

# E-appointments at primary care physicians during Covid-19 pandemic: viewpoint and satisfaction of medical consumers

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## Abstract

**INTRODUCTION:** Use of e-appointment systems in primary care (EASPC) is a common practice in western countries, however, there is no evidence of implementation in R. N. Macedonia and other similar countries in development.

**OBJECTIVES:** This study explores the viewpoints and satisfaction of medical consumers (MC) on EASPC, and the impact of Covid-19 global pandemic concerning their appointments at primary care physicians.

**METHODS:** A survey on MC above the age of 15 years was conducted in July 2020. The results were analysed in SPSS 23.

**RESULTS:** The majority of participants were in favour on implementing an EASPC despite their neutral satisfaction with the walk-in method. Furthermore, they were confident in its effectiveness in the fight against spreading of Covid-19.

**CONCLUSION:** The MC opinion and satisfaction is crucial when developing health care systems and their implementation as a mix of services. For the system to succeed, it must be financed and supported adequately and as such, further research is necessary to explore a real-time EASPC usage.

**Keywords:** e-appointments, eHealth systems, primary health care, walk-in method, Covid-19 pandemic, medical consumer satisfaction.

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## 1. Introduction

For a medical consumer (MC) to be able to use the medical health facilities (MHF) an easy approach to see a physician is necessary. By using the traditional walk-in method where the patient is required to wait in line, the waiting time for patients increases, it overloads the MHF and it is influencing the work on the physician [1]. Additionally, crowded waiting rooms for the patients are a usual thing in the MHF [2]. With the fast improvement of the Internet information technology over the years, many MHF lean towards using electronic appointment systems for patients (EASP) [1].

According to World Health Organization Regional Office for Europe [3], by 2019 the level of satisfaction for MC in

Macedonia was estimated at 45%. This improvement was delivered by reducing the time spent on stand-by to see a physician with the use of “Moj Termin” (My Appointment) an integrated national system for electronic scheduling and recording of medical interventions, and by using the fast response rate from primary care physicians (PCP). This appointment system for secondary health care (SHC) was one of the first EASP that started implementation in 2012 [4]. However, the EASP progress for reducing the wait-time have not taken into account an e-appointment segment for PCP [5], so, it does not provide full potential in raising the level of satisfaction, and decreasing time spent on waiting for overall health care by implementing electronic appointment system for primary care (EASPC).

### 1.1 Traditional walk-in vs. EASPC

The advantage of planning the work schedule for the PCP brings merits in their work. In addition, a well-planned and structured EASP produces more arranged appearances of MC and improved health care for patients with chronic illnesses and other special circumstances where follow-up is needed [6]. Furthermore, EASPC will enable fluent workflow process and lower crowding in waiting rooms at the MHF, while satisfying needs of both MC and PCP [7].

The implementation of EASP will add additional satisfaction, easy access, and managing appointments for both MC and physicians [7]. Siddiqui and Rashid [8] introduce a comparison between these two types of systems. Their study shows that appointments made by web-based ZocDoc system lowers the rate of no-show patients to 6.9% in comparison to other ways of making appointments, which

was 17-31%. By using the Internet as a way to schedule appointments, the MC will acquire more open approach when using the MHF. Furthermore, EASP reduces the waiting time, improves level of satisfaction, and decreases workload on the PCP. The negative points in implementing EASP goes to protecting sensitive information of the MC, getting use to the system, and costs for its integration from the PCP views, whereas, for the MC was the way of communicating and practice in using the Internet [9]. A case study in Australia reported that 89% of the MC interviewed in 2014 were not inclined on the idea of replacing the traditional walk-in method to an EASPC. It is recommended to do research on the viewpoints of MC and PCP before introducing such system [10].

Figure 1 shows a flow chart of a traditional walk-in vs. the EASPC.

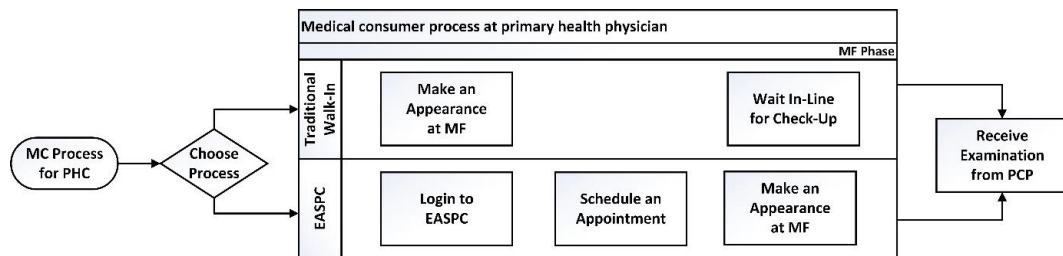


Figure 1. Flowchart of MC process comparison of traditional walk-in vs. EASPC

Furthermore, using EASPC is proved to be effective in reducing wait-times, and raising the level of satisfaction for both MC and PCP [1]. The rates of MC that do not show on their appointment and the ones that use the traditional walk-in varies from 20-30% and 10-25% respectively. In addition, it is reported that the number of no-shows is greater in the mornings in comparison to the walk-ins in the afternoon [11].

Hence, deviations from the appointment schedules in the EASPC would be [7]:

- Emergencies that come in straight using the walk-in system or over the phone;
- Split time between practice and appointments for the PCP service: for example, 08:00-14:00 for traditional walk-in and 17:00-20:00 for EASPC. This should be decided individually by the PCP work schedule and the needs of their patients.

A system called ‘Choose and Book’ presented by Parmar et. al. [12] has shown to lower the no-show rates and increase appearances of patients, because it enables MC to plan-in their schedule when is most suitable to them for a medical examination or consultation. In their results, the presented system had notably improved the appearance rates than the traditional way of visiting MHF [12]. Additionally, the fluctuation in rates for MC no-shows might be in correlation with the MC age, gender, previous visits, employment status, education, etc. As a solution, overbooking and scheduling more than one MC per

appointment slot may influence these rates [7, 11, 13]. Furthermore, many studies that are investigating causes for no-shows are giving recommendation on using reminder modules to further reduce these rates [1]. MC show dissatisfaction in waiting for longer periods before they are received for examination or consultation. The quality of service (QoS) of PHC very much depends on their satisfaction rating [2, 14]. The main purpose of developing a well-organized appointment system is to reach fairness between the MC satisfaction by lowering waiting time and the PCP stand-by time and working overtime [11, 15].

It should be added that, in today’s world crisis with corona virus Covid-19 pandemic, using these types of systems for the health care can be very beneficial. In the waiting rooms, the MC are further exposed to health perils just by waiting to be received by the PCP [16]. Adding to this, the PCPs and all the medical staff are additionally exposed to the spread of Covid-19 by being in close contact to the MC and themselves [17]. As a practice level in the health care system, it has gone through considerable changes in adjusting to the new health threat [18]. With the fast growth of the information technologies and the rapid spread of the Covid-19 pandemic it gave new values, possibilities and challenges in the progression of the health care overall. As the clinics are closed, except for emergencies only, MC are consulting their physicians using Internet communication tools [18]. Furthermore, the system could provide online consultation appointments with the PCP the

same way as a normal visitation. The provided video consultations with an online service have proven to be effective in UK as it has been used to over 80% of the country's health practices [18]. Adding to this, video consultation in comparison to phones are more favourable to sicker patients than others. For the PCP this would provide better look on the patient and further assess the MC health problems [19, 20]. EASPC can be used as a notification of the Covid-19 disease, as it would provide a short questionnaire run by an algorithm, and if the patients have certain symptoms, it would alert the PCP.

