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Research Article

Activity on Facebook pages of Family Health Units of the Porto Metropolitan Area in a COVID-19 year

Atividade das Unidades de Saúde Familiares da Área Metropolitana do Porto no Facebook em ano de COVID-19

Actividad de las Unidades de Salud Familiar de Área Metropolitana de Oporto en Facebook en año de COVID-19

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Abstract

Introduction: Lately, social networks have been enabling new forms of interaction between people and institutions and the scalable sharing of contents from different areas, although not always reliable. **Objective:** To characterize the presence of Facebook pages of Family Health Units (FHU) of the Porto Metropolitan Area (Portugal) as of December 2020, its metrics of age, followers, publications, and interactions in a given time interval, and its distribution by organizational model (Family Health Units A and B) and Health Center Group; to verify the trend of creating pages in 2020 (first year of the COVID-19 pandemic); and to assess the topics addressed by the 50 publications of the last 60 days with which people interacted the most. **Methods:** This is an exploratory, cross-sectional, descriptive, and analytical study in which Facebook pages of Family Health Units of the Porto Metropolitan Area were individually assessed on December 30, 2020 and respective metrics for an interval of 60 days of activity were obtained from the Fanpage Karma platform. Frequencies, intervals, means, and medians were estimated and parametric and nonparametric tests were applied. **Results**: Of the 135 operating Family Health Units (FHU–B: 64%), 53% had an active page (FHU–B: 61%, $p<0.05$), ranging between 0 and 81.3% of the Family Health Units in each Health Center Group, created in the last ten years (median 4.6 years, FHU–A 1.5 *versus* FHU–B 5.3, $p<0.05$), increasing 44% in 2020. The number of followers is heterogeneously distributed among different Family Health Units and Health Center Groups, although without differences between Family Health Units models, not exceeding 1,000 in 69% of pages and only five pages reaching more than 2,000 followers. Of the active pages, 75% (54/72) posted an average of 0.3 times a day for the last 60 days. There are no significant associations between number of followers or between FHU A and B models and time of the last publication or number of publications at 60 days. During that time, 15,913 interactions were generated (average of 18.8 per publication). When analyzing the 50 publications with most interactions in the last 60 days, there is a predominance of topics related to COVID-19, organizational and bureaucratic issues, remarkable events related to the Family Health Units, and COVID-19 vaccine promotion/information. **Conclusions:** It was verified that Family Health Units have not been sufficiently exploring the communicative and collaborative potential of social networks (although it has increased in a pandemic year). With room for advancement, social networks can constitute a complementary and interactive tool for promoting access to and improving the quality of services, combating misinformation, empowering citizens for health, and improving health outcomes.

Keywords: Online social networking; Communication; Health centers; Delivery of health care, COVID-19.

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Resumo

Introdução: As redes sociais têm possibilitado, nos últimos anos, novas formas de interação entre pessoas e entidades e a partilha escalável de conteúdos de diversas áreas, embora nem sempre de forma criteriosa. **Objetivos:** Caracterizar a presença de páginas das Unidades de Saúde Familiar da Área Metropolitana do Porto (Portugal) na plataforma *Facebook* à data de dezembro de 2020, suas métricas de idade, seguidores, publicações e interações num dado intervalo de tempo e sua distribuição por modelo organizacional (Unidades de Saúde Familiar–A/B) e Agrupamento de Centros de Saúde; verificar a tendência de criação de páginas em 2020 – ano de pandemia por COVID-19 – e aferir as temáticas abordadas pelas 50 publicações dos últimos 60 dias que obtiveram mais interações. **Métodos:** Estudo exploratório transversal, descritivo e analítico, com verificação individual das páginas das Unidades de Saúde Familiar da Área Metropolitana do Porto a 30 de dezembro de 2020 e obtenção de métricas relativas a um intervalo de 60 dias de atividade por meio da página *Fanpage Karma*. Foram calculadas frequências, intervalos, médias e medianas e aplicados testes paramétricos e não paramétricos. **Resultados:** Das 135 Unidades de Saúde Familiar funcionantes (64% Unidades de Saúde Familiar–B), 53% tinham página ativa (61% Unidades de Saúde Familiar–B, p<0,05), variando entre 0 e 81,3% das Unidades de Saúde Familiar em cada Agrupamento de Centros de Saúde, criadas nos últimos dez anos (mediana 4,6 anos, Unidades de Saúde Familiar–A 1,5 versus Unidades de Saúde Familiar–B 5,3, p<0,05), com crescimento de 44% no ano de 2020. O número de seguidores distribui-se heterogeneamente entre diferentes Unidades de Saúde Familiar e Agrupamento de Centros de Saúde, contudo sem diferenças entre modelos de Unidades de Saúde Familiar, não ultrapassando o milhar em 69% das páginas, e com apenas cinco páginas alcançando mais de 2 mil seguidores. Das páginas ativas, 75% (54/72) publicaram em média 0,3 vez por dia nos últimos 60 dias. Não se verificam associações significativas entre o número de seguidores ou entre modelos Unidades de Saúde Familiar–A/B e o tempo da última publicação ou o número de publicações a 60 dias. Durante esse tempo, foram geradas 15.913 interações (média de 18,8 por publicação). Analisadas as 50 publicações com mais interações dos últimos 60 dias, verifica-se o predomínio de temas relacionados com a COVID-19 e com questões organizacionais e burocráticas, efemérides relativas às Unidades de Saúde Familiar e informação/promoção da vacina contra a COVID-19. **Discussão:** Admite-se haver aplicação reduzida pelas Unidades de Saúde Familiar (embora crescente em ano de pandemia) do potencial comunicacional e colaborativo das redes sociais. Havendo margem de progressão, estas podem constituir uma ferramenta complementar e interativa para a promoção do acesso e a melhoria da qualidade dos serviços, o combate à desinformação, a capacitação para a saúde dos cidadãos e a melhoria de resultados em saúde.

Palavras-chave: Redes sociais online; Comunicação; Centros de saúde; Atenção à saúde; COVID-19.

