THESE de DOCTORAT DE L'UNIVERSITE DE LYON

Opérée au sein de
l'Université Claude Bernard Lyon 1 et l'Universidade Federal do Rio Grande do Sul

École Doctorale N° ED 205 et Escola de Administração
Interdisciplinaire Sciences-Santé EDISS et
Programa de Pós-|Graduação em Administração PPGA
Spécialité de doctorat :
Disciplines : Epidémiologie et Santé Publique et Administration

Soutenue publiquement le 25/01/2021, par :
Rita de Cassia NUGEM

EFFECTIVENESS ON STROKE HEALTH CARE: A COMPARISON BETWEEN BRAZIL AND FRANCE

Sous la direction des : Messieurs les Professeurs Ronaldo BORDIN et Philippe MICHEL,
Co-directeur : Monsieur le Professeur Vincent PIRIOU

Devant le jury composé de :

PASCAL Christophe Président
TROMBERT-PAVIOT Béatrice Rapporteure
LIBANIO Claudia de Souza Rapporteure
SCHOTT-PETHELAZ Anne-Marie Examinatrice
MALIK Ana Maria Examinatrice
CARBONAI Davide Examinateur
BORDIN Ronaldo Directeur de thèse au Brésil
MICHEL Philippe Directeur de thèse en France
DUSSART Claude Invité

Porto Alegre – Lyon

Universidade Federal do Rio Grande do Sul	Université Claude Bernard Lyon 1
Escola de Administração PPGA	École Doctorale Interdisciplinaire Sciences Santé EDISS
Programa de Pós-Graduação Doutorado em	Health Services and Performance Research EA7425
Administração - Estudos Organizacionais Brazil	Épidémiologie et Santé Publique - France

2021

L'EFFICACITE DE LA PRISE EN CHARGE DE L'ACCIDENT VASCULAIRE CÉRÉBRAL EN PHASE AIGUE : UNE COMPARAISON ENTRE LE BRÉSIL ET LA FRANCE

Résumé : Les systèmes de santé brésilien et français ont été structurés comme d'accès universel et une prise en charge globale, hiérarchisés par le niveau de soins, décentralisés politiquement et administrativement. Comme le système de santé français est considéré comme l'un des meilleurs au monde l'hypothèse suivante a été élaborée : Est-ce-que le système de santé français est-il plus efficace en résultats que le brésilien en matière de stratégies et soins de santé en cas d'accident vasculaire cérébral ? L'objectif général était de comparer l'efficacité de résultats entre les systèmes de santé brésilien et français liés aux soins de l'Accident Vasculaire Cérébral. L'étude a cherché à identifier les points communs et les divergences entre les deux politiques nationales de santé liées aux soins de l'accident vasculaire cérébral à travers les objectifs spécifiques qui visaient à décrire : les politiques de santé et la pratique clinique pour les soins de l'accident vasculaire cérébral dans les deux systèmes de santé ; de rechercher et de décrire le nombre d'hospitalisations aiguës ; la durée moyenne de séjour à l'hôpital ; le taux de mortalité hospitalière ; les décès et le coût du traitement des accidents vasculaires cérébraux à l'hôpital. Méthodes : Comparaison et description des similitudes, des différences ou des relations entre les données concernant les politiques, les facteurs de risque et les indicateurs de santé concernant les soins de l'accident vasculaire cérébral, de 2010 à 2017. Comme résultats, les données ont été obtenues des deux pays auprès des Ministères de la Santé ou des agences internationales respectifs. Les résultats ont montré que les données directement liées à la période d'hospitalisation entre 2010 et 2017 différaient considérablement d'un pays à l'autre. Par rapport aux hospitalisations dues à un AVC aigu, le taux de mortalité hospitalière au Brésil est de 163 pour 1.000 hospitalisés contre 263 en France. La durée moyenne de séjour des hospitalisations aiguës était de 7.6 jours au Brésil contre 12.6 en France. La prévalence des accident vasculaire cérébraux par tranche d'âge entre 2010 et 2017 montre que pour les 0 à 39 ans le taux n'a pas montré aucune croissance ou diminution importante et peut être considérée comme stable ; des 40-59 ans, il a augmenté dans les deux pays et que de 60-79 ans et 80+ ans, le taux était en augmentation en France alors qu'en baisse au Brésil. Concernant les coûts d'hospitalisation pour AVC aigu de 2010 à 2017, le Brésil avait une dépense moyenne de Parité de Pouvoir d'Achat $79.579.810.78 par an et la France avait $446.919.476.40. Deux hypothèses ont été posées pour expliquer ces différences : 1) le coût est plus faible au Brésil à cause des économies d'échelle ? Cette hypothèse est réfutée car même si des économies d'échelle sont réalisées grâce à des achats plus importants liés aux technologies et aux matériels pour les

services de santé ainsi qu'à l'optimisation des espaces institutionnels et professionnels, cette hypothèse ne suffit pas à expliquer la différence constatée entre les coûts d'hospitalisation pour accident vasculaire cérébral au Brésil et en France. 2) La manière différente de répartir et de gérer les coûts peut interférer avec le coût final ? Cette hypothèse est plausible mais nécessiterait une enquête plus approfondie. Il serait intéressant de calculer les coûts des hospitalisations pour accident vasculaire cérébral en France en utilisant la méthode d'absorption et, à son tour, au Brésil, de faire le calcul via le système Diagnoses Related Group. De cette façon, il serait possible de connaître la différence exacte entre les coûts de chaque pays. Comme cette seconde hypothèse ne pouvait être ni réfutée ni affirmée, une troisième hypothèse a été soulevée : la différence de change entre le Brésil (Real) et la France (Euros) conduirait à l'illusion que le Brésil dépense moins en hospitalisations pour accident vasculaire cérébral ? Au fur et à mesure que la monnaie brésilienne fluctue sur le marché des changes international, elle se dévalue avec le temps à cause du scénario économique international. Bien qu'il s'agisse d'une hypothèse probable, elle sort du cadre de cette thèse et, pour cette raison, elle ne fera pas l'objet de recherches. Les hypothèses discutées ne sont pas suffisantes pour expliquer la différence des coûts d'hospitalisation aiguë pour cause d'AVC entre le Brésil et la France. En conclusion, l'hypothèse initiale semble réfutée. Le système de santé brésilien par rapport au système de santé français est plus efficient et il est plus efficace en résultats en ce qui concerne le séjour moyen à l'hôpital et pour le taux de mortalité hospitalière. Les deux systèmes de santé sont en constante évolution pour répondre aux nouveaux besoins et obtenir des ressources financières suffisantes pour fournir un service de qualité à leur population. Aucune différence majeure n'a été trouvée concernant les politiques de santé et les plans nationaux de santé liés à l'AVC. Des études ultérieures peuvent être mises en œuvre pour identifier les facteurs explicatifs, notamment parmi les facteurs de risque et les actions en soins primaires, et la prise en charge après les soins hospitaliers aigus en termes de prévention secondaire, de réhabilitation, voire en soins palliatifs.

MOTS-CLÉS : Accident vasculaire cérébral ; Systèmes de Santé ; Facteurs de risque ; Politiques de santé ; Soins de santé ; Brésil ; France ; Gestion en Santé ; efficacité de résultat.

EFFECTIVENESS ON STROKE HEALTH CARE: A COMPARATION BETWEEN BRAZIL AND FRANCE

Abstract: Both healthcare systems were structured as universal access and comprehensive care attention, hierarchized by the level of care, politically and administratively decentralized. To measure the effectiveness of the Brazilian healthcare system, a comparison with another country is desirable. The French healthcare system is considered to be one of the best in the world, the following hypothesis has been developed: Is the French health system more effective in terms of results than the Brazilian in terms of strategies and care in stroke? The general objective was to compare the effectiveness of the Brazilian and French healthcare systems related to stroke care. It was sought to identify the commonalities and discrepancies between both national health policies related to stroke care through the specific objectives that sought to describe health strategies and clinical practice for stroke care in both healthcare systems; to research and to describe the number of acute hospitalizations, the average length of stay in the hospital, hospital mortality rate, deaths and the cost of in-hospital stroke treatment. Methods: Comparison and description of the similarities, differences, or relationships between the data regarding policies, risk factors, and health indicators about stroke care, from 2010 to 2017. The data were obtained from both countries (publicly accessible information or on request) from the respective Ministries of Health or international agencies. As a result, about acute stroke hospitalizations, the in-hospital mortality rate in Brazil was 163 per 1.000 hospitalized people versus 263 in France. The average length of stay of acute hospitalizations was 7.6 days in Brazil versus 12.6 in France. The prevalence of strokes by age group shows from 0 to 39 years old the rate did not show any significant growth or decrease and it can be considered stable; from 40-59 years it was increasing in both countries; from 60-79 and 80+ years this average rate has been increasing in France and decreasing in Brazil. Regarding the acute stroke hospitalizations costs from 2010 to 2017, Brazil had an average expenditure of Power Purchasing Parity $79.579.810.78 per year. France had $446.919.476.40. So, after this result, two hypotheses have been put forward to explain these differences: 1) The cost is lower in Brazil because of the economies of scale? This hypothesis is refuted because even if economies of scale are achieved thanks to larger purchases linked to technologies and materials for health services and the optimization of institutional and professional spaces, this hypothesis is not sufficient to explain the difference observed in-hospital costs between Brazil and France. 2) Can the different ways of allocating and managing costs interfere with the final cost? This hypothesis is plausible but would require further investigation. It would be interesting to calculate the costs

of hospitalizations for stroke in France using the absorption method and, in turn, in Brazil calculate then using the Diagnoses Related Group method. In this way, it would be possible to know the difference between both countries. This second hypothesis could neither be refuted nor affirmed. Thus, a third hypothesis has been raised - the exchange difference between Brazil (Real) and France (Euros) would lead to the illusion that Brazil is spending less on hospitalizations for stroke? As the Brazilian currency fluctuates in the international forex market, it devalues over time due to the international economic scenario. Although this is a probable hypothesis, it is outside the scope of this thesis, and, for this reason, it was not be tested. The hypotheses discussed are not sufficient to explain the difference in acute hospitalization costs by stroke between Brazil and France. In conclusion, the initial hypothesis seems refuted. Compared to the French healthcare system, the Brazilian healthcare system is more efficient, and it is more effective in terms of in-hospital average stay and in-hospital mortality rate. To conclude, both healthcare systems are constantly changing to meet new needs and obtain sufficient financial resources to provide a quality service to their population. No major differences were found about the health care policies and the National Health Plans related to stroke. However, the data directly linked to the period of hospitalization differed substantially between countries. Subsequent studies can be implemented to identify the explanatory factors, notably among the risk factors and actions in primary care and the moments after hospital care, such as secondary prevention and palliative care.

KEYWORDS: Stroke; Healthcare Systems; Risk-factors; Health policies; Health care; Brazil; France; Effectiveness; Health Management.

Université Claude Bernard Lyon 1

Président de l'Université M. Frédéric FLEURY

École Doctorale Interdisciplinaire Sciences-Santé – EDISS

Direction Professeur Sylvie RICARD-BLUM

Health Services and Performance Research EA7425 - Épidémiologie et Santé Publique

Direction Professeur Anne-Marie SCHOTT-PETHELAZ

8 Avenue Rockefeller, 69008. Lyon. France

Universidade Federal do Rio Grande do Sul

Reitor Carlos Bulhões MENDES

Escola de Administração EA

Coordenador Professor Sidinei Rocha de OLIVEIRA

Programa de Pós-Graduação Doutorado em Administração PPGA - Estudos Organizacionais

Coordenador Professor Fábio Bittencourt MEIRA

Rua Washington Luis, 855. Centro Histórico. Porto Alegre. Brasil

Remerciements

A Mme la Professeure Anne-Marie Schott, je vous remercie d'avoir m'accepté comme doctorante au sein du Laboratoire HESPER, pour votre accompagnement et votre soutien pendant l'ensemble de mon doctorat. Votre disponibilité et vos qualités d'écoute m'ont permis de gérer mes crises pour poursuivre et finir ma thèse plus sereinement. Je ne saurais vous remercier assez pour votre soutien sur les plans professionnels et personnels, dans les bons mais aussi les douloureux moments. MERCI.

Ao Professor Ronaldo Bordin, eu te agradeço primeiramente por ter me incentivado a fazer o doutorado e imensamente por todo apoio incansável e por tudo o que aprendi contigo, não somente no plano pessoal, mas também no profissional. Agradeço por me ajudar a enfrentar os meus medos e os períodos mais difíceis que eu vivi na minha vida. Estamos trabalhando juntos desde 2013 e eu não quero parar essa parceria. Não terei jamais palavras para te agradecer de forma suficiente tudo o que fizeste por mim. Gratidão.

A M. le Professeur Philippe Michel, je vous remercie d'avoir accepté d´être directeur de thèse et de m'avoir soutenu pour la préparation de ma thèse et pour l'ensemble des travaux menés sur ce thème au sein du laboratoire HESPER, j'en suis très honorée.

A M. le Professeur Vincent Piriou, je vous remercie d'avoir m'accepté comme votre doctorante, même si vous êtes le co-directeur de thèse aujourd'hui, sans votre aide je ne serais pas là.

A Mme les Professeures Béatrice TROMBERT-PAVIOT et Cláudia de Souza LIBANIO, je vous remercie d'avoir accepté d'être rapporteures de ce travail, j'en suis très honorée.

A Mme la Professeure Ana Maria MALIK, je vous remercie d'avoir accepté d'être examinatrice de ma thèse, j'en suis très honorée.

Ao Professor Davide CARBONAI, eu te agradeço de ter aceitado ser o examinateur de minha tese, eu me sinto muito honrada.

A M. le Professeur Christophe PASCAL et M. le Professeur Claude DUSSART, je vous remercie pour tout le soutien dès les comités de suivi de thèse et d'avoir accepté l'invitation pour participer à ma soutenance. Vos conseils étaient essentiels pour mon développement et l'avancement de ma thèse. MERCI.

L'EFFICACITE DE LA PRISE EN CHARGE DE L'ACCIDENT VASCULAIRE CÉRÉBRAL EN PHASE AIGUE : UNE COMPARAISON ENTRE LE BRÉSIL ET LA FRANCE

RESUMÉ SUBSTANCIEL

Les systèmes de santé brésilien et français ont été structurés comme d'accès universel et une prise en charge globale, hiérarchisés par le niveau de soins, décentralisés politiquement et administrativement. La France est un pays industrialisé à revenu élevé, et les soins de santé impliquant la quote-part et le remboursement des frais. Le Brésil est membre des ABRIC (Afrique du Sud, Brésil, Russie, Inde et China), un pays à revenu moyen-supérieur, et dispose du Système Unifié de Santé depuis 1990. Il organise un large éventail de services couvrant toutes les dimensions de la santé (prévention, guérison et réadaptation) et repose sur la gratuité pour plus de 210 millions de personnes. Les ressources de santé sont limitées et liés aux coûts. Le système de santé doit être efficient et réduire les admissions à l'hôpital pour des problèmes de santé qui peuvent être résolus sans nécessiter d'hospitalisation à travers des soins primaires effectifs. Parmi les définitions proposées, l'efficacité des résultats est décrite comme « l'effet des actions et pratiques sanitaires mises en œuvre ». L'efficacité des résultats peut donc être évaluée par la différence entre l'impact réel du service et son impact potentiel dans une situation idéale déterminée. Elle peut également être conceptualisée comme la mesure dans laquelle les soins de santé, les services et les actions atteignent les résultats attendus. Afin de comprendre ce qu'est l'efficacité du système, il est nécessaire de distinguer trois termes découlant du management : efficience, efficacité et efficacité de résultat. Ils ont des significations différentes et sont souvent utilisés à tort comme synonymes. Les concepts suivants ont été distingués : L'efficience est liée à l'utilisation des ressources physiques et humaines. Elle peut être défini comme la capacité à produire le maximum de résultats avec une dépense minimale d'énergie, de temps et un minimum de déchets. Dans les services de santé, cela signifie fournir le meilleur traitement au patient en utilisant le minimum de ressources. L'efficacité est le degré auquel les objectifs et les buts sont atteints au cours d'une période donnée, quels que soient les coûts et correspond au processus de soins et son objectif est d'améliorer la santé du patient. L'efficacité réel est l'ensemble des conditions idéales pour le traitement d'un individu (structures physiques, équipements, services et qualité). Il concerne le résultat concret, ou les actions qui ont fait que ce résultat se concrétise (objectifs et buts souhaités), et établit la relation entre les résultats et l'objectif (l'amélioration réelle obtenue en santé dans le traitement du patient).

Hypothèse et objectifs

Comme le système de santé français est considéré comme l'un des meilleurs au monde l'hypothèse suivante a été élaborée : Est-ce-que le système de santé français est-il plus efficace en résultats que le brésilien en matière de politiques et soins de santé en cas d'accident vasculaire cérébral ? Pour confirmer ou réfuter cette hypothèse, l'objectif général suivant a été élaboré : Comparer l'efficacité en résultat entre les systèmes nationaux de santé brésiliens et français liés aux soins de l'accident vasculaire cérébral. Les objectifs spécifiques ont été: I) Caractériser les deux systèmes de santé en termes de structure, de ressources et de financement; II) Décrire les stratégies de soins en termes de pratique clinique des accidents vasculaires cérébraux et de parcours de soins de l'accident vasculaire cérébral; III) Décrire la prévalence par groupe d'âge, les hospitalisations aiguës, la durée moyenne du séjour à l'hôpital et les taux de mortalité à l'hôpital par accident vasculaire cérébral dans les deux systèmes de santé, IV)

Décrire les coûts hospitaliers dans les deux systèmes de santé liés à l'accident vasculaire cérébral.

Méthodes

Elles ont été fondées sur la comparaison et description des similitudes, des différences ou des relations entre les données concernant les politiques, les facteurs de risque et les indicateurs de santé par rapport aux soins d'accident vasculaire cérébral au Brésil et en France dans la période 2010 à 2017. En termes quantitatifs, des données secondaires ont été collectées sur les sites officiels du ministère de la Santé ainsi que sur les départements d'informatique sanitaire des deux pays. Pour l'analyse des données, des calculs et des statistiques simples ont été effectués. La période choisie pour la recherche se situe entre les années 2010 à 2017 car, dans cet intervalle de temps, les mêmes données ont été trouvées pour les deux pays. L'approche qualitative a mis l'accent sur la relation entre ces données et les politiques de santé publique, cherchant à mieux comprendre ces chiffres et leurs implications. L'ensemble des données quantitatives et qualitatives se complètent, car la réalité qu'elles couvrent interagit dynamiquement. Pour mieux interpréter les structures et les institutions résultant de l'action humaine (facteurs de risque, politiques de santé publique, indicateurs de santé). Dans cette recherche, l'efficacité des résultats est liée aux indicateurs de hospitalisations aiguës, séjour moyen, taux de mortalité à l'hôpital, décès, prévalence et les coûts hospitaliers dans les deux systèmes de santé liés à l'accident vasculaire cérébral. Les coûts (total et moyen) étaient déjà calculés et disponibles au téléchargement, en Real (BRL) pour le Brésil et en Euros (EUR) pour la France. Pour comparer les coûts des hospitalisations aiguës, il était nécessaire de convertir ces valeurs en Parités de Pouvoir d'Achat (disponible sur le site de l'Organisation de coopération et de développement économiques) - le taux de conversion monétaire qui tente d'égaliser le pouvoir d'achat des différentes devises, en éliminant les différences de niveaux de prix entre les pays (mesuré en termes de monnaie nationale par dollar américain). Pour la conversion de devises, le calcul mathématique simple suivant a été effectué : coût annuel total divisé par la valeur du Parité de Pouvoir d'Achat annuel.

Résultats

La recherche sur les politiques de santé pour la pratique clinique de l'accident vasculaire cérébral au Brésil, a trouvé le Plan d'action stratégique de lutte contre les maladies chroniques non transmissibles au Brésil 2011-2022. L'ordonnance n° 664/2012 a approuvée les protocoles cliniques et les directives thérapeutiques pour l'accident vasculaire cérébral et l'ordonnance n° 665/2012 qui a défini les critères pour la qualification des établissements hospitaliers en tant que centre de soins d'urgence pour les patients victimes d'un accident vasculaire cérébral. Le respect de ce protocole clinique est obligatoire. Les résultats de la recherche sur les politiques de santé pour la pratique clinique de l'accident vasculaire cérébral en France, ont permis de trouver le plan d'action national contre les accidents vasculaires cérébraux, développé dans le cadre de la stratégie de prévention et de prise en charge des accidents vasculaires cérébraux. La loi n° 2004-806 Politique de santé publique (9 août 2004) fixe cinq objectifs relatifs aux maladies cardiovasculaires, consistant à réduire la fréquence et la gravité des séquelles fonctionnelles liées à l'accident vasculaire cérébral, et la circulaire du 6 mars 2012 qui organise les réseaux régionaux et la prise en charge des accidents vasculaires cérébraux. Les protocoles cliniques et thérapeutiques nationaux ont été établis par le ministère de la Santé des deux pays et ont été mis en œuvre par la loi ou par arrêté ministériel. Les principaux éléments des plans

d'action pour la santé du Brésil et de la France sont résumés en termes de prévention, promotion et de rétablissement de la santé.

Les résultats de la recherche sur les Parcours de soins de l'accident vasculaire cérébral au Brésil, ont montré que le traitement des personnes ayant subi un accident vasculaire cérébral est effectué dans des hôpitaux spécialisés appelés centres de soins d'urgence pour les patients victimes d'un accident vasculaire cérébral ou dans l'hôpital. Pour la prévention et la promotion de la santé contre l'accident vasculaire cérébral, au Brésil, les unités de santé de base couvrent 64,6% de la population brésilienne pour les soins globaux, tels que l'hypertension, le diabète et l'obésité. La télémédecine permet l'accès à une assistance spécialisée qualifiée et constitue un support pour le diagnostic et le traitement de l'accident vasculaire cérébral. Après les soins de l'accident vasculaire cérébral, le traitement est prescrit par un spécialiste et le patient retourne à l'Unité de Santé de Base pour consulter le médecin généraliste, et les spécialistes en cas de besoin. La réadaptation est réalisée dans les Centres Spécialisés de Réadaptation en tenant compte de l'impact du handicap sur les fonctionnalités, des facteurs cliniques, émotionnels, environnementaux et sociaux.

Les résultats de la recherche sur les Parcours de soins de l'accident vasculaire cérébral en France ont montré que le traitement est effectué dans des hôpitaux de soins aigus (publics ou privés à but lucratif ou privés à but non lucratif), et également dans des services plus spécialisés appelés Unités Neuro-Vasculaires. La télémédecine vise à offrir aux patients un traitement dans un délai plus court jusqu'à ce que le patient arrive aux urgences ou aux Unités Neuro-Vasculaires. Après les soins aigus de l'accident vasculaire cérébral, le patient subit une évaluation pour démarrer son programme personnalisé de rétablissement de santé et d'activités quotidiennes. La réadaptation est réalisée dans les unités de rééducation et de réadaptation. Les résultats de la recherche sur les indicateurs de soins de l'accident vasculaire cérébral, ont montré que les facteurs de risque sont importants pour le contrôle de l'accident vasculaire cérébral. Les deux pays sont similaires en ce qui concerne la consommation de sel, le diabète et l'obésité. La France a eu une consommation d'alcool plus élevée, plus de tabagisme et d'adultes hypertendus. Le Brésil a eu un pourcentage plus élevé de personnes qui ne font pas d'activité physique. S'agissant des hospitalisations dues à un accident vasculaire cérébral aigu le Brésil a recensé en moyenne 156.531 hospitalisations annuelles. La France a compté en moyenne 107.887 hospitalisations annuelles. Le Brésil a comptabilisé en moyenne 42.410 décès par an par hospitalisation aiguë pour un accident vasculaire cérébral (2% de la population) alors que la France a totalisé 28.423 décès par an (4.2% de la population). Dans la période entre 2010 et 2017, le taux moyenne de mortalité hospitalière au Brésil était 163 pour 1.000 personnes hospitalisés à cause d'accident vasculaire cérébral contre 263 en France. La durée moyenne de séjour des hospitalisations en cas d'accident vasculaire cérébral était 7,6 jours au Brésil contre 12,6 jours en France. Habituellement, les raisons d'une durée moyenne de séjour plus longue sont : la différence de composition des cas, d'âge, d'accès au système de santé, de durée de transfert vers les structures de rééducation. Cette différence s'explique en partie par la structure d'âge : au Brésil, l'accident vasculaire cérébral survient dans la tranche d'âge entre 60 et 79 ans (5.91/10.000 au Brésil contre 4.47/10.000 en France) lorsqu'en France, la tranche d'âge la plus touchée par l'accident vasculaire cérébral est 80+ ans (15.16/10.000 en France contre 12.25/10.000 au Brésil). Un autre point qui attire l'attention est la différence entre les deux pays en ce qui concerne la mortalité par accident vasculaire cérébral à l'hôpital. Bien que les patients restent plus longtemps dans les hôpitaux en France, le taux de mortalité hospitalière brésilien est plus faible, et une hypothèse pour expliquer ce fait pourrait être due à la prévention sanitaire

brésilienne, qui améliore la santé de la population. La prévalence des accidents vasculaire cérébraux par tranche d'âge montre que de 0 à 39 ans le taux n'a montré aucune croissance ou diminution importante et peut être considérée comme stable entre 2010 à 2017, même avec une croissance démographique. Le taux pour la tranche d'âge des 40-59 ans était en augmentation dans les deux pays, et pour la tranche des 60-79 ans et 80+ ans, le taux augmentait en France alors qu'il diminuait au Brésil, dans la période entre 2010 à 2017.

Discussion

La raison de la baisse des taux au Brésil peut être associée au travail de la prévention sanitaire, principalement sur les facteurs de risque, dans les Unités de santé de base qui a été élue par l'Organization Mondiale de la Santé comme l'un des 10 meilleurs programmes de santé au monde pour son efficacité de résultats sur le contrôle de la mortalité infantile et des hospitalisations pour maladies chroniques (hypertension, diabète et la politique antitabac). Les recherches de Starfield prouvent que la santé de la population est meilleure là où les soins primaires existent, et des études ont montré des taux plus bas pour toutes les causes de mortalité, y compris les accidents vasculaire cérébraux. Les soins primaires dans les deux pays sont axés sur la prévention et la promotion de la santé par le biais de campagnes et de politiques, mais la manière dont les deux pays ont établi leurs soins primaires est complètement différente. La prévention sanitaire brésilienne parvient à améliorer la santé de la population de telle sorte que la mortalité hospitalière et les taux moyens d'hospitalisation dus à un accident vasculaire cérébral soient inférieurs à ceux de la France. Aucune différence significative n'a été trouvée concernant les politiques et stratégies de santé liés à l'accident vasculaire cérébral. Cependant, les données liées à la période d'hospitalisation différaient d'un pays à l'autre. Concernant les coûts d'hospitalisation pour accident vasculaire cérébral aigu de 2010 à 2017, le Brésil avait une dépense moyenne de Parité de Pouvoir d'Achat $79.579.810.78 par an alors que la France avait $446.919.476.40. Deux hypothèses ont été posées pour expliquer ces différences : 1) le coût est plus faible au Brésil à cause des économies d'échelle ? Cette hypothèse est réfutée car même si des économies d'échelle sont réalisées grâce à des achats plus importants liés aux technologies et matériels pour les services de santé et à l'optimisation des espaces institutionnels et professionnels, cette hypothèse ne suffit pas à expliquer la différence constatée entre les coûts d'hospitalisation pour accident vasculaire cérébral au Brésil et en France. 2) La manière différente de répartir et de gérer les coûts peut interférer avec le coût final ? Cette hypothèse est plausible mais nécessiterait une enquête plus approfondie. Il serait intéressant de calculer les coûts des hospitalisations pour accident vasculaire cérébral en France en utilisant la méthode d'absorption et, à son tour, au Brésil, de faire le calcul via le système Diagnoses Related Group. De cette façon, il serait possible de connaître la différence exacte entre les coûts de chaque pays. Comme cette seconde hypothèse ne pouvait être ni réfutée ni affirmée. Ainsi, une troisième hypothèse a été soulevée - la différence de change entre le Brésil (Real) et la France (Euros) conduirait à l'illusion que le Brésil dépense moins en hospitalisations pour les cas d'accident vasculaire cérébral ? Au fur et à mesure que la monnaie brésilienne fluctue sur le marché des changes international, elle se dévalue avec le temps à cause du scénario économique international. Bien qu'il s'agisse d'une hypothèse probable, elle sort du cadre de cette thèse et, pour cette raison, elle ne fera pas l'objet de recherches. Les hypothèses discutées ne sont pas suffisantes pour expliquer la différence des coûts d'hospitalisation aiguë par accident vasculaire cérébral entre le Brésil et la France.

Conclusion

L'hypothèse initiale semble réfutée. Le système de santé brésilien par rapport au système de santé français est plus efficient et il est plus efficace en résultats en ce qui concerne au séjour moyen à l'hôpital et le taux de mortalité hospitalière en cas d'accident vasculaire cérébral. Aucune différence majeure n'a été trouvée concernant les politiques de santé et les plans nationaux de santé liés à l'accident vasculaire cérébral. Des études ultérieures peuvent être mises en œuvre pour identifier les facteurs explicatifs, notamment parmi les facteurs de risque et les actions en soins primaires, ainsi que la prise en charge après les soins hospitaliers aigus, en termes de prévention secondaire, de réhabilitation, voire de soins palliatifs.

TABLES

FIGURES

ABREVIATIONS

ACS Aid for the Acquisition of a Complementary Health (Aide à l'Acquisition d'une Complémentaire Santé)

AIDS Acquired Immunodeficiency Syndrome

AIHW Australian Institute of Health and Welfare

ALD Long-term Diseases (Affections de longue durée)

AME State Medical Aid (Aide Médicale de l'État)

ANS National Supplementary Health Agency (Agência Nacional de Saúde Suplementar)

ARS Regional Health Agencies (Agence Régionale de Santé)

AVC Stroke (Accident vasculaire cérébral)

CAPs Retirement and Pension Funds (Caixas de Aposentadorias e Pensões)

CIHI Canadian Institute for Health Information

CMU Universal Health Coverage (Couverture Maladie Universelle)

CMU-C Additional Universal Health Coverage (Couverture Maladie Universelle Complémentaire)

CNAM-TS National Health Insurance Fund for Salaried Workers (Caisse Nationale de L'assurance Maladie des Travailleurs Salariés)

DALYs Disability Adjusted Life Years

ESO European Stroke Organization

ESF Health Family Strategy (Estratégia de Saúde de Família)

FNH French National Healthcare System

FUNRURAL Rural Worker Assistance Fund (Fundo Rural)

GDP Gross Domestic Product

HAS High Authority of Health (Haute Autorité en Santé)

HDI Human Development Index

IAPs Institutes of Retirement and Pension (Institutos de Aposentadoria e Pensões)

INAMPS National Institute of Social Welfare and Medical Assistance (Instituto Nacional de Assistência Médica da Previdência Social)

INPS National Institute of Social Welfare (Instituto Nacional de Previdência Social)

MRI Magnetic Resonance Imaging (IRM Imagerie par Resonnance Magnetique)

MCO Medicine-Surgery-Obstetrics (Medecine-Chirurgie-Obstetrique)

MRS Modified Rankin Scale

NCDs Noncommunicable diseases

NGOs Non Governamental Organization

NIHSS National Institutes of Health Stroke Scale

PMSI Information Systems Medicalization Program (Programme de Médicalisation des Systèmes d'Information)

PPP Purchasing Power Parity

PUMA Universal Health Protection (Protection Universelle Maladie)

SAMU Mobile Emergency Care Service (Service d´Aide Médicale Urgent / Serviço de Atendimento Médico de Urgência)

SMUR Services mobiles d´urgence et de réanimation

SSR Soins de suite et de réadaptation

SSS Scandinavian Stroke Scale

SU Stroke Unit

SUN Stroke Unit Network

SUS Unified Health System (Sistema Único de Saúde)

UBS Basic Health Units (Unidade Básica de Saúde)

UNV Neurovascular Unit (Unité Neurovasculaire)

USLD Long-term Care Unit (Unité de soins de longue durée)

WHO World Health Organization

WSO World Stroke Organization

PREFACE

In general, there is no agreement among the authors about a definition for what would become a "healthcare system", even if it is a consensus, it does not define itself as a synonym for "health care systems" [1]. The definitions, concepts, and categories used to define or analyze the Healthcare Systems vary according to values, principles, and conceptions about what health is and the State responsibility in the health of the population [1,2]. Healthcare Systems services are a combination of resources, organization, financing, and management, resulting in population health care services [3].