There is little, if any, published studies on the viewpoints and satisfaction of MC in using the currently active traditional walk-in system and how they grasp the idea of implementing an EASPC in R.N. Macedonia, especially in times of pandemic crisis. This study explores this uncharted area.

## 2. Related work

Al-Haqwi and Al-Shehri [6] have done a study on the satisfaction of physicians, the employees in the primary health facilities, and some random clients above 15 years of age in Saudi Arabia on the idea of introducing an appointment system at the primary care by replacing the standard "walk-in" system. They concluded that both the majority of participants in their study presented as patients and as physicians were in favour of introducing an appointment system and that the degree of education, employment status, and if the patients were married or not did not reveal any significant effect on the participants. Akintomide et al. [2] for example, point out that by using the standard "walk-in" system, there is a rise in crowding of patients in waiting rooms of health centres for an ultrasound and the common dissatisfaction of both the patients and the personnel in Nigeria. In their study, they included two different groups of patients: one that implements scheduling and other without scheduling. They reach a conclusion where appointment intervals at 30 minutes would decrease crowding and reduce the waiting time, hence improving the satisfaction level. Although this appointment system is done for radiology, their study shows us that an appointment system will be beneficial to schedule patients in appropriate spaced-out time and to allow them to choose the most convenient time slot. As a comparison, in addition to this, in the radiology department at a national level with the use of eHealth system 'My appointment' the time that the patients spend in waiting declined to no more than seven days from 15 months [21]. In Canada, USA, and UK, by increasing the waiting time, more and more patients lean towards urgent health care for even the basic and normal health problems, thus increasing the dissatisfaction of the PHC [16]. Because of problems like this in which the patients were facing, it adds to an increase number of sick people. In 2012 there was a rise in the number of sick people from the adult population in Canada by 23% in comparison to New Zealand with a 5% increase and Switzerland with rise of 2% [16]. Open access scheduling is the most commonly used

practice and also follow-up consultation phone calls, e-mails and the presence of staff contributes to decreasing the time spent in waiting areas for patients [22, 23]. However, answering the phone calls, e-mails and other follow-up questions will add an additional workload on the PCPs. The staff of the primary healthcare facilities should cover this. The PCPs should be relieved from additional workload like executing administrative work, hence the point of EASPC. By providing and enabling additional useful ways and types of communication, the number of unnecessary appointments would decline [24, 25]. This means that, the increased number of patients that are in real need of in-person check-up at the physician will be evenly distributed, thus providing better health care.

We can see the improvements and the rise of satisfaction level that the appointment system done in a traditional way over the telephone, e-mail, or in-person brings to the health care for primary physicians [5, 6, 23]. However, even if an appointment was booked over the phone or e-mail, in many cases in other countries and especially here, the patient would still wait for a check-up at the PCP if there are others before him. Currently, with the development of information technology and rise of the Internet use, introducing EASPC will contribute even further to the satisfaction, ease of access, and use of appointments of both MC and PCPs [8].

Web-based e-appointment systems have a rising tendency in practical application because of the positive effect on some variables, especially in reducing the percentage of patients that don't show, declining time on stand-by, increasing the level of satisfaction, declining workload on the employees and so on [9]. The only downside for PCPs in adopting web-based scheduling was the protection of sensitive data, adaptability, and price, whereas for the patients it was more affected by their ways of communication and their comfort in working on the Internet and with computers [9].

However, with the development of ICT technologies, the security of sensitive data is always a priority and for patients that find some difficulty to work on systems like this, there is always some help provided in easing their use. There are two prime ways of building a medical appointment system. First being web and cloud-based and second being medical scheduling software as a service [9]. The health care practitioners do not design these services, but some IT companies like ZocDoc and InQuicker [25]. Given the year of the article by Zhao et al. [9] till now the number of IT companies is greatly increased and so more safe and suitable solutions may have been introduced.

## 3. Materials and methods

### 3.1 Environment and Study Population

A study on the viewpoint and satisfaction of medical consumers (MC) in primary health care (PHC) was carried out in Macedonia. The sample of the study included a randomly selected MC between 15 and 65 years of age. To

meet the study objectives to be relevant for this country, by using the standard sample size formula the minimum sample size was calculated:

$$n = (z^2 \pi (1 - \pi) / e^2) / (1 + z^2 \pi (1 - \pi) / e^2 N) [26]$$

where:

$n$  – Sample size;

$z$  – The desired confidence level, which determines the value of  $z$ , the critical value from the standardized normal distribution;

$e$  – The acceptable sampling error;

$\pi$  – The population proportion;

As such, the following samples were estimated:

- At least 385 number of respondents to answer the questionnaires as MC from a population of 1.381.352 by the latest census in 2002, that fall in the category between 15 and 65 years of age [27]. The margin of error was set to 5% and confidence level of 95% [26].

Adding to the above, from the population mentioned above, the EASPC would be most beneficial and more prone to usage by students and to MC with active employment standing. Having said that, the number of full-time students in the past years was around 50.348 per year [27], and health insured carriers with employment status that are registered in the health insurance fund by 2019 is around 565.000 [28]. Hence, we get a clear image that a substantial portion of the population is covered in using EASPC in their daily lives.

### 3.2 Structured Questionnaire

An online survey questionnaire was used in this research study and it was structured in three parts:

- First part of the survey included the demographic characteristics of the participants;
- Second part of the survey included MC satisfaction and opinion on the current traditional walk-in method;
- Third part included MC viewpoints on the idea of proposing an EASPC, on which category of MC the EASPC would be most beneficial, the anticipated positives, and negatives of web-based appointment system. Additionally, this part includes opinion of the MC on the importance of such a system in critical times of Covid-19 global pandemic crisis.

### 3.3 Statistical Analysis

Statistical software IBM SPSS Statistics version 23.0 for Windows operating system (SPSS Inc, Chicago, Illinois) was used for all statistical analysis. Categorical variables were introduced as percentages and frequencies. A cross tabulation on the satisfaction and viewpoints of MC with different variables was done to search for any feasible significant correlation. Chi-Square to test correlation and

Phi and Cramer's V to measure effect size between variables was used, and a two-tailed P-value < 0,05 was considered significant. For setting the null hypothesis: it was presumed that the two variables were independent.

## 4. Results

Having in mind the difficult period from the global pandemic of Covid-19 where most of the population was indoors, the questionnaire started to be distributed throughout social networks and email messages on June 27, 2020 to a random population. As such, in the period of two weeks the total number of responses reached 478, which fulfils and satisfies the estimated sample size from the given population, making it relevant for this research. In addition to this, with the initially defined confidence level of 95%, and with the received number of sample responses, the margin of error was estimated to 4.48%.

