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The Investigation of City Hospitals within the Scope of Urban Planning in Turkey

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Abstract: City hospital model, recently a current issue in Turkey, has become an important part of the health system and start to be actualized to enhance both the working conditions of health personnel and health services offered to the citizens. Along with Turkey's accelerated privatization policy, in 2017, it was decided to meet the health needs with a system produced by the public-private partnership model (PPP). City hospital investments, which are introduced as an important demonstration of development, have many reflections on the city, health, public and national economy. In this article, the effects of the city hospitals in the context of holistic planning will be discussed within the scope of the location of hospitals, transportation facilities, and accessibility. Ankara Bilkent City Hospital, which was completed as the largest hospital in Europe and is currently used extensively, has been chosen as the case area of the article since the physical environment and city-related problems can be identified and evaluated.

1. Introduction

City hospitals become the main topic of conversation in the health system of Turkey by the introduction of the new law about the construction of service facilities with public-private cooperation by the Ministry of Health in 2013. The city hospital models start to be actualized in 2017 and the construction/design processes of rest hospitals to be open in particular cities are still in progress. In these hospitals, which are envisaged to be patient-oriented, they aim to increase the quantity and quality in spatial areas, to make a positive impact on patient safety and perception, and to educate staffs on the accurate functioning of medical processes. Nonetheless, with the emergence of city hospitals, some operational problems have occurred regarding both the working conditions of healthcare staff such as workload and work hours, and the access of citizens to healthcare services (Sasam Institution, 2018). Especially unforeseen and undefined consequences regarding the accessibility level of healthcare services are noticed after the hospitals are put in practice.

This paper aims to examine the evaluations developed by questioning the location of the city hospitals in the city, to analyze them through the objective of planning, and to provide a planning vision for future city hospitals. In this sense, first of all, the construction model of the city hospitals (public-private partnership) will be examined, which is also criticized administratively, and the targets of implementation of these hospitals will be explained. In this model, although it is aimed to use public services efficiently and to contribute to this development by the private sector, the economic results of the process are discussed with their positive/negative aspects.

The model and the design phase of the hospital include interrelated decisions. In the next chapter, the reflections of the city hospitals on the city in terms of urban planning are evaluated especially with the example of Bilkent City Hospital. These reflections gain importance not only in terms of the connection of a new structure with the city but also in the uncertainties regarding the future of closed hospitals. Therefore, the paper focuses on the processes of these two transformation areas. The evaluation made through the criteria comprises transportation, accessibility, and location with the opinions of planners.

2. The Emergence of City Hospitals

One of the most important services that should be effective in the provision of public services by states is healthcare. As one of the developing countries, in particular, Turkey, the increasing elderly population and the pressure of technology developments on public services led to the need for sustainable reforms. As the third and most significant pillar of the Health Transformation Program, which has been implemented since 2003, city hospitals have been introduced to the Turkish health system. Turkey's 81 provinces, in the framework of an approach developed by the World Bank, were divided into 29 regions (Şengül, 2017). Besides, it is envisaged that existing public hospitals will be closed to realize 70% occupancy rate in city hospitals. As a result, a system in which health services in 81 provinces are concentrated in 29 regions has been defined. Due to some legal obstacles, the first contract of the city hospitals was concluded in 2011 for Kayseri City Hospital (Tatar, 2018). As of 2019, 10 of city hospitals whose 20 signed contracts were completed (Turkey Ministry of Health).

The rationale for the realization of the city hospitals is to increase and improve the capacity of health services in general. Through city hospitals, The Ministry of Health aims to provide a

health campus with quality services thanks to its physical location, better patient satisfaction and to bring together service practicality with the quality of the private sector. Chronic diseases such as obesity, cancer, cardiovascular diseases, the expectations of citizens with the formation of health consciousness, and insufficient quality of the existing hospitals to provide adequate health services, are presented as valid reasons for the execution of city hospitals (Gökkaya et. al, 2018). To provide the quality of hospital service, it is planned that the hospitals have a 5-star hotel standard and that the patient rooms have a washbasin, showers, and toilet. In addition, clinical hospitals, guesthouses, motherhouses, corridors with moving walkways, and heliports have been defined in these city hospital campuses (Sözer, 2013).