Traditionally, healthcare systems can be classified into three ideal models: permissive or free-market, compulsory social insurance, and publicly funded [1]. More recently, varying from country to country, the role of the State and its power of intervention, the shaping of the public-private mix of service providers, and whether or not the user is free of charge, among other variables, has made it difficult to categorize a country strictly into one of these three models [4]. In the contemporary processes of healthcare sector reform, the State's role and its involvement in service provision have been fundamentally questioned, in detriment of other more decisive actions to obtain better results on health and welfare for the population. The list of criticisms is extensive, but very synthetically, it is noted that despite the high amounts of financial resources invested, many countries have failed to provide the implementation of universal, equitable, and good quality policies of health care [1]. Usually, the healthcare systems are constituted to a greater or lesser extent by a mix of public and private services, based on the national healthcare system or national health insurance system [3].

According to WHO, for management to maximize effectiveness (outcomes), barriers to implementing cost-effective interventions (incomes) need to be identified and overcome. Several studies have documented the common inefficiencies and inadequacies in the performance of healthcare systems, which also influence the delivery of diseases interventions, as

1. excessive and costly use of inappropriate technologies, medicines, and invasive procedures;

2. lack of focus on efficiency;

3. underutilization of primary-care facilities and maintaining hospitals with low occupancy rates;

4. failure to remunerate staff adequately encourages good performance and offers them incentives to work in rural locations and primary care.

It depends on a political commitment, public policies, and all stakeholders involved. With a little more investment in the healthcare system and strategic containments could be injected resources saved in other areas for better health care [5].

The concept of effectiveness in health care has been discussed since the 1980s. It has been associated with meeting the objectives and goals of a healthcare system. For this reason, effectiveness is related to the results obtained through an intervention. The Canadian Institute for Health Information (CIHI) and the Australian Institute of Health and Welfare (AIHW) define the effectiveness of the healthcare system according to the degree of achievement of the result desired by the intervention or action [6]. The process integrates from the acquisition of inputs (all types of resources involved in providing care, including human resources), health services, and the result obtained in this care. The result of health care can be defined as the "effectiveness" of this care. So, when it comes to effectiveness, we are talking about the result obtained through health services provision. In other words, a productive system can deliver services or products with efficacy ("doing the right thing") and efficiency ("doing more with less or with the same resources"). In the definition of ONA (National Accreditation Organization in Brazil), it is the relationship between the real benefit offered by health care and the potential result, represented schematically by a fraction in which epidemiological and clinical studies offer the information and results to obtain the result of this relationship [7]. These terms: efficiency, efficacy, and effectiveness will be better explained in chapter 1.

Comparing is understood as the act of seeking similarities, differences, or relationships between something that can be described to seek a general understanding [8]. Comparative research can contribute to improved health services and generates new public policies, new work processes, and other benefits. Smith (2012) states that the international comparison of healthcare systems' performance may significantly influence national politicians. The World Health Report 2000 was an indication of the potential power of such comparisons and pointed to the methodological difficulties that arise when seeking to do so in an operational manner. The starting point of most international comparisons is creating a conceptual framework in which to base the collection

of information and use them in a heuristic way for understanding a healthcare system. In the 2000s, much energy was spent creating various conceptual frameworks at the international level [2]. This study brings several cases of comparisons made among some healthcare systems in different countries, in chapter 1. The comparison made in this study is also better explained in the methodology.

The Brazilian Healthcare System – Unified Health System (SUS) - created by the 1988 Federal Constitution, promotes universal access, comprehensive attention, and equity of health care actions [9]. The SUS is a political and organizational formulation for ordering health care services and actions. Thus, SUS is not a service or an institution, but a system that means a set of units, services, and actions that interact for a common purpose. These elements of the system, at the same time, refer to health promotion, protection and recovery or, Primary Care (it is the first level of health care and is characterized by a set of health actions, at the individual and collective level, which covers health promotion and protection, disease prevention, diagnosis, treatment, rehabilitation, harm reduction and health maintenance in comprehensive care made by the UBSs), Secondary Care (formed by specialized services on an outpatient and hospital level, as medium complexity procedures, and includes specialized medical services, diagnostic and therapeutic support and urgent and emergency care), Tertiary Care (highly specialized set of therapies and procedures that involve high technology and/or high cost, such as oncology, cardiology, ophthalmology, transplants, high-risk birth, traumatic-orthopedics, neurosurgery, dialysis, otology, restorative surgery (mutilations, trauma or severe burns), bariatric surgery (morbid obesity), reproductive surgery, assisted reproduction, clinical genetics, nutritional therapy, progressive muscular dystrophy, imperfect osteogenesis, cystic fibrosis, chemotherapy, radiotherapy, hemotherapy, magnetic resonance and nuclear medicine, in addition to the provision of exceptional medications, such as bone prostheses, pacemakers, cardiac stent, etc.), free of charges for the population [9, 10].

Brazil is going through the process of polarized epidemiological and demographic transition. That means a large population concentration in the urban areas where there is a complete offer of health care services in contrast to the country cities where the health care services provided are scarce. There is a mixed picture of diseases considered archaic (such as parasitic diseases) along with modern diseases (chronic degenerative diseases, noncommunicable diseases, etc.) [11].

The French healthcare system was characterized as universal access, comprehensive attention, based on solidarity. The French healthcare system organizes medical attention care by linking the professional physician (General Practitioner - GP) with the users previously registered in primary care, like Brazil. The management of health care is usually done with the participation of this physician. [12]. Regarding the actions of the healthcare systems, Europe and North America's countries mainly managed to control and eradicate various infectious and parasitic diseases from the first half of the 20th century. As a consequence of this process, the second half of the twentieth century was characterized by the predominance of "diseases of modernity": chronic-degenerative diseases, external causes, and malignant neoplasms. In contrast, countries in South America, the Caribbean, and Asia only showed essential changes in the epidemiological profile by the second half of the 20th century [13].

Noncommunicable diseases (NCDs) accounts for about 71% of the cause of death worldwide (41 million deaths in 2016), the majority caused by the four main NCDs: the cardiovascular disease was responsible for 17.9 million deaths (44% of all NCDs deaths); Cancer for 9.0 million deaths (22%); Chronic respiratory disease for 3.8 million deaths (9%); and diabetes for 1.6 million deaths (4%). NCDs are multifactorial, that is, determined by several factors, whether social or individual. The major NCDs (cardiovascular disease, chronic respiratory disease, diabetes mellitus, and cancer) have four common risk factors: tobacco use, physical inactivity, unhealthy diet, and harmful alcohol use. Note that these risk factors are modifiable. From all NCDs, ischemic heart disease and stroke are the leading causes of death and disability worldwide. A total of 15 million people suffered a stroke and 5.8 million deaths. They have remained the leading cause of death in the world over the past 15 years. Stroke claims more lives annually than AIDS, tuberculosis, and malaria combined [14, 15].

In Brazil, noncommunicable diseases (NCDs) were responsible for 577.308 deaths (2016) and are responsible for about 70% of healthcare expenditures in Brazil [14, 15]. The stroke has an annual incidence of 226.800 inhabitants and, the mortality rate due stroke is approximately 68.000 deaths annually (2016) [16, 17].

In France, non-communicable diseases (NCDs) were responsible for 488.500 deaths (2016) [14]. The stroke has an annual incidence of 140.000 inhabitants. Approximately 30.000 people die each year from stroke. [18, 19, 20].

This thesis started in the Health management research group, at the School of Administration, which is part of the Federal University of Rio Grande do Sul, Brazil, which since 2014, has been interested in comparative research, aiming at the continuous improvement of SUS. This group has already completed two compared kind of researches[1] between internationals healthcare systems in their health care, namely: A percepção do conceito de equidade nos sistemas nacionais de saúde do Brasil e Suécia (The perception of the concept of equity in national healthcare systems in Brazil and Sweden) authored by Bettina Sá D'Alessandro, master's thesis published in 2019 and, Políticas comparadas de saúde: a atenção domiciliar aos portadores de demência no Brasil e na Holanda (Compared health policies: home care for people with dementia in Brazil and the Netherlands) authored by Karen Milou Aarts, master's thesis published in 2016; both guided by professor Dr. Ronaldo Bordin and, this research being the third to be finished.

The curiosity to study the French healthcare system came from the researcher herself, after watching a NorthAmerican documentary called "Sicko" performed by Michael Moore (2007), showing an overview of some international healthcare systems: Canada, Great Britain, and France, classified as "Universal Access," unlike the NorthAmerican who is classified as "Permissive." So, to know another universal healthcare system, such as the Brazilian one, and to deepen the knowledge about the world's healthcare systems, was the trigger to start this research. In the documentary, Michael Moore was very impressed with the French Healthcare System and, the researcher wished to "see up close" how this healthcare system works.

The first chapter presents the context of the Brazilian and French healthcare systems and characterizes both Healthcare Systems. It shows some comparative studies in some healthcare systems globally, bringing a reference to efficiency, efficacy, and effectiveness. The hypothesis, the objectives proposed, and the methods for this research are also presented.

The second chapter characterizes and compares Healthcare Systems through historical background, structure, human resources, and funding.

The third chapter presents the scenario and concepts related to stroke globally in Latin America, Europe, Brazil, and France. Describe the health policies, strategies, clinical practice, and the stroke care paths in the Brazilian and French healthcare systems, and describe the risk factors,

---

[1] Available at: https://sabi.ufrgs.br

prevalence by age group, acute hospitalizations, the average length of stay in-hospital, and in-hospital mortality rates by stroke.

The fourth chapter presents the amount spent in both health systems by stroke hospitalizations, and other health indicators related to stroke.

The fifth chapter presents the conclusion and the perspective for further research.

INTRODUCTION

The following introduction, the Brazilian and French Healthcare Systems, shows some comparative studies in healthcare systems worldwide, the concepts of efficiency, efficacy, and effectiveness, describe the hypothesis, the objectives, and the method used in the thesis.

The following introduction concerns the Brazilian and French healthcare systems, showing some comparative studies between the global health systems, as well as the concepts of efficiency, effectiveness and effectiveness, besides describing the hypotheses, objectives and method used in this thesis.

1. NATIONAL HEALTHCARE SYSTEMS – BRAZIL AND FRANCE

1.1. Brazilian Healthcare System – SUS

Brazil is the fifth largest country in the world in size with an area of 8,515,767 km^2. In 2019 its population was estimated at 212,393 000 inhabitants (6th in the world); its GDP (PPP[1]) was calculated at $ 3.372 trillion (8th in the world), however GDP per capita (PPP) was valued at 16,096.401 (106th in the world). The country spends around 8% of its GPD on the healthcare system, approximately 50% of this fraction is exclusively for the public healthcare system – universal access [21]; half of this amount comes for private health care providers and the health expenditure per capita in 2015 was PPP$ 1.392. The Gini index (2015) was 51.3 (high), whereas the HDI was 0.754 (high, 79th in the world) [21, 22].

The Unified Health System (SUS) encompasses all health services from blood pressure assessment to organ transplantation. Health care is comprehensive from pregnancy throughout life, aiming at prevention and health promotion. The management of health actions and services is solidary and participatory among the three entities of the Federation: The Union, the States, and the municipalities. The network that makes up the SUS is broad and includes actions as well as health services. The SUS has primary, medium, and high complexities, urgency and emergency services, hospital care, epidemiological, sanitary, environmental surveillance actions and services, and pharmaceutical assistance [23].

The SUS is part of social security. Health is seen as a citizen's right, and the State must meet these needs. Public healthcare centers, public hospitals, profit or non-profit hospitals offer

health care services. The three spheres of government - federal, state, and municipal - finance the Unified Health System (SUS), thereby generating the necessary revenue to cover expenses with public health actions and services [9, 24].

The creation of the Unified Health System (SUS), formalized in 1990, established the principles of universality in access to free health services, comprehensiveness in health actions and services, and equity in care - a wide range of services covering all dimensions of health (prevention, cure, and rehabilitation). The State is responsible for providing services and products directly or by hiring private actors, but completely free of charge. Comprising over 200 million people, SUS can be considered the most extensive universal health system worldwide. The establishment of this system represented a radical break with what was a low institutionality and based on philanthropic or private providers and insurers, and access to health services restricted to specific groups. The SUS administration, provision, and financing are decentralized, with shared responsibility between the Union (State), the 26 states (federal states), and more than 5,570 municipalities [25]. Based on the constitutional precepts, SUS is guided by the following doctrinal principles [9]:

Universality - health care to any citizen, the right of access to all public health services. Health is a right and a duty of the municipal, state and federal government.

Equity - To ensure actions and services according to the complexity required, without privileges or barriers. Every citizen is equal before the SUS and will be served according to his/her needs up to the limit of what the system can offer for everyone;

Comprehensiveness - The recognition in practice of services that each person is an indivisible and integral part of a community; health promotion, protection, and recovery actions with varying degrees of complexity, forming a healthcare system capable of providing comprehensive assistance.

The organization of SUS is governed by the following principles [9]:

Regionalization and hierarchy - The healthcare network organized in a hierarchical and regionalized way allows for an even better knowledge of health problems from a defined area at all levels of complexity;

Solvability - when a problem with an impact on health arises, the corresponding service can face it and solve it up to the level of its competence;

Decentralization - redistribution of responsibilities for healthcare actions and services among the various levels of government - federal, state, and municipal;

Citizen participation – in the process of formulating health policies and controlling their implementation. This participation must take place in the Health Councils, with equal representation of users, government, health professionals, service providers, and also complementarity of the private sector. When it is necessary to contract private services, this must happen under three conditions:

1) a contract according to public law;

2) the private institution must be following the fundamental principles and technical standards of SUS;

3) the integration of private services must occur within the same SUS organizational logic [9].

Figure 1 shows the structure and organization of the SUS.

Figure 1 - Brazilian Healthcare System - SUS
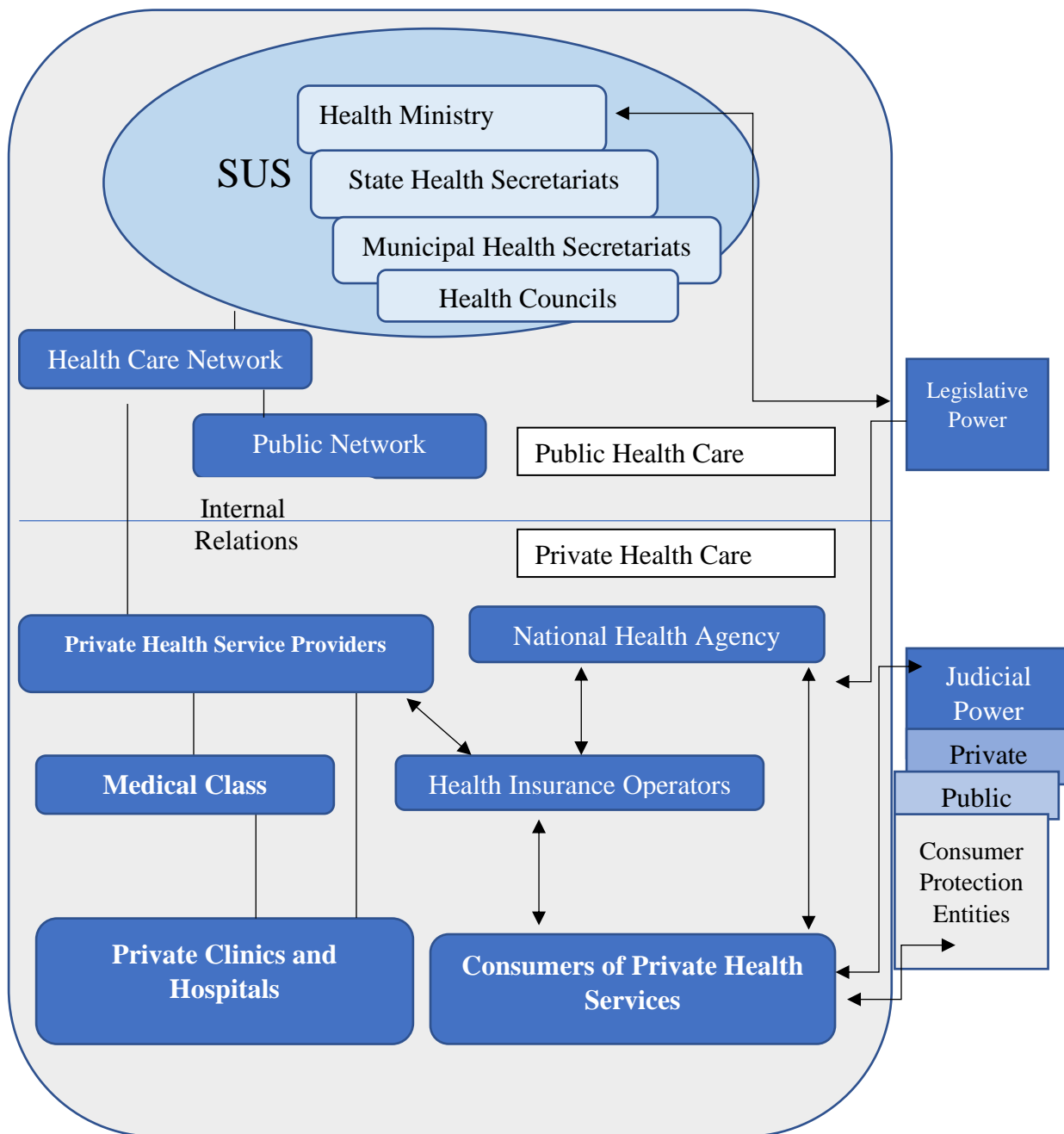
Source: Adapted [25].

The organization of health services respects regionalization and hierarchy criteria, which allows for a more excellent knowledge of the health problems of the population in the delimited area, favoring epidemiological surveillance actions, vector control, health education, and outpatient and hospital care actions at all complexity levels. It is decentralized regarding the distribution of responsibilities for health actions and services among the various government levels - municipal, state, and federal. Citizen participation is part of the process through the Health Councils [24].

The private health sector complements when there is poor service in the public sector [12]. As a management structure, the SUS is composed of the Ministry of Health, being the national manager and responsible for planning, standardizing, supervising, monitoring and evaluating policies and actions, for this purpose using the SUS control instruments in articulation with the National Health Council. Its structure includes the Oswaldo Cruz Foundation - FIOCRUZ, National Health Foundation, National Health Surveillance Agency, National Agency for Supplementary Health, Brazilian Company of Hemoderivatives and Technology, National Cancer Institute, National Institute of Traumatology and Orthopedics, and federal hospitals. It formulates national health policies but does not perform the actions. For this purpose, it counts on the partnership of states, municipalities, NGOs, foundations, companies, etc. [23].

The State Health Secretariats (one for each of the 26 states) formulate health policies and actions in their states and support them. They coordinate and plan the SUS strategy and are responsible for providing health care in their territory. The Municipal Health Secretariats (SMS) plan, organize, control, evaluate, and execute health actions and services. The municipality prepares health policies, coordinates, and plans the SUS at the municipal level through federal laws. It can establish partnerships with other cities to ensure full care for its population, thus integrating an "inter-municipal health consortium" [23].

The SUS consists of low, medium, and high complexity. Low complexity, or Primary Health Care, comprises Family Health Units (USFs) and Basic Health Units (UBSs). They provide vaccinations, rapid tests, provision of medicines, injections, medical, dental and nursing care, as well as other primary care characteristics. The UBSs are responsible for the health of children, women, adults, the elderly, dentistry, examination requests and medicines. The professional team consists of pediatricians, obstetrician-gynecologists, and general practitioners. In some UBSs, there are nutritionists, psychologists, and home care. The general practitioner arranges appointments for elective procedures and more specific examinations with

specialists in the public or private clinics that provide health services for the municipalities. The UBS' estimated population coverage is 74.35% of the Brazilian population. The USF provides care and accompanies patients with chronic diseases, such as diabetes and hypertension. The team consists of a general practitioner, general nurse, nursing assistant or technician, and community health agents. The Units may also include dentists, dental assistants, and oral health technicians. USFs are responsible for promoting health prevention through community health agents. There are currently 298,610 USF teams [23, 26, 27].

Medium complexity or Secondary Attention is triggered for specialist consultations, complementary exams, and hospital admissions that do not require a high-tech level. The 24h Emergency Care Units are responsible for providing medium complexity care in cases of accident victims, heart problems, urgencies, etc. The user may remain under observation for up to 24 hours or be relocated to the referral hospital [23].

High complexity or Tertiary Care is responsible for the treatment that requires high-cost technological resources such as surgery, cancer treatment, dialysis procedures, chemotherapy, radiotherapy, and hemotherapy. All emergencies require hospitalization, surgeries, maternity or more elaborate imaging tests, urgency, and emergency services. Brazil also has the Mobile Emergency Care Service (SAMU) established in 2005, which provides rapid relief to the victim after an emergency. SAMU deals with clinical, surgical, traumatic, obstetric, pediatric, and psychiatric care, among others. The SAMU attends anywhere, and the teams are made up of physicians, nurses, nursing assistants, and first aid drivers [23].

In Brazil, the private health services sector is composed of 759 health insurance operators (some are clinics, hospitals, medical and dental offices, examination and imaging laboratories) with about 17,800 different health insurances, comprising a variation in the range of health services coverage, reaching about 47,000,000 Brazilians (25% of the population), 24,799,687 in exclusively dental insurance [28]. The sector is regulated by the National Supplementary Health Agency (ANS) through a set of governmental measures and actions: creating rules, control, and supervision of the sector operated by companies to ensure the public interest. It is linked to the Ministry of Health and is responsible for the health insurance sector (or private insurance). This sector of health services was intended to complement the health system at the beginning of the SUS. Nowadays, it acts in a supplementary way. The choice of health insurance is free and dependent on purchasing power. Even if people have private health insurance, they are not

excluded from free SUS services. Users of SUS have complete coverage to utilize all health services, whether promotion, prevention, or recovery [9].

1.1.2 National French Healthcare System

France has an area of 640,679 km^2 (42nd in the world); its estimated population is 67,201,000 inhabitants (21st in the world); its GDP in Power Purchasing Parity (PPP) is US$ 2,826 trillion (10th in the world), its GDP per capita is US$ 44,100 (40th in the world). The country spends about 12% of GDP on its healthcare system, approximately 81% of this fraction is exclusively for the public healthcare system – universal access, and the per capita health expenditure in 2015 was PPP$ 4,542. The Gini index (2013) was 30.1 (medium), and the HDI (2015) was 0.897, which is very high (21st in the world) [20, 22].

In France, the Healthcare System is part of the Social Security System, and was established in 1945 after the end of World War II. The French National Healthcare system is structured according to its doctrinal principles of equal access, quality of care, solidarity, and has the coexistence of the private sector provision [29]. Health care services are offered by private physicians, public hospitals, profit and non-profit hospitals. Funding is provided by equal contributions from employers and employees on the payroll. The state, guided by social solidarity, is responsible for financing the insurance for unemployed workers. This combination of formal employers/employees co-financing and public funding for the unemployed supplies health care for the population [30].

The French Security System is decentralized from a local and institutional perspective and is divided into three central schemes: a) general Scheme; b) agricultural workers; and c) financing funds, divided into national and local independent bodies. For medical coverage, three insurers provide some medical coverage:

1. *Protection Universelle Maladie* - PUMA: intended for legal residents who are not initially affiliated with any existing schemes.

2. Couverture *Maladie Universelle Complémentaire* - CMU-C: who cannot afford the remains to be paid and whose income is below a certain threshold.

3. Aide *à l'Acquisition d'une Complémentaire Santé* – ACS. Complementary insurance.

There is also *Aide Médicale de l'État* - AME, which assumes healthcare costs for undocumented migrants [8, 20].

Users have a free choice of health professionals and facilities; however, they should be referred to a general practitioner. Physicians have the autonomy to set up private offices, and the payment for consultations is made directly by the user, with partial reimbursement of these expenses by *Assurance Maladie*. A consultation with a general practitioner costs 25 euros (usually), which is paid directly to the professional. The *Assurance Maladie* covers 17 euros of this total, and the rest is payable by the user ("out-of-pocket"). Most users also buy private insurance (mutual insurance associations) that will cover this "out-of-pocket." In general, the *Assurance Maladie* covers 77.8% of the value, mutual insurance associations 13.2%, and 7.5% goes to out-of-pocket. If you consult with your GP, the *Assurance Maladie* covers 70%, and mutual insurance covers 30%, leaving no charges to the user [29, 31].

The French healthcare system can be characterized as [32]:

i)   a combination of the Beveridge model and Bismarck model, with health care insurance funds and powerful state intervention;

ii) a mix of public and private services, financed by the same provider (the State) for the same services of the same population, with freedom of choice and unrestricted access to users, and freedom of practice for health care professionals;

iii) its administration is complex and plural, with co-management by the State and Health Insurance Funds.

Due to compulsory insurance, this model of the healthcare system guarantees almost total coverage of health care. Another feature that draws attention is the compulsory insurance system and its financing model, maintained by equal contributions from employers and employees on the payroll. This type of financing has to its advantage the guarantee of assurance for all employees employed and the minimal State contribution. The State becomes responsible for financing insurance for unemployed workers. This combination of formal employer co-financing and public funding for the unemployed provides a high level of healthcare for the population [48].

The Parliament controls the National Health System, its resources, and its priority public health policies. The Ministry of Solidarity and Health is the central administration and comprises four directorates:

- Directorate General of Health (*Direction générale de la santé*)

- Directorate General of the Care Organization (*Direction générale de l'organisation des soins*)

- Social Security Directorate (*Direction de la securité sociale*)

- the General Directorate of Social Policy (*Directorate General of Social Cohesion*) [30]

The State intervenes directly in health financing, medical facilities, setting service tariffs, managing health costs, and organizing service provision. The Ministry is responsible for the management and implementation of health policies. The Ministry is supported by the Health Agencies, which are public operators and partners, such as the High Authority for Health (HAS). It is also responsible for overseeing care facilities and health insurance organizations, as well as monitoring and training health professionals [34, 35].

Figure 2 shows how the French Healthcare System is organized and structured.

Figure 2 - Organization of the French Healthcare System
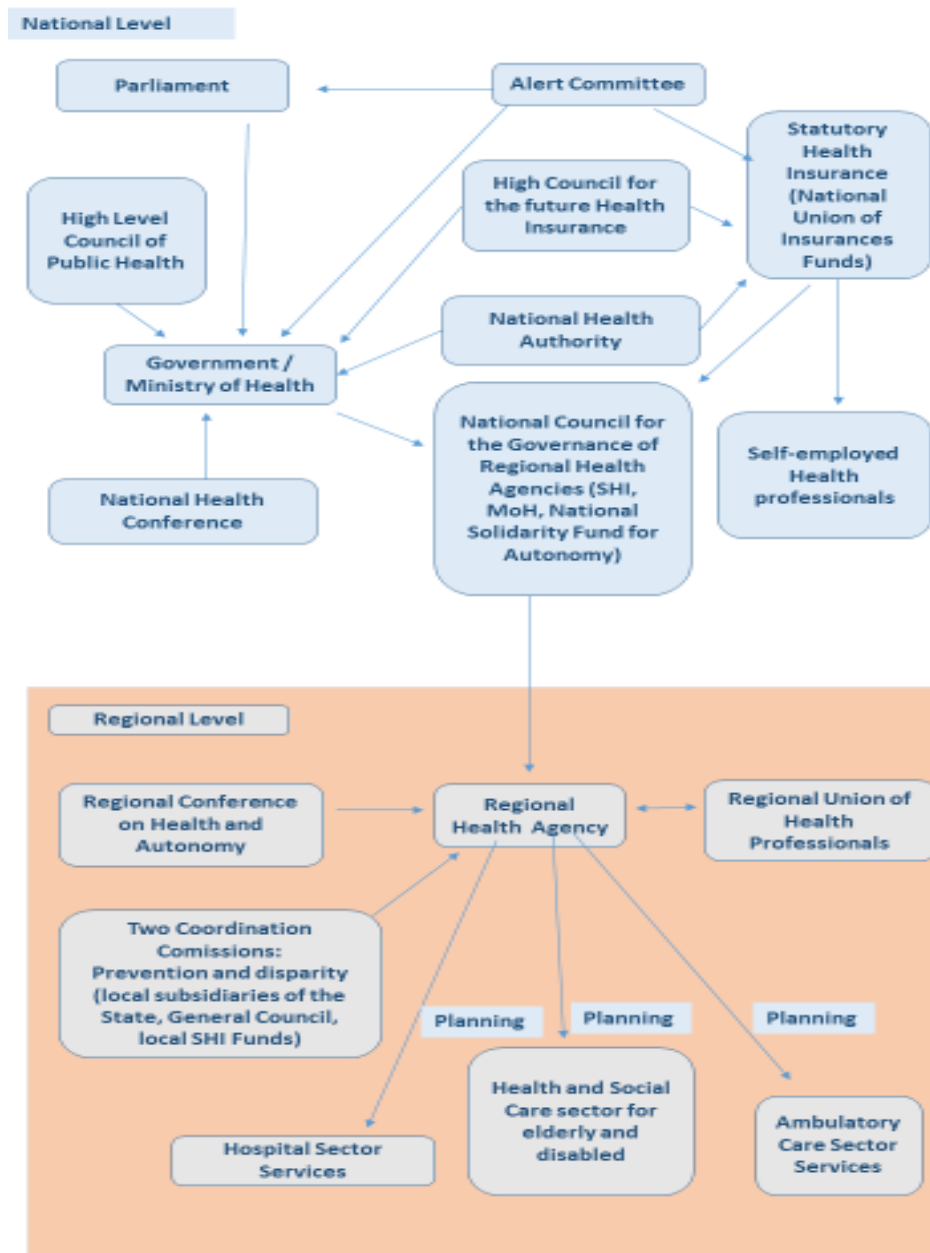
Source: adapted [36].

The Regional level has the responsibility to manage the health and social-medical system through the Regional Health Agencies (ARS) which coordinates the prevention, follow-up care and manages resources to enable equal access to all and continuous care with quality and safety. The agencies adapt national policies to their needs and characteristics. At the local or municipal level, facilities and professionals are organized under ARS supervision. Primary care is offered by general practitioners (first resource) who make referrals to specialists (second resource) or to a health facility (third resource). It is made up of the following structures: Municipal or outpatient structure where self-employed and salaried professionals work individually in their

office, or a coordinated group in a nursing home or health center. The health care professionals are general practitioners and specialists, dentists, pharmacists, midwives, nurses, physiotherapists, pediatricians, etc. [37].

The social and medical-social establishments are responsible for the care of the vulnerable, precarious, excluded, elderly, and disabled. In addition, specialized structures accommodate certain patients or residents adequately: neurovascular units, centralized specialized pain consultations, integrated and specialized centers for the obese, centers for rare diseases; memory and research resource centers and consultations (CM2R); cognitive-behavioral units (UCC) and the Houses for Autonomy and Integration for Alzheimer's disease (MAIA). There are the poles of activity and care adapted (PASA) and the reinforced shelter units (UHR) which favor the articulation, information and follow-up between the structures [37].