Resumen

Introducción: Las redes sociales han permitido nuevas formas de interacción interpersonal y el intercambio escalable de contenidos de diferentes áreas, aunque no siempre sea confiable. **Objetivo**: caracterizar la presencia en *Facebook* de páginas de Unidades de Salud Familiar en el Área Metropolitana de Oporto (Portugal) a diciembre de 2020, sus métricas (edad de página, seguidores, publicaciones y interacciones) en un tiempo determinado y su distribución por modelo organizacional (Unidades de Salud Familiar–A/B) y por Agrupamiento de Centros de Salud; verificar la tendencia de creación de páginas en 2020 - año de la pandemia por COVID-19 - y evaluar los temas abordados por las 50 publicaciones de los últimos 60 días que tuvieron más interacciones. **Métodos**: Estudio exploratorio transversal, descriptivo y analítico de datos de las páginas de *Facebook* de Unidades de Salud Familiar y métricas respectivas para un periodo de 60 días de actividad, obtenidos de la plataforma Fanpage Karma. **Resultados**: De 135 Unidades de Salud Familiar en funcionamiento (64% Unidades de Salud Familiar–B), el 53% tenía una página activa (61% Unidades de Salud Familiar–B, p<0.05), variando entre 0 y 81,3% del Unidades de Salud Familiar en cada Agrupamiento de Centros de Salud, creado en los últimos 10 años (mediana 4,6 años, Unidades de Salud Familiar–A 1.5 *versus* Unidades de Salud Familiar–B 5,3, p<0,05), creciendo un 44% en 2020. El número de seguidores se distribuye de manera heterogénea entre diferentes Unidades de Salud Familiar y Agrupamiento de Centros de Salud, sin embargo sin diferencias entre Unidades de Salud Familiar–A y Unidades de Salud Familiar–B, no superando el millar en el 69% de las páginas, y con solo cinco páginas alcanzando más de 2000 seguidores. El 75% de las páginas activas (54/72) publicó una media de 0,3 veces al día durante los últimos 60 días. No existen asociaciones significativas entre el número de seguidores o entre los modelos Unidades de Salud Familiar–A/B y el momento de la última publicación o el número de publicaciones a 60 días. Durante ese tiempo, se generaron 15913 interacciones (promedio de 18,8 por publicación). Analizando las 50 publicaciones con más interacciones, se observa un predominio de temas relacionados con el COVID-19, cuestiones organizativas y burocráticas, efemérides relacionadas con la Unidades de Salud Familiar e promoción de la vacuna contra el COVID-19. **Conclusiones:** Se admite que las Unidades de Salud Familiar no vengan explorando lo suficiente el potencial comunicativo y colaborativo de las redes sociales, aunque han mejorado en año de pandemia. Habiendo capacidad para mejorar, ellas pueden constituir una herramienta complementaria e interactiva para promover el acceso y mejorar la calidad de los servicios, combatir la desinformación, formar para la salud de los ciudadanos y mejorar los resultados en salud.

Palabras clave: Redes sociales en línea; Comunicación; Centros de salud; Atención a la salud; COVID-19.

INTRODUCTION

The increasing use of social network platforms has significantly shaped the way in which people and institutions communicate and interact with each other, also enabling the search for information and the creation of their own content (multimedia or textual) and its immediate and scalable dissemination.[1]

Worldwide, each person spends more than two hours in social networks every day, with Facebook being the favorite platform of users,[2] accessed by 92% of the Portuguese working age population. Of the national users of social network, 36% are concentrated in Greater Lisbon and Greater Porto.[3]

Due to the presence, regularity, and interactivity of their users, several organizations (from commercial to governmental ones[1-9]) engage themselves in these networks as a way to approach their target audience to unidirectionally inform or mutually interact, inducing behavioral changes or obtaining feedback from their followers through reviews, suggestions, shares, or transactions of goods and services.[1,5]

In the case of health institutions, social networks provide a fast and efficient way to promote literacy in their area of activity and access to services, to educate and support chronic patients, and to stimulate awareness-raising campaigns, in contrast to other sources of information that disseminate beliefs and myths that are not credible and potentially harmful. This is true both at the individual level – in which the internet and social networks compete with health professionals as a preferred source of information – and at the collective level, for which the applicability of social networks has been studied in the implementation, among others, of campaigns for screening, vaccination, or blood donations, preventive programs in vulnerable groups[5-7,10-18] or directives to the population in the face of emerging situations.[19-25] Incidentally, in December 2019 an infectious outbreak emerged, which would globally spread, including in Portugal, and in March 2020 the World Health Organization declared a pandemic due to the new coronavirus (COVID-19) disease.[26]

In recent decades, several authors have sought to assess the presence of health institutions in social networks, with a predominance of North American studies or those involving hospitals[6,8-13,20,25,27-31]. Nevertheless, there are few studies representing primary health care[6,7,10], particularly in Europe and Portugal.

In this context, it is worth addressing the Family Health Units (FHU). They are primary care centers with multidisciplinary teams (family doctors, nurses, and administrative technicians), personalized healthcare providers, which are close to their communities, and each encompassing about 4 to 18 thousand registered users. They have their own identity and are currently arranged in two organizational models (FHU-A and FHU-B), distinct in degree of maturity, autonomy, remuneration, and professional incentives: while model A presupposes a stage of learning and improvement of teamwork (at the expense of the individualized work without regular evaluation practices) and the development of practices of internal contractualization, model B is suitable for more mature teams, with effective performance of teamwork and acceptance of more demanding contractual levels of performance. The later model is an evolution of the former, after achieving the contractual objectives and subsequent validation by ministerial order[32]. Aiming at the improvement of the quality of the services, FHU seek to regulate and implement healthcare, management, and support processes — within the context of external communication, it can be mentioned as examples: assessing the users' satisfaction, analyzing suggestions, providing informative or educational contents in physical or virtual environments (for instance, on websites).[33]

Upon the COVID-19 pandemic declaration and the subsequent implementation of general population containment measures[34,35] for preventing contagions, these units had to be converted to a predominantly non-face-to-face activity, and the need for being present and active on social networks was perceived to establish a more accessible, agile, transparent, and efficient communication with their communities.