The public-private partnership (PPP) model is preferred in the implementation of these hospitals. The logic for this model is that the financing of the project, hence the physical equipment, maintenance, repair, and renovation is in the charge of the private sector; health service delivery and customer guarantee is in the charge of the state (Gökkaya et. al, 2018). The world's first public-private cooperation practice in the health sector was implemented in the UK. According to findings, it caused criticism due to public damage and caused many hospitals to go bankrupt (Sözer, 2013). This model adopted in order to take advantage of the private sector in Turkey, raises several results not only in commercial and legal areas but also in the sense of urban planning. Particularly, the advantages and disadvantages of the hospitals, which are completed and served, for citizens, health workers, and the state are emerging. Also, gathering hospitals that specialize in different fields on a single campus and closing old hospitals is another result affecting urban planning. Therefore, the results of the emergence of city hospitals need more comprehensive and detailed research in the planning dimension.

3. The Impacts of City Hospital in Planning Dimension

City hospitals can be considered as one of the large-scale projects that have recently come up. The fact that public-private cooperation is preferred to provide financing in the construction of such projects and that the government gives the investor uncertain guarantees has many economic consequences (Şengül, 2017). These results ultimately influence the health system in Turkey. And according to Şengül, this situation shows that large-scale projects such as city hospitals have become the center of economic and administrative sanctions imposed by politics (2017).

For the selection of location for city hospitals, Turkey's first divided into 29 regions and a plan has been made that the concentration of health services in 29 centers at 81 provinces. Again, as Şengül states, the selected centers to be metropolitan may feed the underdevelopment level of the remaining provinces (2017). Therefore, he argued that such a centralization project would increase the imbalance between regions.

The planning dimension within the city is determined by the location choices and accessibility of the city hospitals in general. At this point, it is sought to answer the questions about how hospital transformations affect the planning in the city and the study includes the information within this scope. In addition, since these projects are long-term, they can contribute to the process of city hospitals under construction or planned. The evaluation of city hospitals from the perspective of planning will be discussed under two chapters as the effects of the newly established hospitals and the effects of the closure of existing hospitals.

3.1. THE IMPACT OF DISUSED HOSPITALS ON PLANNING

The planning of city hospitals on the periphery of the city and the closure of existing public hospitals with insufficient health services has effects on the surrounding of closed hospitals. With different functions and a number of beds, these hospitals were located too close to the city center, easily accessible. In addition, the commercial enterprises supporting healthcare in the vicinity of the closed hospitals fed the economy there. The fact that city hospitals gather all these public hospitals under one roof offers more comprehensive and new health services in terms of quantity and quality. However, the impact of the closure of existing hospitals and the commercial areas that have lost their function in the surrounding area, which is not given information in the EIA report regarding its future, remains an enigma to be solved.

Şengül evaluates the impact of the closed hospitals on the city through the Ankara case. With the opening of Bilkent and Etlik city hospitals (Figure 1) in Ankara, 14 public hospitals, most of which are in the center, are foreseen to be closed. He states that these hospitals are in Ankara's decaying areas and the closure of them will transform their regions into more 'disused' areas of the city (2017). The term 'disused' refers to abandoned buildings without urban activity and any development of their surroundings. In Ankara case, the health facilities, which were closed to open city hospitals, are located in Sıhhiye, Dışkapı, and Ulus districts in the city center (Figure 1). In particular, the spatial identity and public functions of 'Sıhhiye', which takes its name (in Turkish) from health services, are mostly supported by different health facilities such as education and research, women's health and children, physical therapy, and rehabilitation. These health facilities are pioneering and well established in the field of treatment of diseases that require advanced expertise. The existing hospitals in these regions also fed the commercial and social areas around them with the staff, the patients, and visitors coming to hospitals.

Figure 1. The location of Bilkent / Etlik City Hospitals and city center

In the same period, the relocation of ministries and public institutions to Eskisehir Road has been one of the factors that weakened the economy of these regions. As Şengül points out, city hospitals are not only large-scale health projects but also urban development or urban transformation projects. In this

context, “These projects, which mean urban development at the point they are located, point to the urban destruction in the regions where hospitals were closed” (2017). Therefore, there is a necessity for urban planning for these buildings, which have become ‘disused’ areas in the city center. These buildings, which are also valuable with their location in the city center, can be transformed into areas that meet the public needs and provide social benefits for them.