1.2 COMPARATIVE ANALYSIS STUDIES IN HEALTHCARE SYSTEMS

The WHO has been conducting comparative health research and reporting across countries since several years. For example, there have been some statistical research on a) life expectancy; b) infant mortality; c) causes of deaths in children; d) mortality in adults; e) global health statistics; f) maternal mortality; etc. The WHO Health Information and Statistic System - Global Health Estimate - provides a comparative assessment of cause of mortality and health losses due to illness and injury in all world regions. The latest assessment of causes of deaths between 2000 and 2015, on a global, regional and by country basis, is available on the WHO website[2] [38].

The Global Health Observatory has data on the current situation and priorities in health issues. There is an annual statistical publication - World Health Statistics - on global health, which compiles key indicators annually. It also includes a summary of annual progress on the Millennium Development Goals related to health[3]. There is also a page with statistics by country, with the main health data compiled by WHO and partners, with descriptive and analytical summaries on health indicators[4]. In the observatory, it is also possible to verify through the International Health Regulations Monitoring Framework, where all WHO partner

---

[2] http://www.who.int/healthinfo/global_burden_disease/en/
[3] http://www.who.int/gho/publications/mdgs-sdgs/en/
[4] http://www.who.int/gho/countries/en/

countries need to have or develop a minimum core of public health capacities to implement thirteen capabilities[5] effectively (e.g., areas of health surveillance, zoonosis, health, health coordination, health laboratories, health policies, and risk communication). There is the Health Equity Monitor, which monitors inequity in maternal, reproductive, newborn, and child health interventions. In more than a third of the countries surveyed, there are at least a twenty percent gaps in coverage of these interventions between the richest and poorest countries[6].

The Observatory also outlines the standards to be used in health research, such as creating uniformity for collecting and analyzing research data in the field. The use of these classifications and terminologies is essential to maintain consistency across analyses and, more importantly, to allow the aggregation of the same type of data coming from various sources and several types of research[7] [39, 40].

While these frameworks have varied purposes, they focus on providing a better understanding of a healthcare system, its goals, and its outlined structure and factors that drive their performance. Careful examination of available international health frameworks suggests that, over time, there is a degree of convergence both within the framework of architecture and goals and in the problems encountered. The priority is to clarify the areas where differences in understanding, focus, and principles remain [2].

In order to demonstrate the importance of comparative studies in health, some articles were searched on WHO, PAHO (Pan American health organization), IPEA (research institute and applied economics), and SCIELO (Scientific electronic library online) websites. Thus, about 20 publications were chosen (articles and reports) based on the keywords "comparison" and "healthcare systems", describing several cases of comparative studies between countries and the results found. The aim was to improve the national healthcare system itself through experiments carried out in other healthcare systems. To explain how the comparative analyses are performed, some comparative studies were described between countries and the results found. Comparative research of international healthcare systems usually aims to improve the national healthcare system itself through experiments conducted in another healthcare system.

The Report of the Expert Consultation on Primary Care Systems Profiles & Performance (2015) brings case studies in primary care, in a comparative analysis between five countries:

---

[5] http://www.who.int/gho/ihr/en/
[6] http://www.who.int/gho/health_equity/en/
[7] http://www.who.int/research-observatory/classifications/en/

Bangladesh, Nigeria, Pakistan, South Africa, and Tanzania. This study provides practical information on key aspects of primary health care, such as healthcare policies and programs, funding, the scope, quality, and distribution of services, including human resources, among other aspects [39].

> "It shows the shift from traditional research that focuses on specific disease programs to focus on healthcare systems, the vehicle by which health care programs are implemented" (Professor Helen Schneider – Public Health School / the University of the Western Cape in South Africa).

The results of these 20 case studies were published between 2016 and 2017. Other countries studied were: Brazil, Cameroon, Colombia, Ethiopia, Indonesia, Kenya, Peru, Sri Lanka, Thailand, and Uganda. This comparative analysis is intended to serve as a basis to analyze these twenty countries and develop a guide that will help decision-makers design models for primary health care through each one's experience.

The World Health Report, published in August 2013 by WHO, reinforced the idea that countries should continue to invest in research to develop universal health coverage to shape their healthcare system according to their situation. Through universal health coverage, citizens get the health services they need without heavy payloads. The Report showed how each country can use research to determine health-related issues, how the healthcare system can be structured, and how to measure progress according to specific health situations. On average, investment in research in low- and middle-income countries has grown by around 5% each year, especially in Brazil, India, and China. The case studies from several countries have demonstrated the importance of research in improving health services, from prevention and control of specific diseases to better functioning of the healthcare system. The Report also showed that more health research is being published due to international collaboration[8][40].

Hortale (2000) wrote a series of three articles on comparative analysis in healthcare systems. The first article in the series presented the different models proposed to describe health services, or the healthcare system in general. From this work, the authors considered using the categories of access and decentralization as possible categories in the construction of the model. In the second article, they further discussed these categories, arguing in favor of the association between them for their ability to be useful in decision making; their values vary according to the object they want to measure; allow time comparisons; have a specific variability in time and

---

[8] http://www.who.int/mediacentre/news/releases/2013/world_health_report_20130815/en/

space, and have a mutually exclusive character. The assumption, for the authors, is that the health of an individual is a social responsibility. Therefore, the operationalization of the model considers two dimensions: the social and the political. The third and last article presents a proposal for operationalizing access and decentralization in the healthcare system analysis model. It accepts the hypothesis that if the healthcare system is decentralized, it will lead to greater access to the system. This proposal was intended to contribute to a more meaningful connection of these categories with the observed reality [41].

Ocké-Reis (2006), in his research entitled: Comparative healthcare systems: expenditure, access, and performance, published in the DIMAC Seminar in Rio de Janeiro in 2006, summarizes his research as follows [42]:

> "Comparative studies of healthcare systems' spending at the international level have attracted the attention of economists. In 2003, Brazil applied US$ 597 per capita in health, or 7.6% of Gross Domestic Product (GDP), while, on average, some countries of the Organization for Economic Cooperation and Development (OECD) spent US$ 3.145 or 10.8% of GDP and some Latin American countries US$ 622 or 6.7% of GDP. That is, even though the Brazilian Constitution has defined that health is a social right, seeking to meet the health needs of the population through the provision of universal access to services, it can be estimated that, in relative terms, public expenditure in health in Brazil presents a proportion similar to that observed in the North American system - which is a typically liberal model. In Brazil, a rate of 2.1 doctors per thousand inhabitants is also observed, and a lower number of beds than the OECD countries, but higher than those in Latin America. Using an approximate measure of performance, Brazil has the highest rate of infant mortality and the lowest life expectancy among selected countries" [42].

Marinho et al. (2009) evaluated the efficiency of healthcare service providers in Brazil in comparison with countries of the Organization for Economic Cooperation and Development (OECD). The estimated variables such as life expectancy at birth for men; life expectancy at birth for women; child survival index; years of life recovered for communicable diseases; years of life recovered for non-communicable diseases, years of life recovered for external causes; population size; and geographical area. According to the authors, these data can represent an efficient healthcare service, given the per capita expenditure on health care. [43, 44].

Perhaps, the most exciting contribution in the study performed by Marinho and coworkers is the comparison between their study and those conducted by others [44]. For example:

a) Evans et al. (2000) placed Brazil in 78th place among 191 countries evaluated, with the same variables studied;

b) In a WHO study (2000), in which the healthcare product includes a set of variables (synthetically known as responsiveness) related to citizens' expectations, Brazil ranked 125th out of 191 evaluated countries; France ranked first; Italy second; the United States 37th; Cuba 39th and Sierra Leone 191th place;

c) Ribeiro and Rodrigues Jr (2006) evaluated the efficiency of public spending in Latin America with several performance indicators, including health (infant mortality and life expectancy at birth). Costa Rica, Uruguay, and Chile achieved the best results. Cuba and Haiti were not part of the sample.

Furthermore, they concluded that Brazil performs poorly on health outcomes but did not discriminate the position of the Brazilian healthcare system in that work; in the end, Marinho argues that there is no consensus in the literature related to country health rankings, although, in principle, developed countries (except the United States) appear in the best positions [44].

Conill (1999) sought to demonstrate that the study of health care integration and coordination brings essential elements to evaluate healthcare systems guided by a Primary Healthcare Policy (PHC). They made a descriptive study of the forms and factors that facilitate or hinder PHC integration, from the comparative analysis of reforms carried out in Latin America, through systematic review and analysis of documents. They found three identified integration modalities, as result:

1. selective primary care within maternal and child programs;

2. emergency first aid as the gateway and structuring axis of a public system;

3. municipal experiences in insurance-based systems.

An explanatory model of fragmentation is developed, showing the need to articulate macro, meso, and microsocial analysis for a comprehensive view of service performance. They concluded that segmentation is persistent with service fragmentation, even in cases of universal based healthcare systems[9]. The proposed model articulates these two categories, contributing to select indicators for evaluating public healthcare systems oriented by this policy [45].

---

[9] The study was carried out as part of a cooperation project of the European Commission to promote social cohesion in Latin America by strengthening public policies and institutional capacity management called Eurosocial. It was part of the preparatory phase of the subproject "Strengthening the Integration of Primary Care

Ferreira (2013), in his research on the importance of comparative analysis for a better understanding of the problems in the financing of universal healthcare systems from the 1980s on, the financing mechanisms of the healthcare systems of three European countries: Germany, France, and United Kingdom [46].

Morais and Santos (2015) developed a comparative analysis of the Brazilian and Cuban healthcare systems by characterizing the systems and comparing demographic, resources, morbidity, and mortality indicators. After the analysis, they concluded that the healthcare system in Cuba operates closer to the principles of universality, equity, guarantee of access, financing, and better performance of related indicators than the Brazilian healthcare system; they also showed that social indicators infer better conditions in Cuba, such as higher HDI, higher literacy rate, higher life expectancy at birth, and greater access to the health network. The study concludes that the Cuban healthcare system shows a better performance of its actions since its indicators show similar values to those of developed countries. They emphasized in this better performance expressive government spending on their financing, unlike public-private participation in Brazil, in addition to a lower expenditure of financial resources that are proportional to GDP or per capita [47].

Xu et al. (2006) made a comparative analysis of healthcare systems in three African countries: Kenya, Senegal, and South Africa. They concluded that users are considered economic agents rather than beneficiaries or target groups and seen as stakeholders. One of the essential conclusions of this work is that in recent years, necessary knowledge has been accumulated, estimating the costs of being unprotected against economic shocks [48].

Araújo (2014) made a comparative analysis of the trajectory of the healthcare systems in Brazil, the United States, and the United Kingdom, from the end of the 19th century until 2014. He used the approach of their respective models of management, financing, and coverage. The conclusion of the study indicates that the SUS, guaranteeing health care as right and duty of the State for everyone, faces obstacles, especially regarding its financing. Compared to the United Kingdom, which also has a universal public healthcare system, Brazil invests much less in health care. On the other hand, the United States, which does not have a universal public healthcare system, presented the highest health care expenditures of the three countries

---

with Other Levels of Attention," which involved a consortium of European and Latin American teaching and research institutions.

analyzed. Despite having the highest expenditure on health care, part of the North American population is totally deprived of health care [49].

Silva (2012) compared the main characteristics of healthcare systems in ten countries with the highest gross domestic product in the Americas: Brazil, Argentina, Canada, Chile, Colombia, Ecuador, United States, Mexico, Peru, and Venezuela. It was used data obtained from publicly available information databases and a literature review on the characterization of international healthcare systems. The author summarized the main common elements and differences between the healthcare systems and highlighted aspects related to the universalization of health care and the categorization of health care spending in the countries to analyze the participation of the public health care sector. The data obtained on the healthcare systems of the countries analyzed allowed us to perceive the characteristics and failures of the Brazilian Unified Health System (SUS) [50].

Levino (2011) described the healthcare reform process in Latin American countries and its repercussions in Brazil, Colombia, and Peru's healthcare systems. They analyzed the composition of the national healthcare systems of these three border countries. They assessed the limits and possibilities of integrating local healthcare systems in the context of the triple Amazon border. In the comparison between the three countries, they found out that the Brazilian model has the characteristics of a national public healthcare system, while in Colombia and Peru there are health care insurance systems, with the adoption of mandatory health care insurance plans. Assistance with user segmentation and coverage contingency. The three countries have a mix of public and private health care services and differ in the level of state access and type of regulation. They concluded that the specificities of the healthcare systems of the three border countries make it complex to construct a single healthcare system on the border that makes universal access, equity, and comprehensive care for citizens living on the border of the three countries. They found out the preponderance of the public sector in the primary health care network and that this would allow the integration of local healthcare systems regarding the organized offer of health care actions in the first and second levels of care for the three countries [51].

Kruk et al. (2017) stated that there has been an expansion of access to primary health care interventions for millions of people in low- and middle-income countries from the Millennium Development Goals on health. However, the access alone will not be sufficient to achieve the sustainable development goals (SDGs) if healthcare systems cannot provide a high quality of

care, i.e., care that improves health outcomes and provides value to people. Moreover, the healthcare system's user experience is rarely considered, which could contribute to better performance [52].

The Lancet Global Health Commission on High-Quality Health Systems in the SDG Era aims to generate scientific work and be multidisciplinary, active, broad-ranging, and measurable indicators. It will incorporate the Journal's commitment to "a better science for better lives." This Commission will be managed by more than 30 academics, politicians, and healthcare system experts from eighteen countries. Guided by the values of originality, rigor, relevance, and respect for local actors and their context, they will review current knowledge, bring new empirical work, and propose policy recommendations to measure and improve quality for SDG goals. They aim to produce a unique conceptual framework of a high-quality healthcare system that should increase the relevance of the concept to politicians, providers, and the people. Work will be delimited by the quality dimension, including the right to quality health care [52].

In conclusion, these surveys sought to contribute to the improvement of healthcare systems in general and the health care services, based on new public policies and new forms of work processes, among other benefits.

1.3 EFFICIENCE, EFFICACY AND EFFECTIVENESS

To understand effectiveness, it is necessary to distinguish between three basic terms arising from management: efficiency, efficacy, and effectiveness [53]. According to the references cited below, these terms are widely used in the health literature, mainly in the analysis of health policies, care processes, and the implementation of new processes.

All three concepts have different meanings and are often misused as synonyms. Therefore, the following concepts were distinguished: efficiency can be defined very briefly as "doing more with less or doing more with the same resources". Efficiency is related to the use of physical and human resources. It can be defined as producing the maximum results with the minimum expenditure of energy, time, and waste. It is associated with rationality-productivity (action, strength, the virtue of producing) and applies to the resources used and the time spent [54]. It means providing the best treatment to the patient using the least quantity of resources in health services. Reduction of rework, innovation, new methods and technologies can be included,

everything that uses less effort, resources, and costs, without affecting the quality of care. For example, when more patients are cared for in the same time, or more patients are cared for in a shorter time without losing the quality of care. It is also efficient when fewer resources are used or less is spent on specific health care. Not necessarily all three actions simultaneously, one can spend less to care for the same number of patients, which is efficient. One can care for more patients and use the same resources, which is to be efficient. One can care for the same number of people using the same resources, but this is also being efficient in a shorter time.

Efficacy is achieving the proposed objective through the available resources. It is associated with the notion of optimum, goals, and time in the relationship between the intended results and the results obtained. It is the degree to which the objectives and goals are achieved within a given period, regardless of costs. Efficacy, as applied to health services, corresponds to the care process, and its objective is to improve the patient's health. Efficacy is related to planning what will be performed in the care. It requires the resources (inputs) used in the treatment (process) to provide the patients with improvements in their health (result) and quality of life. Therefore, efficacy is the set of ideal conditions for treating an individual (physical structures, equipment, services, and quality).

Effectiveness is the result obtained from a product or service and is linked directly to the results of actions (efficacy). It concerns the concrete result or the actions that made this concrete result happen (objective and desired goals) and establishes the relationship between the results and the objective. In health, effectiveness corresponds to the real improvement obtained in the patient's treatment, using the available resources. Efficacy is the idealized care, and effectiveness is real care, that is, the result of care. Figure 3 shows how these three concepts interact with each other.

Figure 3 – Efficiency, Efficacy and Effectiveness.
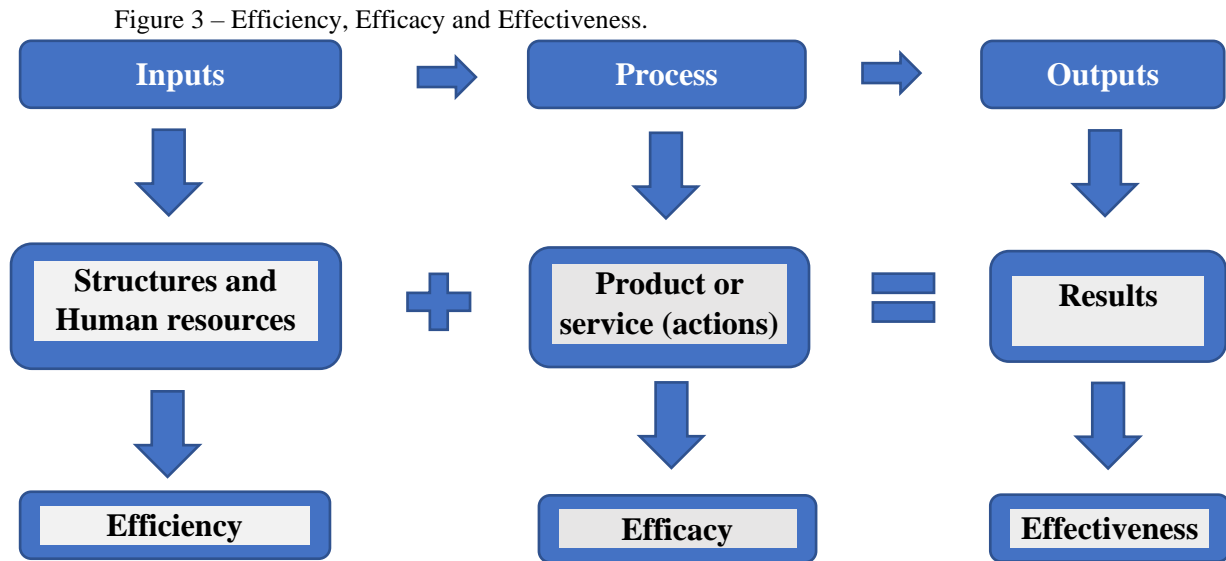
Made by the author. Source: [56, 57, 58].

Donabedian classified the possible approaches to health assessment, which conceived the triad "structure-process-results" (shown in figure 3), based on Bertalanffy's (1968) systemic theoretical framework. For this author, the "structure" would correspond to the relatively stable characteristics of its providers, the instruments and resources, as well as the physical and organizational conditions; the "process" would correspond to the set of activities developed in the relationship between professionals and patients, and the "results" would be the changes verified in the patients' health status that could be attributed to previous care [55,58].

According to Silva et al., this triad assumes the existence of order, harmony, and directionality, in a functional relationship between the components, which does not occur in the practice of health services: the structure does not necessarily influence the process, and the process is not always related to the result. However, the importance of evaluating the effectiveness of actions on the health level of the population can be highlighted. In the impossibility of carrying out special studies to measure this attribute, monitoring and studying the time series of morbidity and mortality indicators can provide indicative patterns of expected changes [54].

Logically, the figure 3 shows the ideal to be achieved, which does not always correspond to reality. However, even if the scenario is different, it can be effective, as depicted in figure 4.

Figure 4 - Possible scenarios for efficiency, efficacy and effectiveness.
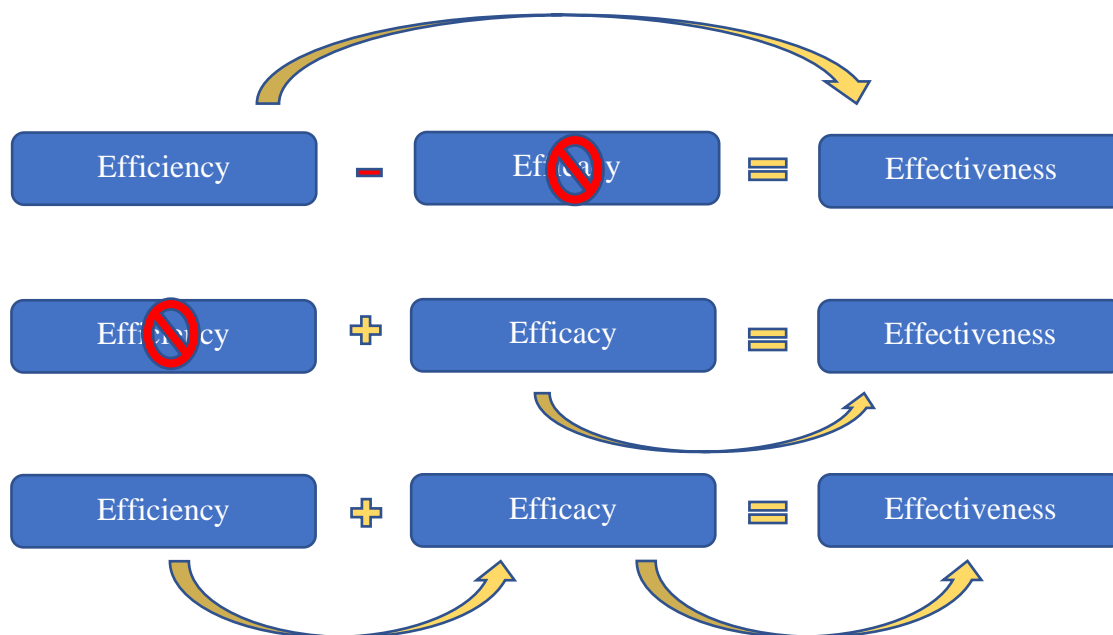
Made by the author.

What is sought is to unite the three concepts: to be efficient, efficacious, and effective. In other words, spend less, offer the right care to obtain the best possible result. Therefore, one must know how much real care (effectiveness) approaches ideal care (efficacy), seeking to improve services so that the real result is as close as possible to the ideal. Effectiveness requires checking the processes (efficacy) to see if they are following what is planned and if these processes are positively impacting the patient's health. One can be efficacious and get the best results (be effective) without being efficient. Just as one can be efficient and have great results without being efficacious, the effect of a given health service on a population will always correspond to effectiveness [57].

Therefore, this thesis sought to describe the structures of both healthcare systems (financing, services, professionals), as well as to contextualize the processes (health policies and services focused on the stroke), aiming to know the results (prevalence, acute hospitalizations, in-hospital mortality, etc.), i.e., the effectiveness.

1.3 HYPOTHESIS

There is a tendency to relate effectiveness to the "effect of implemented health actions and practices" [60]. Effectiveness can be verified by the relationship between the actual impact of the service and its potential impact in a certain ideal situation [61]. Effectiveness is the degree to which improvements in health are achieved [62]. Effectiveness is also seen as the degree to which a particular medical intervention or technology benefits individuals in a population [63]. Moreover, effectiveness can be an attribute of health care based on evidence to verify whether an intervention produces better results than others or is null [64]. It can also be conceptualized as the degree to which health care, services, and actions achieve the expected results [60]. Effectiveness also includes the ability to reduce costs without interfering with the level of health improvement [62].

As health resources are finite, costs and effectiveness can be related. However, decisions must be based on identifying the most appropriate practices for society [65]. In Australia and Canada, the assessment of the effectiveness and efficiency of the healthcare system is based on the level of care. The healthcare system must be efficient in reducing hospital admissions for health problems that can be solved without hospitalization, and primary care is effective in preventing these admissions [61]. The evaluation of a health service or procedure can be performed according to two approaches: a precise and absolute analysis, which considers only the effectiveness; and another, whose evaluation associates the effectiveness to cost [66].

Hence, to research the effectiveness of the Brazilian healthcare system, it is interesting to study the experiences of another universal healthcare system, such as the French Healthcare system. Both healthcare systems were structured as universal access and comprehensive care attention, hierarchized by level of care, politically and administratively decentralized. France is an industrialized high-income country, with health care involving copayment and reimbursement of expenses and spontaneous demand for services. Brazil is a member of the BRICs, of upper-middle-income with totally free health care, with an active search for hypertension and diabetes in the general population. The French healthcare system is considered one of the best in the world and, in order to compare the two systems, the following hypothesis was elaborated:

Can it be inferred the French Healthcare System is more effective than the Brazilian SUS with regard to stroke care and stroke health policies?

To confirm or refute this hypothesis, the following objectives have been outlined.

1.4 OBJECTIVES

1.4.1 General objective

To compare the effectiveness between Brazilian and French National Healthcare Systems regarding stroke care.

1.4.2 Specific objectives

I) To characterize both Health Care Systems in terms of structure, human resources and funding;

II) Describe the health strategies for stroke clinical practice and the pathways for stroke care in both healthcare systems;

III) Describe the prevalence by age group, acute hospitalizations, average length of stay in hospital, and in-hospital mortality rates for stroke in both healthcare systems,

IV) Describe the in-hospital costs in both healthcare systems related to stroke.

1.5 METHOD

The process of scientific comparison between countries helps us to understand what is compared in a broader sense. According to Guzmán-Léon, the activity of comparing focuses on four primary objectives that receive more or less attention depending on the objectives of the researcher: a) The conceptual description allows us to know how other countries are like; b) the construction of classifications and typologies reduces the complexity of the political world and allows the researcher to collect data and organize them as empirical evidence; c) the function of checking the hypotheses of the comparison allows to discard the alternative explanations of the events, actors, structures, etc., in order to construct more general theories and; d) the prediction of the likely results in other countries not included in the original comparison, or future results when specific facts and conditions are available, is produced by the comparison among countries and the generalizations derived from this comparison [67].

Thus, in comparative reasoning, we can discover regularities, perceive shifts and transformations, build models and typologies, identifying continuities and discontinuities, similarities and differences, etc. Every research has its origin in a problem or a question and, it intends to answer that by articulating previous knowledge and, in turn, it can originate new references. However, it is not intended to explain all phenomena and processes, but rather to show which aspects are the most significant, to understand the object of investigation better and, thus, establish an understanding of the data collected, confirm or not the assumptions of the hypothesis of research and answer the question asked and the specific objectives. These purposes are complementary in terms of social research in health care [45].

In this research, effectiveness will be related to effectiveness indicators – Acute hospitalizations, average stay, in-hospital mortality rate, deaths, incidence, prevalence, and the in-hospital costs in both healthcare systems related to stroke. These effectiveness indicators will be better explained in the chapter that deals with the research method.

To achieve the objective, exploratory and descriptive research sought to describe the population (in this case, the Brazilian and French population) where the phenomenon is the stroke and to establish the relationships between these variables. For this reason, the proposed design was bibliographic research on the subject using books and scientific articles and the collection and

analysis of secondary data, without direct contact with the research subjects. The nature of the research is qualitative-quantitative.

In quantitative terms, secondary data were collected from official websites of the Ministry of Health and the health informatics departments of both countries. For data analysis, simple calculations and statistics were performed, such as the simple average. The period chosen for the research is between the years 2010 to 2017 because, in that time interval, the same data were found for both countries.

The qualitative approach worked on the relationship between these data and public health policies, seeking a greater understanding of these numbers and their implications. The set of quantitative and qualitative data complement each other, as the reality covered by them interacts dynamically, excluding any dichotomy. We sought to understand structures and institutions resulting from human action (risk factors, public health policies, health indicators) [68]. The bibliographic research served as a subterfuge to analyze and understand these data with a qualitative bias.

It was tried to avoid repeating the explanation about the method used; from the second chapter of the thesis, in each of the chapters, the methodology used is presented and explained in more detail. In this way, each chapter sought to achieve one or more different specific objectives. The second chapter characterizes and compares both Healthcare Systems through historical background, structure, human resources, and funding. It is related to the following specific objective: I) To characterize both Health Care Systems in terms of structure, human resources, and funding.

The third chapter presents the scenario and concepts related to Stroke in the world, in Latin America, Europe, Brazil, and France and describe the health policies for clinical stroke practice, the stroke care paths in both healthcare systems and describe the risk factors, prevalence by age group, acute hospitalizations, the average length of stay in hospital, and in-hospital mortality rates by stroke. It is related to the following specific objectives: II) Describe the health strategies for stroke clinical practice and the stroke care paths in both healthcare systems and, III) Research and describe the prevalence by age group, acute hospitalizations, the in-hospital average length of stay, and in-hospital mortality rates by a stroke in both healthcare systems.

The fourth chapter presents the in-hospital costs by stroke, and it is related to the following specific objective: IV) Describe the in-hospital costs in both healthcare systems related to stroke.

The fifth chapter presents the conclusion and the perspective of research.

2. NATIONAL HEALTHCARE SYSTEMS FROM BRAZIL AND FRANCE: A COMPARASION

Chapter 2 sought to characterized both Healthcare Systems through historical background, structure, human resources, and funding, as proposed in the first objective of this thesis. In the Annex is attached the article published about this research.

Brazil and France have structured Social Security Programs to ensure health care, social security, and welfare. Both countries share the principles of equity in coverage and solidarity in financing [69]. Specifically, regarding the healthcare system, both countries are struggling to find a strategy to control the supply and demand for services because of rising maintenance costs.

Table 1 - Demographic and health statistical data - Brazil and France, 2018

Demographic and health statistics	Brazil	World ranking position*	France	World ranking position *
Population estimated	212,393,000	5°	65,481,700	22°
Population over 65 years	9.52%	6°	5.99%	10°
Birth rate per 1000 inhabitants	13.4	132°	11,6	153°
Number of children per woman	1.69	159°	1.97	120°
Average life expectancy	76.1	81°	83	10°
Infant mortality rate / 1000 live births	12.4	106°	2.7	180°
Mortality rate per 1000 inhabitants	6.4	128°	9.1	55°
HDI (Human Development Index) (2017)	0.759	79°	0.901	24°

*The world ranking consists of 201 countries. Source: [70, 71, 72, 73]. Made by the author.

Despite differences in territorial extension and population, they have indicators that are close (e.g., birth rate) and completely different (e.g., infant mortality rate). Special attention is drawn to the lower number of children by women, the lower overall mortality rate, and the Brazilian population's aging. The population over the age of sixty is growing worldwide. It is estimated that by 2050 people over the age of 60 will outnumber young people up to 14 years old worldwide, but in Brazil, this transition is expected to occur until 2030, 20 years before [70].

In Brazil, from a total of 1.310.588 deaths in 2018, the leading causes were: Circulatory system diseases (27% - heart ischemia accounted for 32% and cerebrovascular diseases for 28% of these), cancer (17%) and respiratory diseases (11%) [74]. In France, according to INSEE (2019), in 2016, from all the 579.230 deaths, the leading causes were: Cancer (28%), circulatory system diseases (24% - heart ischemia accounted for 23% and cerebrovascular diseases for 18% of these) and respiratory diseases (4%) [71].

2.2 METHOD

It was comparative-descriptive research that sought to characterize and compare both Healthcare Systems through historical background, in terms of structure, human resources, and funding, concerning the specific objective I of this thesis. The data was mainly collected from websites of federal governments and public health organizations in both countries.

The following professionals were selected to represent human resources: Physicians, Nurses, Dentists, and Dental Surgeons, Pediatricians, Pharmacists, Nursing Technicians. These professionals do not represent the universe of all health professionals. However, they are the professionals who work more directly and who have more significant contact with the population.

For Brazil, the research was based on official data from the Ministry of Health, available at DATASUS - Department of Informatics of the Unified Health System, it is responsible for providing SUS with information and informatics support and technology since 1991, for the process of planning, operation and control through information technology [75]. Once on the site, information was sought on the indicators that were used in this study and also based on the CNES - National Register of Health Establishments, for the collection of data about the installed physical capacity, the available services and professionals linked to the health establishments, family health teams, which subsidize managers with nationwide data.