This study aims to understand the use of Facebook by the FHU of a Portuguese region, quantifying the units that were present in the social network over time (namely in 2020), to assess the size of their communities of followers and the degree of production/dissemination of content on their pages and

the respective interaction of users. As complementary objectives, it is sought to understand if there are differences between FHU-A and FHU-B, what types of content generate more interactions and, among these publications, what is the proportional weight of COVID-19.

METHODS

This is a cross-sectional, descriptive, and analytical exploratory study involving FHU of the 17 municipalities of the Porto Metropolitan Area (*Área Metropolitana do Porto* – AMP). This territory covers 9.5% of the area of northern Continental Portugal[36] and 1.7 million people (845.2 per km^2),[37] being one of the regions of the country with the highest prevalence of infection and mortality from COVID-19[38] and regular use of social networks.[3]

There are 12 operating Health Center Groups (*Agrupamentos de Centros de Saúde* – ACeS) in the AMP, composed of healthcare units of different types. They include 135 FHU (mean 11.25/ACeS), which serve 1.57 million registered users.[39] For this study, the identification and inclusion of operating FHU were carried out after visiting the Primary Health Care Identity Card (*Bilhete de Identidade dos Cuidados de Saúde Primários* – BICSP) website[39] in the last week of December 2020. In one of the ACeS, only FHU of the sole municipality (out of three) that is part of the AMP were included. The units were classified into FHU-A and FHU-B based on information available from the BICSP website regarding the month of December.

Then, on December 30, 2020, the names of the respective institutions, either in full or with acronyms or abbreviations when applicable (for instance: “FHU” or “Family Health Unit”; “São João” or “S. João”), were searched in the search fields provided by Facebook[40] and the Google[41] search engine. Institutional pages were included, excluding profiles of individuals, groups, and regarding “places” virtually visited.

For the extraction and organization of data from the included pages:

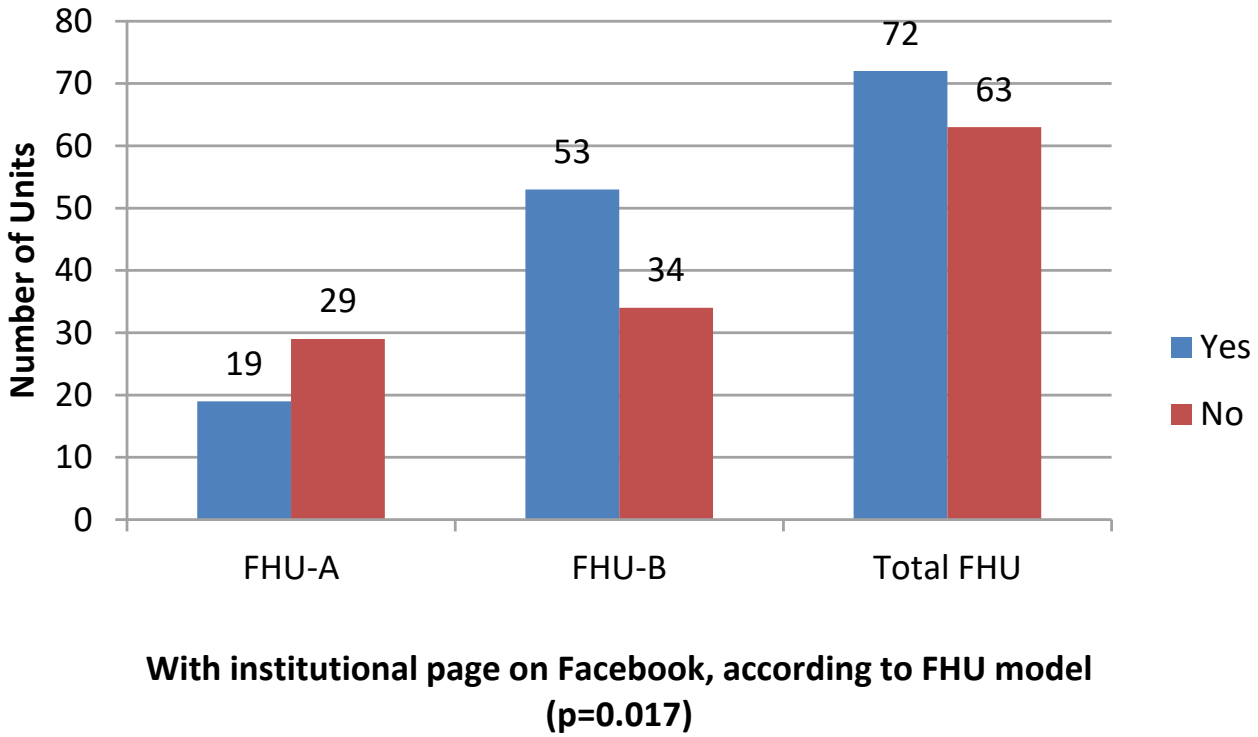
- the URL address, the date of creation of the page, the number of followers, and the date of the last publication were collected via inquiry;
- through the statistical study platform of public social media pages *Fanpage Karma*[42] (which requires prior registration, with free and paid options):
- the following quantitative data for the period between November 1 and December 30, 2020 were collected free of charge: chronology publications (total, with image, video, or hyperlink content); interactions (including comments, shares, or reactions – total and average per publication); and “reactions,” which correspond to clicking on buttons to express several feelings of approval (namely “likes”), surprise, or repudiation;
- due to incomplete survey, five FHU pages were inquired and the missing data were manually collected;
- a free survey was made of the list of the 50 publications with the most interactions in the same 60-day period and the content of the respective publications was checked;
- the data were organized in a spreadsheet, categorized into the aforementioned variables and in the following: ACeS, organizational model, Facebook page, age of the page in years (days since creation divided by 365.25 days in one year), days since the last publication, and their categorization into time intervals (up to 30 days, 31—60, 61—90, 91—180, 180—295, 296—365, and over 365 days). The 295-day milestone corresponds to the date of the declaration of COVID-19 as a global pandemic. December 30, 2020 was considered to be the day one of the estimation.