### 4.1 Demographic characteristics of MC

Table 1 shows demographic characteristics of the MC sample. Majority of the participants of this study were between the age of 19 to 35 years (39,1%), 36 to 50 years (38,9%), and 51 to 65 years (20%) making it total of 98% of the surveyed population. Of the total number of participants, 74,5% were female, 98,1% currently lives in the country and the majority were with higher education (99,6% of which 76,5% were graduated and above). The majority of the participants of this study were married (73,1%), were employed (74,3%), and were living in an urban residence (92,4%).

Table 1. Baseline characteristics of the MC sample

Characteristics	No.	%
Age group		
15-18	3	0,6
19-35	186	39,1
36-50	185	38,9
51-65	95	20,0
> 66	7	1,5
Gender		
Male	120	25,1
Female	356	74,5
Currently living in country		
Yes	464	98,1
No	9	1,9
Educational level		
No formal education	1	0,2
Elementary	1	0,2
High school	109	23,1
Graduate	219	46,4
Post graduate	95	20,1
Doctoral / PhD	41	8,7
Other	6	1,3

Marital status			5-6	55	11,6
Single	99	20,8	>6	71	14,9
Married	347	73,1	Most common reason for visits		
Divorced	13	2,7	Regular examination	43	9,1
Widowed	3	0,6	Chronic disease	62	13,1
Other	13	2,7	If needed	369	77,7
Employment status			Other	1	0,2
Self-employed	43	9,1	Travel time (in minutes) to the MHF		
Employed	353	74,3	0-10	218	45,7
Internship / pre-qualification process / study at university	27	5,7	10-20	180	37,7
Unemployed	36	7,6	20-30	60	12,6
Retired	13	2,7	30-40	10	2,1
Work from home	3	0,6	>40	9	1,9
Living in			Preferred time of day for visit		
Urban residence	439	92,4	08:00-12:00	247	52,0
Rural residence	36	7,6	12:00-16:00	78	16,4
			16:00-20:00	150	31,6

#### 4.2 MC Satisfaction of the current walk-in method

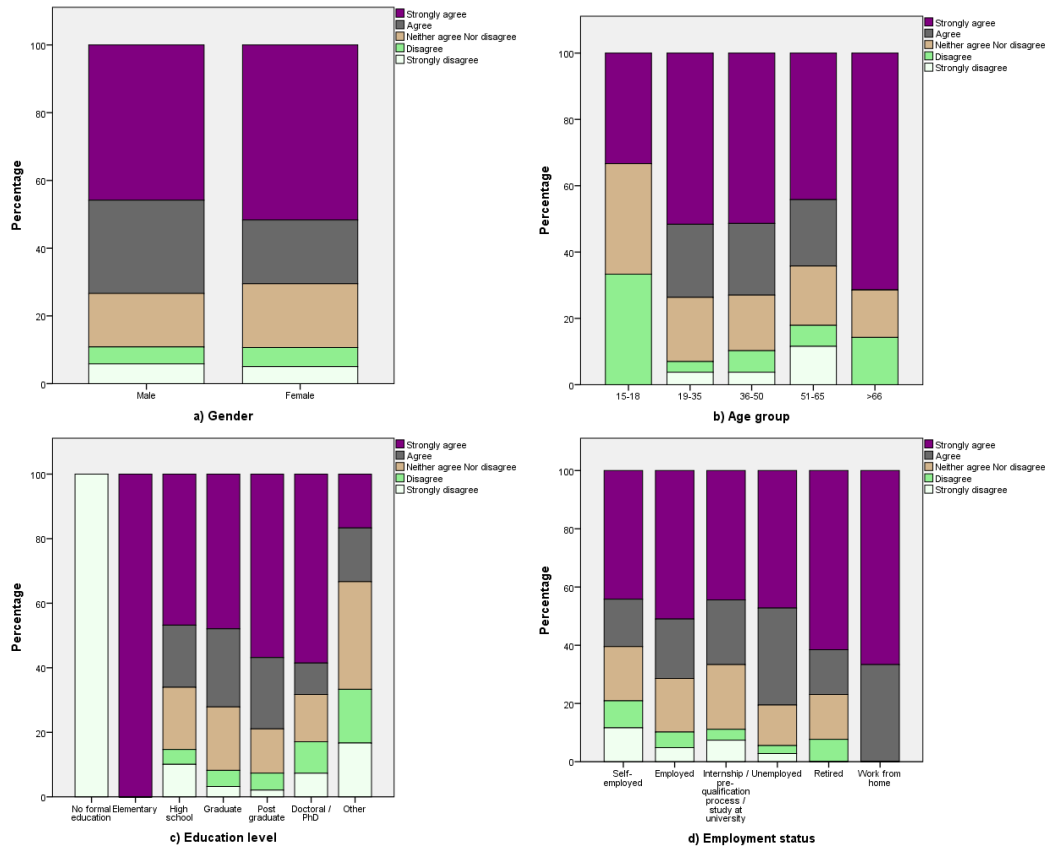
Table 2 shows the viewpoint and satisfaction level of the currently established walk-in method at the PCP in the MHF. The first opinion before reading and answering any questions about the current walk-in method at the PCP, the majority of the participants of this study thought and agreed that it should be improved or changed (44,6%) of which 28,8% strongly agreed, and 22,8% neither agree nor disagree. Most of the participants visit their PCP between 0 and 2 times per year or 44,7%, and the reason being only if needed (77,7%). Majority of the participants were waiting from 10 to 20 minutes in waiting rooms at the MHF before they were received by the PCP (41,9%), and while waiting in the MHF they agreed that they were in a crowd due to increase number of patients in the waiting rooms (55,6%) of which 38% strongly agreed. Additionally, the majority of participants felt and agreed that there is a health risk from other patients while waiting in the MHF to be seen by the PCP (62,6%) of which 48,7% strongly agreed.

Table 2. MC Viewpoint and satisfaction of the current walk-in method

Viewpoints and satisfaction	No.	%
First opinion if walk-in should improve or change		
No opinion	41	8,7
Strongly disagree	55	11,7
Disagree	57	12,2
Neither agree nor disagree	107	22,8
Agree	74	15,8
Strongly agree	135	28,8
Number of visits per year		
0-2	213	44,7
3-4	137	28,8

Strongly disagree	37	7,8
Disagree	52	10,9
Neither agree nor disagree	122	25,6
Agree	84	17,6
Strongly agree	181	38,0
Wait-time (in minutes) in the MHF		
0-10	110	23,0
10-20	200	41,9
20-30	96	20,1
30-40	43	9,0
>40	28	5,9
Health risk at MHF during visits		
Strongly disagree	51	10,7
Disagree	42	8,8
Neither agree nor disagree	85	17,9
Agree	66	13,9
Strongly agree	232	48,7
Exam time (in minutes) at the PCP		
0-10	218	45,7
10-20	235	49,3
20-30	21	4,4
30-40	1	0,2
>40	2	0,4
Satisfaction of the walk-in method		
Very Dissatisfied	73	15,3
Dissatisfied	80	16,8
Neutral	160	33,5
Satisfied	73	15,3
Very satisfied	91	19,1
Second opinion if walk-in should improve or change		
Strongly disagree	25	5,2
Disagree	26	5,5
Neither agree nor disagree	86	18,0
Agree	100	21,0
Strongly agree	240	50,3

The majority (33,5%) were neutral, 19,1% very satisfied, 15,3% satisfied, 16,8% were dissatisfied and 15,3% very dissatisfied of the current walk-in method. The satisfaction of the participants is presented in Figure 2 by gender, age group, education level, and employment status.