For France, the data were collected from the Ministry of Solidarity and Health websites, *L'Assurance Maladie* (AMELI), *Institut National d'Hygiène* (INSERM), *Santé Publique France*, and other health-related websites such as the European Observatory on Health Systems and Policies.

General data were collected directly from the WHO and the World Bank websites. The literature was used several scientific articles that dealt with the theme of healthcare systems in Brazil and France and used it as a subsidy for reflection and comparison between health systems. Therefore, this research's expected results aim to contribute to the increase of knowledge - theoretical and applied - about administration and organization in health systems, assuming the premise that there are essential differences in terms of organization and management between countries.

2.3 RESULTS

2.3.1 Historical Background

Below, Table 2 summarizes the historical context, which is reflected in creating the healthcare systems in Brazil and France. The table seeks to show that building these healthcare systems was similar even though they followed different paths. Both healthcare systems started through social contributions, based on the Bismarckian model by compulsory social insurance.

Over time and influenced by the international scenario, like Welfare State, both healthcare systems approached the Beveridge Model - seeking universal access, the provision and financing of health care services by the State.

Brazil began its universal healthcare system in 1988 by the Federal Constitution, defining health as a duty of the State and a citizen right. In France, universal healthcare was implemented in the 2000s through the law that gives the right to health care services and social protection to all residents.

Table 2 - Evolution of the Health Care Systems historical context in Brazil and France

Date	Brazil	Date	France
1923	Social Security Funds (CAPs)		
1930	Retirement and Pension Institutes (IAPs)	1930	Social Security Funds (Cashiers)
1938-1945	Health actions in all Brazil		
1960	Standardization of health services		
		1961	Social Security coverage to agricultural workers
1963	Social Security Coverage to agricultural workers		
1966	National Institute of Social Security - Social security coverage to Employed	1966	Social security coverage to Self Employed and / or Non- agricultural workers
		1974	Social security coverage for all workers
1977	National Institute of Social Welfare Medical Assistance - Social security coverage for all workers		
		1980	Social Security coverage to unemployed
1986	VIII National Health Conference – SUS proposition	1986	Parliament has a sanitary and financial role
1988-1990	Federal Constitution and SUS / Universal Coverage		
		1999-2000	Universal Coverage (CMU)
		2004	Douste-Blazy Reform
2016	NBFR- Constitutional amendment 95/2016		

Sources: 36, 69, 76, 77.

2.3.2 Facilities and human resources

To illustrate the facilities, Tables 3 and 4 show the quantitative base facilities but, do not reflect the full installed capacity and facilities of health care services.

Table 3 - Health Facilities in Brazil - 2018

Facilities	SUS	For-profit	Non-Profit	Total
High Complexity				
Hospitals	594	930	611	2 135
Ambulatories	3.310	5.241	1.112	9.909
Medium Complexity				
Hospitals	3.394	3.006	1.848	8.248
Ambulatories	47.140	193.214	6.043	247.731
Low Complexity				
Health Center / Basic Health Unit	37.216	190	107	37.513
Medical Office	950	165.399	998	167.338
Health Center	8.852	28	44	8.924
Indigenous Health Care	893	-	-	893

Source: 76.

Table 4 - Health Facilities in France – 2017

Facilities	FNH	For-Profit	Non-Profit	Total
Third Resource				
Hospitals	1364	1.002	680	3.046
Second Resource				
Cancer-Fighting Centers			21	21
Follow-up care and rehabilitation		350	371	721
Short-term or multidisciplinary care facilities		498	143	541
Long-term care		7	19	26
Mental Illness Institutions		145		
First Resource				
Health Homes		910	-	910
Medical Office		36.500	-	36.500
Nurse Office		48.700	-	48.700
Midwife Office		3 811	-	3 811

Source: [78, 79, 80, 81, 82].

To illustrate the human resources, Table 5 shows the quantitative comparison of the number of some Health Professionals per 1.000 inhabitants and the percentage of the professional vinculation into the national healthcare system by category - Brazil and France, 2018. That does not show all categories of health care professionals.

Table 5 - Comparison of the number of Health Professionals per 1.000 inhabitants and percentage of professional vinculation into national healthcare system (by category) - Brazil and France, 2018

Indicator by 1000/inhabitants	Brazil	SUS	France	FNH
Physicians	2,2	62,7%	3,40	70,3%
Nurses	2,5	49,1%	10,0	35,4%
Dentists and Dental Surgeons	1,5	42,0%	0,60	85,0%
Pediatricians	0,1	74,2%	0,08	79,6%
Pharmacists	1,0	16,0%	1,10	07,0%
Nursing Technicians	5,9	37,0%	6,00	58,0%

Source: 76,78-80, 83-88.

2.3.3 Funding

Generally, the GDP is more commonly used to compare health financing. Table 6 compares what each government invests in health on a percentage of GPD.

Table 6- Brazil and France Health Expenditure, 2016

Health Expenditure	Brazil	France
Domestic general government health expenditure (% of current health expenditure)	33.22	82.89
Domestic private health expenditure (% of current health expenditure)	66.69	17.10
Domestic general government health expenditure per capita, PPP (current international $)	590.54	3.964.31
Current health expenditure per capita (current US$)	1.015.93	4.263.36

Source: 22, 89.

In this case, there is a gap between Brazil and France. The Brazilian GDP in 2016 was PPP$ 3.161 trillion (current international PPP$), and the French GDP was PPP$ 2.811 trillion [22, 89].

2.4 DISCUSSION

To understand a health system in a country, one needs to know the history of this system. The population's needs and desires contribute (and sometimes force) the elaboration of public policies, as much as the budget that the State has available for this purpose. Epidemics were often responsible for the primary elaboration of what would later be a national health system. Regardless of the classification or nomenclature is given to this system, the historical context was responsible for its planning and creation, either because of social pressure or the need to combat certain diseases that threatened the population.

The Brazilian healthcare system (Unified Health System - SUS) was created from the 1988 Federal Constitution but, since 1923, Brazil had the Retirement and Pension Funds (CAPs), which were funds that provided the services for physicians, some medicines and, funeral homes for workers and their families [90]. In the 1930s, the first Institutes of Retirement and Pension (IAPs) emerged, partially funded by the government, as a social policy directed to urban workers by professional category (seafarers, traders, bankers) who contributed to Social Security. The institutes absorbed most of the old CAP's [77, 76].

From 1938 to 1945, the sanitary actions provided by the government were expanded throughout Brazil. In 1960 the range of health services from the Retirement and Pension Institutes was standardized for all insured persons, and agricultural workers were insured by the Rural Worker Assistance Fund (Funrural) in 1963 [91].

The military dictatorship took over the government in 1964 and, in 1966, created the National Institute of Social Welfare (INPS), uniting all Institutes of Welfare, establishing agreements and contracts with physicians and hospitals, paying them for the services rendered [76, 90] consolidating organized social protection in the form of insurance. The social security benefits, pensions, and medical assistance were restricted to formal workers [91].

In 1977, INPS became the National Institute of Social Welfare Medical Assistance (INAMPS), which articulated health actions and a set of social protection policies [77]. There was health care for those who did not have a formal job as a charity and philanthropy way. However, actions aimed the public health were universal and provided by the Ministry of Health [76]. The military dictatorship ended in March 1985, by the establishment of the "New Republic." In

1986, the VIII National Health Conference was the inspiration for creating a universal access healthcare system [91].

In 1930, by law, France created the Social Insurers, marking the beginning of social protection - a compulsory protection scheme for wage earners in industry and commerce, in case of sickness, maternity, disability, aging, and death. Even before World War II, two-thirds of the French benefited from social coverage in the event of illness. The choice of a mutualist and the philanthropic insurer was nearly free [29, 30, 32]. In the early years, the priority was given to social security reconstruction, focusing initially on workers and their families. Influenced by the welfare states in various European countries and the idea of social democracy, a network of Social Security Funds was created with management boards (employees' and employers' representatives) [32, 69]. These Social Security Funds ensured coverage of care expenses, and the financing involved the payment of a contribution [30, 32].

The principle of expanding health care coverage to the entire population was born in 1945. However, it was put into practice in stages, being extended to agricultural workers in 1961, self-employed, and non-agricultural workers in 1966. In 1974, it established a personal insurance system for all those who were not in any of the categories covered so far. In the 1980s, protection confronted the rise in the unemployed deprived of the rights to health services [29, 36].

In the early 1990s, laws eased the conditions for access to health services. In 1996, institutions and powers were reorganized, which was perceived as a nationalization of the health system by the growing role of the State in reinforcing the role of Parliament in defining health and financial objectives and establishing regional hospitalization agencies. In financing, part of the salary contributions was replaced by income contribution (tax). In 1999 a law created universal coverage (*Couverture Maladie Universelle* - CMU), effective from 2000 because the person must have a regular residence in France. This reform changed the occupational health insurance system to a universal health system. There are three moments in this process: the universality of health services covered by the residence criterion, the replacement of salary contributions by a tax on financing; and, Parliament's intervention in orienting and setting spending objectives [30, 36].

One can say there is difficulty categorizing both national healthcare systems in a single model because they need the ability to adapt to social and economic changes. New global financial

crises lead to think again about the State's role concerning the population's health in the face of new technologies and high costs to be efficient and effective in their management. They seek to spend as little as possible on their actions through the best-known process, aiming at the best possible results reflected in the quality of the care and health actions.

About the Facilities and Human Resources, Brazil has a continental size and large municipalities. Therefore, the country has large hospitals that serve several municipalities at the same time. One may be wrong if to compare the number of hospitals, once the physical structure may vary by region and population. However, it can be said that most parts of the health facilities are in urban cities since Brazil has about 84% of its population in urban areas [11, 92]. The hospitals are divided into public, private (for-profit and non-profit), clinics, and collective interest private institutions (private hospitals, cancer treatment or dialysis centers). Public hospitals are also responsible for vocational education, scientific, and medical research. There is also Emergency Medicine, through SAMU (*Service d'Aide Médicale Urgente*) and SMUR (*Services mobiles d 'urgence et de réanimation*) [26, 76].

Despite the difference in size and population, Brazil and France bring similarities about the health professionals, as shown in Table 5, the number of physicians as pediatricians, pharmacists, and nursing technicians. Brazil has more than twice as many dentists compared to France. France has more physicians and four times more nurses per 1.000 inhabitants.

A curiosity is that in Brazil, midwives are not recognized as professionals. However, there are valued traditional midwives (mainly in the Amazon region and in the indigenous and Quilombolas communities - Quilombolas are the current inhabitants of rural African communities made up of the African descendants enslaved, who mostly live on subsistence agriculture on long-donated, bought, or occupied land.) Furthermore, in France, the profession is regulated by adding more than 20 thousand midwives [93].

Concerning the financing, in Brazil, chapter III of Law 8080/90, it contains SUS's financial management. According to Art. 33, the financial resources of Unified Health System – SUS, will be deposited in a particular account, in each sphere of its activity, and handled under the supervision of the respective Healthcare Councils. Paragraph 1 describes that the financial resources from the Social Security Budget, from Union Budgets and other sources, will be administered by the Ministry of Health through the National Health Fund at the federal level.

Once malpractice, misappropriation, or non-application of the resources is verified, it will be up to the Ministry of Health to apply the measures provided by law. In Art. 34, it is clarified that the authorities responsible for the distribution of the revenue collected will automatically to be transferred to the National Health Fund - FNS, the financial resources corresponding to the appropriations recorded in the Social Security Budget, to projects and activities to be carried out under SUS [9].

Regarding SUS planning and budget, Art. 36, which will be upward, from the local to the federal level, after hearing its deliberative organs, reconciling health policy's needs with the availability of resources in SUS' health care plans. Municipalities, federal states, Federal District, and Union. Paragraph 1 states that health care plans will be the basis of activities and schedules at each level of SUS's direction, and its funding will be provided in the respective budget proposal [9]. Thus, the Brazilian Healthcare System seeks, universally, offer health care services to the entire population, with private health care plans and private health service providers acting in a complementary way (25 years later, on a supplementary basis).

To understand SUS funding, we need to understand the Brazilian geographical and political context. Brazil is a Federation composed of the Union, 26 states, the Federal District, and 5.570 municipalities. The 1988 Federal Constitution determines the entities' joint action, with joint responsibilities regarding access to health services, in a universal, equal, and comprehensive way. These three managers fund the SUS: Union, states, and municipalities forming cooperative federalism, in which all federated entities must promote, protect, and restore health. There is autonomy in managing the healthcare system in each "government sphere" within its territory, constituting the Brazilian sanitary federalism. This amount should finance animal and human vaccines, specialized and straightforward consultations, blood and imaging tests, transplant surgeries, supplies of materials and medicines to the population, sanitary surveillance at ports, airports, and establishments that handle market food, among other activities of public interest [94, 95].

For the health financing, investment percentages were set by law in 2012, in which municipalities and Federal District must annually apply at least 15% of the taxes collection on actions and public health services; states 12% and, Union the amount invested should correspond to the amount committed in the previous financial year, plus the percentage of Gross Domestic Product (GDP) from the preceding year. However, the Brazilian economic policy

adopted in 2015 has influenced public revenue and health financing in the three spheres of government [95].

From 2017, the Constitutional Amendment 95/2016 - New Brazilian Fiscal Regime - was set a ceiling for government spending until 2037. The main objective was to stabilize the growth of direct spending to contain the increase in public debt. The consequence is that resources to health will no longer be linked to the minimum established by law, with restrictive healthcare financial availability [96]. The vast majority of Brazilian municipalities depend on transfers from the Union to provide health services. The economic crisis and a political and institutional rupture after impeachment in 2016 marked an adverse scenario for social rights established by the 1988 Federal Constitution and menaces the Unified Health System [97].

The participation in SUS financing in 2017 was 43% from the Federal government, 26% from the states, and 31% from the municipalities (that spent about plus 25% over the minimum set at 15% by the law). It shows that the Union has reduced health investment, leaving a more significant burden on municipalities for health services and actions [94, 98]. The solution found for the economic crisis through an austerity regime and fiscal adjustments for the next 20 years, with significant public spending cuts, will bring severe limitations to guarantee social rights and the SUS [97].

Brazil spent, in 2018, PPP$ 18.082.175.203.90 (BRL R$ 36.688.733.488.73 or EUR 8.141.410.000) in health prevention, that means about 29% of the whole public healthcare budget (PPP 53.316.904.879.25 or, BRL 108.180.000.000 or EUR 24.005.700.000) and an amount of PPP$ 86.10 (BRL 174,70 or EUR 39.00) per capita [76, 99].

Concerning the financing of the French national healthcare system (FNH) comes from the Social Insurance (*L'Assurance Sociale*), with an essential role of the State that shares the management with the Health Insurance (*L'Assurance Maladie*) [30, 36, 100]. Funding is made through contributions from employers and taxpayers' income-based and others as specific such as tobacco, alcohol, and the pharmaceutical industry taxes. The complementary health insurance reimburses copayments made by users for health services, and the purchase of medicines, sometimes, is not entirely covered by the health system [101, 102]. Social Security finances most of the services and health goods; by 2018, it reached 78% of health expenses. The complementary insurance finances about 14% of expenditures, the State 1.5% on average, and the rest is paid directly by households [103]. The State finances the prevention, training,

medical research, and health services for the vulnerable through CMU-C and AME [29, 36, 102, 103].

It shows that much of Brazil's health expenditure is spent on private health services. However, because health in Brazil is a federally guaranteed right, all tax-paying citizens are entitled to reimbursement of health expenses (consultations, exams, hospitals, insurances – no refunds for medicines). It is called a health tax waiver (tax expense) and is a practice that has been growing over the last years, reaching the level of US$ 9.482 billion in 2018. Both citizens and companies have reduced income tax payments without a maximum discount ceiling, creating the possibility of unbridled growth in tax exemptions [104, 105].

In another study on public health spending from 2000 to 2014, Brazil was the country with the lowest public health spending, unlike other countries with universal and public healthcare systems. It means a reduction in the State's role as a provider and financier of public health actions and services. After implementing the 'New Brazilian Fiscal Regime,' public health spending is expected to decline further, as well as the excessive government incentives for the pro-profit health services, which contribute to the reduction of public spending and, hinders the implementation of SUS as a universal health system, as provided for in the 1988 Constitution [77]. On the one hand, the lack of funding implies the quality and quantity of public health services. Although SUS benefits millions of people in Brazil, there had always been a discussion about central problems for the proper SUS financing.

In February 2018, the French government established its priority list, ranging from health education reform to hospital funding review, through a renewal of human resources policy and a review of the healthcare system's territorial organization. The hospitals are responsible for about 40% of health care expenses. France remains the third OECD country (http://www.oecd.org/els/health-systems/health-data.htm) with the most prolonged average stay (10 days, compared to 7.8 in other countries). The rate of outpatient surgery remains lower than in neighboring countries. In 2018 hospitals totaled about 1,6 billion Euros deficit. Reports have shown that about 25% of health expenditure is related to unnecessary or redundant acts, and the healthcare system restructuring is being discussed [81, 106].

Another point that needs to be highlighted is the gratuity of the Brazilian health system. The user does not need money to consult with any physician or any other health procedure like surgeries, cancer, or HIV/AIDS treatment, vaccines, and there is no daily limit for

hospitalizations. In France, even if one has private insurance, for most of the appointments and exams, there is a fee to be paid, which will be reimbursed by FNH later but, this refund, the most of times, is partial and not integral to the expenses, leading to out-of-pocket payment. It influences the demand for services and penalizes low-income people.

Therefore, for a better comparison among countries concerning spending and its financing, the following factors could be employed: the level of national and personal income; demographic and epidemiological profiles; differences in system coverage, quantity, diversity, and quality of services offered and; differences in the mechanisms of financing, organization, and provision of health services. Gerdtham's research (2000) on the organization and provision of health services by comparing data from 22 OECD countries highlights the importance of factors linked to each country's healthcare system's institutional characteristics. In this sense, the evidence showed that the results are related to the characteristics of the countries, and the conclusion states that: I) the higher the public participation, the lower the total expenditure; ii) hospital-centric systems tend to spend more; iii) countries where primary care is a filter for other levels of care tend to have a lower level of spending; and iv) the form of payment of general practitioners by capitation (a fixed amount per patient) induces a lower provision and therefore a lower expense than in systems with payment for service or act [107].

So, comparing both healthcare systems suggest that there are similarities between them in terms of structure and management:

1. Both have three levels of care - primary, secondary, and tertiary.
2. They are regionalized and decentralized.
3. They have funding based on solidarity.
4. They have specific public policies directed to specific groups.

They also share the same problems as an aging population and increasing spending on new technologies. Brazil began the twentieth century with a model closer to the Bismarckian and, in the 1980s, broke entirely with this model, starting a universal and free healthcare system. Today, Brazil seeks to merge public and private health services, approaching the Bismarckian model again. The French healthcare system tries to achieve the principles of "Beveridgean" universalism by the "Bismarckian" model.

Both countries have similarities regarding the facilities for health services, such as hospitals, health centers, emergency rooms, doctor's offices. The difference is that in Brazil, there are public free medical offices that belong to the SUS. In Brazil, there are also private offices of professionals and health insurance medical offices. So, there are three types of medical care: free, private health insurance, and out-of-pocket; this applies to medical appointments (GP or specialists), exams, hospital admissions, and emergencies. France has many private medical offices, with self-employed professionals receiving a payment that will be reimbursed by FNH posteriorly. Both in Brazil and France, it is encouraged to consult with the general practitioner before referencing other instances of the System (referral and counter-referral process).

The percentage of GDP spent on health services may not be the best way to understand a country's health financing because each country has a different GDP, leading to the belief that a higher percentage of spending means a better healthcare system, restricting them to economic criteria when the performance also needs to contemplate quality and effectiveness.

2.5 CONCLUSION

This descriptive study shows that even universal access healthcare systems have such distinct characteristics that it is no longer possible to categorize them as a single model. The historical background showed the changes in overtime according to new needing and health policies. Concerning the health care structures and Human Resources, both countries have different facilities. However, there is a similarity of the care in three degrees, be named complexity (Brazil) or resource (France), what changes is the nomenclature. The attempt to curb public health spending is reflected in several public policies that change over the international scene. Sometimes these policies seek to reduce the equity of access to the healthcare system; sometimes, they seek to contain spending on health care services. To conclude, both health systems are continually changing to meet new needs and obtain sufficient financial resources to provide a quality service to their population.

3. STROKE POLICIES AND CARE IN BRAZIL AND FRANCE

The third chapter presents the scenario and concepts related to Stroke globally in Latin America, Europe, Brazil, and France. Describe the health policies for clinical stroke practice, the stroke care paths in Brazilian and French healthcare systems, and describe the prevalence, acute hospitalizations, average length of stay in the hospital, and in-hospital mortality rates by stroke proposed in the second and third objectives of this thesis. In the Annex is attached the article published about this research.

Noncommunicable diseases (NCDs) are considered silent because they develop throughout life and are long-lasting. NCDs accounts for about 71% of the cause of death worldwide (41 million deaths in 2016), the majority by the four main NCDs: the cardiovascular disease was responsible for 17.9 million deaths (44% of all NCDs deaths); Cancer for 9.0 million deaths (22%); Chronic respiratory disease for 3.8 million deaths (9%); and diabetes for 1.6 million deaths (4%) [14]. NCDs are multifactorial, that is, determined by several factors, whether social or individual. The major NCDs (cardiovascular disease, chronic respiratory disease, diabetes mellitus, and cancer) have four common risk factors: tobacco use, physical inactivity, unhealthy diet, and harmful alcohol use. Note that these risk factors are modifiable [108].

From all NCDs, ischemic heart disease and stroke are the leading causes of death and disability worldwide; a total of 15 million people suffered a stroke and 5.8 million deaths. They have remained the leading cause of death globally over the past 15 years [14]. Stroke claims more lives annually than AIDS, tuberculosis, and malaria combined [15].

3.1.1 Risk Factors

The stroke's incidence is related to risk factors such as diabetes type 2, high fasting plasma glucose, low physical inactivity, high body-mass index, obesity, unhealthy diet (low in vegetables, fruits, whole grains, nuts, seeds, milk, fiber, calcium, seafood omega-3 fatty acid, or polyunsaturated fatty acid and diet high in red meat, processed meat, sugar-sweetened beverages, trans-fatty acids, or sodium), tobacco use, harmful use of alcohol and illicit drugs, hypertension, high cholesterol, male gender, genetic disposition, and psychological factors, impaired kidney function; and ambient particulate matter pollution (household air pollution

from solid fuels, and lead exposure) [14, 109]; while the lethality assesses the effectiveness of the treatment instituted. Stroke is the consequence of the risk factors' lack of care [110, 111].

The salt/sodium intake consumption is associated with an increased risk of hypertension and cardiovascular disease. WHO recommends reducing salt intake to less than 5 g/salt or 2 g/sodium/day. In 2016, the level of alcohol consumption worldwide was 6.4 liters of pure alcohol for people aged 15+. Physical activity lowers the risk of stroke, hypertension, and depression. WHO recommends performing at least 150 minutes of moderate-intensity physical activity per week or equivalent. Tobacco use is one of the leading global risk factors for NCDs. The global prevalence of tobacco smoking in individuals aged 15 years and older decreased from 27% (2000) to 20% (2016). Hypertension is a risk factor for stroke and other NDCs. The number of hypertensive adults increased from 594 million in 1975 to 1.13 billion in 2015. In the world, the number of people with diabetes was 422 million in 2014. The upper-middle-income group tended to have higher levels (9%); however, all income groups ranged between 7–9% of the population. Obesity is linked to an increased risk of hypertension and many NCDs, and it is mostly preventable. In 2016, more than 1.9 billion people aged 18+ were overweight, and more than 650 million were considered obese. Some 7% of the population in low-income countries were obese, compared with 25% of the high-income population [112].

According to WHO, the Global Noncommunicable Diseases Action Plan for the period 2013-2020 expected a 25% reduction in premature mortality and to reduce the risk factors associated with stroke and other NCDs: "laws, policies, and regulations have important roles in the prevention and control of diseases. Only governments can legislate for health warnings, introduce mandatory standards and labeling and, health policies. Often governments are the main providers of health care – prevention, treatment, research, and training". [112].

3.1.2 Stroke

A stroke results from an interruption of blood circulation in the brain, usually when a blood vessel ruptures (Hemorrhagic stroke) or a clot blocks it (Ischemic stroke or cerebral infarction). The circulation of oxygen and nutrients stop and damages the brain tissues. The most common symptoms of a stroke are a sudden weakness or a loss of sensation in the face or limb, most often on one side of the body. The other symptoms are mental confusion, difficulty speaking or understanding, loss of unilateral vision or double vision, difficulty to walk, dizziness, loss of

balance or motor coordination, intense and unusual headaches, fainting or unconsciousness. The consequences of a stroke depend on the part of the brain affected and the delay in care. A very severe stroke can lead to sudden death. There is also a transient ischemic stroke, which regresses in a short period, without leaving sequelae, but which will not be a subject addressed in this thesis [14, 113].

The post-stroke sequelae are multiple and frequent; they can be physical and/or psycho-intellectual. They can limit simple day-to-day actions and also impact professional and family life. It is estimated that after one year of the stroke episode (any type), about 30% of patients will die; 25% will have some inability, and 30% will develop dementia [113].

Stroke prevention is characterized by a set of care actions in the individual and collective scope, which includes promoting healthy habits and the prevention related to cardiovascular diseases. The presence of risk factors for vascular diseases should always be investigated (Systemic Arterial Hypertension is the most important risk factor for ischemic and hemorrhagic lesions). This concept should be foreseen the popular education in health, the primary care actions, emergency services (hospital, fixed and mobile components), stroke units, rehabilitation, post-stroke outpatient care, and social reintegration [114].

In the World, the reduction in the stroke's mortality rate began in the mid-1960s and was stabilized at the end of the 20th century. This decline was most pronounced in the United States, Canada, Australia, Western European countries, and Japan. In South America and Eastern Europe, the rates are higher and still show growth. Stroke is a time-dependent disease; the faster the treatment, the greater the chance of complete recovery [114]. The reasons for reducing the mortality rate due to stroke are linked to the disease's incidence and lethality. Stroke is already a public health problem, which may be aggravated if there is no continuity in improving socioeconomic, educational, hospital care, and risk factors control (primary health prevention) [110].

3.1.3 Stroke in Latin America

In Latin American countries, the number of people that had a stroke has increased by 81% from 1990 to 2017. However, due to a great improvement in stroke care, the number of people who survived has increased by 95%. In 2017, there were over 5.5 million stroke survivors. The age-standardized stroke incidence (0.60 million new first-ever strokes), mortality (over 0.26 million deaths), and DALYs[10] (5.50 million stroke-related) in Latin American countries in 2017 were similar to those reported in high-income countries [109].

There is a relatively low proportion of ischaemic stroke (57%) compared with high-income countries (80–85%), but a high proportion of intracerebral hemorrhage (27%) and subarachnoid hemorrhage (15%). Paraguay has the highest age-standardized rates of incidence 128 per 100.000 of the population, mortality 67 per 100.000 of the population, and DALYs 1.276 per 100.000 of the population. Brazil and Uruguay have the highest prevalence – 1.133 per 100.000 people and 1.120 per 100.000 people, respectively. Colombia and Peru have the lowest incidence of 85–87 cases per 100.000 of the population; mortality 25–29 cases per 100.000 of the population; DALYs 530–595 cases per 100,000 of the population [109].

According to the Global Burden of Diseases, Injuries, and Risk Factors (GBD), 2017 Study estimates a huge potential to reduce the stroke burden by 85.3% in Latin America. Bolivia, Ecuador, and Guatemala still have few centers for acute stroke care (stroke units, stroke rehabilitation services, the quality of the services is not monitored). Only Brazil and Chile have National Stroke Policies [109].

Since 2015, to improve stroke care in Latin American, some initiatives have been implemented. The Latin American Stroke Summit[11] took place in Santiago (Chile) in 2015, resulting in "The Declaration of Santiago" was a consensus on prioritizing stroke care in Latin American countries. In 2018, during the XXI Iberoamerican Congress on Cerebrovascular Diseases, at the Latin American Interministerial Stroke Meeting, Argentina, Bolivia, Brazil, Chile,

---

[10] Disability Adjusted Life Years is the sum of years of potential life lost due to premature mortality and the years of productive life lost due to disability.

[11] Led by the American Heart Association and the American Stroke Association, supported by the Pan American Health Organization (PAHO), World Stroke Organization (WSO), Latin American and Caribbean Stroke Network, and other local societies.

Colombia, Costa Rica, Ecuador, Guatemala, Mexico, Panama, Paraguay, Peru, and Uruguay participated in Ministerial Meeting, in Gramado (Brazil), to provide information on the burden of stroke and the differences in stroke care in each country, resulting in "The Gramado Charter," which the main objectives are to reduce mortality from stroke and promote mental health and well-being of the population by 2030 [109, 115]. Brazil is a reference in treating stroke for other countries in Latin America, already having a Stroke Care Line established as a public health policy [115].

In Brazil and Argentina, 100% of the population, and at least 90% of the population in Colombia, Costa Rica, and Panama are covered by the Ministry of Health or social security system, Uruguay and Bolivia only 37% to 65% of the population, respectively. Stroke centers were available in all countries but, their number varied substantially (e.g., only one center was available in Ecuador and Guatemala, whereas Brazil has 156 centers), and workforce development issues existed in the majority of countries. Thrombolysis for patients with acute ischaemic stroke was available in all countries but only for a relatively small proportion of patients (usually <1%). An even smaller proportion of eligible patients received thrombectomy. Data for in-hospital and post-discharge rehabilitation services were not available for Argentina, Bolivia, Guatemala, Mexico, Peru, and Uruguay (no data were available for Colombia, Ecuador and Paraguay for post-discharge rehabilitation services only). [109]

3.1.4 Stroke in Europe

In Europe, between 1997 to 2017, there has been a reduction in stroke cases, and the recovery from stroke has improved, but because the population over 70 is increasing, the numbers of strokes are set to rise and its sequels [116]. Was estimated 1.5 million people would suffer a stroke by 2025 [117]. However, the age-standardized stroke incidence in 2017 was shown 1,6 million new first-ever strokes (ischemic stroke in 80% of cases), the mortality rate was 0,98 million deaths [116, 118]; and DALYs was 17.1 million stroke-related, those rates are higher than in Latin America [119]. There are disparities between and within countries about the stroke care pathway [119]. All countries neglect Post-stroke support because more people survive a stroke due to better and quicker treatment. However, more people are living with disabilities [116, 120].

Projections from The Burden of Stroke in Europe Report 2017 show a 34% increase in the total number of stroke events in 2035. Stroke prevention should be a high priority to find better fighting stroke methods, like standardized care [118, 120, 121]. Country to country, stroke care changes (excellent care in one country, but in another one, it could be poor provision) [120]. The data about stroke varies widely across Europe. National stroke registers and audits in Austria, Denmark, Finland, Germany, Hungary, Ireland, Poland, Sweden, and the United Kingdom are good information sources but usually about hospitalized patients [118]. Comparable data on stroke across European countries lack because previous studies have used different methods (cases, periods of observation, and age groups) [122]. SAFE recommends that each country collect and audit stroke data to monitor healthcare systems' performance and resources over time and is recommended to countries to have a national stroke strategy guaranteed by the government in comprehensive stroke care (prevention, promotion, and recovery) [120].