For statistical purposes, the categorical variables were presented as frequencies and the continuous variables as minimum, maximum, and quartiles, means or medians, when applicable. In order to test a significant association of categorical variables (organizational model and page presence) with each other and among other continuous variables (age of the page, regularity and volume of publications, number of followers), parametric or nonparametric tests were applied depending on their applicability (χ^2 test, *t*-tests for independent variables, or Mann-Whitney tests), defining statistical significance of $p<0.05$, and the Spearman's test was used to verify possible correlation between the number of followers and publications at 60 days since the last publication. Regarding the assessment of publications with the most interactions, it was sought to explore the most addressed thematic areas and to what extent COVID-19 was the subject/topic of the publication. For statistical treatment, the open access platforms *Microsoft Excel 2010*®, *Google Sheets,* and *GNU* PSPP were used.[43]

No ethical opinion was required for this study, as human subjects were not studied nor sensitive data were collected, but only textual and numerical data, open access, on social network platforms.

RESULTS

In the AMP, there are 72 FHU with Facebook pages (53.3%), with a significant predominance of FHU-B, regardless of whether there is more FHU-B than FHU-A in operation (p=0.017) (Figure 1).



FHU: Family Health Unit.
Figure 1. Distribution of Family Health Units in the Porto Metropolitan Area with an active Facebook page in December 2020, by organizational model.

By observing the ACeS, the proportion of FHU represented online becomes more heterogeneous: in the ACeS Matosinhos, they are nonexistent; in the ACeS Maia/Valongo, there are more active FHU (n=16) present on Facebook (n=13, 81.3%), with a higher median age of created pages (7.2 years) (Tables 1 and 2).

The median age of the FHU pages of the AMP is 4.6 years, higher in the FHU-B pages (5.3 years *versus* 1.5 years in the FHU-A, p=0.031), and different among the ACeS. In one ACeS, the oldest page was created only

Table 1. Distribution of Family Health Units of the Porto Metropolitan Area with an active Facebook page in December 2020, according to Health Center Groups and organizational model (n: absolute frequency; %: relative frequency).

FHU distribution by ACeS	Operating FHU				FHU with Facebook page, by organizational model					
	Total		FHU-A	FHU-B	FHU-A		FHU-B		Total	
	n	%	n	n	n	% of FHU-A	n	% of FHU-B	n	% of FHU
ACeS Maia/Valongo	16	11.9	3	13	2	66.7	11	84.6	13	81.3
ACeS Póvoa Varzim/Vila do Conde	14	10.4	4	10	1	25	7	70	8	57.1
ACeS Porto Ocidental	14	10.4	5	9	2	40	4	44.4	6	42.9
ACeS Espinho/Gaia	14	10.4	6	8	4	66.7	6	75	10	71.4
ACeS Gondomar	14	10.4	7	7	2	28.6	5	71.4	7	50
ACeS Feira/Arouca	11	8.1	2	9	0	0	3	33.3	3	27.3
ACeS Matosinhos	11	8.1	5	6	0	0	0	0	0	0
ACeS Gaia	10	7.4	5	5	3	60	5	100	8	80
ACeS Aveiro Norte	9	6.7	2	7	2	100	3	42.9	5	55.6
ACeS Santo Tirso/Trofa	9	6.7	2	7	2	100	5	71.4	7	77.8
ACeS Porto Oriental	9	6.7	5	4	0	0	3	75	3	33.3
ACeS Vale do Sousa Sul (one municipality)	4	3	2	2	1	50	1	50	2	50
TOTAL	**135**	**100**	**48**	**87**	**19**	**39.6**	**53**	**60.9**	**72**	**53.3**

FHU: Family Health Unit; ACeS: Health Center Groups. Bold numbers correspond to the total FHU-A+FHU-B.

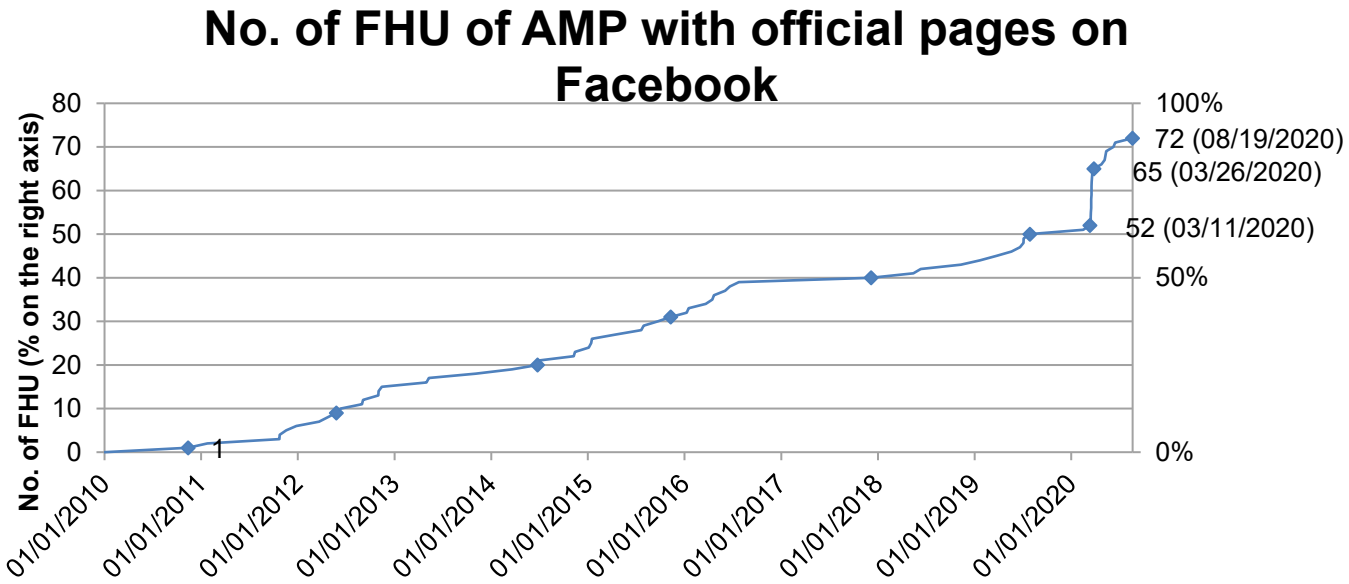
Table 2. Characterization of the age of Facebook pages of Family Health Units of the Porto Metropolitan Area, according to Health Center Groups and organizational model, on December 31, 2020 (Q1, Q2, and Q3: first, second, and third quartiles).