In the time when the Covid-19 infectious disease is experienced, the purposes of city hospital investments, contributions, or disadvantages to the health sector can be observed much more extensively. During this period, due to the increase in the number of Covid-19 cases and the fullness of intensive care units, it has been decided to reopen some of the closed public hospitals. Since these public hospitals in the city center have comprehensive healthcare infrastructure and easy accessibility by citizens, they supported city hospitals in the fight against Covid-19.

3.2. THE IMPACT OF NEW CITY HOSPITALS ON PLANNING

The poor-quality healthcare services and an insufficient number of beds provided by the existing public hospitals required a new health structure with more effective treatment services. Therefore, the increase in the number of square meters per patient, the collection of several treatment units in one center, and the execution of larger and glorious waiting and entrance areas like in private hospitals, have resulted in a health campus comprising all these features. As this spatial growth requires a much larger land area, the hospital location is chosen from large land areas far from the city center. Urban planning decisions made in site selection shapes hospital accessibility and transportation facilities.

In the case of high-intensity use of city hospitals, the effects of urban planning decisions are much more seen. As stated by WHO (2020), “Preparedness in cities and other urban settlements is critical for effective national, regional and global responses to COVID-19”. In terms of city hospitals, to take more effective urgent actions for Covid-19, it has become necessary to increase the intensive care units and patient care units, to plan full-capacity quarantine rooms, and to prepare urban settings of hospitals for disruptive outbreaks. City hospitals, where all these critical actions are concentrated, have become the center of the fight against Covid-19. Therefore, the urban settings of such hospitals have become even more important in managing the case of Covid-19 in terms of continued access to testing by all who require, transfers between hospitals for load-balancing, and essential public services and infrastructure such as public transportation. The fact that healthcare facilities are easily accessible in public health emergencies such as Covid-19 plays an important role in reducing the impacts and risks of the virus. Therefore, as WHO states (2020), the features of city hospitals on an urban scale have become critical in terms of “preventing the spread of Covid-19, and developing resilience to and preparedness for events of a similarly disruptive nature”.

3.2.1. Location of Hospitals

“Hospital accessibility is a vital factor in identifying areas with a shortage of healthcare” (Wang, Du, Huang & Liu, 2020). When choosing a hospital location, in some cases there is no land suitable for building a large-scale hospital in the city center. In this case, there are two options: multiple hospitals close to the central location and small-scale, with different functions and structures, or large hospitals on the periphery of the city (Gültekin and Zorlu, 2019). Small-scale hospitals located close to the center not only provide public transportation easily but also feed the region economically. Large hospitals in the urban periphery may increase public transport costs and may not be sufficient to transform the social environment as it includes all social facilities.

The Ministry of Health states that Bilkent is a region that can serve other provinces (Çankırı, Karabük, Kastamonu, Bartın, Zonguldak, and Bolu) close to Ankara. Bilkent is planned as the 11th of 29 health centers “considering the density of the population, the ease of road transport facilities, the availability of health workforce, the conditions of the existing health facilities and the service delivery capacities” (Akdağ, 2011). Bilkent city hospital is planned in an area between METU, Bilkent, and Hacettepe universities, reached from only Eskisehir Road (Figure 2). Eskişehir Road is one of the transportation corridors where traffic congestions are currently experienced. The hospital, which is added only on this corridor, brings additional traffic loads. It may create new congestions on roads and junctions around the facility, especially in the entrances and exits of the facility (Öncü, 2017). While the homogeneously spread hospitals in the city facilitate access to health, the city hospitals, which changed the center of gravity of the city, carry great mobility (staff, patients, and patient relatives, approximately 20.000 people in one day) to a single point (Yırtıcı, 2019). Therefore, the availability of transportation infrastructure appears as an important criterion in site selection.

Figure 2. Location of Bilkent City Hospital

Also, the EIA report (2U1K Engineering and Consulting Company, 2014) states that the project site is open to development and where comprises large development projects that will interact and have a significant cumulative impact during the construction period. Cumulative impacts occur the combined impacts of more than one project, and although impacts arising from only one project are not significant, the size of the impact reaches critical levels when evaluated together with other projects. Therefore, the EIA report (2U1K Engineering and Consulting Company, 2014) draws attention to the need for cumulative impact assessment especially for the construction process.