To improve stroke care in Europe, the WSO, ESO, WHO European Regional Committee recommended strengthening programs on awareness of the symptoms, risk factors, and stroke consequences. Also, in removing financial barriers to stroke prevention and detection (through universal health coverage) [123] and, dedicated service on all levels of care built around "stroke units," because the access to stroke unit care is highly unequal in Europe (less than half of all stroke patients). The "Action Plan for Stroke in Europe 2018–2030" (ESO/ Stroke Alliance for Europe) and the "Global Stroke Guidelines and Action Plan Roadmap for Quality Stroke Care" (WSO) were made to increase stroke awareness, primary and secondary prevention, access to quality stroke treatment, and long-term care. To achieve this goal is necessary to care about the risk factors - detecting and treating hypertension, combating tobacco and alcohol use, and encouraging physical activity and a healthy diet. Also, enhance services for stroke patients (stroke units, medicines, rehabilitation, universal health coverage to reduce inequalities) finally, stroke action plans to guide policy decisions (prevention, detection, treatment, and long-term care) [121].

Most European countries have universal or near-universal healthcare system (GP appointments, tests, examinations, and hospital care). The basic primary health care coverage usually covers a defined set of benefits and cost-sharing in many cases. In Ireland, about 50% of the population pays the costs of GP visits. Cyprus, Bulgaria, and Romania have at least 10% of their population not covered for health services. In some countries, additional health coverage can be purchased

through private insurance to cover some cost left after basic coverage as France, Netherlands, Slovenia, Belgium, and Croatia – where half or more of the population has private coverage [124]. Thrombolysis treatment rates vary from less than 1% of patients to 16% [116]. As a neurological disorder, most stroke patients carry a lifelong burden of physical, cognitive, mental, and socio-economic consequences [123].

3.1.3 Stroke in Brazil

Brazil is going through the process of polarized epidemiological and demographic transition. That means a large concentration of the population in the urban areas close to the big cities where there is a complete offer of health care services in contrast to the country cities where the health care services provided are scarce. It also presents a mixed picture of diseases considered archaic (such as parasitic diseases) along with modern diseases (chronic-degenerative diseases, external causes, noncommunicable diseases) [11]. Another reason that can be mentioned is Brazil's huge territorial extension and his heterogeneous socioeconomic profile [21].

In Brazil, stroke is the main cause of death (10%) and consists of 10% of acute hospitalizations (149.333 admissions in 2016) in the Unified Health System (SUS), which represents a high cost for the healthcare system. The annual incidence of stroke in Brazil is about 108/100.000 inhabitants. The Mortality Information System (SIM) recorded 40.019 deaths from stroke in 2016 [114]. The National Health Survey calculated the estimated absolute number of people with stroke and disability due to stroke. Their prevalence was estimated at 2.231.000 people with stroke and 568.000 with severe disability [125]. Despite declines in mortality rates, stroke continues to be the leading cause of death and disability in the country. It is also responsible for many hospitalizations and represents a high cost for the healthcare system [17].

3.1.4 Stroke in France

France has an area of 640.679 km2 (42nd in the world); its estimated population was 67.201.000 inhabitants (21st in the world); its GDP is PPP$ 2.826 trillion (10th in the world), its GDP per capita is PPP$ 44.100 (40th in the world); and the country spends about 12% of GDP on the health care system, approximately 81% of this fraction is exclusively for the public healthcare

system – universal access [89]; and, the health expenditure per capita in 2015 was PPP$ 4.542 [22]. The Gini index (2013) was 30.1 (medium), and the HDI (2015) was 0.897, very high (21st in the world). [20, 126].

France spent in health prevention PPP$ 8.0 billion (EUR 6.2 billion) in 2018, which means about 2,25% of the whole national healthcare budget (PPP$ 356 billion - EUR 275 billion) and an amount of PPP$ 119 (EUR 93) per capita [99]. In France, health prevention's per capita expenditure was approximately 38% higher than the Brazilian one. However, overall, 97.75% of France's total spending on the health system is not directed towards health prevention measures. In comparison, Brazil has about 29% of its budget focused on health prevention; however, at a lower expense.

In France, considering all causes of death, stroke is the second main cause; approximately 30.000 people die each year, 110.000 people are hospitalized each year, and an annual incidence of 140.000 inhabitants. It was estimated that 750.000 people had survived a stroke, and 500.000 people have sequelae from stroke [19]. Stroke has an annual incidence of 140.000 new cases year. Stroke is the leading cause of acquired physical disability in adults, the second leading cause of dementia (after Alzheimer's disease) [127].

3.1.5 Health Policies for Stroke Clinical Practice

Once non-communicable diseases are responsible for most of the deaths and disabilities all over the world, WHO did a Global action plan for the prevention and control of noncommunicable diseases 2013-2020, which has a mission "A world free of the avoidable burden of noncommunicable diseases" and as the goal:

> To reduce the preventable, and avoidable burden of morbidity, mortality and disability due to non-communicable diseases using of multisectoral collaboration and cooperation at national, regional, and global levels, so that populations reach the highest attainable standards of health and productivity at every age and those diseases are no longer a barrier to well-being or socioeconomic development [112].

To reach that goal, WHO advises following the overarching principles, that are: Life-course approach; empowerment of people and communities; Evidence-based strategies; Universal health coverage; Management of real, perceived or potential conflicts of interest; Human rights approach; Equity-based approach; National action and international cooperation

and solidarity; multisectoral action. So, there are six objectives to strengthen the prevention and control of noncommunicable diseases worldwide, which in short are:

1. To raise the priority to the prevention and control in global, regional, and national agendas and internationally agreed on development goals through strengthened international cooperation and advocacy.

2. To strengthen national capacity, leadership, governance, multisectoral action, and partnerships to accelerate the country's response.

3. To reduce modifiable risk factors for and underlying social determinants through the creation of health-promoting environments.

4. The health systems should address the prevention and control and the underlying social determinants through primary health care and universal health coverage.

5. To promote and support national capacity for high-quality research and development.

6. To monitor the trends and determinants and evaluate progress in their prevention and control. [112].

During the planned time period 2013-2020, it is expected from the countries to be achieved at least a 25% reduction in risk of premature mortality from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases; 10% relative reduction in the harmful use of alcohol (each country will select indicator(s) of harmful use as appropriate and in line with WHO's global strategy); 10% reduction in prevalence of insufficient physical activity; 30% reduction in mean population intake of salt/sodium (WHO's recommendation is less than 5 grams of salt or 2 grams of sodium per person per day); 30% reduction in prevalence of current tobacco use; 25% reduction in the prevalence of raised blood pressure or contain the prevalence of raised blood pressure; Halt the rise in diabetes and obesity; 50% of people receive drug therapy and counseling to prevent heart attacks and strokes; and 80% availability of the affordable basic technologies and essential medicines, including generics, required to treat major noncommunicable diseases in both public and private facilities [112].

According to WHO (2013), the cost of inaction far outweighs the cost of taking action on noncommunicable diseases. It is affordable for all countries, and it varies from 1% to 4% of

current health spending. However, there is no single way to fit all countries because they are further progress in the prevention and control of noncommunicable diseases and different levels of socioeconomic development. WHO's action plan has a comprehensive response, and all countries could benefit from that [112].

In 2011, the United Nations (UN) held a meeting about NCDs in which member countries had committed to working to halt NCDs' growth. So, in 2012, WHO developed a set of goals and indicators to monitor the achievement of those goals - The global monitoring framework - containing 25 indicators (inserted into three blocks: a) mortality and morbidity; b) risk factors; and c) responses from national systems) and nine voluntary global targets for the prevention and control of NCDs. For nine of them, goals were defined to be reached concerning the baseline [112]. WHO and UN member countries adopt this health policy to their countries, seeking to reduce the burden of NCDs.

3.2 METHOD

The method proposed was comparing Brazil and France about stroke care by collecting secondary data (already existing in the national databases or on request). The health policies concerning stroke care developed in both countries (care and prevention) and the health indicators related to care to better management were studied to achieve the objective. The populations under analysis comprise the entire population of metropolitan France and Brazil. The period analyzed was 2010 to 2017.

The data for the National health care policies from Brazil and France were searched in the Ministry of Health websites (National Health legislation - Circulaire DGOS/R4/R3/PF3 n°2012-106; Loi n°2004-806 du nine août 2004 (France); Portarias n°664 and 665/2012 (Brazil). From a careful reading, the main points related to stroke care were described in table 7. It was sought to extract from only the text related to general stroke care, be it prehospital, hospitalization, and after discharge. The stroke care for certain more specific cases was not considered in this study because it is the exception and because they were varied, what could change the focus of the subject. Those guidelines must be respected in both countries.

The figures were composed of information from both national health plans for stroke care in both countries, and the general steps to be followed for stroke care were shown.

About the health care indicators, the following were chosen: the number of acute hospitalizations, the average length of stay, and in-hospital mortality rate, the reason for this choice were due to these data were available for both countries and are part of the effectiveness indicators related to the management. Data about stroke's prevalence by age group (total cases in a year) were collected from the Hospitalization System of the Unified Health System, obtained in monthly files, according to the principal diagnosis of the discharge note. These files were consolidated in annual periods. For France, data were obtained by request to the Programme de Médicalisation des Systèmes d'Information PMSI.

For the data for the acute hospitalizations and the hospital mortality rate per 1.000 inhabitants, the following formulas were applied:

$$\text{Acute hospitalizations rate} = \frac{\text{Number of acute hospitalizations by stroke}}{\text{Total estimated population}} \times 1.000$$

and;

$$\text{Hospital mortality rate} = \frac{\text{Number of Deaths}}{\text{Total hospitalized patients}} \times 1.000$$

and;

$$\text{Stroke's prevalence by age group rate} = \frac{\text{Number of cases by age group}}{\text{Total estimated population}} \times 10.000$$

For health care prevention, the data about risk factors indicators were collected from the WHO website.

The data referring to the estimated population were collected from the United Nations website. The lack of adjustment of differences in the case-mix and the absence of comparable indicators on post-stroke functional disability can be pointed out.

3.3 RESULTS

3.3.1 Health Policies for stroke clinical practice in Brazil

Brazil, in 2001, published the Strategic Action Plan for Fight Against Chronic Noncommunicable Diseases in Brazil 2011-2022, that aims to promote the development and implementation of effective, integrated, sustainable, and evidence-based public policies for the prevention and control of NCDs and their risk factors [125, 128, 129]. The Plan addresses the four key modifiable risk factors: tobacco use, unhealthy diet, physical inactivity, harmful use of alcohol, which combined generate a significant portion of the burden of NCDs in Brazil. The National Plan has three pillars: 1) health surveillance, monitoring, and evaluation; 2) health prevention and promotion; and 3) comprehensive care [130].

Exclusive for stroke, there is the Cerebral Vascular Accident Care Line (CVA) in the emergency care network [131]. In Brazil, Ordinance no. 664/2012 approves the Clinical Protocols and Therapeutic Guidelines for Stroke - thrombolysis in acute ischemic stroke and, the Ordinance no. 665/2012 provides the criteria for qualifying hospital establishments as an Emergency Care Center for stroke patients in the Unified Health System (SUS). Compliance with this Clinical Protocol is mandatory. The patient or legal guardian must be informed of the potential risks, and side effects related to the use of medication recommended for the treatment of acute ischemic stroke [132, 133].

3.3.2 Health Policies for stroke clinical practice in France

In France, the French 2010-2014 National Stroke Action Plan was developed to the stroke prevention and care strategy and, its objectives: a program of operational and regional actions on a National and Regional scale (17 actions and 31 sub-actions) and; a toolbox including methods (regulations if necessary, good practice standards, guidelines). This Plan is centered on four main axes - improve the health prevention and public information before, during, and after the stroke; enforce the health care channels and to adapt information systems; providing information, training for professionals; promote research and ensure demographic balances – in which the 17 actions are developed. [113, 134].

The law n° 2004-806 Public Health Policy (August 9, 2004) sets five objectives relating to cardiovascular diseases, including one specific to stroke, consisting in reducing the frequency and severity of the functional sequelae associated with stroke and; the Circular of March 6/2012 organizes the regional networks and standard care for stroke patients from the emergency to the relay medico-social and the patient return to home. Improving stroke care requires regional organization, according to needs and resources of territorially defined sectors, including prevention, acute care, rehabilitation, medico-social support coordinated by the ARS [113, 135, 136]. The national clinical and therapeutic protocols were established by the Ministry of Health from both countries and, they were implemented by law or by ministerial ordinance.

Table 7 summarizes the Health Action Plans of Brazil and France's main items, and it seeks to emphasize the points believed to strengthen health prevention, promotion, and recovery [129, 134].

Table 7 – Health National Actions Plans – Brazil and France

Country	Health policies and Laws	Objective	Specific objectives
Brazil	Cerebral Vascular Accident (CVA) Care Line in the Urgency and Emergency care network	Reduce stroke morbidity and mortality, through the Stroke Care Line in the Urgency and Emergency Care Network through the comprehensive care	- Disseminate the knowledge that stroke is a medical emergency; - Improve the population's knowledge about stroke, its signs and symptoms, risk factors and the need for adequate control of them; - Increase the control of risk factors for vascular diseases in basic health care network; - Qualify SAMU 192 for proper stroke care; - Enable Type I, Type II and Type III Stroke Urgent Care Units, to perform general care and thrombolytic therapy; - Expand the supply of hospital beds for chronic care and rehabilitation; - Establish an adequate outpatient clinic care after hospital discharge - rehabilitation, specialized care, home care and social and work reintegration of individuals
France	Action National Plan - Stroke 2010-2014	Develop prevention and information to prevent strokes and limit their sequelae; Improve the organization of stroke care; Improve the offer of re-education, rehabilitation, and reintegration; Implement a research policy in the stroke field; Develop ethical thinking; Facilitate the accompaniment of patients and the action of patient associations; Contribute to changing the social outlook on disability	- Take care of patient victim or suspect of stroke in an organized and territorially defined sector; - Reduce the time between the first symptoms and care, based on a positive diagnosis; - Increase the rate of thrombolysis in eligible patients; - Better coordinate the intervention of professionals at the interfaces between healthcare establishments and city, home or medical-social sector; - Define a specific organization for the management of children's stroke; - Improve professional practices; - Improve information and training for professionals and carers people; - Increase research efforts on stroke due to its social burden;
Brazil	Ordinance No. 664, April 12, 2012	Approves the Clinical Protocol and Therapeutic Guidelines - Thrombolysis in Acute Ischemic Stroke	- The general concept of Acute Ischemic Stroke, diagnostic criteria, inclusion and exclusion criteria, treatment and regulation, control and evaluation mechanisms. This must be used by the Health Departments of the States, Federal District, and Municipalities. - Compliance with the Clinical Protocol and Therapeutic Guidelines - Thrombolysis in Acute Ischemic Stroke is mandatory in eligible patients. - It is mandatory to inform the patient or his legal guardian about the potential risks and side effects related to the use of recommended medication for the treatment of acute ischemic stroke;

			- State, district and municipal managers of the Unified Health System (SUS), should structure the health care network, define referential services and establish flows for the care of patients described in the Annex to this Ordinance
Brazil	Ordinance No. 665, April 12, 2012	Provides the criteria for the qualification of hospital establishments such as the Urgent Care Center for Patients with Stroke, institutes the respective financial incentive and approves the Stroke Care Line.	- The Stroke Care Line is approved, to be observed by all health services enabled, - The Urgent Care Centers for stroke patients are part of the Stroke Care Line and are components of the Urgency and Emergency Care Network (RUE). - To treat stroke patients, Urgent Care Centers will be classified as Type I, Type II or Type III.
France	Circular N ° DHOS /SDO /01/ DGS/ SD5D /DGAS/ PHAN/ 3B /200 4/ 280; June 18, 2004	Establishes the organizational principles of health care, medical-social and social, of traumatic brain and spinal cord injuries. Emphasizes the characteristics of these injuries and the need to provide speed, fluidity, relevance, and durability in their care also, physically, mentally and socially. Recommends an organization in a network of experienced and identified actors for the reception, listening, information and support for relatives of traumatized people.	- Give to the Regional Hospitalization Agencies (ARH), to regional directorates of health and social affairs (DRASS), to the departmental directorates of health business and social services (DDASS) and the organization of the care sector for traumatic brain injury and spinal cord injury which is a basis for the development of Regional Health Organization Schemes, in close collaboration with medical-social actors. - Specifies in its appendices the care of all traumatized craniocerebral types and spinal cord injury.
France	Circular DGOS / R4 / R3 / PF3 n 2012-106. March 6, 2012	Relating to the organization of supply chains services for patients suffering from cerebrovascular accident (stroke)	Presents the guide intended to provide methodological support to ARS in the organization of care for stroke victims. The purpose is to present the three major objectives of the plan that are: structuring the sectors ensuring individualized and optimal care for all stroke victims; development of telemedicine and, information systems. It is supplemented by a methodological guide to help the regions in the implementation of these objectives.

Source: [129, 131-136]

3.3.3 Stroke Care Paths in Brazil

In Brazil, the treatment for stroke patients is carried out in specialized hospitals called Emergency Care Centers for stroke patients. These centers are classified as Type I; Type II, or Type III with a qualified staff, coordinated by a clinical neurologist and, the following resources should be available 24h/7d: continuous cardiovascular and respiratory monitoring; Intensive Care Unit; Clinical pathology laboratory; CT scanner; Neurosurgical; hemotherapy service or transfusion agency, including cryoprecipitate[12]. The number of Emergency Care Centers increased from 35 (2008) to 149 in 2017 [130, 132, 133].

For stroke prevention and promotion in Brazil, the Primary care is the coordinator with about 42.900 Basic Health Units, 42.600 Family Health teams, covering 64.6% of the Brazilian population for the comprehensive care and involve risk factors with adverse potentials, such as hypertension, diabetes, and obesity [4, 108]. In the acute stroke event, the team often performs the first care, evaluate vital signs and blood glucose, do a brief neurological examination, and contact the central urgency regulation (or urgent service) for referral [131, 137].

The main objective of prehospital care includes Basic Health Units, 24-hour (UPA), 24-hour Emergency Services, and SAMU that does the patient transport to a reference center or hospital as soon as possible, prioritizing potential patients for thrombolytic therapy. Telemedicine is expanding to qualified specialized assistance access, regardless of the physical distance. Thrombolytic therapy supported by telemedicine has successful experiences in Brazil, and it is a support for the diagnosis and treatment of acute stroke [130, 131].

The Regulation Centers aimed the Social Assistance and providing the most appropriate alternative to the patient's need. The Anticoagulation Clinic intended to control continuous full anticoagulation, which may be in primary care, specialized care, or in Type II and Type III Urgent Care Center for stroke patients. The Stroke Care Line aims to provide integrated and continuous care within a hierarchical and regulated system and has the following components shown in Frame 3 [130].

---

[12] Cryoprecipitated is a portion of plasma, the liquid part of our blood, and it is rich in clotting factors (proteins that can reduce blood loss by helping to stop or slow bleeding)

Given clinical suspicion of stroke, the following tests should be ordered: resting electrocardiography, capillary blood glucose; FBC (with platelet count); prothrombin time with INR measurement (international normalized ratio); activated thromboplastin part-time; serum potassium, sodium, urea, and creatinine levels. The electrocardiogram aims to identify arrhythmias that cause a stroke. At the same time, blood tests will assess the degree of coagulability and situations that may mimic or aggravate an ongoing stroke (e.g., hypoglycemia, infection, or hydro electrolytic disorders) [132]. In the last 15 years, the thrombolytic therapy and care in stroke units demonstrate levels of evidence as to the main forms of intervention with better prognostic results [130].

Figure 5– Stroke Flow in a Comprehensive Health Care in Brazil

Health prevention and Prehospital Care
- Primary Health Care Units (Basic Health Units)
- Anticoagulation Outpatient Clinic
- Emergency Mobile Component (Prehospital / SAMU 192)
- Telemedicine

Acute Hospital Care
- Emergency Care Units (UPA 24 hours) and Emergency Rooms of general hospitals (not referenced for stroke);
- Stabilization Room (SE);
- Hospitals with a Type I, Type II, and Type III Emergency Care Center for stroke patients;
- Specialized Care Units;
- Long term ward
- Anticoagulation Outpatient Clinic

After Acute Hospital care
- Home Care;
- Ambulatory and Hospital Rehabilitation Services;
- Social Reintegration Service;
- Regulation Centers;
- Anticoagulation Outpatient Clinic
- Primary Health Care Units

Source: [131, 138].

After the stroke care, the treatment should be prescribed by a specialist, and the patient returns to UBS to consult the general practitioner and specialists [4, 123]. The rehabilitation is carried out in the Specialized Rehabilitation Centers (CERS) to carry out diagnoses and treatments, carried out in an interdisciplinary way considering the impact of the disability on their

functionality, as well as the clinical, emotional, environmental, and social factors involved that provide a better quality of life [123].
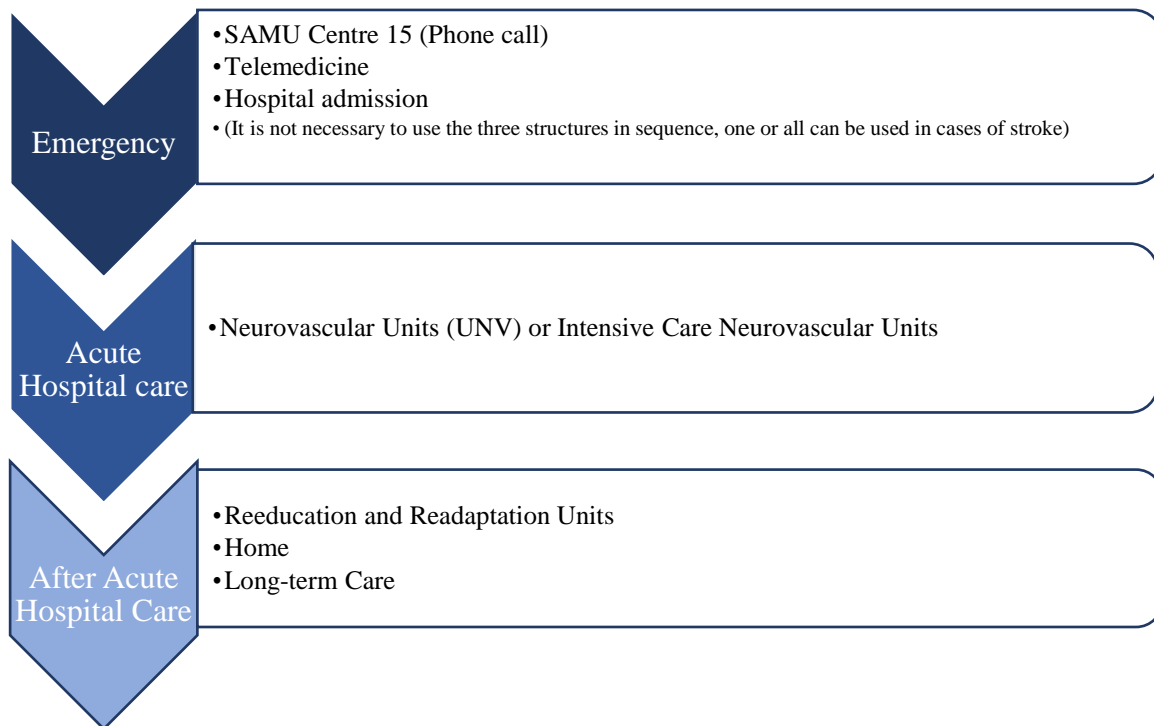
The rehabilitation is carried out in the Specialized Rehabilitation Centers (CERS) for diagnoses and treatments and have the following care: physiotherapy, speech therapy, ergotherapy, psychomotricity, neuropsychology, psychology, and physicians considering the impact of the disability on their functionality, as well as the clinical, emotional, environmental and social factors involved that provide a better quality of life [138].

The long-term care and end-of-life care are done, in large part, at the patient's residence, through a caregiver who can be a family member or a health professional according to the severity and complexity of the disability. The Palliative Care program includes different levels of patient care: home care, outpatient care, procedures in bed-day. In both cases, depending on the patient's health status, he/she goes to control consultations at a UBS, or a team of health professionals goes to his/her home for medical monitoring. If the patient cannot return home due to insufficient autonomy or a disadvantaged social, it is usual to be housed in nursing homes. Usually, the patient is carried to the hospital for the end-of-life last care [139].

3.3.4 Stroke Care Paths in France

In France, stroke treatment is carried out in acute care hospitals (either public or private for-profit or private not for profit) and in more specialized services called Neuro-Vascular Units (UNV). These units are reference centers that are labeled by the Ministry of Health. The number of Neurovascular Units increased from 33 in 2007 to 135 in 2014 [140], and the care is offered by medical and paramedical staff [113, 140]. The following resources should be available 24h/7d.: Imaging (MRI, scanner), cardiology (ETT, ETO, Holter), vascular (transcranial echo-doppler). The Haute Autorité de Santé (HAS) elaborates, with the relevant professional associations, guidelines for clinical practice (recommendations de pratique Clinique: RPC) for the professionals [141]. The Stroke Care Line has the following components shown in Figure 6 [113].

Figure 6– Stroke Flow in a Comprehensive Health Care in France

Emergency
- SAMU Centre 15 (Phone call)
- Telemedicine
- Hospital admission
- (It is not necessary to use the three structures in sequence, one or all can be used in cases of stroke)

Acute Hospital care
- Neurovascular Units (UNV) or Intensive Care Neurovascular Units

After Acute Hospital Care
- Reeducation and Readaptation Units
- Home
- Long-term Care

Source: [113, 141].

The Care organization is based on coordination between the UNV and the various emergency services: SAMU, firefighters, emergency reception, radiologists, neurologists, cardiologists, neurosurgery team, resuscitators. [113]. The composition of this team varies from place to place. The neurovascular units have specialized neurovascular physicians, nurses and nursing assistants, physiotherapists, speech therapists, occupational therapists, social service assistants, and psychologists' presence is recommended [142, 143]. Telemedicine is also a remote medical practice that is an emergency service that aims to benefit patients with treatment in a shorter period until the patient arrives at the emergency ward or the UNV [113].

Given clinical suspicion of stroke, the following tests should be ordered: it is recommended to take blood samples, an electrocardiogram should be performed; capillary blood sugar; blood pressure; the cerebral scanner makes it possible to distinguish a hemorrhage from infarction, and the MRI allows the detection of acute cerebral ischemia from the first hours and also providing prognostic elements. At the end of the clinical-biological-imaging assessment, the neurovascular team defines the therapeutic strategy: admission of the patient to UNV, admission of the patient to the neurovascular intensive care unit, thrombolysis, and in some cases, radio intervention therapy strategy [141]. There is no legal framework establishing the

rules for treating cerebrovascular accidents because the treatment of stroke is not a care activity subject to specific authorization. [142-144].
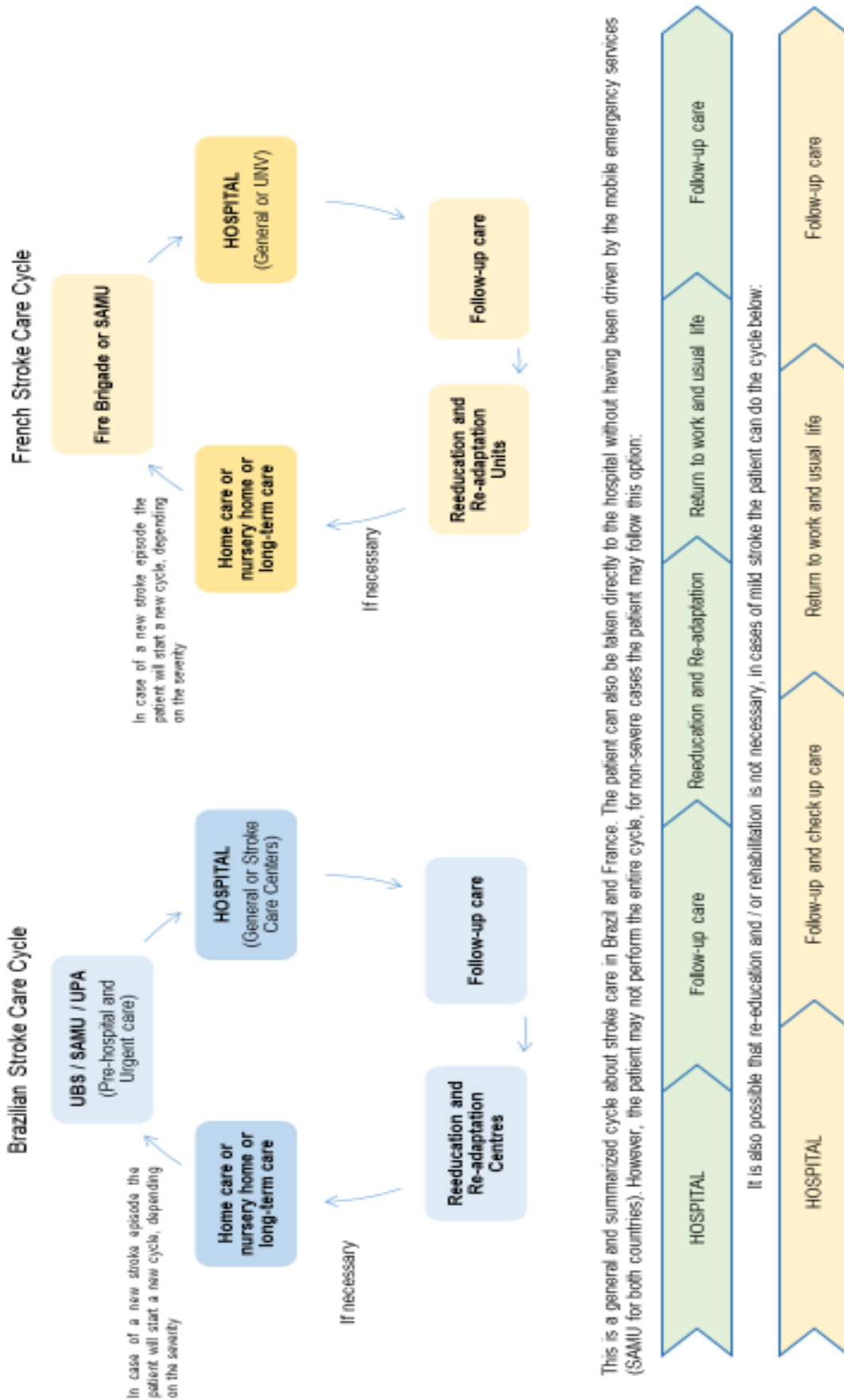
After acute stroke care, the patient undergoes an evaluation to start his personalized health recovery program and day-to-day activities [142]. The care is done in the Reeducation and Re-adaptation Units, which are neurological or geriatric, and have the following care: physiotherapy, speech therapy, ergotherapy, psychomotricity, neuropsychology, psychology, and physicians [113].

The rehabilitation is carried out in the Reeducation and Re-adaptation Units, which are neurological or geriatric, and have the following care: physiotherapy, speech therapy, ergotherapy, psychomotricity, neuropsychology, psychology, and physicians [113].

The long-term care and end-of-life care are done at the patient's residence, or home equivalent (home hospitalization - HAD) or in an institution, according to the severity and complexity of the disability. Also, in accommodation establishment for dependent elderly (EHPAD), specialized reception homes (MAS), nursing homes. If the patient cannot return home due to insufficient autonomy or a disadvantaged social, he/she can be referred to the health care structures. According to the needs they express, palliative care is based on support for the person and those around them to help them as best as possible. Hospital professionals, referring general practitioners, family, and relatives of the patient, participate in the patient's overall care [113].

Below the figure 7 shows the comparison of stroke care in Brazil and France.

Figure 7 - Stroke Care in Comparation

Brazilian Stroke Care Cycle

French Stroke Care Cycle

This is a general and summarized cycle about stroke care in Brazil and France. The patient can also be taken directly to the hospital without having been driven by the mobile emergency services (SAMU for both countries). However, the patient may not perform the entire cycle, for non-severe cases the patient may follow this option:

It is also possible that re-education and / or rehabilitation is not necessary, in cases of mild stroke the patient can do the cycle below:

Source: 4, 113, 131, 137, 138, 142, 143. made by the author.