	Age (in years) of the FHU Facebook pages (on 12/31/2020)					
FHU Model	Minimum	Q1	Median/Q2	Q3	Maximum	Mean
FHU-A	0.6	0.8	1.5	2.6	8.6	2.4
FHU-B	0.4	0.8	5.3	8.1	10.1	4.9
ACeS	Minimum	Q1	Median/Q2	Q3	Maximum	Mean
ACeS Maia/Valongo	0.9	5.4	7.2	8.2	9	6.4
ACeS Póvoa Varzim/Vila do Conde	0.5	0.8	1.7	4.9	5.3	2.6
ACeS Porto Ocidental	0.8	2.3	5.5	8.1	9	5.2
ACeS Espinho/Gaia	0.4	1	4.6	5.6	9.9	4.1
ACeS Gondomar	0.8	0.8	4.5	5.1	8.3	3.6
ACeS Feira/Arouca	6.5	6.5	6.5	8.3	10.1	7.7
ACeS Matosinhos	–	–	–	–	–	not applicable
ACeS Gaia	0.6	1.8	4.3	7.9	9.2	4.7
ACeS Aveiro Norte	0.8	1.5	1.5	6.8	9.2	4
ACeS Santo Tirso/Trofa	0.7	0.8	0.8	1.9	5	1.7
ACeS Porto Oriental	0.6	0.7	0.8	4.7	8.6	3.3
ACeS Vale do Sousa Sul (one municipality)	1.6	1.7	1.7	1.7	1.8	1.7
TOTAL	**0.4**	**0.8**	**4.6**	**6.9**	**10.1**	**4.3**

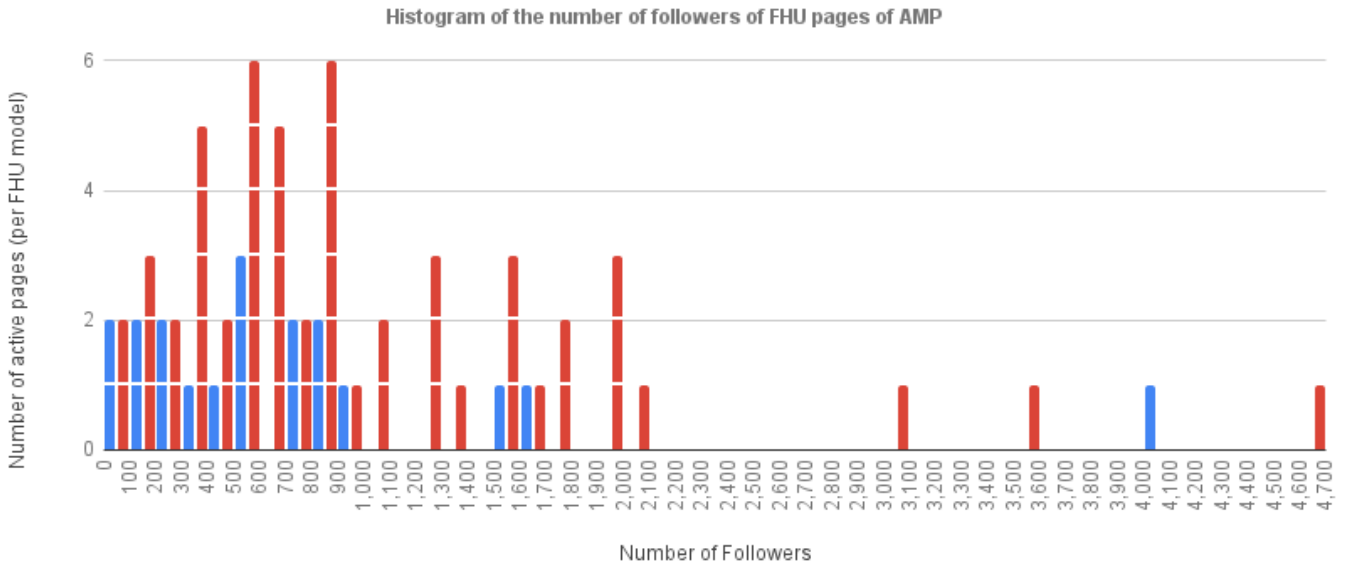
FHU: Family Health Unit; ACeS: Health Center Groups. Bold *numbers correspond to the total FHU-A+FHU-B.*

five years ago, whereas in another ACeS there are few active pages, all created over six years ago (Table 2). In mid-2016, there were about half of the current created pages, resulting from a relatively linear growth since 2010. In 2020, a considerable increase can be observed: from 51 pages on March 10, to 65 pages two weeks later and 72 in August (Figure 2).

Concerning the reach of the created pages (n=69,243 followers, average of 962/page), only 30.5% (22/72) of the represented FHU have more one thousand followers; 6.9% (5/72) have more than two thousand; and only two FHU have more than four thousand. A total of 5.6% (4/72) pages have less than one hundred followers (Figure 3).



FHU: Family Health Unit; ACeS: Health Center Groups.
Figure 2. Evolution of the creation of Facebook pages of Family Health Units of the Porto Metropolitan Area between 2010 and 2020.



FHU: Family Health Unit; FHU-A in blue; FHU-B in red.
Figure 3. Histogram of Facebook pages of Family Health Units of the Porto Metropolitan Area regarding the number of followers on December 31, 2020.