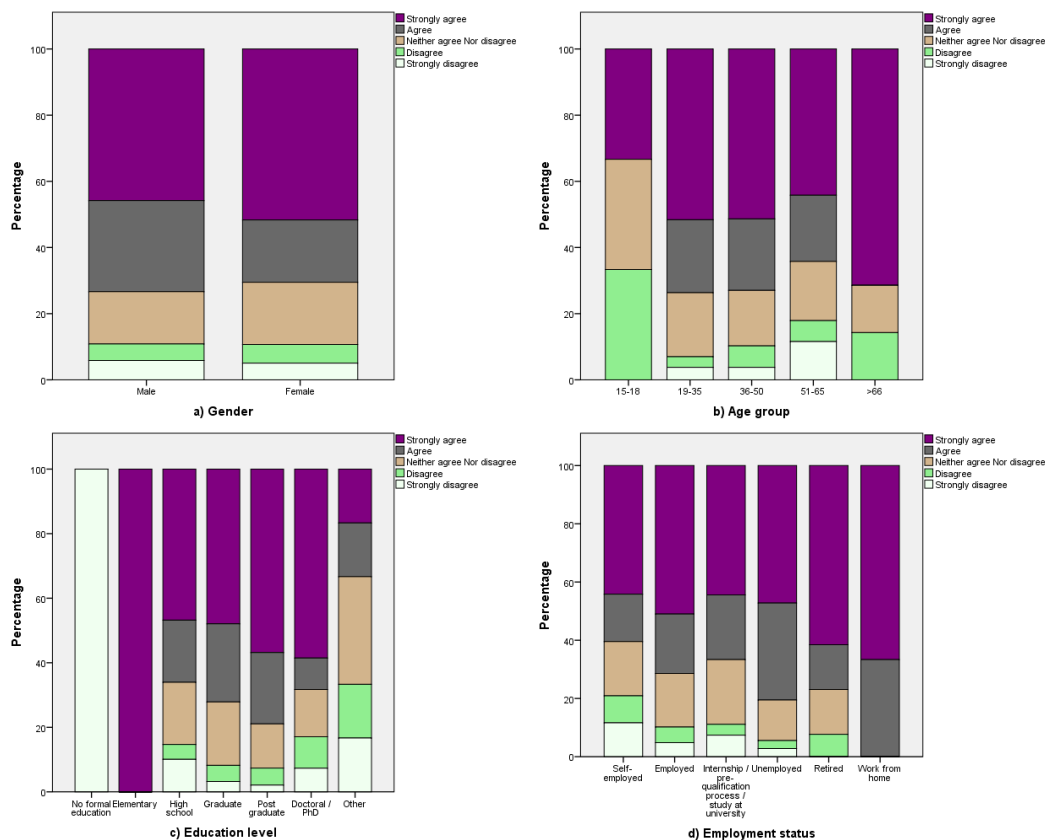


**Figure 2.** Satisfaction of participants on the current walk-in method by a) Gender, b) Age group, c) Education level, and d) Employment status

There were fewer participants with neutral opinion, very satisfied, and satisfied, which strongly agreed that the current walk-in method should be changed or improved than to be expected. Furthermore, there were more dissatisfied and very dissatisfied participants than to be expected. Similarly, with the other satisfaction levels, there are differences between the actual count and the expected count. The difference between satisfaction and the opinion for changing or improving the current walk-in method is statistically significant ( $X^2=136,01$ ,  $P=0,000$ ). In this case, the p-value is smaller than the standard alpha value of 0,05, so we'd reject the null hypothesis that asserts the two variables were independent of each other. The data suggests that the variables satisfaction and changing or improving of the walk-in method were associated with each other, and the effect was almost moderate (0,267), i.e., participants wanting to change or improve the current walk-in method was playing some role at how people respond to the question. Same as with crowding ( $X^2=74,92$ ,  $P=0,000$ ), waiting time ( $X^2=78,50$ ,  $P=0,000$ ), and health risk ( $X^2=70,86$ ,  $P=0,000$ ), all statistically significant and the effects were almost moderate (0,198, 0,203, and 0,193 respectively), i.e., all of them play some role at how people

respond to the question. In addition, age group ( $X^2=32,44$ ,  $P=0,009$ ), employment status ( $X^2=35,93$ ,  $P=0,016$ ), and number of visits ( $X^2=25,16$ ,  $P=0,014$ ) were all statistically significant, however, the effects were weak to moderate (0,131, 0,138, and 0,133 respectively), i.e., all of them were not playing a big role at how people respond to the question. Other variables including gender, education level, marital status, etc. did not reveal any significance or effect on the MC satisfaction.

Furthermore, after reading and answering some questions about the current method of realizing work (walk-in), the participants were given a repeated question for their second opinion on the subject, and the majority thought and agreed that it should be improved or changed (71,3%) of which 62% strongly agreed. Hence, changing their opinion led to an increase in total agreed to 26,7% of which strongly agreed by 21,5% from the previous question, leading us to conclude that the participants were prone to improvement and changes in the PHC system even more. The opinion of improving and changing the current walk-in system is presented in Figure 3 and regardless of gender, age group, education level, and employment status of the participants, majority supported the idea.



**Figure 3.** Opinion of the participants on changing or improving the current walk-in method by a) Gender, b) Age Group, c) Education Level, and d) Employment Status

There were more participants who strongly agreed on health risk exposures in waiting rooms in MHF than to be expected, that supported the idea of changing or improving the current walk-in method. Additionally, there were fewer that agree, neither agree nor disagree, disagree, and strongly disagree than to be expected. Similarly, with the other participants' opinion on health risk exposure, there were differences between the actual count and the expected count. The difference between the opinion that the walk-in method needs to be improved or changed and health risk exposures was statistically significant ( $X^2=85,71, P=0,000$ ). In this case, the p-value is smaller than the standard alpha value of 0,05, so we'd reject the null hypothesis that asserts the two variables were independent of each other. The data suggests that the variables health risk exposure and the opinion that the walk-in method needs to be improved or changed were associated with each other, and the effect was almost moderate (0,212), i.e., the opinion on health risks while waiting in MHF was playing some role at how people respond to the question. Same as with crowding at the MHF ( $X^2=83,65, P=0,000$ ), which was also statistically significant and the effect was almost moderate (0,210), i.e., opinion on the health risks exposure was playing some role at how people respond to the question. In addition, education level

( $X^2=41,44, P=0,015$ ), arrival time ( $X^2=40,55, P=0,001$ ), and waiting time ( $X^2=44,20, P=0,000$ ) of the participants were all statistically significant, however, the effects were weak to moderate (0,148, 0,146, and 0,152 respectively), i.e., all of them were not playing a big role at how people respond to the question. Other variables including age group, gender, employment status, marital status, etc. did not reveal any significance or effect on the MC views.

