars and motorcycles.

Potential for change

While MDAs may pose a threat to the environment, several are attempting to make environmentally conscious changes.

For example, delivery platforms in the United Kingdom have been reducing automatic provision of disposable cutlery *(24)*. In some cities in the WHO European Region, the preferred mode of delivery is the bicycle because of issues of accessibility and parking for cars. Understanding the impact MDAs can have on the environment will enable the development of systemic changes that will allow for sustainable solutions.

Impact of MDAs on physical activity

MDAs have changed food and dining culture globally. MDAs take away the time and effort involved in home food preparation, reducing ingredient purchasing, food preparation and cleaning up after meals. Similarly, in the workplace, MDAs allow colleagues to socialize and use their breaks productively by sharing mealtimes without leaving the office or preparing food. In 2017, the Just Eat Observatory reported a 137% increase in lunch orders for delivery across 15 Italian cities *(24)*.

While food and alcohol delivery services may increase socialization, they largely remove aspects of food culture that encourage physical activity and instead encourage sedentary behaviour. Consumers no longer need to incorporate physical exercise into the routine of collecting takeaway orders, shopping or walking to buy coffee. As MDAs centre themselves around punctuality and convenience, this aspect poses an inevitable challenge to population health. Throughout the WHO European Region, as well as elsewhere in the world, some food delivery companies explicitly promote sedentariness. As the cost of delivery decreases, food and alcohol delivery may become more attractive to a greater number of people.

IN 2017, THE JUST EAT OBSERVATORY REPORTED A 137% INCREASE IN LUNCH ORDERS FOR DELIVERY ACROSS 15 ITALIAN CITIES

Impact of MDAs on road safety

The rise in MDAs is also impacting road safety in that delivery drivers regardless of mode of transport will be affected by traffic and road hazards. With many MDA drivers paid on commission, speed of delivery is key to maximizing earnings, which can be detrimental for the safety of drivers and other road users.

Pressure from both customers and food outlets to avoid delays can lead to drivers suffering from fatigue and taking unwarranted risks such as exceeding urban speed limits or failing to comply with traffic signals. In making their deliveries, drivers of both motorized and non-motorized vehicles frequently park in nondesignated and illegal areas, which increases traffic congestion and risk of collision with other road users.

As the popularity and utilization of MDAs increase, urban planning must consider the evolving use of roads and address road safety and traffic conditions to accommodate the increasing presence of delivery riders in urban areas.

As with other aspects of the transportation system, chain-of-responsibility legislation is essential for the protection of drivers as well as the general population within a system that is essentially coordinating labour services remotely *(27)*. Such legislation requires employers to create safe and healthy workplaces and makes them jointly accountable for negative outcomes where work policies and employers' expectations can lead to unsafe practices (**Case study 1**).

Trauma caused by driver under time pressure.

Drivers respond to the time pressures by coming under increased psychological pressure. A study from the Netherlands investigated the effects of time pressure on driver performance psychological activity. In situations of time pressure, drivers drove faster than they did when it was not there. The pressure also affected maximum braking distance, accelerator use and lane discipline. Drivers had increased heart and respiratory rate, pupil dilation and reduced blink rate. While an increase in sympathetic arousal can help to improve driver precision, the increased speed can be a leading contributor to traffic accidents *(28)*.

Impact of MDAs on food safety

Food safety is key for food security and a basic human right. It is the assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use *(26)*, and is a shared responsibility across all stakeholders on the food chain. With the increasing use of MDAs, the management of food safety risks associated with food storage, delivery and transportation need special attention.

Ready-to-eat food should not be kept at temperatures between 5°C and 60°C for more than two hours *(29)*. Maintaining food at proper temperatures is critical to

limiting the growth of pathogenic bacteria or the formation of microbial toxins in food. This may be a challenge for food service outlets producing ready-to-eat or ready-to-cook food for delivery to the consumer unless appropriate modes of delivery are being used, such as insulated thermal bags.

It is also important that any material used for wrapping and packaging does not constitute a source of contamination. Materials should be stored so they do not become contaminated and packaging operations should be carried out in a manner that prevents contamination of the food.

Cross-contamination between different types of food during storage, transport and delivery must also be appropriately managed. Allergens should be identifiable during ordering, and during storage, transportation and delivery; it is important that unpackaged food does not come into contact with potential allergen sources and that raw and ready-to-eat items are appropriately separated.

In addition to the risk of contamination from chemical or microbiological hazards, there may also be risks of contamination from physical hazards such as dust if food is not appropriately packed and protected during storage, delivery and transportation.