3.3.5 Stroke Care Indicators

Table 8 shows a comparison of the risk factors indicators in Brazil and France. Table 9 shows a historic series between 2010 to 2016 about Acute Stroke Hospitalizations, Average stay, Hospital Deaths, and Hospital mortality rate from Brazil and France. Table 10 shows the prevalence[13] of stroke in Brazil and France from 2010 to 2017, by age group.

Table 8 - Risk factors indicators related to Stroke in Brazil and France, 2010 and 2016

|	2010		2016	
Risk Factors	Brazil	France	Brazil	France
Total alcohol per capita consumption, adults aged 15+ (liters of pure alcohol) (world average is 6,4 liters)	8,7	12,2	8	13
Physical Inactivity - adults aged 18+ (%). Recommended 150 minutes of moderate-intensity physical activity per week	48,6	33	47	32
Salt/Sodium intake - (g/day). Recommendation - 5 g/day salt or 2g/day sodium	x	x	10g	10g
Tobacco use - Current tobacco smoking, adults aged 15+ (%). Worldwide prevalence 20%	14.1	23,6	14	28
Raised blood pressure - adults aged 18+ (%)	40.0	42,7	23	29
Diabetes - adults aged 18+ (%)	9,7	6,8	8	8
Obesity - adolescents aged 10-19 (%)	x	x	9	7
Obesity - adults aged 18+ (%)	18,8	18,2	22	23

Source: [14, 145]

The risk factors are important for stroke control, so table 8 compares the risk factor indicators tracked by WHO in Brazil and France. Both countries are similar regarding salt consumption, diabetes, and obesity. France has higher alcohol consumption, tobacco smoking, and hypertensive adults. Brazil has a higher percentage of people who do not do physical activity [112, 146, 147, 148].

---

[13] Prevalence is the absolute frequency, that is, the simple counting of cases and refers to the total number of cases counted in a limited time and a certain place (Meneghel, 2015).

Chart 1 – Risk factors in comparation – Brazil and France

Risk Factors
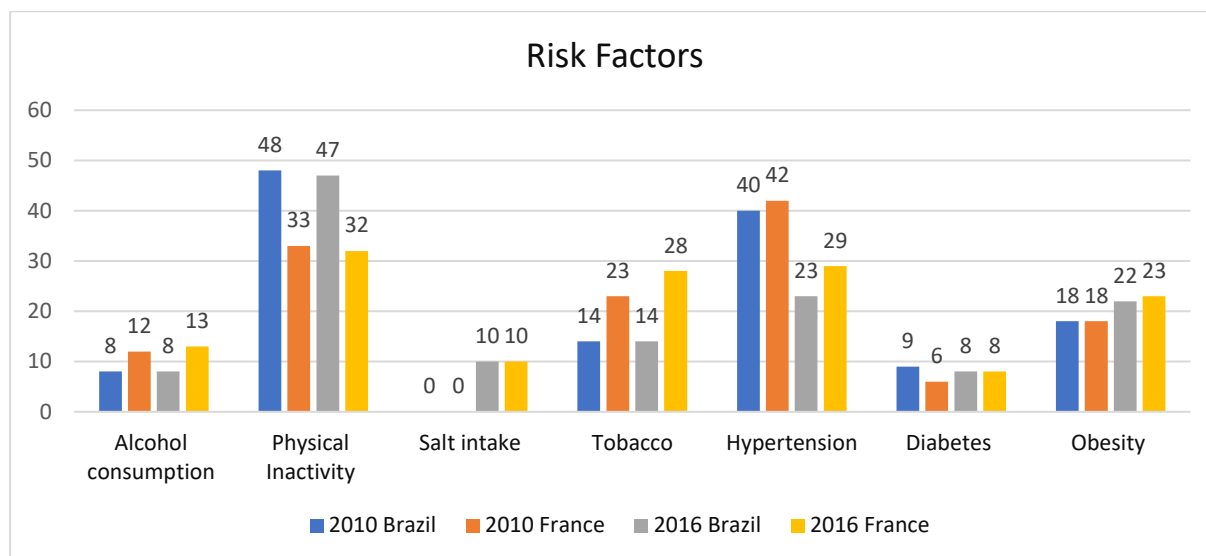
Source: Table 8.

About Acute Stroke Hospitalizations, shown in Table 9, on average, Brazil has 156.531 annual hospitalizations in SUS due to a stroke, which corresponds to 7.4% of the Brazilian population. France has an average of 107.887 annual hospitalizations, which corresponds to 16.10% of the French population, more than twice the Brazilian percentage. Similarly, Brazil has an average of 42.410 deaths per year from stroke acute hospitalization in SUS, which corresponds to about 2% of the Brazilian population. France has about 28.423 deaths per year from a stroke, which corresponds to 4.2% of the French population.

Chart 2 - Taux de prevalence d'avc aigü (%), par tranches d'âge au Brésil et en France - 2010 à 2017 (par rapport à la population totale du pays).


Taux de prevalence d'avc aigü (%)
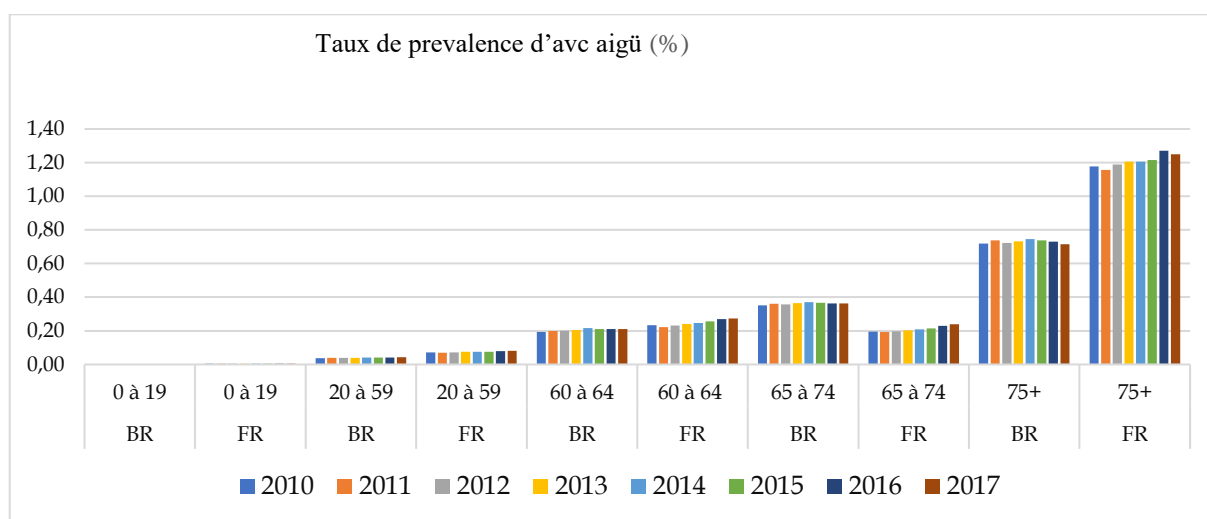
Source: Table 9

The prevalence of strokes by age group (table 10) shows that this rate has remained practically stable from 0 to 39 years old, even with population growth. This rate for the age group of 40-59 years old has been increasing in both countries, and for the age group of 60-79 and 80+ years old, the rate has been increasing in France and decreasing in Brazil.

Regarding the in-hospital mortality rate of acute stroke hospitalization, Brazil has an average acute stroke hospitalization mortality rate of 139 per 1.000 hospitalized. France has an average of 263 per 1.000 hospitalized people, which is higher than the Brazilian rate (table 10).

Chart 3 - Standardized death rate for stroke in Brazil and France (100,000 inhabitants / year), 2016 (reference population: world population)
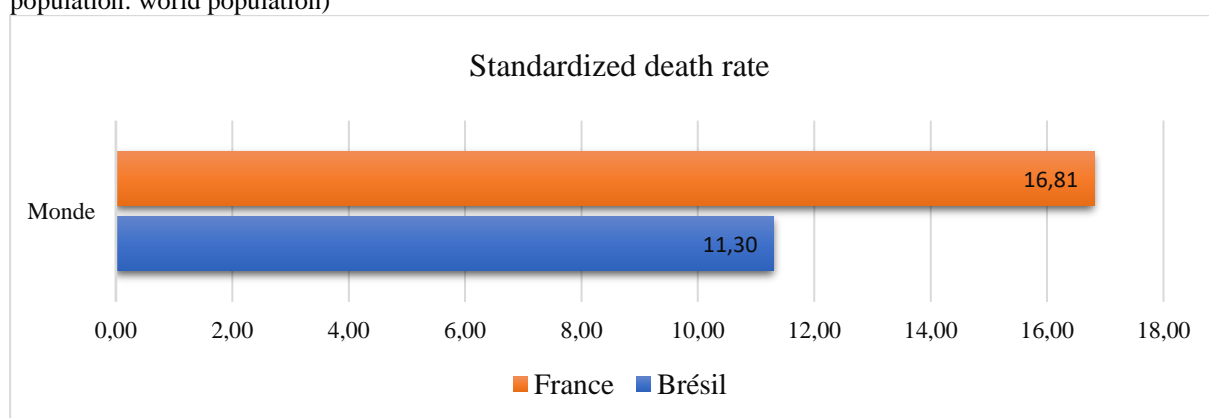
Source: Table 9 and 10 [73]

The average length of stay of acute hospitalizations for stroke is about 7.6 days in Brazil and 12.6 days in France (i.e., 61% higher). In Brazil, the treatment in the stroke centers was associated with reducing 2 to 10 days of hospitalization.

Chart 4 – Stroke average stay in hospital (Brazil and France)
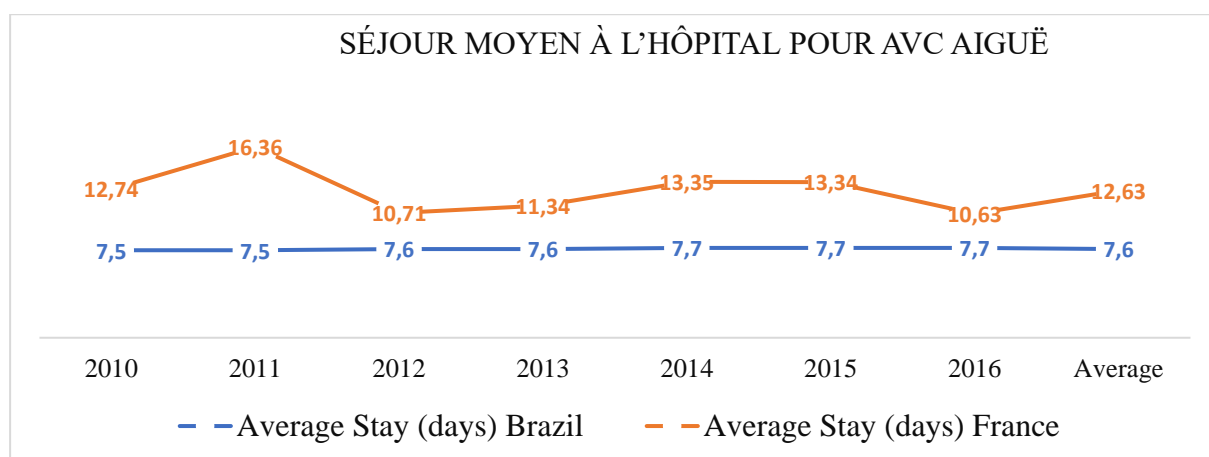
Source: Table 9

Table 9 - Acute Stroke Hospitalizations, Average stay, Hospital Deaths and Hospital mortality rate from Brazil and France, 2010 - 2017

Year	Acute Hospitalizations (total amount = prevalence)		Average Stay (days)		Hospital Deaths		Acute Hospitalizations rate per 1000 inhabitants		Hospital Mortality rate per 1000 hospitalized patients		Estimated Population (in thousands)	
	Brazil	France	Brazil	France	Brazil	France	Brazil	France	Brazil	France	Brazil	France
2010	116.633	101.982	7.5	12.74	20.018	28.559	0.59	1.62	171.6	280.	195.714	62.880
2011	124.143	101.359	7.5	16.36	20.944	28.529	0.62	1.60	168.7	281.4	197.515	63.222
2012	127.512	105.269	7.6	10.71	21.082	28.141	0.63	1.65	165.3	267.3	199.287	63.564
2013	133.930	108.514	7.6	11.34	21.406	28.495	0.66	1.69	159.8	262.5	201.036	63.894
2014	142.403	110.439	7.7	13.35	22.134	28.550	0.70	1.72	155.4	258.5	202.764	64.194
2015	145.276	112.188	7.7	13.34	23.388	28.391	0.71	1.74	160.9	253.	204.472	64.453
2016	149.333	115.460	7.7	10.63	24.154	28.301	0.72	1.78	161.7	245.1	206.163	64.668
Average	134.176	107.887	7.6	12.63	21.875	28.423	0.66	1.68	163.34	263.9	-	-

Source : [149, 150].

Table 10 – Stroke's prevalence by age group in Brazil (BR) and France (FR), 2010 to 2017 (total cases in a year by age group)

Year	0 - 9		10 - 19		20 - 29		30 - 39		40 - 49		50 - 59		60 - 69		70 - 79		80+	
	BR	FR	BR	FR	BR	FR	BR	FR	BR	FR	BR	FR	BR	FR	BR	FR	BR	FR
2010	154	425	634	422	1708	1236	4082	2836	11541	6943	23606	12579	34164	17768	41020	28890	34337	48495
2011	159	350	637	387	1731	1107	4274	2706	12305	6670	24843	12236	35828	18066	43149	27568	35913	49490
2012	187	392	686	403	1744	1196	4566	2807	12440	7025	25266	12830	37132	19607	42745	27843	36731	51848
2013	203	427	674	404	1832	1208	4648	2765	12520	7331	26227	13233	39087	20920	44458	28582	38147	53350
2014	189	383	721	403	1907	1197	4905	2693	13071	7270	27594	13602	41535	21956	46335	28767	39198	54492
2015	182	398	692	380	1870	1093	5008	2607	13133	7222	27642	13813	42492	23187	47218	29253	40194	55943
2016	176	403	692	393	1966	1143	5155	2839	13402	7297	28295	14629	44360	24966	48031	31017	41386	59154
2017	197	427	638	416	2040	1134	5174	2840	13661	7485	29060	14824	45477	25437	49229	32346	41515	58521
Total	1.447	3.205	5.374	3.208	14.798	9.314	37.812	22.093	102.073	57.243	212.533	107.746	320.075	171.907	362.185	234.266	307.421	431.293

Source : [149, 151] *BR= Brazil. FR = France.

3.4 DISCUSSION

This research is essential because several countries have programs for evaluating their healthcare systems based on data and indicators to know the quality of hospital and primary care, the whole system's performance, evaluate specific parts, allocate resources, compare results, and promote policies. In Brazil, there is an effort to evaluate its healthcare system through indicators. The OECD evaluates the economic policies of its member countries intending to compare healthcare systems. Although Brazil is not a member, the OECD seeks to include it in calculating some indicators. It considers Brazil as one of the largest economies, and there is a good representation of indicators calculated for Brazil. Thus, Brazil has its healthcare system compared to other countries, pointing out areas that can be improved and its good results [152].

Laws and policies guide every public healthcare system, so the core policies developed to follow the WHO recommendations are based on each country's experiences and health characteristics and its regions, but special attention is paid to risk factors. Brazil aims the health prevention and control of NCDs in comprehensive care through the modifiable risk factors: tobacco use, unhealthy diet, physical inactivity, harmful use of alcohol. France aims the stroke prevention and care strategy through a program of operational and regional actions on a National and Regional scale seeking improve the health promotion and prevention especially including population information about the urgent call in case of first symptoms of the "call reception and regulation center" (CRRA) in charge of classifying the requests for urgent medical assistance according to the priorities and available resources of his region and implementing the most effective solution for the patient. Both countries are focused on health prevention, but the strategies are different.

In Brazil, the law (ordinances) about stroke refers to the Clinical Protocols and Therapeutic Guidelines (including thrombolysis) and the criteria for qualifying hospital establishments as an Emergency Care Center for stroke in the Unified Health System (SUS) also, information of the potential risks and side effects related to the treatment. In France, the law reduces the frequency and severity of the functional sequelae and organizes the networks and standard care (prevention, acute care, rehabilitation, medico-social support).

There are no significant differences between policies and laws related to stroke prevention and treatment in both countries. Both countries develop health education campaigns for the

population which aim to recognize the first symptoms of stroke, seeking to publicize the importance of the care as soon as possible to avoid the consequences, sequels, and premature death from stroke. Brazil has the Emergency Care Centers for stroke patients, and France has the Neurovascular Units (UNV) but, all hospitals in both countries can admit victims of a stroke. In Brazil, in acute stroke events, the patient can be taken to the Basic Health Unities or 24-hour (UPA) or 24-hour Emergency Services or SAMU that will drive the patient to a hospital.

There is no pre-determined flow; SAMU can assist the patient if the event occurs on the street; for example, the patient can be taken directly to a hospital or an Urgent Care Center for Patients with Stroke. In France, the most common way is to call the fire brigade or the SAMU, that will transport the patient to the emergency department of the nearest hospital or a UNV if there is one nearby. The patient may also arrive at these different services by his or her means. If the patient arrives at a hospital without a UNV, they will receive first aid or even, in some cases, thrombolysis by telemedicine and then transferred to a hospital with a UNV. In both countries, it depends on the patient's location and who will call for help. The care after stroke is very similar for both countries.

In addition to stroke-oriented policies, both ministries of health have on their websites (Brazil[14] - France[15]) information about what a stroke is - how it occurs, signs and symptoms, risk factors, how to prevent a stroke, and how to call for help in the event of a stroke, emphasizing that time plays a special role in that case. About the campaigns for stroke prevention through health education for the population, mainly on the world stroke day on 29 October - date stipulated by WHO[16]. Moreover, on websites of patient's organizations and associations as France AVC (Association for assistance to patients and families of stroke victims) and the Société Française Neuro-Vasculaire (French Neuro-Vascular Society), which develops several campaigns for stroke prevention[17] in the last 15 years, there is information and explanatory videos about stroke. This study also found a petition for the health minister in France, in video form, asking

---

[14] https://saude.gov.br/saude-de-a-z/acidente-vascular-cerebral-avc /

[15] https://solidarites-sante.gouv.fr/soins-et-maladies/maladies/maladies-cardiovasculaires/accident-vasculaire-cerebral-avc/

[16] http://www.cespharm.fr/fr/Prevention-sante/Actualites/Archives/Campagne-radiophonique-AVC-agir-vite-c-est-important

[17] https://www.societe-francaise-neurovasculaire.fr/avc-nous-sommes-tous-concernes

for a national campaign aimed the stroke (the videos can be watched in full by following the links in the footnotes[18],[19]).

In Brazil, campaigns for stroke are developed by the Ministry of Health. They are also put into practice by organizations and associations such as Rede Brasil AVC (Brazil Stroke Network) and the Sociedade Brasileira de Doenças Cerebrovasculares (Brazilian Society of Cerebrovascular Diseases). Their campaigns aim to raise awareness about the individual risk of stroke and equip people to the maximum with information and prevention tools to save lives. T-shirts and pamphlets are distributed in these campaigns as videos[20], testimonials, and interviews are published (facebook.com/CampanhaAVC). Also, there are lectures for the population and programs on radio, television, newspapers, websites. Several "Walks," "Races," or "Bicycle tours" are organized throughout Brazil to Fight Against Stroke-(#correndocontraoavc). The campaigns are carried out in public places such as squares, parks, beaches, shopping malls, and the actions performed: guidance on stroke, warning signs, risk, and prevention factors and the rehabilitation: physio, speech therapist, occupational therapist. Also, doing nutritional and physical activity guidelines; blood pressure, blood glucose, weight, and height verification; radial pulse check (teaching the patient to check his pulse) "Check your pulse and protect your brain." In 2019, applications were released "Riscômetro[21] de AVC" (Stroke Riskmeter) and the AVC Brasil[22] (Stroke Brazil).

The annual hospitalizations by a stroke in Brazil, is 7.4% of the Brazilian population, while France has 16.10% of the French population, more than twice the Brazilian percentage. Similarly, the mortality related to stroke in Brazil 2% of the Brazilian population, compared to 4.2% of the French population. The reason for lower rates in Brazil, may be associated with the strong work of primary care. Brazil has a focus on health prevention, mainly on risk factors, which is facilitated by the healthcare system itself, where health prevention is carried out in

---

[18] https://www.facebook.com/PourUneCampagneDeSantePubliqueContreL.AVC/videos/266714574208426/

[19] https://secure.avaaz.org/fr/community_petitions/Ministere_de_la_Sante_Pour_une_campagne_de_sante_publique_contre_lAVC/

[20] https://www.youtube.com/watch?v=f5MddEk98JM&t=17s /
https://www.youtube.com/watch?v=NiB3YcVjmPM

[21] Making it possible for each person to calculate their stroke risk and monitor improvement with changing habits that lead to risk factors over time.

[22] Application with AVC warning signs, direct dialing to SAMU, or a pre-registered family member and location, by georeferencing, of local stroke centers (all centers registered in Brazil).

UBSs (Primary Care), for example: In 2015, SUS was registered 85.156.031 hypertensive people which recorded 32.667.882 GP appointments; 24.403.883 diabetic people which recorded 11.713.823 GP appointments; 433.277 assistance to alcohol users; accompanied in comprehensive care for health prevention and promotion, a total of 123.453.438 general practitioner's appointments. In other words, a total of 297.734.118 Brazilian families registered; that carries out medical consultations for health prevention or promotion. Brazil has 42.900 Basic Health Units facilities in operation with 42,600 Family Health Strategy teams, covering 64,6% of the Brazilian population in a Healthcare System free of charges, in what is known as primary care [112, 148, 146, 147, 153].

According to Starfield (1998), Primary Care is: "the provision of accessible and comprehensive care by clinicians who meet most health care needs, developing a sustainable partnership with their patients and practicing in the context of family and community". This has been used to measure the four main characteristics of primary care: first-contact access for each new need; long-term person-focused care (not only the disease); comprehensive care for most health needs and, coordinated care when it must be sought elsewhere [154].

The Family Health Strategy, implemented in 1994 in Brazil, linked to a Basic Health Unit (including GP physician, nurse, nursing technician, community agents, dentist, and nutritionist) was elected by WHO as one of the ten best health programs in the world for its effectiveness in controlling infant mortality and hospitalization for chronic diseases (hypertension and diabetes) [155].

The teams are responsible for knowing the reality of local families, identifying the most common health problems and monitoring the treatment to promote the quality of life of the Brazilian population and intervene in factors that put health at risks, such as lack of physical activity, poor diet and the use of tobacco and alcohol. It is characterized by a set of health actions, at the individual and collective level, which covers health promotion and protection, the prevention of diseases, diagnosis, treatment, rehabilitation, harm reduction, and health maintenance to develop comprehensive care that positively impacts the population's health

situation at all levels of health prevention - primary[23], secondary[24], tertiary[25] and quaternary[26] [156].

These health services are provided also "on the move" in their territory in an attitude of "active search" for the population's health problems, in an asymptomatic population, individuals who are at risk of developing a certain disease or disorder and who would benefit from further investigation, immediate preventive or therapeutic action. The active search is usually understood as: to seek individuals for symptomatic identification, as actions of epidemiological and sanitary surveillance, regarding compulsory notification diseases. The active search is mentioned in Brazilian legislation and technical health texts, in addition to being considered an assignment of all professionals of the Family Health Strategy in the National Primary Care Policy [157]. In this sense, it is a "proactive stance" - mapping health needs - in the face of the population's health-disease problems in a comprehensive health care practice beyond spontaneous demand, it is possible to interact and to see the individual in a holistic way aiming not only the appropriate treatment but an improvement in their quality of life [157, 158, 159].

The French Healthcare System there is no data on health prevention performed in medical offices. For example, about NCDs health prevention, the Assurance Maladie has published, in 2018, some results as: Relate to the primary or secondary prevention of cardiovascular risk, there is screening for chronic kidney disease in hypertensive and/ or diabetic patients (nearly 180.000 and 100.000 patients respectively) and clinical examination of the feet of diabetic patients. The optimization of prescriptions relating to antihypertensive drugs increased in 2017, in particular relating to the antiplatelet treatment with aspirin, the rise for antihypertensive drugs (252.000 patients), and statins (55.000 patients). Secondary prevention of cardiovascular risk (history of coronary artery disease) treated with statins and/or other medicines recorded a slight decline (-0.6 points). About promote the care of cardiovascular risk patients - primary or secondary prevention - the monitoring cardiovascular risk is on the decline, the surveillance of

---

[23] Actions aimed at preventing the occurrence of diseases before they development.

[24] Secondary prevention actions occur in situations in which the disease process is already in place, preventing or delaying the evolution of diseases through the execution of diagnostic and therapeutic procedures.

[25] Action implemented to reduce functional impairments in an individual or population resulting from an acute or chronic problem, including rehabilitation (eg preventing diabetes complications, rehabilitating post-infarction patient - AMI or stroke).

[26] Action detecting individuals at risk of excessive, diagnostic, and/or therapeutic interventions to protect them from inappropriate new medical interventions and suggest ethically acceptable alternatives.

patients on oral anticoagulant treatment goes from 79% to 77.2%, representing nearly 12.000 patients with less good follow-up. The diabetic patients have benefited from at least 2 HbA1c dosages during the year also decreased slightly (-0,2 points). Similarly, diabetic patients treated with metformin increased by 0.8 points. This report mentions the prevention of addictive behavior towards tobacco and alcohol but there are no results shown about this [160].

Primary Care in both countries is focused on health prevention and promotion through campaigns and policies but how both countries have established their primary care is completely different.

In Brazil, health prevention is a world reference, as the tobacco control policy (best program in the world). According to the Ministry of Health and WHO, after the program, there was a 46% drop in the percentage of smokers from 1989 to 2010. Brazil has been at the forefront of global tobacco control initiatives, one of the few countries to document important decreases in smoking rates and illegal consumption resulting from strong tobacco control policies (measures at the highest level of achievement: protecting people from tobacco smoke, offering help to quit tobacco use, enforcing bans on tobacco advertising, promotion, and sponsorship, and implementing health warnings to warn people about the dangers of tobacco use) [155, 161]. Visiting Brazil, Henning (2018), learned the continued research and advocacy policies to reduce tobacco use and, he also learned about the emerging work taking place to curb diet-related diseases like diabetes and hypertension. He said: "Brazil, a country known for its spectacular coastline, football prowess, and vibrant culture, has also become known in the public health community for its progressive action to prevent noncommunicable diseases" [162].

Regarding the average length of stay for stroke, Brazil has about 7.6 days, and France has an average of 12.63 days of acute hospitalization. The French hospital length of stay average is about 61% higher than in Brazil. In Brazil, the stroke centers' treatment was associated with a reduction of 2 to 10 days of hospitalization due to work carried out by the multidisciplinary team specialized within an average period of 7 days [163]. Usually, the reasons for a longer ALS (average length of stay) are different in case mix, age, access to the healthcare system, and duration to the transfer to the rehabilitation structures. The age structure partly explains this difference: in Brazil, a stroke occurs in the age group between 60 and 79 years (5.91/10.000 in Brazil against 4.47/10.000 in France) and, in France, the age group struck by stroke is people over 80 years old (15.16/10.000 in France against 12.25/10.000 in Brazil).

Another point that draws attention is the difference between both countries for stroke in-hospital mortality. Brazil has an average of 1.08, and France has 4.44 per 10.000 inhabitants. Although patients stay longer in hospitals in France, the Brazilian in-hospital mortality rate is lower. A hypothesis to explain this fact could be health prevention in the Brazilian primary care that improves the population's health. Primary care in health promotion and prevention is evident as long as researchers know how to distinguish primary care from other aspects of health services. Several shreds of evidence prove that primary care improves health and reduces health differences between different population groups in the same country. Starfield's research proves that the health of the population is better where primary care exists. Studies have shown lower rates for all causes of mortality, including stroke, influenced by the supply of primary care, and even wiped out the adverse effect of income inequality. All-cause mortality was lower, where the supply of primary care was greater [164, 165, 166, 167, 168, 169, 170, 171]. So, primary care is associated with improved health outcomes [179]. It was 2% lower for stroke mortality where the primary care resources were abundant and 1% higher where the primary care resources were scarce [154, 165, 171].

Starfield et al., suggesting that "in many urban areas, a great supply of primary care physicians does not ensure certain population subgroups' access to primary care" – people go to places such as hospitals, clinics, and emergency rooms, which do not emphasize primary care. Another point is copayment, which can restrict access to primary care because people can go to health facilities free of charges to pay, which do not provide comprehensive health care, only palliative care. It enabled us to examine the extent to which the receipt of better primary care is associated with better health. Policy characteristics were the attempts to distribute health services resources equitably (according to the extent of health needs in different areas of the country); universal or near-universal financial coverage guaranteed by a publicly accountable body (government or government-regulated insurance carriers); low or no copayments for health services; the percentage of physicians who were not primary care physicians; and professional earnings of primary care physicians relative to those of other specialists. The first important finding is that the practice characteristic[27] score was highly correlated with the policy characteristics score. That is, the adequate delivery of primary care services was associated with supportive governmental policies. The most consistent policy characteristics were the government's attempts to distribute resources equitably, universal financial coverage that was

---

[27] Operational definitions of these indicators and the Method of scoring them is described in Starfield, B. 1998. Primary Care: Balancing Health Needs, Services, and Technology. New York: Oxford University Press.

either under the aegis of the government or regulated by the government, and low or no patient cost-sharing for primary care services. [154].

The stronger the country's primary care orientation, the lower the rates of all-cause mortality, all-cause premature mortality, and cause-specific premature mortality from cardiovascular and other diseases. This relationship held even after controlling for various system characteristics (GDP per capita, total physicians per 1.000 populations, percentage of older adults) and population characteristics, including the average number of ambulatory care visits, per capita income, alcohol consumption, and tobacco consumption. The analyses estimated that increasing a country's primary care would be expected to reduce premature deaths [154].