### 4.3 MC Viewpoint on EASPC and Covid-19 case

The participants of this study were asked about their opinion on implementing an e-appointment system at the PCP as a combination to the already established walk-in method (Table 3), as well as their thoughts on certain possible positives and negatives that the system would enable as shown in Table 4. Furthermore, the participants gave their opinion about their concerns on the Corona virus and if this system would be of any help in the current battle against the pandemic. The responses were obtained and categorized as shown in Table 3 and 4. The majority of the participants of this study strongly agreed on the idea of introducing EASPC

as an addition to the current walk-in method (62%), 11,4% agreed, 10,5% neither agree nor disagree, 6,3% strongly disagree, 5,7% had no opinion on the subject, and 4,0% disagree.

Table 3. MC Viewpoints on introducing EASPC to the current walk-in method

MC viewpoints	No.	%
Introduction of EASPC as addition to the current walk-in method		
No opinion	27	5,7
Strongly disagree	30	6,3
Disagree	19	4,0
Neither agree nor disagree	50	10,5
Agree	54	11,4
Strongly agree	294	62,0
Preferred time of day for appointment		
08:00-12:00	229	49,2
12:00-16:00	56	12,0
16:00-20:00	180	38,7
Improve results from Table 4 by dividing time period in mix services		
Strongly disagree	50	10,7
Disagree	33	7,1
Neither agree nor disagree	86	18,5
Agree	116	24,9
Strongly agree	181	38,8
Reminder system to improve results for no-shows and lateness		
Strongly disagree	22	4,7
Disagree	22	4,7
Neither agree nor disagree	57	12,2
Agree	102	21,7
Strongly agree	266	56,7

Majority of the participants were most likely to make an appointment with their PCP between 08:00 to 12:00 hours (49,2%) and 16:00 to 20:00 hours (38,7%) in the day making it total of 87,9% of the surveyed population. This would indicate that the best use of the system for MC would

be between these hours in addition to the walk-in method. The participants recognized the positives that come with EASPC, as such, the majority agreed that the implementation of EASPC would provide time-saving in their daily life (59,8%), reduce crowding at the MHF (60,9%), and improve patient care (53,7%). Furthermore, the majority of the participants agreed that by introducing EASPC it would improve the organization at the MHF (58,2%), reduce waiting time at the MHF (58,7%), and assure a time slot for an appointment (56,8%). In addition, with the implementation of EASPC, most of the participants agreed that it would make it easier for patient follow-ups (59,2%), make an improvement in medical services (52,9%), offer easy consultation appointments (57,7%), and it would be essential for health care, providing better care and benefits for all patients, especially for the more vulnerable category of patients (chronically ill, pregnant women and children) (57,2%).

The MC had concerns about the negatives of the system, however, the majority neither agree nor disagree that the implementation of the EASPCP would reduce flexibility of the PCP services at the MHF (33%), 23,2% strongly agreed, 17,3% strongly disagreed, 16,6% disagreed, and 10,0% agreed. Most of the participants agreed that there will be problems with no-shows and lateness of patients for appointments at the MHF (47,6%). In addition, the participants thought that the results about the problems of no shows and lateness of patients with the use of EASPC would improve by introducing an automatic reminder system, such as messages, e-mail, phone call, etc. (78,4%). Furthermore, by dividing the time period of the day, one period for electronic appointments and one period for the walk-in method (mixing of services), the majority of the participants thought that the above results would improve (63,7%). This contributes to the previous question where the participants point out time of day for making an appointment via the EASPC adding to the need for mix type of methods at the PCP.

Table 4. MC Viewpoints on possible positives/negatives and help against Covid-19 spread by using EASPC

MC viewpoints	Strongly disagree No. (%)	Disagree No. (%)	Neither agree nor disagree No. (%)	Agree No. (%)	Strongly agree No. (%)
Positives					
Saves time	30 (6,6)	33 (7,3)	119 (26,3)	38 (8,4)	233 (51,4)
Reduce crowding	27 (5,9)	37 (8,1)	114 (25,1)	41 (9,0)	236 (51,9)
Improves care	38 (8,4)	46 (10,2)	125 (27,7)	41 (9,1)	201 (44,6)
Improves organization	27 (6,1)	46 (10,3)	113 (25,4)	48 (10,8)	211 (47,4)
Reduce wait-time	23 (5,1)	44 (9,7)	120 (26,5)	42 (9,3)	224 (49,4)
Assured visit time slot	30 (6,6)	49 (10,8)	116 (25,7)	35 (7,7)	222 (49,1)
Easy for follow-up	23 (5,2)	37 (8,3)	121 (27,3)	44 (9,9)	219 (49,3)
Improve PCP services	38 (8,6)	50 (27,3)	121 (27,3)	44 (9,9)	191 (43,0)
Offer easy consultations	28 (6,3)	42 (9,4)	118 (26,5)	41 (9,2)	216 (48,5)
Essential for health care	31 (6,9)	42 (9,3)	120 (26,6)	42 (9,3)	216 (47,9)
Negatives					
Flexibility	76 (17,3)	73 (16,6)	145 (33,0)	44 (10,0)	102 (23,2)



No shows and lateness Covid-19 Case	44 (9,9)	58 (13,1)	130 (29,3)	58 (13,1)	153 (34,5)
Help against spreading	21 (4,5)	14 (3,0)	39 (8,4)	68 (14,6)	325 (69,6)
Enable online video consultations	46 (9,9)	20 (4,3)	68 (14,6)	74 (15,8)	259 (55,5)
Filled form to determine emergency for exam	34 (7,2)	23 (4,9)	68 (26,7)	89 (19,0)	255 (54,4)
Better response from doctors by filling form	27 (5,8)	26 (5,6)	37 (7,9)	93 (19,9)	285 (60,9)

In today's Corona virus crisis, where concerns about spreading the illness increase, the majority of the participants of this study agreed that the implementation of EASPC and using such a system would help and provide additional benefits to the overall health care (84,2%) of which 69,6% strongly agreed. On the idea that the EASPC system should also enable online scheduling of video consultations with their PCP, 71,3% of the participants were in favour. This would provide fast communication with the PCP and it would show a glimpse of the patients' needs and health problems to which the PCP would react and guide the patient. Hence, increasing protection against Covid-19 and other easily spreading diseases and thus further decreasing the possibilities of being infected. Most of the participants agreed that by initially describing problems and the cause for making an appointment when filling-out a form trough

EASPC, it would further help the PCP to determine the urgency for the examination and be prepared for the patients' arrival (73,4%). This would give the PCP head start in diagnosing the health problems and especially help detecting signs of an illness beforehand, making it crucial with the global pandemic with Corona virus. In addition, the participants agreed that this type of system would help doctors to respond better, especially in the case of coronavirus signs (80,8%) of which 60,9% strongly agreed, making it essential for their safety.

Figure 4 shows the opinion of the participants on introducing EASPC as addition to the walk-in method, and regardless of the gender, age group, education level, and employments status, majority were in favour on implementing EASPC.