For food delivery providers, it is recommended to adopt a risk-based food safety management approach and identify food safety risk factors and necessary control measures. This may include implementation of Hazard Analysis and Critical Control Points or other risk-based systems.

READY-TO-EAT FOOD SHOULD NOT BE KEPT AT TEMPERATURES BETWEEN 5°C AND 60°C FOR MORE THAN TWO HOURS

CONTRACTORS INVOLVED IN THE GIG ECONOMY OFTEN HAVE NO RIGHT TO A MINIMUM WAGE, PAID HOLIDAYS OR SICK LEAVE.

Impact of MDAs on labour

As MDAs are a new sector, challenges remain regarding how to regulate and manage workforces. MDAs are digital networks that coordinate their own labour services, most commonly via computer-implementable instructions, also known as algorithms *(27)*. MDAs have been a large part of the emergence of the so-called gig economy, where companies contract individuals to carry out small tasks or jobs *(30,31)*. The nature of this work means that opportunities for workers are often irregular in terms of income, working conditions, social protection, skill utilization, freedom of association and the right to collective action *(31)*. All jobs are managed

digitally through a platform and so, while the work remains physical, the organization of the labour process is fully digitalized *(30)*. A survey in 2016–2017 showed that 9–22% of workers across seven European countries generated some income from gig work *(32)*. These figures are expected to grow in future.

Restaurants who wish to be a part of a food and alcohol delivery service pay a commission to appear on the platform and cover delivery costs. Drivers are generally classified as external contractors and paid on commission *(30)*. Gig economy contractors such as MDAs have further control over workers through the nature of online digital platforms, because they can monitor workers in real time by tracking location and number of deliveries *(31,32)*. Workers, by comparison, have little control over their work as they are often unable to see the destination before they accept the job and they do not have the capacity to make informed decisions *(31,33)*. Moreover, the time needed to complete the overall delivery can be substantially more than is justified by the remuneration *(34)*. Workers are rewarded for the number of deliveries they make and, because they accept tasks on this basis without fully appreciating what is being expected, they may end up working lower-paid shifts with fewer, longer deliveries. Poor regulation of the gig economy may also allow unchecked exploitation of undocumented migrant workers by food delivery platforms *(35)*. Workers who participate in the gig economy are not protected by workers' rights and their contractual status offers little or no protection from dismissal (**Case study 2**) *(36)*.

CASE STUDY 2

Foodora in Turin, Italy

In 2016, the German MDA Foodora caused a stir of public protests concerning worker mobilization in the gig economy. Riders working for Foodora in Turin staged a series of public protests which sparked debate in Italy about the working conditions of the gig economy (*36*). Demands were centred around cycle maintenance, Internet connection costs and higher hourly wages, which were lower in Turin than in Milan. These demands came after Foodora's September 2016 transition from paying an hourly rate to payment on commission (*30*). Foodora refused riders' demands to be classified as employees.

Making systemic changes to improve the working conditions of riders may be a beneficial move for MDAs, as research shows consumers are increasingly concerned about the poor working conditions of delivery drivers *(33)*. The generation of a short-term source of income is the main value for those who work in this gig economy, and regulations should be put in place to ensure that these individuals continue to benefit from this new way of working. As the expansion of digital food environments including MDAs is now reconfiguring labour conditions, it is essential for new legal frameworks to take into consideration the current and future developments of these new standards.

Impact on cities

Due to the current lack of regulations of MDAs, many municipalities are concerned about their impact on their population. As MDAs expand in reach and become accessible to people in smaller urban centres, the amount of unhealthy food options increases. Public health workers are expressing concerns regarding the increase availability of convenient, unhealthy food options in an increasing number of cities and smaller regional areas. The appeal of the convenience of MDAs means that many food and alcohol outlets in these areas have no choice but to partner with a delivery platform in order to stay competitive.

Conclusion

This factsheet highlights MDAs as a component of a rapidly transforming digital food environment. As more and more of our decisions surrounding food and beverages are made in the digital arena, it is important for public health authorities to understand the potential impacts of MDAs on NCDs and other public health concerns. As this factsheet has shown, there are multiple entry points to improving the health and sustainability of digital food environments in the WHO European Region. A systems approach can assist in macro-level assessment while at the same time allowing local and national governments to focus on particular areas, collect data, propose interventions and develop appropriate policies.

The WHO NCDs Office is currently developing an artificial intelligence tool with Kingston University, United Kingdom, to pilot data collection in the WHO European Region. Ministries of health can contact the WHO NCDs Office for further details on this tool, or for any other queries regarding digital food environments.

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