There are no significant differences in the median number of followers between FHU-A and FHU-B pages (p=0.097). The distribution of the number of followers per FHU in the different ACeS is also diverse: the sets of pages of the ACeS Maia/Valongo and Feira/Arouca (with older median of age) and Santo Tirso/Trofa (with younger median of age) have the highest medians of followers (Tables 1 and 3). Of the pages created in 2020, although 18 have fewer followers than the median, the remaining four (three FHU-B and one FHU-A) are above the median and have greater reach than other older pages.

Table 3. Description of the number of followers of the Facebook pages of Family Health Units of the Porto Metropolitan Area, according to Health Center Groups and organizational model, on December 31, 2020 (Q1, Q2, and Q3: first, second, and third quartiles).

	No. of followers of the FHU pages on Facebook (on 12/31/2020)					
FHU Model	**Minimum**	**Q1**	**Median/Q2**	**Q3**	**Maximum**	**Mean**
FHU-A	49	254	547	887	4,083	782
FHU-B	50	447	790	1,370	4,699	1,026
ACeS	**Minimum**	**Q1**	**Median/Q2**	**Q3**	**Maximum**	**Mean**
ACeS Maia/Valongo	665	778	1,582	1,987	4,699	1,858
ACeS Póvoa Varzim/Vila do Conde	50	220	348	555	869	392
ACeS Porto Ocidental	51	178	290	833	1,064	475
ACeS Espinho/Gaia	83	302	694	862	1,286	617
ACeS Gondomar	345	513	840	1,429	2,072	1,020
ACeS Feira/Arouca	830	1,054	1,278	1,636	1,993	1,367
ACeS Matosinhos	–	–	–	–	–	not applicable
ACeS Gaia	315	520	634	775	1,370	689
ACeS Aveiro Norte	139	675	744	891	1,757	841
ACeS Santo Tirso/Trofa	303	477	1,279	1,591	4,083	1,400
ACeS Porto Oriental	181	277	373	675	976	510
ACeS Vale do Sousa Sul (one municipality)	49	184	318	453	587	318
Total	**49**	**366**	**710**	**1,261**	**4,699**	**962**

FHU: Family Health Unit; ACeS: Health Center Groups. Bold numbers correspond to the total FHU-A+FHU-B.

As for the regularity of contents, 59.7% of the FHU pages (43/72) active at the time of data collection display publications posted in the last 30 days, and 75.0% (54/72) in the last 60 days. Conversely, 8.4% (6/72) have not posted any content since the pandemic declaration (Table 4). Concerning the amount of publications, only four FHU (5.6%) account for more than 20 publications in the last 30 days: three are

Table 4. Characterization of the Family Health Units FHU-A and FHU-B of the Porto Metropolitan Area regarding the time interval elapsed since the last publication until December 31, 2020

	Date of last publication							
	<=30 days	**31–60 days**	**61–90 days**	**91–180 days**	**180–295 days**	**296–365 days**	**>365 days**	**Subtotal**
FHU-A n (%)	12 (63.2)	2 (10.5)	1 (5.3)	–	2 (10.5)	1 (5.3)	1 (5.3)	19 (100)
FHU-B n (%)	31 (58.5)	9 (17)	5 (9.4)	–	4 (7.5)	1 (1.9)	3 (5.7)	53 (100)
Total n (%)	**43 (59.7)**	**11 (15.3)**	**6 (8.3)**	**0 (0.0)**	**6 (8.3)**	**2 (2.8)**	**4 (5.6)**	**72 (100)**

Bold numbers correspond to the total FHU-A+FHU-B.

pages created in 2020 and one corresponds to that with the most followers. At 60 days, only 2.8% (2/72) presented more than 60 publications and 9.7% (7/72), more than 40 (Table 5). During this period, an average of 11.8 publications were posted per active page (0.2/page/day), increasing, when only taking into account pages with publications in those 60 days, 15.7 publications per page (0.3/page/day). There are no significant associations between the number of followers of a FHU page or between FHU-A/B models and the time of the last publication or the number of publications in the last 60 days (Table 6).

Table 5. Characterization of the Family Health Units FHU-A and FHU-B of the Porto Metropolitan Area regarding the number of publications 30 to 60 days before December 31, 2020.

		No. of publications per page in the last 30 or 60 days								
		None	**1 – 5**	**6 – 10**	**11 – 20**	**21 – 40**	**41 – 60**	**61 – 100**	**Over 100**	**Subtotal**
FHU-A	**30 days**	7 (36.8)	6 (31.6)	3 (15.8)	3 (15.8)	–	–	–	–	**19 (100)**
n (%)	**60 days**	5 (26.3)	3 (15.8)	2 (10.5)	5 (26.3)	2 (10.5)	2 (10.5)	–	–	
FHU-B	**30 days**	22 (41.5)	21 (39.6)	4 (7.6)	2 (3.8)	4 (7.5)	–	–	–	**53 (100)**
n (%)	**60 days**	13 (24.5)	19 (35.8)	8 (15.1)	5 (9.4)	3 (5.7)	3 (5.7)	1 (1.9)	1 (1.9)	
Total	**30 days**	29 (40.3)	27 (37.5)	7 (9.7)	5 (6.9)	4 (5.6)	–	–	–	**72 (100)**
n (%)	**60 days**	**18 (25.0)**	**22 (30.6)**	**10 (13.9)**	**10 (13.9)**	**5 (6.9)**	**5 (6.9)**	**1 (1.4)**	**1 (1.4)**	

Bold numbers correspond to the total FHU-A+FHU-B.

Table 6. Analysis of any association between medians of the variables under study (A, C, and D — numerical; B — categorical); there were no statistically significant differences or correlations between the studied variables.

Variables in association (per page)	C — Days since the last publication	D — No. of publications in the last 60 days
A — No. of followers of FHU page	r_s=0.18 (Spearman's correlation)	r_s=0.17 (Spearman's correlation)
B — FHU model (FHU-A or FHU-B)	p=0.531 (Mann-Whitney test)	p=0.498 (Mann-Whitney test)

FHU: Family Health Unit.