There are many public institutions and ministry buildings in the Bilkent region, and many public officials use Eskişehir Road to reach their workspaces (Figure 2). In addition, this

transportation axis, which also serves a large mosque that has been recently constructed, has become a region where rent is high. At this point, who will use Bilkent City Hospital is an important question. "The Bilkent EIA report (2U1K Engineering and Consulting Company, 2014) explicitly emphasizes that high-income groups living in Bilkent and similar regions will benefit from private health services and will use this hospital in a limited manner" (Şengül, 2017). Therefore, to reach these hospitals, which are mostly used by people from lower-income groups, "a longer-time and costly trip" becomes necessary (Şengül, 2017).

3.2.2. Transportation Facilities

"Transportation issues include lack of vehicle access, long distances and lengthy travel times to reach needed services, transportation costs, inadequate infrastructure and adverse policies that affect travel" (Health Research & Educational Trust., 2017). Elderly, under-educated, minority, or low-income groups are much more affected by transport-related problems. Elderly, disabled, and veterans who are exposed to social isolation are particularly vulnerable to transportation barriers (Health Research & Educational Trust., 2017). Therefore, city hospitals built in the periphery of the city need to have a public transportation plan considering the groups such as patients in need of emergency treatment and elderly people who cannot move without companions. For example, it has been determined that Covid-19 mostly affects the age group of 65 and over, and intensive care units are used mostly by this group. Also, in this type of rapidly transmitted infectious disease, the elderly has to go to the hospital unaccompanied. It is necessary to ensure that they access the hospital without stress and trouble and to reduce the risk of human-to-human transmission. However, extensive and crowded public transport routes can become focal points for transmission.

In this context, the transportation issue of Bilkent City Hospital has been examined and Öncü (2017) evaluated the user profiles and their transportation types. According to his study, the trips to Bilkent city hospital are generally planned through individual transportation such as automobile, taxi, and ambulance. Similarly, in terms of the income levels and the values of their time in a hospital, doctors come to the hospital with individual transportation. Other healthcare staffs also have access to the hospital via a shuttle or public transport. To meet the needs of the city hospital, those who sell goods and services, business followers, and logistic service providers use the highway again. Therefore, when the transportation patterns of the user profiles are examined, it is determined that 70-85% of individual transportation is used. This situation is stated to affect the congestion in transportation corridors (Öncü, 2017).

The quality of the vehicle, which is another factor related to transportation, affects the comfort of the trip in a short time. "Perceived distance and time burdens are frequently cited by patients as a barrier to healthcare utilization" (Health Research & Educational Trust., 2017). When the transportation information of Bilkent City Hospital's website is examined, it is seen that direct transportation is provided only by bus and minibus. Accessed by only one bus or multiple vehicles hospital can be quite challenging for those already suffering from health problems.

Considering the transportation infrastructure around Bilkent, 13 road lanes should be identified to provide access to Bilkent city hospital with 3700 beds (Öncü, 2017). However, the only connection way, in this case, is Eskisehir road with 3-4 lanes (Figure 02). This problematic situation is stated in the EIA report as follows: "The most important cumulative impact will be related to the increase in traffic. Therefore, the plans of Ankara Metropolitan Municipality for traffic management are necessary"(2U1K Engineering and Consulting Company, 2014).

3.2.3. Accessibility

It is essential to consider geographical and transportation barriers in terms of accessibility to hospitals for patients to get accurate and timely diagnosis and treatment services (Zhan et.al., 2020). The main targets of city hospitals with qualified health services and better health outcomes are closely related to "a better and clearer definition and calculation of accessibility to healthcare" (Zhan et.al., 2020). Before the investment of city hospitals, implementations have been made to develop policies to improve family health centers and family medicine services, which are primary healthcare services. This system allows patients to use centers where they can easily access, rather than going to larger hospitals, and reduces healthcare system costs (Santaş et. al., 2019). Therefore, it may be advantageous to have a hierarchical structure in terms of accessibility in the health system and to implement health centers that can be reached in a short time for primary care diseases. However, city hospitals are considered to be a much more favorable system in terms of ease of access (Santaş et.al., 2019). In the study of Santaş, which compiled the newspaper news that wrote the advantageous /disadvantages aspects of city hospitals, easy accessibility is asserted to be the most prominent benefit of city hospitals. Due to the all-inclusive facilities of city hospitals, patients can complete the entire process in one hospital without being referred to other centers. City hospitals are also planned as a complex including social life areas, recreational areas, and shopping centers. These living centers accommodate many units with different functions that support the patient's healing process such as patient education, smoking cessation, advanced aging diseases, health at home, etc. (Ankara Bilkent City Hospital). Providing social facilities and promoting well-being of patients by creating supportive surroundings reveal the advantageous side of the city hospitals.