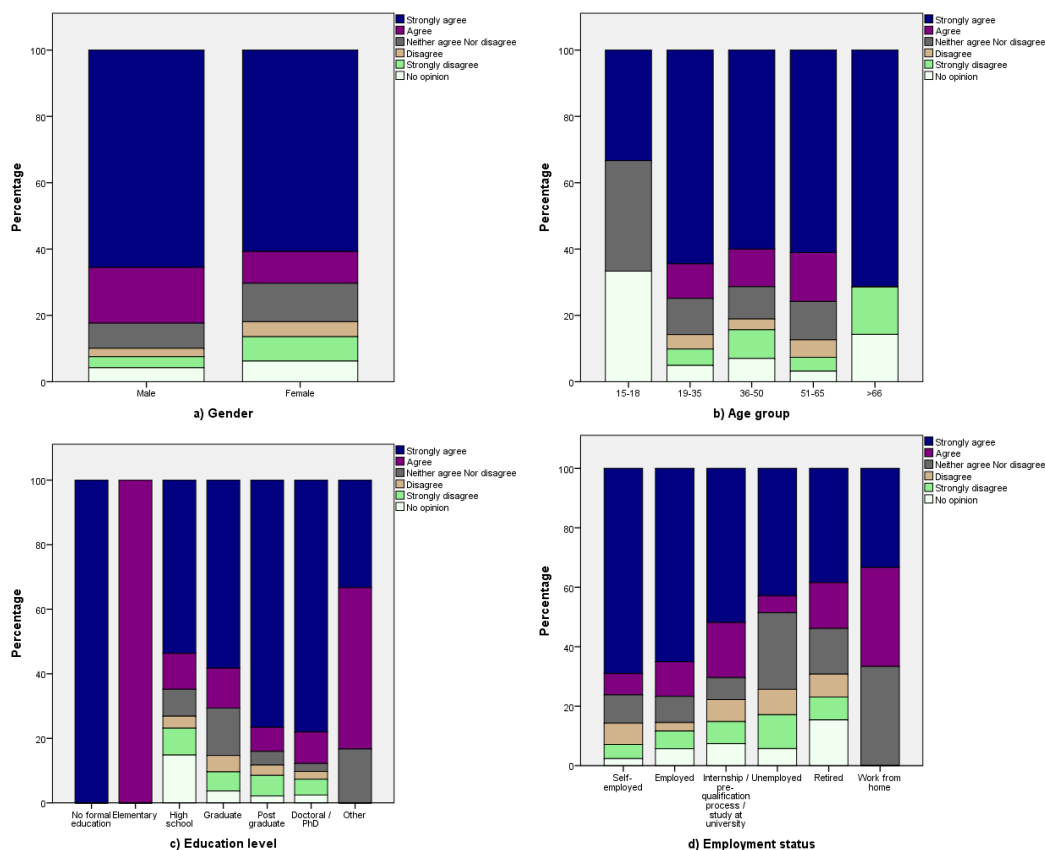


Figure 4. Opinion of participants on introducing EASPC as mix to the current walk-in method by a) Gender, b) Age Group, c) Education Level, and d) Employment Status

There were more participants who strongly agreed on health risk exposures in waiting rooms in MHF than to be expected, that supported the idea on introducing EASPC as a mix system. Additionally, there were fewer participants who agree, neither agree nor disagree, disagree, and strongly disagree than to be expected. Similarly, with the other opinions on health risk exposures, there were differences between the actual count and the expected count. The difference in supporting the idea of introducing EASPC to the current walk-in method and health risk exposures was statistically significant ( $X^2=95,09$ ,  $P=0,000$ ). In this case, the p-value was smaller than the standard alpha value of 0,05, so we'd reject the null hypothesis that asserts the two variables were independent of each other. The data suggests that the variables health risk and opinion of introducing EASPC as a mix of systems were associated with each other, and the effect was almost moderate (0,224), i.e., health risk exposures was playing some role at how people respond to the question. Same with the opinion on changing or improving the current walk-in method ( $X^2=86,18$ ,  $P=0,000$ ) was statistically significant and the effects was almost moderate (0,213), i.e., wanting to change or improve the walk-in method was playing some role at how people respond to the question. In addition, education level ( $X^2=58,56$ ,  $P=0,001$ ), number of visits ( $X^2=33,64$ ,  $P=0,004$ ), crowding ( $X^2=61,02$ ,  $P=0,000$ ), and satisfaction on the current walk-in method ( $X^2=43,84$ ,  $P=0,002$ ) were all statistically significant, however, the effects were weak to moderate (0,158, 0,154, 0,180, and 0,152 respectively), i.e., all of them were not playing a big role at how people respond to the question. Other variables including age group, gender, employment status, marital status, etc. did not reveal any significance or effect on the MC views.

## 5. Discussion

This study explores the viewpoints and satisfaction level of medical consumers on the possibility of implementing and using an EASPC in Macedonia as an addition to the currently established walk-in method. With the increasing rate of improving the Internet information technology, these types of systems are becoming a regular practice in other more developed countries. The already established electronic appointment system for SHC "Moj Termin" is already providing tremendous improvement in decreasing the wait-time and crowding at MHF [4].

A well-arranged and planned process of receiving MC in MHF would be beneficial and improve healthcare overall as suggested by other studies [7, 8, 9]. As presented in Figure 1, the effectiveness of adding an EASPC to the equation would increase satisfaction to both parties MC and PCP with achieving a state of fairness in lowering wait-time and crowding for MC and stand-by time and working overtime for the PCP [1, 11, 15].

Many related work studies investigate this area of adding appointments and replacing the traditional walk-in method as it would increase the satisfaction especially for MC (Figure 2), but also for PCP which are in favour for new additions and changes. They discovered that, by reducing crowding and wait-time for patients in MHC, it would increase the satisfaction for MC [2, 6, 21]. Additionally, by incorporating reminders like phone calls and e-mails it would reduce no-show rate of patients [24, 25]. However, this also runs the risk of increasing the workload on the PCP, as it needs to be covered by the staff of the PHC [24, 25].

As presented in Table 1, the majority of MC lived in an urban residence, indicating to the raised risk concerns on their health in regards to the great number of populations present in urban areas [29, 30, 31]. Considering this information, other studies confirmed on the increased health risks especially during times of pandemic like the spread of easily transmitted Covid-19 virus [32, 33].

The majority of MC stated that the most common reason for visitation to the PCP was when they needed to, which indicates that, unless the MC show some signs of sickness or disease, they are not inclined for visitation (Table 2). Having this into consideration, a report by WHO [34] stated that the population needs to have prior knowledge on the early stages and symptoms of the virus in order to seek help sooner.

The most preferred time of day for visitations to the PCP by the MC was recorded between 08:00 and 12:00 hours (Table 2), which shows that even in times of pandemic, the visitation preferred time would remain, unless, it was changed by nationwide issued restrictions during pandemic. This shows that the restrictions won't have a major effect on the majority of the MC and additionally this adds up with the recorded preferred time for appointments by the MC (Table 3).

Furthermore, the majority of MC were facing with crowding in the MHF during visits (Table 2), which guides us to believe that they were being exposed to further health risks while they were waiting to be examined by the PCP [35]. In addition, a report by the EU Centre for Disease and Control [36] shows that this threat was majorly increased during pandemic times than before, and as such, certain measures to prevent the spreading of Covid-19 must be taken.

The implementation of EASPC brings certain positives and negatives overall [9]. The MC agreed that by enabling electronic appointments at PCP, it would improve the PCPs services (Table 4), as reported in [37].