Regarding the format of the 847 publications posted in the last 60 days, 77.4% contain images; 10.4%, hyperlinks; and 6.5%, videos. A total of 15,913 interactions were generated, with an average of 18.8 per publication, 221 (3.7/day) for each active page, and 295 (4.9/day) for each page with publications in the last 60 days. Among interactions, shares (160.4 per page; 10.2 per publication) and reactions (125.4 per page; 8.0 per publication) predominate, with fewer comments on average (8.85 per page; 0.56 per publication). Table 7 complements the aforementioned data with a description of the ten FHU with the most publications between November 1, 2020 and December 30, 2020.

Regarding the complementary investigation of the 50 publications (5.9% of the total) with the highest number of interactions in the last 60 days, about 80% address the COVID-19 topic, encompassing: educational appeals and measures (individual protection strategies and contagion prevention), organizational announcements (reorganization of services and support to users, including telephone and e-mail contacts), clarification of the start of vaccination against COVID-19, clarification of legal procedures (for instance, measures of state of emergency in force at the time, validity extension of legal documents expired in the meantime) and administrative procedures (justification for absenteeism from work and obtaining support from Social Security during infection or prophylactic isolation). The latter example is in five of the first six publications (and in 12 out of the 50) with the most interactions and shares, with similar or shared publications between these pages. The remaining "non-COVID" publications on this list address general administrative topics (access to online documentation,

Table 7. Characterization of publications and respective interactions on pages of the Family Health Units of the Porto Metropolitan Area from November 1, 2020 to December 30, 2020.

Page name/FHU	Model	Publications between 11/1/2020 and 12/30/2020				Interactions per page (and average per publication)			
		Total	With image	With video	With link	Total	Reactions	Comments	Shares
1. FHU Nova Salus	FHU-B	107	83	6	16	273 (2.6)	207 (1.9)	3 (0.03)	63 (0.6)
2. FHU Veiga do Leça	FHU-B	63	54	6	3	179 (2.8)	154 (2.4)	10 (0.16)	15 (0.2)
3. FHU Vale de Cambra	FHU-A	59	48	7	4	320 (5.4)	240 (4.1)	6 (0.10)	74 (1.3)
4. FHU Valongo	FHU-B	59	40	1	5	2,352 (39.9)	1,501 (25.4)	46 (0.78)	805 (13.6)
5. FHU Porto Centro	FHU-B	45	35	0	9	393 (8.7)	226 (5.0)	40 (0.89)	127 (2.8)
6. FHU Sudoeste	FHU-B	43	40	1	2	77 (1.8)	54 (1.3)	8 (0.19)	15 (0.3)
7. FHU Santa Justa	FHU-A	41	27	0	4	1,003 (24.5)	475 (11.6)	7 (0.17)	521 (12.7)
8. FHU Porto Douro	FHU-B	38	22	3	10	362 (9.5)	221 (5.8)	5 (0.13)	136 (3.6)
9. FHU Corino Andrade	FHU-B	36	27	6	2	217 (6.0)	115 (3.2)	9 (0.25)	93 (2.6)
10. FHU Saúde no Futuro	FHU-B	33	28	2	3	57 (1.7)	52 (1.6)	1 (0.03)	4 (0.1)
Top 10 with the most publications	(Average)	52.4	40.4	3.2	5.8	523.3 (10.0)	324.5 (6.2)	13.5 (0.26)	185.3 (3.5)
54 pages with publications	(Average)	15.7	12.1	1.0	1.6	294.7 (18.8)	125.4 (8.0)	8.9 (0.56)	160.4 (10.2)
72 active pages (with and without publications)	(Average)	11.8	9.1	0.8	1.2	221.0 (18.8)	94.0 (8.0)	6.6 (0.56)	120.3 (10.2)

FHU: Family Health Unit. Source: Fanpage Karma.

non-resolution of clinical or administrative requests by Facebook), remarkable events and symbolic landmarks (for example, the World Diabetes Day, anniversary of FHU, termination of professional functions). As for the remarkable events, a FHU promoted an "advent calendar" with daily publications and frequent reactions, listing general health education measures outside the scope of COVID-19.

DISCUSSION

Since the creation of the first FHU in 2006[44] and its first presence on Facebook in 2010, only half of the FHU active in the AMP have been on this social network. Although this is not the first study in Portugal on the use of social networks by health organizations, this is the first one addressing FHU. In a 2018 study, only eight out of 17 national ACeS had their own Facebook page, and the first page was only created four years after the creation of these institutions.[11] However, this study assessed such administrative bodies

without detailing the contents potentially related to their various operational units, which include the FHU. At the international level, there are few studies addressing primary health care: in England (a country with a public health service similar to the Portuguese one), regional studies have shown an increase in the institutional presence of general practices on Facebook in four years, from 37 to 96%,[6,10] after external consulting in the area of communication and digitalization of services.

There is a predominance of studies in the hospital context, particularly in the United States of America, with a high prevalence, although heterogeneous, among studies with different methodologies and sampling, from 68 to 99%.[9,13,27] In turn, in 2016, only 23% of public hospitals and 44% of private hospitals in a Portuguese sample were on Facebook.[20] Other researches also observed different prevalence values (7-93%) in different European[27-30] and Asian countries,[25,31] both on Facebook and other platforms not analyzed in this study. In one of these studies, which included 873 hospitals from 12 European countries, there was an increase in the presence of those on social networks, from 10 to 67% between 2009 and 2011, with significant differences between countries.[45]

The present study also shows an increasing trend in the presence of FHU over the last decade, especially in the pandemic year of 2020. No studies from 2020 that demonstrate this increase in other countries were found, but there are studies that indicate more published content and interactions obtained from the pages of health institutions.[3,8,21,23] In Portugal, during the Zika virus epidemic, only 10% of a hospital sample addressed this topic.[20] This study indicates greater sensitivity and perception, on the part of FHU and its followers, of the need to communicate about COVID-19 through the platform, considering the increase in the number of pages and the high prevalence of content about the pandemic among the publications with most interactions in the last 60 days.