In terms of accessibility in city hospitals, difficulties in transport standout such as insufficient public transport, distance to the city center. It was stated that the difficulty of accessing the hospital disrupted the control examinations of the chronic patients and many patients who neglected the control applied to the emergency department because of the complications (Pala, 2019). Also, it is argued that emergency cases take longer to reach the emergency service of a city hospital than to the emergency services of closed public hospitals (Pala, 2019). It is stated that with the opening of a trauma department in Bilkent city hospital, all trauma patients in the city have been brought to the city hospital (Koyuncu, 2019). For example, when there is a trauma patient in Pursaklar, a region far from the Bilkent city hospital in Ankara, the ambulance passes the Pursaklar Public Hospital and many public hospitals on the way and brings the patient to the Bilkent city hospital. This situation also makes it difficult for patients and their relatives to return home (Koyuncu, 2019).

4. Discussion

The projects of the city hospitals, which are introduced to the health system with the Health Transformation Program, are presented as planning to provide human-centered healthcare that gives the human deserved value. One of its most important features is that it provides a healthcare service where all

departments are ensured and the patient can implement all operations without transferring to other hospitals. However, as the comprehensive healthcare service delivery requires a separate spatial planning for each department and care center, a huge hospital project is emerging, with many entry and exit points, connected by long corridors at a campus-scale and complexity. In this sense, as the large dimensions and capacities already reached by city hospitals to provide comprehensive health service are realized without multifaceted planning, the negative consequences related with accessibility and transportation become inevitable. Though, planning criteria such as the geographical structure of the city, population distribution, user profiles, the distance of the population to healthcare centers are very critical in such projects.

In the perspective of urban planning, city hospitals have been examined in more detail within the scope of criteria such as transportation infrastructure, accessibility, and location characteristics. In terms of transportation alternatives and routes to the hospitals, the city hospitals could not be fully generated. This planning process has been defined as the dynamic adaptation process after the completion of the project (Sasam Institution, 2018). The hospitals have been opened to service before the transportation alternatives could be developed adequately so that the main alternative becomes a road transport option. Although this situation necessitates the increase and qualification of the existing roads, the adequate and qualified roads connected to the hospital campus has not been established yet. As a specific example, Eskisehir Road connected to Bilkent city hospital indicates this approach. Eskisehir road is a problematic axis due to congestion in the morning and evening hours. Together with the city hospital, alternative roads will be needed for the traffic to be loaded on this axis and a transport infrastructure should be proposed accordingly.

These problems caused by the location choices of the hospitals require more comprehensive and detailed studies for the other city hospitals being planned. In addition, a vision should be put forward for the future process and functions of closed hospitals. In this context, the destruction of health identity that has been built in the city center for years and the deterioration of the spatial distribution of health service with newly opened city hospitals become important discussion focuses. In this sense, the planning of city hospitals does not only cover the new construction area but also the design of the abandoned area.

Again, as seen during global Covid-19, an extensive plan is needed to develop effective responses to Covid-19 on an urban scale. The management of Covid-19 includes a strategic action plan, not only increase the capacity of health services but also facilitate the transfer between health facilities and eliminate barriers to accessing the health system. It can be seen that city hospitals as pandemic hospitals face a great patient burden in this process, and provide healthcare services to constantly increasing infectious patients with both their treatment resources and well-equipped spatial areas. Considering the transformation of city hospitals into pandemic hospitals, the location of these hospitals in the city constitutes an effective factor in such pandemics. Especially, it is very important for critically ill patients living in districts far from city hospitals to reach the hospital by ambulance as soon as possible. Despite this, such patients are brought to the city hospitals rather than the nearest public hospital. For this reason, the location of city hospitals close to the periphery of the city and far from the city center may become problematic. In such pandemics, a geography-based health structure and ease of access to health services stand out to control the spread of the disease.

With the closure of public hospitals in the center and moving to the Bilkent City Hospital, the citizens have been forced to travel more and more time to reach the city hospital. In the Covid-19 pandemic, with the increased transportation time and increased mobility, the virus is likely to spread further. In the situation where city hospitals are inaccessible and insufficient, a few of closed public hospitals are repurposed according to pandemic conditions. Essentially, many closed public hospitals could have continued to provide qualified service for many years with improvements and renovations. Therefore, these hospitals may also be reviewed as a part of the preparedness plan for future pandemics to support city hospitals.