The EASPC implementation in other countries it is demonstrating great advantages for MC [11]. The appointment procedure and its efficiency has shown to affect greatly on the MC satisfaction level [13]. Hence, by introducing the option of appointments and schedules for PCP to the public (Figure 3), it will provide a rise to the overall satisfaction to the health care system as a whole [16]. The satisfaction level of MC can be improved simply by lowering the waiting time for appointments for PHC to a minimum or to make it non-existent [7, 38].

This study shows that MC supports the idea on implementing EASPC in PHC in this country as a mix of services (Figure 4).

The study population were in favour of a number of positives that the EASPC would bring in PHC: time saving, reduce crowding, improves health care, PCP services and organization, reduce waiting time, assured time slot, easy for follow-up patients, offer easy consultations, and it would be essential for health care (Table 4). However, the participants shown concerns about some negatives like reducing flexibility of the PCP and increasing no-shows and lateness of patients, as reported in other research [1, 6, 10]. As such, the proposed solution of EASPC should provide flexibility and work alongside the current walk-in method [6, 7, 16].

Furthermore, EASPC can be used as an online communication tool in today's pandemic Covid-19 escalation where the access to the PCP is limited to extreme cases only. Through online consultations, the MC can establish a connection to their PCP and provide health care. As presented in Table 4, the studied population was confident with the functions that EASPC would provide concerning the Covid-19 case: help against spreading [34], in favour of online video consultations with the PCP [20], filling the form for appointment to determine emergency and purpose for examination, and improve doctor's response [18, 20]. This is especially important and beneficial in times of pandemic, in order for the PCP to be able to recognize early symptoms of Covid-19 in advance [39, 40].

## 6. Conclusion

To sum up, implementing an e-appointment scheduling system and other patient-centred interventions could reduce waiting time and increase satisfaction for MC. There are certain positives (mainly improving PCP work services and help against spreading of infectious diseases) and negatives (reduce flexibility of the PCP, no shows and lateness of patients) that come with the implementation of the system. Additionally, from the above arguments, we can see that web-based e-appointment system further shows the effectiveness in offering timely accessed spots to PHC compared to the traditional walk-in method. These uncovered results need to be considered seriously, and can benefit for further improvements to overall health care in Macedonia and other similar countries in development. Additionally, these finding may provide insights to the governments and public health authorities on the opinion and viewpoints of the population before issuing other restrictive measures and regulations concerned to PCPs. However, we acknowledge that the data presented in this study may not be relevant for the entire population since PHC is under Ministry of Health. Further studies are required to test the performance of the EASPC and examine the satisfaction of MC after the system is implemented into MHF, and what impact it will give to

the quality of healthcare in real-time. There should be a flexible way in introducing EASPC to PHC, and to have a successful implementation in PHC, the EASPC must be financed and supported adequately. In addition, this research may address the policy makers about the importance of offering timely accessed services in PHC. The presented study concludes that MC are in favour of introducing an e-appointment system in PHC in R.N. Macedonia, especially in pandemic times.

## References

- [1] Cao W, Wan Y, Tu H. *et al.* A web-based appointment system to reduce waiting for outpatients: A retrospective study. *BMC Health Serv Res.* 2011 Nov 22; 11(318). doi: 10.1186/1472-6963-11-318
- [2] Akintomide AO, Ukweh ON, Efang SA. An audit of the appointment booking system and patient waiting time in an ultrasound unit in Nigeria: A need to eliminate congestion in our public hospitals. *J Family Med Prim Care.* 2019 Jun; 8(6): 2055-2060. doi: 10.4103/jfmpc.jfmpc\_235\_19. PMID: 31334179; PMCID: PMC6618229.
- [3] WHO Regional Office for Europe: Primary health care organization, performance and quality in North Macedonia, pp. 24. WHO Regional Office for Europe, Copenhagen, 2019. [accessed 2020 Apr 10]. <http://www.euro.who.int/en/countries/north-macedonia/publications/primary-health-care-organization.-performance-and-quality-in-north-macedonia-2019>.
- [4] Health Insurance Fund of Republic of North Macedonia, [accessed 2020 Apr 04]. <http://www.fzo.org.mk/default.asp?ItemID=2F6E5A69811CF34EAC37E0307A7541F7>.
- [5] Ministry of Health, [accessed 2020 Apr 26]. <http://zdravstvo.gov.mk/moj-termin-opsti-informacii/>.
- [6] Al-Haqwi AI, Al-Shehri AM. Appointment system in primary care: opinion of consumers and providers. *J Family Community Med.* 2007 Sep; 14(3): 99-102. PMID: 23012154; PMCID: PMC3410158.
- [7] Gupta D, Denton B. Appointment scheduling in health care: Challenges and opportunities. *IIE Transactions.* 2008 Jul 17; 40(9): 800–819. doi: 10.1080/07408170802165880
- [8] Siddiqui Z, Rashid R. Cancellations and patient access to physicians: ZocDoc and the evolution of e-medicine. *Dermatol Online J.* 2013 Apr 15; 19(4): 14. PMID: 24021373.
- [9] Zhao P, Yoo I, Lavoie J, Lavoie BJ, Simoes E. Web-Based Medical Appointment Systems: A Systematic Review. *J Med Internet Res.* 2017 Apr 26; 19(4): e134. doi: 10.2196/jmir.6747. PMID: 28446422; PMCID: PMC5425771.
- [10] Zhang X, Yu P, Yan J. Patients' adoption of the e-appointment scheduling service: A case study in primary healthcare. *Stud Health Technol Inform.* 2014; 204: 176-81. PMID: 25087546.
- [11] Cayirli T, Yang KK, Quek SA. A Universal Appointment Rule in the Presence of No-Shows and Walk-Ins. *Production and Operations Management.* 2012 Jul; 21(4): 682–697. doi: 10.1111/j.1937-5956.2011.01297.x
- [12] Parmar V, Large A, Madden C, Das V. The online outpatient booking system 'Choose and Book' improves attendance rates at an audiology clinic: a comparative