This discussion was done to demonstrate how the Primary Care in Brazil manages to improve the health of the population so that the hospital mortality and the average hospital stay rates due to a stroke are lower than in France. After SUS, from 1991, the life expectancy of Brazilians went from 62.5 years to 75.8 years in 2016. This is the proof that SUS is effective in its results, through the growth of life expectancy in 13 years [70]. In France, between 2009 and 2019, the life expectancy of men went from 77.5 years to 80 years and for women the rate went from 84 years to 85 years. That means, in 10 years, the growth of 2.5 years in life expectancy is observed for men and one year for women [203]. In Brazil, there is a process of accelerating the aging of the population (which took about 115 years to happen in France, will happen in 21 years in Brazil), and in 2030 the Brazilian population over 64 years of age will be more numerous than the population of 14 years, as indicated below in the estimated demographic growth, made by the United Nations, in France and Brazil.
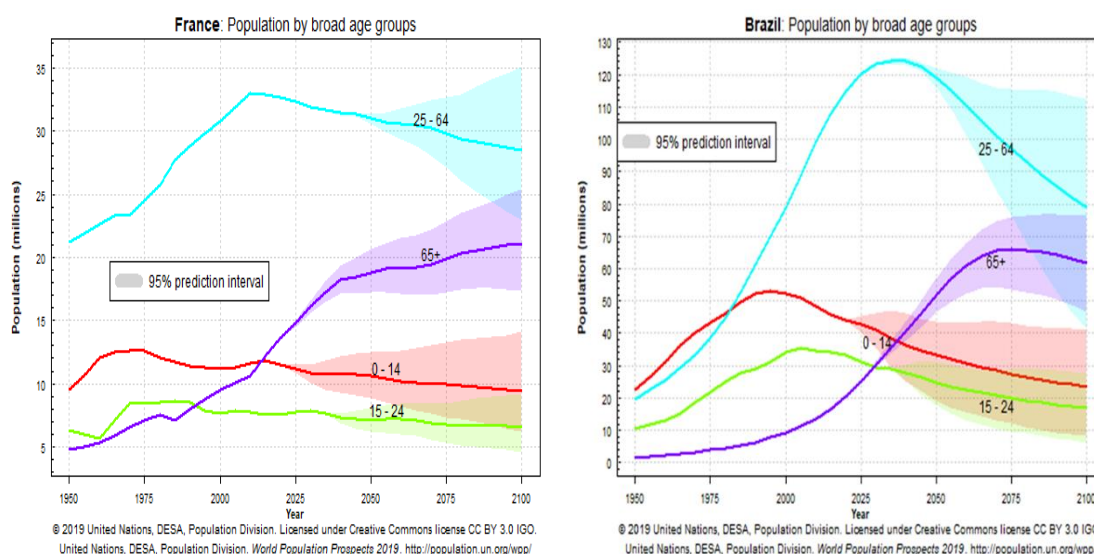
The high levels of social inequality in Brazil do not impact the difference between France and Brazil. In France, social inequalities are lower, which leads to a better distribution of income for the population as a whole, which generates better living conditions as longer life. In Brazil, the Inequality-adjusted HDI (IHDI)[28] is 0,574, while in France, the same rate is 0,809 (the closer to 1, the better the index). In Brazil, the income share held by the richest 1% of the population is 28.3 (means that 1% of the population owns 28,3% of the country's income), while in France, this index is 10,8 and, to the Income share held by richest 10%, in Brazil it is 41.9 (10% of the population owns 41.9% of the national income) in France, this index is 26.6. 11% of the Brazilian population has about 70% of the country's income [172, 173]. To alleviate these inequalities, SUS offers all its services free of charge, including consultations, medications, transportation, hospitalizations, surgeries. Such user fees would probably not have been instituted in most countries had equity considerations been high on the health agenda. Countries adopting a universal health system without any user fees, such as Brazil, have effectively removed inequities in access to first-level health facilities [174]. Without the primary health care policy in Brazil, the health indicators would be worse. It has been proven, through several studies, the positive influence of SUS' Primary Care to improve the health of Brazilians and the strengthening of primary health care as an engine for reducing inequalities and preventing and promoting health [175-178].

France has a health system that is also universal, but with co-payment rates, which is not the case in Brazil. This factor can repress the demand for health services since one must pay for health services reimbursed à posterior by Assurance Maladie and the private insured (Mutuelle - for those who own it). There is an exemption from payment for a certain segment of the population, which does not have the financial resources to cover this co-payment. However, studies show that 1 in 3 French people forgo health care because they consider the payment "out-of-pockets" (reste à charge) too high. The survey revealed that 38% of French people did not have the financial resources to pay GP Office's fees and expenses; 29% said that their Mutuelle does not reimburse them sufficiently; about 18% said they have difficulties paying health care fees; 58% look for only sector 1 generalists (cheaper fee); 49% do not buy medicine if they already have it at home and, 38% ask for prescribed then only generic medicines or those

---

[28] The IHDI combines a country's average achievements in health, education, and income with how those achievements are distributed among the country's population by "discounting" each dimension's average value according to its inequality level. Thus, the IHDI is the distribution-sensitive average level of human development.

that are reimbursed by Assurance Maladie. Many reports the difficulty of obtaining an appointment within an acceptable time limit and 25% claim the lack of doctors nearby. However, there is good access to the general practitioner, with the largest weight going to specialized and expensive care, prevention, dentists, and ophthalmologists [179, 180].

3.5 CONCLUSION

No significant differences were found about the health policies and the National Health Plans related to stroke. However, the data directly linked to the period of hospitalization differed substantially between countries. Subsequent studies can be implemented to identify the explanatory factors, notably among the risk factors and actions in primary care and the moments after hospital care, such as secondary prevention and palliative care. This research can collaborate to improve the healthcare systems and health policies of both countries in stroke care.

4. HEALTH CARE COSTS

The fourth chapter presents the in-hospital costs in both healthcare systems due to stroke hospitalizations, as proposed in this thesis's fourth and last objective. This research does not intend to deepen the discussion about the concepts and types of costs; however, a broad and generic explanation on the topic is necessary. The relevance of cost information is in the relationship between costs and the guarantee of rights. Holmes and Sunstein (2000) highlight that "rights" cannot be protected or applied without public resources, and these "rights" have costs, including the right to health (not restricted to social rights as the provision of goods and services by the State). It is necessary to allocate public resources, so it is important to know how much of the public resources are necessary to guarantee the rights and manage these resources better so that the results of implemented policies (effectiveness) are optimized [181].

The correct information is the most important because wrong and skewed information lead managers to make inappropriate decisions, even if they have the best cost-finding technique [182]. In the health sector, knowledge of the costs of procedures and the main products are essential to support decisions that promote hospitals' financial stability and national healthcare systems [181].

It is not intended to deepen the discussion on all types of costs that exist (direct cost; fixed; variable; indirect; marginal; unitary; non-operational; operational), only to explain clearly and simply some concepts for the better understanding of the results that are presented following, and the relationship between the results and health indicators. It is also necessary to distinguish between costs and expenses because the difference between these concepts is often not clear. The cost is also an expense. The expense is recognized as a cost when the production factors are used to manufacture a product or perform a service. Thus, the concept of cost refers to the valuation of all resources used in producing a good or service, whether they are people, equipment, consumables, water, electricity, and physical space, among others. In the health field, the term cost information refers to knowledge of the costs of providing goods, actions, and services, policies, programs, and the maintenance of health facilities. It is a meta-information that describes the information as a summary of others, presenting answers to questions about how and how much resources were consumed in the processes. From these data, it is possible to propose measures to improve health services [181].

There are several forms of cost appropriation presented in the specialized literature. However, there is still no consensus among the authors on the nomenclature used for such methods. Therefore, the methods most used by health institutions for cost management are presented. The institution is responsible for analyzing and deciding which is the most appropriate method to achieve its objectives. The methods are not exclusive and can be used mutually.

Table 11 below shows the differences between the most used methods.

Table 11– Usual methods for calculating costing in organizations

Costs	Method
Absorption	It fully appropriates all costs (direct, indirect, fixed and variable) to the final products / services. That is, all expenses related to the manufacturing effort or all expenses for a service are distributed to all products / services.
Direct or Variable Costing	It separates the variable costs and fixed costs, being appropriate to products and services only costs that vary with their volume of production. The fixed costs are considered expenses for the period, and their values are allocated directly to the result. It is generally used for managerial purposes as a tool to assist management in making decisions.
ABC Activity-Based Costing	Analyzes the activities carried out within the institution and their respective relationships with cost objects. The basic principle of this system is to make as many proportional and non-proportional costs as possible through cost drivers. It is a costing system that is still very new and little tested. ABC costing is suitable for complex organizations, where products consume resources in a very heterogeneous way.

Source [182]

Implementing a cost system allows estimating the costs involved in service, generating results represented by the adequate use of resources [183]. Health cost management can be defined as the application of a set of methods and techniques of planning, monitoring, and evaluation to the management of health establishments, the administrative units of the system, and the national health system as a whole, in order to improve its performance, having as fundamental inputs in this process the information on the use of resources and the costs of goods and services offered to the population.

4.1. Health Care Costs in SUS, Brazil

The cost allocation method adopted in SUS is absorption Costing because it identifies the real costs of the final products or services and fully appropriates all costs to the final products/services. It is the most used among institutions linked to SUS. Another important factor is that its calculation is possible based on the institution's segmentation into cost centers.

Thus, in hospitals, segmentation into specialized areas is easily identified, such as hospitalization, operating room, laundry, nutrition, administration, laboratory. The cost must absorb variable costs (the amount is affected by the quantity produced) the fixed costs (not affected by the produced). This costing method allows allocating the expenses of the organization's central administration to the other units. This method applied in health establishments, such as hospitals and emergency care units, makes it possible to know the unit's total cost, by cost centers, by cost item, and by the average cost of care or the patient. With the adoption of the absorption costing method, it is possible to know the total cost of the operating room and the patient's average cost without differentiating it by the type of surgery to which he was submitted. The costs can be estimated and compared with the final service costs.

The absorption costing system controls the cost and performance of the entity and the cost centers, comparing the estimated costs with the budgeted values. It will generally indicate when the institution's costs will exceed the budgeted amounts. This methodology is reliable. It allocates all costs to the final products/services; ensures a unitary view of each service's total cost, provided that all costs are absorbed [181, 184].

The National Cost Management Program (PNGC), which was created through a technical manual prepared by the Ministry of Health in 2005, has as main objective the generation, improvement, and dissemination of cost-relevant information. PNGC provides a standardized methodology and specific information system and technical support in all phases of the implementation of cost management for all SUS entities [185]. The PNGC helps managers to prepare the budget based on the calculated costs, to plan the resources available in health services (improve the use of installed service capacity and optimize the use of resources; analyze the performance of establishments, services, and networks assistance to ensure greater access to more adequate costs); in decision-making and in the adoption of reasonable measures to reduce costs, without negatively impacting the quality of the service (increasing efficiency without jeopardizing effectiveness); estimate the final value of a new service and procedure, decide on the investment in new health procedures, clearly identify the cost centers that consume more resources than planned, and detect waste [183, 186].

Table 12 shows the cost management through the Cost Centers and their groups, which may vary according to each health institution's specificity and/or interest, but this is a general idea of how it works.

Table 12– Cost Management in SUS (Resource Allocation by Cost Center and its groups)

Cost Center	Groupes	Activities
Administrative Cost Center	Administration Group	Administrative and management activities (advisory, planning, financial: medicine, nursing, risk management, cost management, superintendence, HR management, accounting, billing and treasury)
	Computer Group	Computer activities (customer and network support area, systems development, support and production)
	Condominium Group	Costs related to infrastructure (security, telephony, waste collection, elevators and transport)
	Supply Group	Inventory control and input supply activities (warehouse, shopping, pharmacy, chemotherapy, parenteral nutrition and medical gases)
	Engineering and Maintenance Group	Engineering and maintenance activities (boiler, clinical and civil engineering and infrastructure and maintenance)
Intermediate Cost Center	Assistance Support Group	Assistance support (physiotherapy, psychology, social work, speech therapy)
	Surgical Center Group	Activities in the operating room (anesthesia, operating room, post-anesthetic recovery)
	Obstetric Center Group	Surgical activities of obstetrics
	Image Group	Imaging area (bone densitometry, echocardiogram, mammography, nuclear / radioisotope medicine, hospital and outpatient radiology, magnetic resonance, computed tomography, ultrasound)
	Laboratory Group	Laboratory activities (specialty laboratory, clinical analysis, pathological anatomy)
	Graphic Methods Group	Graphic activities (electrocardiology, electroencephalography)
	Special Procedures Group	Examinations and/or treatments -high degree of complexity and specialization (hemodialysis, digital angiography, cystoscopy, ergometry, exercise test, treadmill, blood center - exams, collection, blood bank, transfusion agency, radiotherapy, urodynamics, gynecological cystocoscopy, vectorcardiogram)
	Intensive Care Unit Group	Intensive and semi-intensive hospitalization activities (adult, pediatric, neonatal)
	General Support Group	General support to all other cost centers (sterilized material center - CME, laundry, cleaning, linen and sewing)
	Group Technical Commissions	Technical commissions (hospital infection, ethics, death, others)
	Teaching Group	Teaching activity and medical residency
	Nutrition Group	Nutrition and diet activity (milk bank, lactation, enteral/parenteral diets, dietary nutrition)
	Medical and Statistical Archive Group	Medical file activity and hospitalization statistics
Final Cost Center	Ambulatory Group	General and specialty outpatient clinics (medical and non-medical)
	Nursery Group	Nursery-related costs
	Inpatient Group	All inpatient units (surgical, gynecological, medical, obstetric, pediatric, orthopedic, psychiatric, private / health insurance), except nursery and ICU.
	Urgency and Emergency Unit Group	Urgent and emergency care (emergency room; adults and children
External Cost Center	External activities, services and demands	They are centers that receive the costs of activities or services provided to patients not linked to the hospital (external demands).

Source: [184, 186]. Made by the author.

A cost management system distributes the costs among the various administrative and intermediary cost centers to the final cost centers. Administrative costs are apportioned to other cost centers. Intermediate cost centers provide services and support other cost centers, and their costs are passed on to the other centers through apportionment criteria. The final cost centers absorb the administrative and/or intermediate cost centers' costs, and their costs are passed to the product or service provided. In the absorption costing method, the final product absorbs all the costs involved in the production process. Thus, to proceed with the reciprocal allocation of costs from administrative and intermediary cost centers to final cost centers, it is necessary to use a sequence of assessments carried out between cost centers. By classifying the cost centers, the segmentation in specialized areas of the entities is easily identified, such as laboratory, ward, nutrition service, administrative services. The composition of cost centers must be under the organization's strategic planning [185]. For satisfactory results, the cost centers must have a relationship network among departments to facilitate the allocation of their expenses. There is reciprocal participation between the non-productive cost centers. This fact is considered before making the final apportionment among the cost centers [187], which allows the cost information to be used in decision making from a more macro perspective. It has less complex implementation [181].

SUS uses care parameters, historical value series, and services to ascertain the real costs of services, especially high-cost ones such as oncology and organ transplants, or widely used services such as immunobiological. The payment to SUS institutions is made by a "package" of services; as it is national, the gain in scale greatly reduces the values (for example, the purchase of vaccines, medicines, technological equipment) [184].

To calculate the average cost, as the cost of hospitalization, the SUS does so by specialties, in a given geographic space, in the year considered. The hospitalization indicator shows the information on the distribution of hospital admissions performed, according to the classification adopted in the Ministry of Health tables for purposes of payment in SUS. Thus, SUS's average value of resources in the provision of hospital care and the specialties provided is expressed. Variations may occur due to the relative frequency of the types of service as they have differentiated remuneration. The classification of hospital services provided by SUS and the remuneration values are shown in tables adopted by the Health Assistance Secretariat of the Ministry of Health [186, 188].

The method of calculating the average value of hospitalizations in SUS is shown below:

$$\frac{\text{Value of expenditure on hospital admissions in the specialty}}{\text{Total number of hospitalizations in the specialty}} \times 1{,}000$$

The available data come from the SUS Hospital Information System - SIH / SUS, managed by the Ministry of Health, through the Health Assistance Secretariat, in conjunction with the State Health Secretariats and the Municipal Health Secretariats, being processed by DATASUS - SUS Computer Department, from the Executive Secretariat of the Ministry of Health. The Hospitalization Authorization (AIH) is the document to identify the patient and the services provided under the hospitalization regime and provide information for the Hospital Information System's management. It is generated when there is an admission to a public or private hospital, and it is through this document, the billing of hospital services in SUS is made feasible. AIH is issued exclusively by SUS, with its numbering. There are two types of AIH: Initial AIH - for initial hospitalization and continuity AIH (long stay - for psychiatric cases and patients under long-term care. Hospitals participating in SUS (public or private insured) send information on hospitalizations made through the AIH electronically (online transmission). This information is processed in DATASUS, generating the main information, and forming the Database of hospital admissions in Brazil. SIH/SUS collects more than 50 variables related to hospitalizations: identification and qualification of the patient, procedures, examinations, medical acts performed, diagnosis, the reason for discharge, amounts due. [187].

SUS has two perspectives for applying cost management: 1) the macro view of a SUS manager at the federal, state, and municipal levels and, 2) the micro view of health unit managers. In the first perspective, cost management is materialized by making decisions about national health policies and programs and establishing administrative measures that impact the SUS, whether at the national or local level. Cost information is crucial for preparing and monitoring management contracts, dimensioning the resources, and deciding on more efficient remuneration models for reimbursement of services for establishments. It can also be used to support the adoption of incentives to promote efficiency in using resources [181].

For calculating and analyzing costs, the Ministry of Health and DATASUS developed software called APURASUS, which optimizes in a standardized and structured way the calculation and

management of health costs [185]. The APURASUS considers each health institution's specificities, automatically calculating the reciprocity between the non-productive cost centers and transfers the total cost of these centers to the productive ones by inserting or transferring the date [187].

In its Charter of Rights of Health Users, SUS describes that it is the citizen's right to have resolutive service with quality, including information on the cost of the interventions from which he has benefited. The Organic Health Law (n°8,080, September 1990) already presented the need to elaborate on technical norms and establish quality standards and cost parameters for health care. The Ministry of Health, the National Council of Health Secretaries (CONASS), and the National Council of Municipal Health Secretaries (CONASEMS) have sought to define methodologies, instruments, and information systems for calculating costs that allow the estimation of financial resources for the global costing [189].

4.1.1 Health Care Cost in National Health System in France

In 1982, the French Ministry for social affairs introduced the Diagnosis Related Groups (DRG) system (or associated diagnostic groups) as a method for financial regulation and hospital management, classifying hospital admissions through "Groupes homogènes de malades" (GHM) as part of the medicalization program of the information system (PMSI). The GHM enables to describe the short-term activity and compare the productivity of the establishments among them, observing hospital production based on the patients' characteristics and the health care service [190].

After 2004, GHM started to be used as a payment form to activity-based pricing (or T2A) in public and private hospital sectors, establishing an incentive for cost efficiency (linking the revenue to activity), measured by its production in the length of stay classified in GHM, and the establishment of a national tariff applicable to all healthcare establishments. The State as the sole payer, through Assurance Maladie, imposes a single tariff in the territory and a macroeconomic regulation of hospital expenses [191].

A National Cost Study (ENC in French) is carried out in annual surveys by the Agence Technique de l'Information sur l'Hospitalisation (ATIH) over the fields Medical-surgical-

obstetric (MCO), Follow-up and Rehabilitation Care (SSR in French) et Home Hospitalization (HAD in French) to find out the costs of health services. The goal is to produce a cost benchmark for each of these fields and calculate the costs of hospitalization per stay for MCO by an anonymous weekly summary (RHA in French) for full hospitalization and RHA for partial hospitalization for SSR, by sequence for HAD. These surveys take place through voluntary establishments or those selected (recruitment process governed by decree n° 2016-1273 of September 28, 2016) relating to the National cost studies (article L. 6113-11, of the public health code). Participation implies a commitment from the establishment via an agreement and a quality charter over nearly three years. From the collection and analysis of these data, the consolidation of the data set on individual costs is made, which are used to build a national cost reference [192].

The ATIH's mission is to manage the financing system of the health establishments technically, contribute to the monitoring and financial and medico-economic analysis of these, and calculate the rates and costs of services [193]. The average value per GHM defines the establishment's tariffs and is calculated from the ENC database, bringing together three or four years of cost data collection. For example, to know the tariff for the year 2009, data from 2006, 2007, 2008, and 2009 were used, updating the costs before 2009 according to a rate calculated by aggregation of activity [194]. According to the medical classification in GHM for MCO, GME for SSR, and GHPC for HAD, the national average costs are given according to the medical classification. A national cost is then produced using an adjustment process using national data collected by PMSI [195].

To facilitate this process, the institution must rely on the Activity Tree as defined by the analytical tree available on the ATIH website, which presents the tree structure of analysis sections (SA). It covers all of the activities potentially present in a healthcare facility. The analytical principle underlying the rules defined for the ENC is that of homogeneous sections. That consists of dividing a structure into analysis sections. Each of them comprises a grouping of means contributing to the same goal and whose activity can be measured by a Unit of Work (UO in French) [192].

The UO measures the output of the activity of an analysis section. The UO per SA for the part not assignable to the stay is the day of hospitalization. The ENC has Clinical Analysis Sections (SAC in French) for each complexity of health care. For the MCO, the Clinical Analysis

Sections are defined based on the clinical services supporting patients in full hospitalization or partial hospitalization. These SAs, therefore, cover all the care activities carried out in health establishments as part of the short stay, regardless of the terms of care. These activities result in the production of Medical Unit Summaries (Résumés d' Unité Médicale - RUM in French) in the PMSI. Resuscitation activities are the only SAs to give rise to the production of Medical Unit Summaries (RUM) in the PMSI and medico-technical acts within the unit. The establishment relies on the analytical tree to create as many SAs as necessary, depending on the specialties and care modes [192].

For the SSR, the clinical analysis sections are defined based on the clinical services supporting patients in full hospitalization (including hospitalization during the week), part-time day and night, and the sessions. Therefore, they cover all the care activities carried out in the structures for all the care modes. The establishment relies on the analytical tree to create as many SAs as necessary, depending on illness treated, the health care services, and the patients' age [192].

At the end of each ENC campaign, ATIH publishes the average costs: during the stay, by homogeneous patient group (DRG/GHM) in MCO; by the day, by medico-economic group (GME) in SSR; by the day, by homogeneous care group (GHPC) in HAD; by the day, by a group of residents in EHPAD. The costs considered include, in addition to operating expenses, overheads, and capital costs. Teaching and research remain excluded from DRGs; other activities, for example, psychiatry, are not yet considered. The cost structure differs between public or private non-profit hospitals, known as ex-DG (global endowment), and private for-profit clinics, known as ex-OQN (national quantified objectives) [194].

Certain direct and indirect costs linked to the establishment's operation, such as energy costs, cleaning, works, restoration, are prorated and allocated to the activity considered to be closest to this service. For each section of the study, a unit cost of the UO is calculated by dividing the total of the residual net expenses of the section by the total activity, measured through the UOs [192], as shown below:

$$\text{Unit cost of the UO} = \frac{\text{net residual charges of the section}}{\text{total activity of the section}}$$

The costs are then transferred to the stays/sequences in proportion to the number of UO consumed, as shown below:

$$\text{Transfer} = \text{UO Total from each stay/sequence} * \text{UO unit cost}$$

Table 13- Cost Management in FNS through DRG and their Groups

Sector	Groups	Activities
MCO Analysis sections	SAC*	The SACs are allocated the share of the expenses of medical, nursing and other personnel contributing to their activity, medical expenses and other expenses related to the operation of these accommodation units.
	SAMT	Emergencies; SMUR; laboratories for biological medical analyzes (biochemistry, immunology, microbiology, etc.) and anatomy-pathology; operating theaters (surgical unit, obstetrical unit, pediatric unit, ambulatory unit, etc.); imaging (radiology, ultrasound, MRI, etc.); anesthesiology (including the recovery room or post-intervention monitoring room - SSPI); rehabilitation/re-education; functional explorations; the hyperbaric chamber; radiotherapy; protected brachytherapy rooms; dialysis; possibly other medico-technical activities carried out in the establishment (according to their mode of operation: internal, subcontracting, groups).
	LM LGG STR	Hospitality and general charges must be allocated within the Logistics and General Management (LGG) sections; the Medical Logistics (LM) sections - the operating costs of the pharmacy service to the consumer sections and stays; operating costs of the biomedical engineering service at consumer sections and stays; Restoration; Laundry; Administrative services (general character and related to personnel); Reception and management of patients; Upkeep-maintenance; Information System Department (DSI) (charges related to medical and medico-technical; DIM Department of Medical Information Service), the activity of professionals (doctors and technicians) for the processing, management and control of medical information and its analysis; Motorized patient transport (excluding SMUR); Stretcher and pedestrian transport of patients.
SSR Analysis Sections	SAC**	Staff costs (medical, nursing and other personnel contributing to their activity), expenses of a medical nature and expenses of other nature related to the operation of these accommodation units
	SAMT RR Plateaux	Staff costs (excluding RR personnel), medical expenses and another nature related to the operation of these platforms
	SAMT RR Professionals	Staff costs dedicated to the rehabilitation activity (employees of the SSR structure, temporary staff, liberal workers billing per shift)
	SAMT	Imaging (radiology, ultrasound, MRI, etc.); biological medical analysis laboratories; functional explorations (cardiac, respiratory, neurological, urodynamic); other medico-technical activities carried out in the establishment; medical charges and charges of other nature linked to the operation of these medico-technical platforms.
	LM LGG STR	Hospitality costs and general nature must be allocated within the Logistics and General Management (LGG) sections, and where applicable, to the Medical Logistics (LM) sections - the operating costs of the pharmacy service to the consumer sections and to the sequences; operating costs of the biomedical engineering service to consuming sections and sequences; etc.
HAD Analysis sections	SAMT Intervenants ***	Exclusively staff costs, whether the worker is an employee, temporary freelance worker or made available to the establishment
	SA Intervenants transport	Charges relating to carrying out rounds to the homes of workers' patients (staff corresponding to the transport phase of salaried and liberal workers; operation and maintenance of the vehicle fleet dedicated to rounds of workers; kilometer reimbursements paid to salaried workers using their personal vehicle when carrying out their rounds; for liberal workers: the amounts indicated on the invoices)
	SAMT	Imaging (radiology, ultrasound, MRI, etc.); biological medical analysis laboratories; functional explorations; other medico-technical activities carried out in the establishment. Charges of a medical nature and charges of other nature linked to the functioning of these trays
	LM/ LGG/ STR	The maintenance and delivery activity of pharmaceutical specialties, consumables and equipment installed at the patient's home, whether this is carried out by salaried staff of the structure or by subcontractors.

Source: [192]. Made by the author.

*Specificities on resuscitation: The UO for resuscitation SACs for the charges of medical and nursing staff is the omega. It is used to transfer the charges of medical personnel, on-call duty and nursing staff onto the RSA. The omega results from a calculation that takes into account the length of stay in intensive care, as well as the specific procedures performed to intensive care. This calculation is detailed in the instruction document published on the ATIH website.

**The SACs' UO for the Nursing Staff is the SIIPS point (Individualized Nursing Score to the Caregiver). It is used to dump the charges of nursing staff on the RHAs.

***This section only concerns DAF/ex-DG establishments. In fact, in OQN/ex-OQN, the activities of consultations and outpatient care are the liberal activity of practitioners. All charges incurred by establishments in this regard give rise to reimbursement within the framework of the fees.

Table 13 shows the cost management through the ENC, but the frame does not represent all DRG complexity, it is just a way to show an idea about this costing system.

The Clinical Analysis Sections (SAC) are defined based on the MCO clinical services supporting patients in full hospitalization or partial hospitalization. These SACs, therefore, cover all the care activities carried out in health establishments. These activities result in the production of Medical Unit Summaries (RUM) in the PMSI. Resuscitation activities are the only SACs that produce both the Medical Unit Summaries (RUM) and medico-technical acts within the unit in the PMSI. The institution relies on the analytical tree to create as many SACs as necessary, depending on specialties and support methods. Activities benefiting from specific funding must be distinguished as intensive care in neurovascular units and outside neuro-vascular units; the neurovascular unit outside intensive care; continuous pediatric and non-pediatric surveillance; neonatology without intensive care or with intensive care; the interregional secure hospital unit; the Short-Term Hospitalization Unit (UHCD); palliative care units (the list will be updated annually on the ATIH website, and it is mandatory only if the establishment has a unit dedicated to it). The establishment has the possibility of having a finer division than what is proposed there insofar as it can follow its loads in the same way [196].

The ATIH provides two software for the transmission of data, which the participating institution must use: ARCAnH (Assistance in the Realization of Hospital Analytical Accounting): allows the entry of accounting data according to the ENC methodology and; ARAMIS (Anonymized Collection of Medical Data and Stay Information): allows the anonymization of the monitoring files of loads and units of work during the stay and PMSI files [192].

4.2 METHOD

SUS has made strides in data collection and preparation of information related to epidemiological surveillance, health care, and health units' production. Information systems such as the Mortality Information System (SIM), the SUS Hospital Information System (SIH), and the SUS Outpatient Information System (SIA) are recognized for their usefulness, reliability, and national coverage [181]. The data were collected from the websites: DATASUS (official health information system in Brazil) and ATIH (website containing information on hospitalization in France) for the costs and the average cost of acute hospitalizations by stroke.

In Brazil, the costs express the value of resources spent by SUS in the provision of hospital care, and the processing of information is performed centrally by DATASUS (https://datasus.saude.gov.br/). The acute hospitalization's information is available on the financial resources allocated to each hospital that integrates SUS, the volume of hospitalizations /month, the principal diagnosis of hospitalizations, the procedures performed, the number of beds for each specialty, and the average time patient's stay [141]. As shown below:

The hospital sends the information by Hospitalization Authorization (AIH), and this information is processed by DATASUS, generating credits for the services provided, and forming a valuable database. The entire public system uses a single price list (historical average of all invoices submitted by service providers, public or private), defined by the Ministry of Health, which establishes payment for procedures separating them into components: Professional Services, Hospital Services, Diagnostic Services, Therapies, Professional Acts, Special Materials, Medicines, Orthotics and Prostheses. In other words, the item hospital costs include hospitality, maintenance, food, medicines, professional services, exams, and procedures [141].

In France, there is the national cost study which collects data from public and private health establishments with activities in medicine, surgery, obstetrics, and dentistry (MCO), according to the categories of activities: major category of diagnosis, a major sub-category of diagnosis, root, and classification in homogeneous groups of sick. The methodology for this study is available on the ATIH website. Based on the data collected, a national cost benchmark by the financing sector is constructed (DGF for public establishments and OQN for private ones). These data contain the average cost of hospitalization according to the classification in homogeneous groups of patients each year. These costs result from a statistical recovery process using national data collected by the information systems medicalization program (PMSI). The results are available from 2013, and, for previous years, the cost reference is found in this link: https://www.scansante.fr/enc-mco.

No cost calculations were made because the costs (total and average cost) were already calculated and available to download. The costs were available in Reais (BRL) for Brazil and Euros (EUR) for France.

It was necessary to convert these values into PPP - Purchasing Power Parities (PPP) – the rate of currency conversion that tries to equalize the purchasing power of different currencies by

eliminating the differences in price levels between countries' costs of acute hospital admissions. This indicator is measured in terms of national currency per US dollar. It was consulted OECD website where these rates are available [197].

For the currency conversion, the following simple mathematical calculation was made: total annual cost divided by the annual PPP value, like any currency conversion.

$$PPP = \frac{\text{Total annual hospitalization cost}}{\text{PPP currency annual rate}}$$

4.3 RESULTS

Table 14 - Cost of acute hospitalization for stroke in Brazil and France (in Purchasing Power Parity 2010- 2017)

Year	Total Cost		Average Cost	
	Brazil	France	Brazil	France
2010	57.752.274,37	360.456.049,43	497,15	5.687,00
2011	63.080.737,50	402.875.229,50	509,35	4.087,57
2012	69.540.106,35	398.613.166,40	548,40	4.276,90
2013	76.957.407,54	420.415.564,70	575,07	4.301,90
2014	84.798.287,77	415.759.793,50	597,55	4.359,10
2015	89.465.374,32	506.752.512,30	612,90	5.191,90
2016	94.610.292,36	542.691.629,40	632,35	5.074,90
2017	100.434.006,06	527.791.866,20	658,41	4.977,20
Total	636.638.486,27	3.575.355.811,43		
Average	79.579.810,78	446.919.476,42		

Source: [113, 133, 137].

About the acute stroke hospitalizations costs from 2010 to 2017 - remembering the currency refers to the monetary conversion in international PPP, allowing the comparison between two different currencies through the analysis of the cost of acute hospitalizations for stroke, Brazil has an average expenditure of PPP 79.579.810.78 per year and France has PPP 446.919.476.40, which means an expense greater than 500% for France concerning the Brazilian expenditure, for the same purpose.