Nevertheless, there are several ACeS whose creation of pages by FHU is neither a common nor a recent practice. On the one hand, the ACeS Feira/Arouca (without its own Facebook page) only has three (out of 11) FHU with active former pages. On the other hand, the ACeS Matosinhos, despite not having FHU with created pages, is part of a Local Health Unit (which includes the local hospital), whose page[46] on Facebook regularly produces content since 2016 and has more than 20 thousand followers.

Likewise the proportion of health units with active pages, there are different distributions in the number of followers, publications, and interactions between the respective pages (and between ACeS), similar to other international studies.[8,10,11,13,20,25,27,28,31] This diversity of results can be explained by: differences in the organization, availability of time, training, and interest of FHU professionals; non-professionalized management and implementation of the pages; different appreciation of their impact on communities; maturity of internal and external communication between the organizations of each ACeS.

In turn, there tends to be a greater representation of active pages of FHU-B and with more uptime *versus* FHU-A. If the "age" factor is not surprising because it is assumed that FHU have greater maturity and seniority due to being created as a FHU-A and seeking to evolve to a higher organizational model,[32] the greater representation of the FHU-B may be due to the greater predisposition of the teams to improve communication processes with their users/followers, with online presence on a website being one of the assessed items when evaluating those units.[33] Conversely, there are no differences between FHU-A and FHU-B in the median number of page followers – which can be explained by the different ages of the pages and the aforementioned conditions regarding the differences between ACeS.

In Portugal, it is estimated that 77% of the population actively uses social networks, 84% of which are Facebook users.[2] However, there is a reduced number of followers of the studied pages (mostly in the order of hundreds), when compared with the number of users subscribed in each FHU (in the order of

thousands), similar to other studies involving health institutions,[10,11,13,20,25,27,28,31] unlike what happens with organizations that are larger, with greater commercial vocation, and evolved marketing.

The COVID-19 pandemic accelerated the digitalization of health services and increased online communication.[47] Nonetheless, only a limited set of FHU regularly streamline their pages and has greater interaction from their users. However, the consistency (in regularity and amount) of publications of a page does not correlate with the scope of its communities of followers. In this study, the degree of interaction of its users with the published content did not necessarily seem to depend on the number of followers and the amount of created publications as well, differing from what has been observed in some studies.[18,21,23] Nonetheless, the FHU with the most followers produced more content in 60 days and had a greater presence in the list of publications with greater interactivity. This refers to the need to understand what forms and contents are important to convey and arouse the interest of citizens, as well as to avoid the superfluous, excessive, and/or erroneous dissemination of information, which confuses or disinterests their followers and which can be reflected in low rates of average interactivity per publication.[20,24,27] The frequent use of images and infographics in publications has been associated with greater user interaction in other studies.[15,18,20,27,29] In the context of COVID-19, the creation of content with simple and concise directives, good multimedia quality (image, video, and/or sound), originating from credible agencies with greater national and/or regional impact (governmental authorities), and number of followers were reported as factors of interactive success.[19] However, many organizations still adopt social networks without adapting their practices and favoring mass and unidirectional communication.[13,20,25,27,28]

In the time sample selected at 60 days, assuming that it does not necessarily represent the dynamics of other months of the year, the greater interest of followers in certain legal issues of everyday life – which, although merely administrative, tended to generate doubts and cause recurrent restraints in the assistance of the FHU — and in the expected beginning of vaccination as one of the solutions to combat the COVID-19 pandemic stand out. The high proportion of publications related to COVID-19 in the analyzed list of the most interactive publications may be due to the urgency and timeliness of the topic among users and/or the lower investment in raising awareness of other topics such as lifestyle improvements, changing harmful habits, and control of chronic diseases. It should be noted that the pages and content created before the pandemic had a greater educational dimension in the prevention of diseases and health promotion in several areas[21] and were aimed at specific groups due to their risk/vulnerability, which could be the focus of future research.

In addition to the possible biases of temporal and regional selection, there are limitations or unresolved questions in this study , considering the fact that standardized guidelines for systematic research on social networks were not found.[18] Other characteristics concerning the publications (scientific rigor, time of publication, own creation or created by third parties, responses to comments, among others), the FHU (urban/rural insertion, contribution to the education of medical students during their training or specialization, number of registered users, and health professionals currently working), or the pages (reasons for their creation, additional information, and potentially useful features, such as: description, contact lists and/or buttons, location, schedules, services, access to an appointment platform, conversation with a real or virtual assistant/chatbot) were not analyzed.

Aiming at improvements for future application, it should be relevant to encourage the creation and implementation of these platforms by FHU,[7] promoting their image and identity before the local community and other institutions, mutually interacting with them, also disseminating educational messages or warnings

regarding health promotion and disease prevention, in the context of everyday life or health and social emergencies.

It is worth investing in training on social networks, usage policies and codes of conduct by users and health professionals, articulation with communication offices of the ACeS/Regional Health Administrations (*Administrações Regionais de Saúde* – ARS), whenever the case, and formulation of strategies and objectives to be achieved for more efficient communication and interaction.[6,7,48-56] Involving citizens and patients' associations in the creation and revision of content and in the assessment of their health information needs and the understanding of the disseminated messages will be beneficial and useful.[28]

As new possibilities for future research, it should be mentioned: the extension to a national and/or international field of study; the assessment of the level of literacy (digital and health-related) and the satisfaction of FHU users with an active page, or the impact of this platform on health status indicators, namely chronic diseases associated with lifestyle, an issue addressed in some international studies[5,6,12-16,18,31], but little explored at the national level.

All in all, considering the context of adherence to and regular use of social networks by citizens in the national territory, it is assumed that there is an underutilization of the communicational and collaborative potential of social networks on the part of FHU. With room for advancement, the use of social networks can constitute a complementary and interactive tool for promoting access to and improving the quality of services, combating misinformation, empowering citizens for health, and improving health outcomes.

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