References

Akdağ, R. (2011). Yataklı Sağlık Tesisleri Planlama Rehberi Özet Kitap, Tedavi Hizmetleri Genel Müdürlüğü. Retrieved from: http://rapor.saglik.gov.tr/SHGM/shgm_yatirim.pdf

Gökkaya, D. (2018). Kamu-Özel Ortaklığı Bağlamında Şehir Hastanelerinin Değerlendirilmesi. Social Sciences Studies Journal, (4). DOI: 10-26449/sssj.581

Gültekin, S. and Zorlu, F. (2019). Türkiye'de Sağlık Sistemindeki Dönüşümlerin Mekansal Etkileri: Mersin Kent Örneği. Journal of City and Regional Planning, 1(1), pp. 35-93.

Health Research & Educational Trust. (2017, November). Social Determinants of Health Series: Transportation and The Role of Hospitals. Chicago, IL: Health Research & Educational Trust. Retrieved from: www.aha.org/transportation

Koyuncu, B. (2019, November). Ankara Şehir Hastanesi Deneyimi. The Symposium of Şehir Hastaneleri: Yalanlar ve Gerçekler. Şişli Municapility Nazım Hikmet Cultural and Art House, Istanbul.

Öncü, E. (2017). Şehir Hastanelerinin Kent İçi Ulaşıma Etkileri. Şehir Hastaneleri Sempozyumu, TMMOB Mimarlar Odası-Ankara Tabip Odası, March 2017, Ankara.

Pala, K. (2019, May 7). Şehre Uzak Hastaneler Hastaları Mağdur Etti. (Birgün, Interviewer). Retrieved from: https://www.birgun.net/haber/sehre-uzak-hastaneler-hastalari-magdur-etti-258085

Santaş, G. and Santaş, F. (2019). Şehir Hastanelerine İlişkin Haberlerin Gazetelerde Yansıması. Sosyal Bilimler Yüksekokulu Dergisi, 22(1), pp. 105-111.

Sasam Institution. (2018). Şehir Hastaneleri Araştırması. Sağlık-Sen Publications. Ankara. ISBN: 978-605-87841-7-8

Sözer, A. N. (2013). Sağlıkta Yeniden Yapılanmanın (Özelleştirmenin) Devamı Olarak Şehir Hastaneleri. Dokuz Eylül Üniversitesi Hukuk Fakültesi Dergisi, 15, pp. 215-253.

Şengül, T. (2017). Planlama Perspektifinden Büyükşehirlerde Hastanelerin Yer Seçimi Kararları. Şehir Hastaneleri Sempozyumu, TMMOB Mimarlar Odası-Ankara Tabip Odası, March 2017, Ankara.

Tatar, M. (2018). City Hospitals in Turkey. Retrieved from: https://health-in-turkey.com/2018/06/04/city-hospitals-of-turkey/

Turkey Ministry of Health, General Directorate of Public Hospitals, Department of City Hospitals. Retrieved from: https://khgmsehirhastaneleridb.saglik.gov.tr/

Yırtıcı, H. (2019, March 2). Şehir Hastaneleri: Hasta Üreten Fabrikalar. Gazeteduvar. Retrieved from: https://www.gazeteduvar.com.tr/yazarlar/2019/03/02/sehir-hastaneleri-hasta-ureten-fabrikalar/

Wang, J., Du,F., Huang, J. & Liu, Y. (2020). Access to Hospitals: Potential vs. Observed. Cities, 100 (2020). DOI: 10.1016/j.cities.2020.102671

WHO (2020). Strengthening Preparedness for COVID-19 in Cities and Urban Settings. Interim Guidance for Local Authorities.

Zhan, P., Li, S. & Liu, D. (2020). Unequable Spatial Accessbility to Hospitals in Developing Megacities: New Evidence from Beijing. Health&Place, 65 (2020). DOI: 10.1016/j.healthplace.2020.102406

2U1K Engineering and Consulting Company (2014). Bilkent Ankara Integrated Health Campus Environmental Impact Assessment (EIA) Report. Retrieved from: http://eced.csb.gov.tr/ced/jsp/portal/main2.htm