- audit. *Inform Prim Care*. 2009; 17(3): 183-6. doi: 10.14236/jhi.v17i3.733. PMID: 20074431.
- [13] Barghash M, Saleet H. Enhancing outpatient appointment scheduling system performance when patient no-show percent and lateness rates are high. *Int J Health Care Qual Assur*. 2018 May 14; 31(4): 309-326. doi: 10.1108/IJHCQA-06-2015-0072. PMID: 29790448.
- [14] Prakash B. Patient satisfaction. *J Cutan Aesthet Surg*. 2010 Sep; 3(3): 151-5. doi: 10.4103/0974-2077.74491. PMID: 21430827; PMCID: PMC3047732.
- [15] Chenl PS, Robielos RA, Palaña PK, Valencia PL, Chen GY. Scheduling Patients' Appointments: Allocation of Healthcare Service Using Simulation Optimization. *J Healthc Eng*. 2015;6(2):259-80. doi: 10.1260/2040-2295.6.2.259. PMID: 26288890.
- [16] Ansell D, Crispo JAG, Simard B, Bjerre LM. Interventions to reduce wait times for primary care appointments: a systematic review. *BMC Health Serv Res*. 2017 Apr 20; 17(1): 295. doi: 10.1186/s12913-017-2219-y. PMID: 28427444; PMCID: PMC5397774.
- [17] Giannis D, Geropoulos G, Matenoglou E, Moris D. Impact of coronavirus disease 2019 on healthcare workers: beyond the risk of exposure. *Postgraduate medical journal*. 2021; 97(1147), 326–328. doi: 10.1136/postgradmedj-2020-137988.
- [18] Thornton J. Covid-19: how coronavirus will change the face of general practice forever. *BMJ*. 2020 Mar 30; 368: m1279. doi: 10.1136/bmj.m1279. PMID: 32229477.
- [19] Donaghy E, Atherton H, Hammersley V, McNeilly H, Bikker A, Robbins L, Campbell J, McKinstry B. Acceptability, benefits, and challenges of video consulting: a qualitative study in primary care. *Br J Gen Pract*. 2019 Aug 29; 69(686): e586-e594. doi: 10.3399/bjgp19X704141. PMID: 31160368; PMCID: PMC6617540.
- [20] Greenhalgh T, Koh GCH, Car J. Covid-19: a remote assessment in primary care. *BMJ*. 2020 Mar 25;368:m1182. doi: 10.1136/bmj.m1182. PMID: 32213507.
- [21] Arak P, Wójcik A. Transforming eHealth into a political and economic advantage, pp. 37-39. *Polityka Insight*, Warsaw, 2017. [accessed 2021 Nov 02]. [https://www.politykainsight.pl/\\_resource/multimedium/20111291](https://www.politykainsight.pl/_resource/multimedium/20111291).
- [22] Pickin M, O'Cathain A, Sampson FC, Dixon S. Evaluation of advanced access in the national primary care collaborative. *Br J Gen Pract*. 2004 May;54(502):334-40. PMID: 15113514; PMCID: PMC1266165.
- [23] Goodall S, Montgomery A, Banks J, Salisbury C, Sampson F, Pickin M. Implementation of Advanced Access in general practice: postal survey of practices. *Br J Gen Pract*. 2006 Dec;56(533):918-23. PMID: 17132379; PMCID: PMC1934051.
- [24] Lattimer V, George S, Thompson F, Thomas E, Mullee M, Turnbull J, Smith H, Moore M, Bond H, Glasper A. Safety and effectiveness of nurse telephone consultation in out of hours primary care: randomised controlled trial. The South Wiltshire Out of Hours Project (SWOOP) Group. *BMJ*. 1998 Oct 17; 317 (7165): 1054 - 9. doi: 10.1136/bmj.317.7165.1054. PMID: 9774295; PMCID: PMC28690.
- [25] Coleman K, Phillips K. Providing underserved patients with medical homes: assessing the readiness of safety-net health centers. *Issue Brief (Commonw Fund)*. 2010 May; 85:1-14. PMID: 20496478.
- [26] Levine DM, Stephan DF, Krehbiel TC, Berenson ML. *Statistics for managers: Using Microsoft excel*. 5th edn. Prentice Hall, New Jersey. Published 2008
- [27] State Statistical Office of Republic of North Macedonia: Enrolled students in higher schools and faculties in the Republic of North Macedonia in the academic year 2018/2019 (first cycle of studies), pp. 1. State Statistical Office of Republic of North Macedonia, Skopje, 2019. [accessed 2020 Apr 26]. [http://www.stat.gov.mk/pdf/2019/2.1.19.27\\_mk.pdf](http://www.stat.gov.mk/pdf/2019/2.1.19.27_mk.pdf).
- [28] Health Insurance Fund of Republic of North Macedonia, [accessed 2020 Apr 26]. <http://fzo.org.mk/default.asp?ItemID=8754C32D4C42FE4DAE4394F4D7584EB6>.
- [29] Krefis AC, Augustin M, Schlünzen KH, Oßenbrügge J, Augustin J. How Does the Urban Environment Affect Health and Well-Being? A Systematic Review. *Urban Science*. 2018; 2(1). doi: 10.3390/urbansci2010021.
- [30] Kuddus MA, Tynan E, McBryde E. Urbanization: a problem for the rich and the poor? *Public Health Rev*. 2020; 41, 1. doi: 10.1186/s40985-019-0116-0.
- [31] Pinchoff J, Mills CW, Balk D. Urbanization and health: The effects of the built environment on chronic disease risk factors among women in Tanzania. *PLoS ONE*. 2020; 15(11): e0241810. doi: 10.1371/journal.pone.0241810.
- [32] Sahasranaman A, Jensen HJ. Spread of COVID-19 in urban neighbourhoods and slums of the developing world. *J. R. Soc*. 2021; Interface. 18: 20200599 doi: 10.1098/rsif.2020.0599.
- [33] Sharifi A, Khavarian-Garmsir AR. The COVID-19 pandemic: Impacts on cities and major lessons for urban planning, design, and management. *Science of The Total Environment*. 2020; 749, 142391. doi: 10.1016/j.scitotenv.2020.142391
- [34] World Health Organization. Regional Office for the Western Pacific. Role of primary care in the COVID-19 response. 2021; [accessed: 2021 Nov 02] <https://apps.who.int/iris/handle/10665/331921> License: CC BY-NC-SA 3.0 IGO.
- [35] Sasaki J, Shiino Y, Kato Y, Kudo D, Fujita M, Miyairi I, Mochizuki T, Okuda H, Nagato T, Nabetani Y, Takahashi T. Checklist for infection control in the emergency department. *Acute Med Surg*. 2020; 7: e540. doi: 10.1002/ams.2540.
- [36] European Centre for Disease Prevention and Control. Checklist for hospitals preparing for the reception and care of coronavirus 2019 (COVID-19) patients. ECDC: Stockholm. 2020; [accessed 2021 Nov 02]. <https://www.ecdc.europa.eu/sites/default/files/documents/covid-19-checklist-hospitals-preparing-reception-care-coronavirus-patients.pdf>.
- [37] Graham T, Ali S, Avdagovska M, Ballermann M. Effects of a Web-Based Patient Portal on Patient Satisfaction and Missed Appointment Rates: Survey Study. *J Med Internet Res*. 2020; 22(5): e17955. doi: 10.2196/17955.
- [38] Michael M, Schaffer SD, Egan PL, Little BB, Pritchard PS. Improving wait times and patient satisfaction in primary care. *J Healthc Qual*. 2013 Mar-Apr; 35(2): 50-59; quiz 59-60. doi: 10.1111/jhq.12004. PMID: 23480405.
- [39] Yinan M, Yi-Roe T, Linn TT, Louis C, Cook A, Dickens B, Yii-Jen, Lim F, Lim J, Yinxiaohe S, Sundaram M, Soh A, Tan G, Wong F, Young B, Zeng K, Chen M, Ong D. Identifying COVID-19 cases in primary care settings. 2020; doi: 10.1101/2020.08.26.20182204.
- [40] Salman R, Luke NA, Florian L, Stigler DK, Harumi QY, Weel C. On behalf of the Global Forum on Universal

Health Coverage and Primary Health Care, Lessons on the COVID-19 pandemic, for and by primary care professionals worldwide, *European Journal of General Practice*. 2020; 26:1, 129-133, doi: 10.1080/13814788.2020.1820479.