Chart 5 – Stroke hospitalizations cost (PPP) – 2010 to 2017 in Brazil and France

Coûts des hospitalisations dûs à un AVC ($PPP)
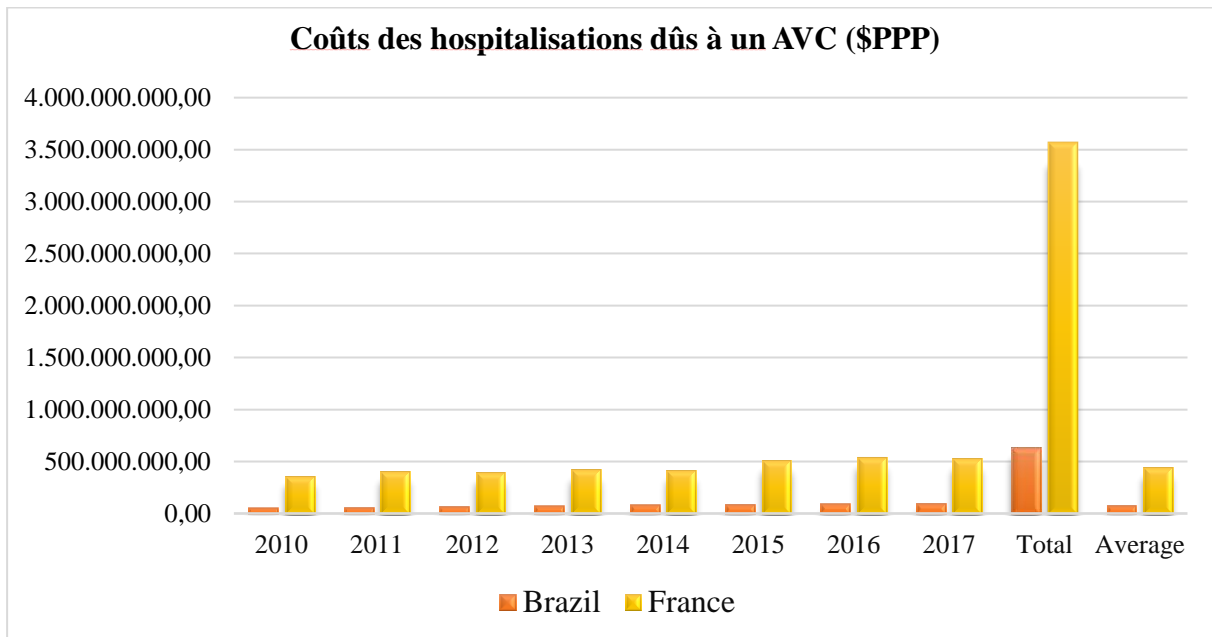
Source: Table 14

Chart 6 – Stroke hospitalizations average cost

COÛT MOYEN PAR PATIENT HOSPITALISÉ ($PPP)
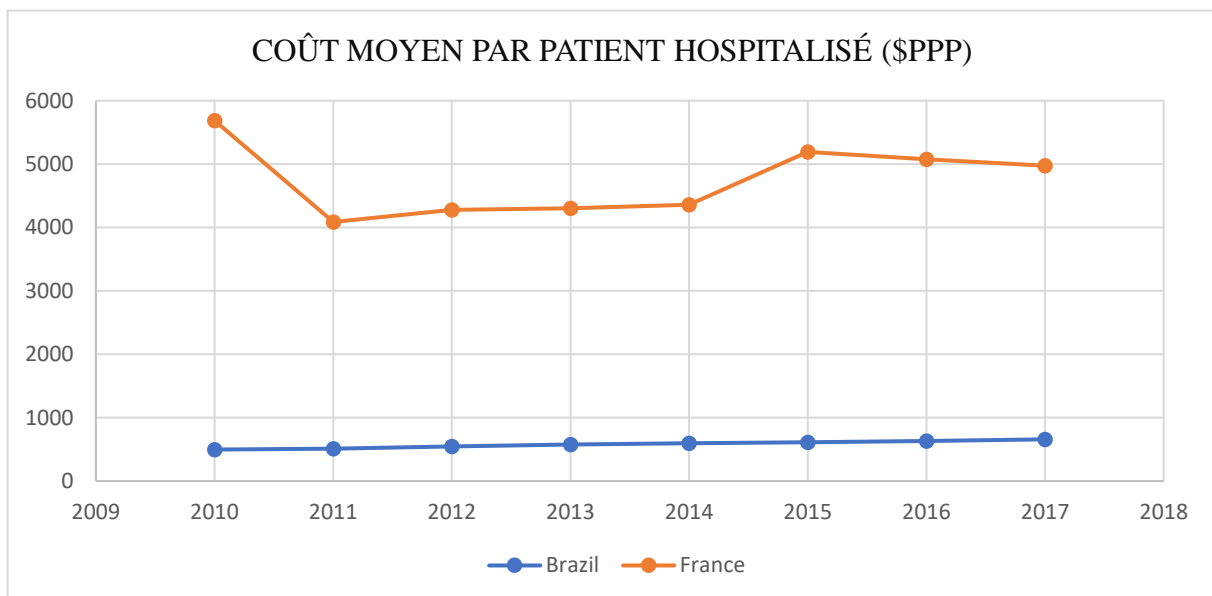
Source: Table 14

4.4 DISCUSSION

About the cost of acute hospitalization for stroke in Brazil and France, two hypotheses could be raised: 1) the cost is lower in Brazil since the facilities are larger, enabling economies of scale? 2) The different ways of allocating and managing costs can interfere with the final cost?

It was begun with the first hypothesis; economies of scale are discussed. Economies of scale occur when long-term average costs decrease as the volume of activities increases, and fixed costs are spread over a larger number of these activities. Economies of scale are more likely to occur when fixed costs are higher than variable production costs, common in health services [198]. The reduction in idle capacity produces an increase in revenue due to economies of scale due to increased patients [199].

As Brazil is a country of continental dimensions and has a unique healthcare system, economies of scale are obtained from purchasing in large quantities (medicines, technologies, human resources, equipment, materials) and spending on infrastructure, number of beds, and establishments. There are economies of scale in the hospital activity, mainly due to its high degree of specialization and technological intensity: the more assistance a unit performs, the greater the probability of obtaining favorable clinical results [200].

Another way to achieve economies of scale is the "Consortium." The consortium between cities in Brazil is a form of a regional partnership developed in SUS over the 1990s. It is expressed by the Intermunicipal Health Consortia (partnerships established among cities that agree on rules for financing services) based on resources from associated municipalities. The municipalities are organized cooperatively, concentrating in a host city that requires a greater number of procedures to have an adequate scale and quality, as the hospitals [198, 201]. When there is an increase in activity level, the variable costs increase; however, fixed costs do not increase, causing a positive variation in the result [200].

In general, consortia aim to expand the supply of medical specialists or services with a higher technological density. Small municipalities are service buyers from the host municipality, capitalizing their offer and generating economies of scale. In regions where there are several small municipalities, the consortia represent an expansion in the offer of specialized services close to residence. In this sense, the logic of cooperation tends to overcome competition for resources from other spheres of government [201].

On the other hand, the second hypothesis - The different ways of allocating and managing costs can interfere with the final cost? It could be a good way to think about the differences found out. In absorption costing, the patient's average cost per cost center is obtained, but the cost of the activities performed in the care is not known. For example, a surgical center where several surgeries are performed per month: appendectomy, mastectomy, neurosurgery, among others; using the adoption of the absorption costing method, it is possible to know the total cost of the operating room and the average cost of the patient, without differentiating it by the type of surgery to which he was submitted. From the perspective of the health system manager, individualized cost information is relevant for creating groups of related diagnoses (GHM) (Diagnosis-Related Groups - DRG) to define reimbursement values for the service provided by public providers and private. In this model of remuneration to the provider, the cases are classified according to the following variables: principal and secondary diagnosis, age and sex of patients; the presence of comorbidities and complications; and procedures performed. A homogeneous pattern of resource consumption characterizes the cases classified as belonging to the same DRG, and by the same clinical significance, they are similar economically and clinically [202]. In this case, the cost information of the patient is important not for isolated use or to deal with the reimbursement of a case, but rather to guide the average cost per DRG, which in turn will serve as an input for the calculation of the reimbursement value by DRG by the health system manager.

In DRG, the costs of activities are known, but not the total costs from the cost centers and health unit. However, we can know the average cost of each type of surgery or the procedure performed, provided that the processes and activities for performing these surgeries have been previously defined. Currently, the absorption and DRG costing methods complement each other in the production of cost information. The decision to start the deployment using one method or another depends on the priority perspective for using the information. If the objective is the macro view of the system, absorption costing is better, which provides complete information on costs, and then moves on to DRG, which is very centered on process management. Vieira suggests that it would be more rational to move from the least complex method to the most complex, starting with absorption costing for DRG [181]. The Brazilian choice for the absorption method may be why the costs of hospital treatment for stroke seem much lower in Brazil than in France. If the DRG method had been used, the costs might have been different.

According to Pouvourville, the French model is more like a regulatory model administered by establishment activity and productivity tariffs than to a model of competition by comparison implemented in the United States by Medicare. In terms of resource allocation, the consequences of this model are analyzed in the light of a selection of theoretical and empirical works on the economic incentives induced by the prospective payment on a case-by-case basis. Based on an annual objective for the evolution of public sector hospital expenditure reimbursed by health insurance voted by Parliament, a regional allocation of the corresponding budgetary masses was made, charged to the regional hospitalization agencies to distribute them among the establishments based on historical costs and, based on the difference between the unit costs of each establishment and the regional average cost. The less expensive establishments then enjoyed a higher authorized increase in their historical budget than the more expensive establishments. The definitive answer given by managers and payers to these problems is well known: payment is intended to cover expenses as a rule. Rate measures indirectly measure the effectiveness of a structure. The use of resources, without knowing whether they are being used wisely. The best known of these indicators are the number of admissions, the number of days, the number of acts performed, the bed occupancy rate, the average length of stay. The economic versions of these indicators are the cost of procedures and length of stay. However, managers and payers have always been aware that these indicators were too aggregated. They did not allow us to measure the performance of the patient. 'an institution. Thus, for a long time, the hospital managers and payers have been asking for alternatives. The instruments allowing them to identify hospital resources according to homogeneous categories of patients, diseases, or treatments are among them. Such tools have been available since the early 1980s [190].

It is worth remembering what was explained about the efficiency, efficacy, and effectiveness in Chapter 1. At first glance, it seems that the Brazilian healthcare system is more effective than the French. In this case, we assume the inputs as the structure and human resources of the healthcare systems in both countries, remembering the inputs directly related to efficiency and operating costs. Efficacy, which is related to objectives and goals through planning the care (strategy and care technique), aiming the patient's cure, and is the work process (health policies and stroke care). Ultimately, the effectiveness is the result of this care. In other words, its resulting product. The reason for this choice lies in the fact the health measures are not measures of production volume. Instead of measuring the volume produced, the outputs used to seek to measure the healthcare system's average quality as a whole [55, 56, 200], within an operational

and rational logic adapted from the industrial model. However, according to Pouvourville [190]:

> "It is difficult to measure the contribution of care to improving health status, and it is even more difficult to give a relative value to one state of health compared than another. Furthermore, the practice of medicine does not lend itself well to an analysis of the industrial type, where we relate factors of production and products, and where we can measure the productivity of a process. Indeed, the choice and the effectiveness of a treatment depends on the patient's general condition and some of his psychic and social characteristics, and there is no always a consensus within the medical profession on the therapeutic response to a given clinical problem" [190].

Although the total expenditure in Brazil's healthcare system may seem smaller than registered in developed countries, it is compatible with the regional standard and some OECD countries [189]. To be effective, it is also necessary to have good results. The Brazilian healthcare system is efficient, efficacious, and effective. It could be said that the French healthcare system is efficient and effective, but not as efficient as the Brazilian one (see figure 1 and 2). It can be said that both have structure, resources, technical knowledge, technologies, planning, and health policies to achieve the objectives proposed concerning stroke care.

So, a third hypothesis would be raised - the money exchange difference between Brazil (Real) and France (Euros) would lead to an illusion that Brazil spends less on stroke care. As the Brazilian currency fluctuates in the international exchange market, it would not, in reality, have its correct value. There is a value paid, a documented value, but it devalues over time and depends on the international scenario. Even if a calculation was made to bring Brazil's expenditures to present value, an error could be made. Despite being a probable and very interesting hypothesis, it is outside the scope of this thesis, and, for this reason, it will not be tested.

4.5 CONCLUSION

The hypotheses discussed in this chapter are not sufficient to explain the difference in the costs of acute hospitalization by stroke between Brazil and France. So, even if the hypotheses above fail to fully explain the reasons why the Brazilian healthcare system spends less on its stroke care, the important is that Brazil has as good results as France. After reading this thesis, it could be said that the Brazilian healthcare system is more effective than the French. However, this statement would lead to an error because both healthcare systems are engaged to do the best stroke care possible.

5 CONCLUSIONS

Related to the hypothesis, if it could be inferred, the French Healthcare System is more effective than the Brazilian SUS related to stroke care and stroke health policies? The hypothesis is refuted. This research found that the Brazilian healthcare system has good results as the French healthcare system related to stroke care. Compared to the French healthcare system, the Brazilian healthcare system is more effective in terms of in-hospital average stay and in-hospital mortality rate as shown in Table 9. It can be inferred that the Brazilian healthcare system, when compared to the French healthcare system, is more efficient because it spends less. However, this efficiency could be relative and it is needing new studies about that.

In general, there is a problem to guarantee financial resources in sufficient volume to ensure the constitutional right to health. The ability to finance healthcare systems has been threatened in most countries due to changes in the demographic profile (aging of the population combined with the decrease in birth rates), the increased incidence of chronic diseases that consume many resources over long periods, the increase in life expectancy, the constant introduction of new technologies and medicines.

5.1 PERSPECTIVES OF RESEARCH

The perception of the results of this research arouses the desire to expand knowledge in new studies. Several comparisons can be made about epidemiological studies on stroke care, such as primary health care related to health prevention (risk factors), emergency care; telemedicine; case-mix between cities of the same size; comparison of post-stroke care; between sex and age group.

Concerning management studies, some comparisons could be made, such as an in-depth study of the cost allocation system to verify if there are significant differences about what was found in this research; a proposal for a specific cost allocation method for the health sector based on a systematic review of these methods and a case study and action research. Management of primary health care (prevention of risk factors for stroke); emergency care management (mobile and land); management of telemedicine and other technologies; comparison of thrombolysis and its results in a cost-benefit comparison. In any case, the subject is vast, and several new types of research may result from this thesis, including other countries' addition to the comparison.

REFERENCES

1. Almeida C, Szwarcwald CL, Travassos C. et al. Desenvolvimento de metodologia de avaliação do desempenho do sistema de saúde brasileiro. FIOCRUZ. Rio de Janeiro. 2003.

2. Smith P C, Papanicolas I. Health system performance comparison: an agenda for policy, information, and research. World Health Organization - Observatory on Health Systems and Policies. 2012.

3. Immergut EM. Health Politics - Interests and Institutions in Western Europe. Cambridge University Press. New York. 1992.

4. Nugem RC, Bordin R, Michel P et al. National Health Systems of Brazil and France: A Comparative Analysis. World Journal of Advance Healthcare Research. V. 3. P. 50-61. 2019.

5. World Health Organization WHO. Urban Planning essential for urban health. Geneva. 2010. Available at: https://www.who.int/mediacentre/news/releases/2010/urban_health_20100407/en/

6. Viacava F, Laguardia J, Ugá MAD et al. Avaliação de Desempenho do Sistema de Saúde Brasileiro: indicadores para monitoramento. FIOCRUZ. Rio de Janeiro. 2011.

7. Silva ABM. Metodologia Diagnosis Related Groups (DRG brasil) para análise da efetividade das internações hospitalares na saúde suplementar na cidade de Belém-Pará: Proposta de um modelo remuneratório. (Dissertação de mestrado). Belém-PA 2019.

8. Conill E, Hortale VA, Pedroza M. Desafios na construção de um modelo para análise comparada da Organização de Serviços de Saúde. Cadernos de Saúde Pública. V. 1. p. 79-88. 1999.

9. Brazil. Constituição da República Federativa do Brasil 1988– Brasília: Senado Federal, Coordenação de Edições Técnicas. 1990.

10. Czeresnia D, Freitas CM (Org.) Promoção da saúde: conceitos, reflexões, tendências. Rio de Janeiro. Editora Fiocruz. 2003.

11. Nugem, RC. Doenças Relacionadas ao Saneamento ambiental inadequado (DRSAI) em Porto Alegre/RS. (Dissertação de mestrado). Pós-Graduação em Saúde Coletiva da Escola de Enfermagem. PPGCOL/UFRGS. SABI. 2015.

12. XXIV Congresso do Conselho Nacional de Secretarias Municipais de Saúde. CONASEMS. Comparação entre Sistemas de Serviços de Saúde da Europa e o SUS:

Pontos para reflexão da Agenda da Atenção Básica - Silva, SF. Belém do Pará. Brasil. 2008.

13. Carvalho, EMF et al. O processo de transição epidemiológica e inequidade social: o caso de Pernambuco. Revista da Associação de Saude Publica do Piaui. Teresina. V. 1 P. 107-119. 1998.

14. World Health Organization WHO. Noncommunicable Diseases (NCD) Country Profiles. 2018. Available on: https://www.who.int/nmh/publications/ncd-profiles-2018/en/

15. World Stroke Organization WSO. The Global Stroke Fact Sheet. 2019. Available at: https://www.world-stroke.org/news-and-blog/news/wso-publishes-global-stroke-fact-sheet

16. Ministério da saúde. Sala de Apoio à gestão estratégica. Mortalidade por grupo de causas. Número de óbitos por grupo de causas. 2019. Available at: http://sage.saude.gov.br/#

17. Botelho TS, Neto CDM, Araújo, FLC et al. Epidemiologia do acidente vascular cerebral no Brasil. Epidemiology of stroke in Brazil. Temas em Saúde. João Pessoa. V. 16. P. 361-377. 2016.

18. World Health Organization WHO. Reports. 2019. Available at: https://www.who.int/gho/publications/en/

19. Fondation pour la recherche sur les AVC. Fréquence. 2019. Available at: http://www.fondation-recherche-avc.org/fr%C3%A9quence

20. INDEXMUNDI. Detailed country Statistics. 2019. https://www.indexmundi.com/

21. Saldiva PHN, Veras M. Gastos públicos com saúde: breve histórico, situação atual e perspectivas futuras. Estudos Avançados. V. 32. P. 47-61. 2018.

22. The World Bank - Domestic general government health expenditure (% of current health expenditure). 2019. Available at: https://data.worldbank.org/indicator/SH.XPD.GHED.CH.ZS

23. Ministério da Saúde. Estrutura do SUS. Atenção Especializada. 2019. Available at: http://www.saude.gov.br/sistema-unico-de-saude/estrutura-do-sus/770-sistema-nacional-de-saude/40317-atencao-especializada

24. Brazil. Law 8080. Dispõe sobre as condições para a promoção, proteção e recuperação da saúde, a organização e o funcionamento dos serviços correspondentes e dá outras providências. 1990. Available at: http://www.planalto.gov.br/ccivil_03/leis/l8080.htm

25. Vilarinho, P. F. A percepção da captura política da saúde suplementar no Brasil. Cadernos Ebape. Rio de Janeiro. V. 8. P. 694-709. 2010.

26. Ministério da Saúde. O que é Atenção Básica. 2017. Available at: http://aps.saude.gov.br/smp/smpoquee

27. Ministério da Saúde. Secretaria de Atenção Primária em Saúde. 2019. Available at: http://aps.saude.gov.br/ape/esf/

28. Agência Nacional de Saúde Suplementar ANS. Sala de Situação. Dados sobre ao setor de serviços privados. 2019. Available at: http://www.ans.gov.br/perfil-do-setor/dados-e-indicadores-do-setor/sala-de-situacao

29. Assurance Maladie AMELI. Histoire de l'Assurance Maladie. 2018. Available at: https://www.ameli.fr/l-assurance-maladie/connaitre-l-assurance-maladie/missions-et-organisation/la-securite-sociale/

30. European Observatory on Health Systems and Policies. Health Systems in Transition (HiT) profile of France. 2015. Available at: https://www.hspm.org/countries/france25062012/livinghit.aspx?Section=1.1%20Geography%20and%20sociodemography&Type=Section

31. Ministère des Solidarités et de la Santé. Missions du Ministère. 2015. Available at: https://solidarites-sante.gouv.fr/ministere/missions-du-ministere/

32. Sandier S, Paris V, Polton D et al. Health care systems in transition: France. WHO Regional Office for Europe. 2004. Available at: https://apps.who.int/iris/handle/10665/107575

33. Júnior JPB, Messias KLM. Sistemas de Serviços de Saúde: Principais Tipologias e Suas Relações com o Sistema de Saúde Brasileiro. Revista Saúde Com. V. 1. P. 79-89. 2005.

34. Ministère de Solidarité et de la Santé. Système de santé, médico-social et social. 2017. Available at: https://solidarites-sante.gouv.fr/systeme-de-sante-et-medico-social/

35. Agence Régionale de Santé. Agir pour la santé de tous. 2017. Available at: https://www.ars.sante.fr/

36. Chevreul K, Berg BK, Durand-Zaleski I et al. France: Health system review. Health Systems in Transition. V. 3. P. 1–218. 2015.

37. Ministère de Solidarité et de la Santé. Système de santé, médico-social et social. 2017. Available at: https://solidarites-sante.gouv.fr/

38. World Health Organization WHO. Mortality and Global Health Estimates. 2020. Available at: http://www9.who.int/gho/mortality_burden_disease/en/

39. World Health Organization WHO. Report of the Expert Consultation on Primary Care Systems. 2015. Available at: https://www.who.int/alliance-hpsr/news/2015/primreport/en/

40. World Health Organization WHO. Health research is essential for progress towards universal health coverage. World Health Report. 2013. Available: http://www.who.int/mediacentre/news/releases/2013/world_health_report_20130815/en/

41. Hortale VA, Pedroza M, Rosa MLG. Operacionalizando as categorias acesso e descentralização na análise de sistemas de saúde. Cadernos de Saúde Pública. V.16. P.231-239. 2000.

42. Ocké-Reis CO. Sistemas de saúde comparados: gasto, acesso e desempenho. In: Seminários DIMAC. IPEA. Rio de Janeiro. 2006.

43. Marinho A, Cardoso SS, Almeida VV. Brasil e OCDE: Avaliação da eficiência em sistemas de saúde. Texto para Discussão. IPEA. Brasília.2009.

44. Marinho A, Cardoso SS, Almeida VV. Brasil, América Latina e Caribe: Avaliação de Eficiência em Sistemas de Saúde. IPEA. Brasília. 2011.

45. Conill EM. Acompanhamento e avaliação de serviços e sistemas de saúde. Mérida. 2011. Available at: https://docplayer.com.br/35753374-Acompanhamento-e-avaliacao-de-servicos-e-sistemas-de-saude.html

46. 2° Congresso Brasileiro de Política, Planejamento e Gestão em Saúde. Sistemas Comparados: um estudo sobre os esquemas de financiamento europeus. Ferreira JMR. Belo Horizonte. 2013.

47. Morais JRM, Santos MLWD. Brasil e Cuba: Sistemas de Saúde sob a análise comparada. Economia E Políticas Públicas. V. 3. P. 31-52. 2015.

48. Xu K, Carrin G, Chatterji S et al. What is the impact of social health protection on access to health care, health expenditure and impoverishment? A comparative analysis of three African countries. ILO/OECD/WHO. Geneva. 2006.

49. Araújo PPA. Análise Comparativa dos Modelos de Gestão dos Sistemas de Saúde do Brasil, Estados Unidos e Reino Unido. Campina Grande (monografia). Universidade Estadual da Paraíba. 2014.

50. Silva CG. Análise comparativa das características dos sistemas de saúde nas Américas. (monografia). Universidade de São Paulo. São Paulo. 2012.

51. Levino A, Carvalho EF. Análise comparativa dos sistemas de saúde da tríplice fronteira: Brasil/Colômbia/Peru. Revista Panamericana de Salud Publica. V. 30. P. 490-500. 2011.

52. Kruk ME, Pate M, Mullan Z. Introducing the Lancet Global Health Commission on High-Quality Health Systems in the SDG Era. V. 5. P. 480-481. 2017. Available at: https://www.ncbi.nlm.nih.gov/pubmed/28302563

53. Barnard CI. The Functions of the Executive, Cambridge. Harvard University Press. MA. 1968.

54. Portal Educação. Definições de eficiência, eficácia e efetividade para o Gestor de Conteúdo. 2013. Available at : https://www.portaleducacao.com.br/conteudo/artigos/marketing/definicoes-de-eficiencia-eficacia-e-efetividade-para-o-gestor-de-conteudo/44038

55. Donabedian A. The Definition of Quality and Approaches to its Assessment. Ann Arbor, Michigan. Health Administration Press. 1980.

56. Donabedian A. The Criteria and Standards of Quality. Ann Arbor, Michigan. Health Administration Press. 1980.

57. Donabedian A. The Seven Pillars of Quality. Arch Pathol Lab Med. V. 114. P. 1115-1119. 1990.

58. Bertalanffy LV. Théorie générale des systèmes. Georges Brazziler Inc. New York. 1968.

59. Silva LMV, Formigli VLA. Health Evaluation: Problems and Perspectives. Cadernos Saúde Pública. Rio de Janeiro. V. 10. P. 80-91. 1994.

60. Facchini LA, Piccini RX, Tomasi E et al. Avaliação de efetividade da Atenção Básica à Saúde em municípios das regiões Sul e Nordeste do Brasil: contribuições metodológicas. Cadernos de Saúde Pública. V. 24. P. 159-172. 2008.

61. Vuori H. A qualidade da Saúde. Divulgação em Saúde para Debate. CEBES. Londrina. V. 1. p. 17-25. 1991.

62. Donabedian A. An Introduction to Quality Assurance in Health Care. Oxford. University Press. 2003.

63. Joint Comission on Accreditation of Healthcare Organizations – JCAHO. The Measurement Mandate on the Road Performance Improvement in Health Care. Chicago IL. Department of Publications. 1993.

64. Institute of Medicine of the National Academies IOM. Comittee on Quality of Health Care in América. Crossing the Quality Chasm: a new health system for the 21st century. 2001. Available at : www.iom.edu/~/media/Files/Report%20Files/2001/Crossing-the-Quality-chasm/Quality%20Chasm%202001%20%20report%20brief.pdf

65. Berg M, Ter MR, Van der Burg M. Guidelines for Appropriate Care: The Importance of Empirical Normative Analysis. Health Care Analysis. V. 9. P. 77–99. 2001.

66. Kazandjian VA, Stemberg EL. Epidemiology of Quality. Aspen Publishers. Gaithersburg. 1995.

67. Guzmán-León A. Comparing in order to build public policy in times of globalization. Revista Iberoamericana Educação Superior. México. V.7. P. 135-156. 2016.

68. Minayo, MCS. Pesquisa Social. Teoria, método e criatividade. Petrópolis. Vozes, 2001.

69. Cordilha AC; Lavinas L. The reshaping of healthcare systems in the age of financialization. Lessons from France and Brazil. Ciência & Saúde Coletiva. V. 7. P. 2147-2158. 2018. Available at: http://www.scielo.br/pdf/csc/v23n7/1413-8123-csc-23-07-2147.pdf

70. Instituto Brasileiro de Geografia e Estatística IBGE. Países. 2019. Available at: https://paises.ibge.gov.br/#/

71. Institut National de la statistique et des études économiques INSEE. Population par sexe et groupes d'âges en 2019. 2019. Available at: https://www.insee.fr/fr/statistiques/2381474

72. Pison G. Tous les pays du monde. Populations et Sociétés. 2019. Available on: https://www.ined.fr/fichier/s_rubrique/29504/569.population.societes.tous.pays.monde.2019.fr.pdf

73. United Nations Development Programme. Human Development Index and its components. 2017. Available at: http://hdr.undp.org/en/composite/HDI

74. Departamento de Informática do SUS DATASUS. Painel de Monitoramento da Mortalidade CID-10. 2019. Available at: http://svs.aids.gov.br/dantps/centrais-de-conteudos/paineis-de-monitoramento/mortalidade/cid10/

75. Departamento de Informática do SUS DATASUS. Histórico / Apresentação. 2019. Available at: http://datasus.saude.gov.br/datasus

76. Seminário Internacional Tendências e Desafios dos Sistemas de Saúde nas Américas. O Sistema Público de Saúde Brasileiro. Ministério da Saúde. By Souza RR. São Paulo. 2002.

77. Carvalho AI, Barbosa PR. Políticas de saúde: fundamentos e diretrizes do SUS. UFSC/CAPES/UAB. Brasília. 2010.

78. Ministère des Solidarités et de la Santé. Les établissements de santé. 2018. Available at: https://drees.solidarites-sante.gouv.fr/etudes-et-statistiques/publications/panoramas-de-la-drees/article/les-etablissements-de-sante-edition-2018

79. Ministère des Solidarités et de la Santé. La démographie des médecins. 2016. Available at: https://drees.solidarites-sante.gouv.fr/etudes-et-statistiques/open-data/professions-de-sante-et-du-social/la-demographie-des-professionnels-de-sante/la-demographie-des-medecins-rpps/

80. Ministère des Solidarités et de la Santé. La démographie des autres professions de santé. 2015. Available at: https://drees.solidarites-sante.gouv.fr/etudes-et-statistiques/open-data/professions-de-sante-et-du-social/la-demographie-des-professionnels-de-sante/la-demographie-des-autres-professions-de-sante-rpps-et-adeli/

81. STATISTA. Nombre d'établissements de santé avec capacités d'hospitalisation en France en 2017, selon le secteur. 2017. Available at: https://fr.statista.com/statistiques/514779/nombre-etablissements-sante-capacite-hospitalisation-secteur-france/

82. Ministère Chargé de la Santé. Les chiffres clès de l'offre de soins. 2018. https://solidarites-sante.gouv.fr/IMG/pdf/dgos_cc_2018_02_16_a_web_pages_hd.pdf

83. Conselho Federal de Medicina CFM. Estatística. 2019. Available at: https://portal.cfm.org.br/index.php?option=com_estatistica

84. Conselho Federal de Odontologia. Estatísticas. 2019. Available at: http://cfo.org.br/website/estatisticas/quantidade-geral-de-entidades-e-profissionais-ativos/

85. Conselho Federal de Farmácia. Dados 2018. Available at: http://www.cff.org.br/pagina.php?id=801&menu=801&titulo=Dados+2018

86. Conselho Federal de Nutricionistas. Quadro Estatístico. 2018. Available at: http://www.cfn.org.br/index.php/estatistica/

87. Conselho Federal de Psicologia. A Psicologia Brasileira apresentada em números. 2019. Available at: http://www2.cfp.org.br/infografico/quantos-somos/

88. Conselho Federal de Enfermagem. Enfermagem em números. 2019. Available at: http://www.cofen.gov.br/enfermagem-em-numeros?undefined=undefined

89. The World Bank. Current health expenditure (% of GDP). 2019. Available at: https://data.worldbank.org/indicator/SH.XPD.CHEX.GD.ZS

90. Polignano MV. Histórias das Políticas de Saúde no Brasil: Uma Pequena Revisão. UFMG. 2001. Available at: http://www.saude.mt.gov.br/upload/documento/16/historiadas-politicas-de-saude-no-brasil-

91. Mathias M. Antes do SUS: Como se (des)organizava a saúde no Brasil sob a ditadura. FIOCRUZ. 2018. Available at: https://cee.fiocruz.br/?q=antes-do-sus

92. Instituto Brasileiro de Geografia e Estatística IBGE. Projeção da população. 2019. Available at: https://www.ibge.gov.br/apps/populacao/projecao/

93. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Ações Programáticas Estratégicas. Livro da parteira tradicional. 2012. Brasília.

94. Funcia FR, Bresciani LP. A Gestão Recente do Sistema Único de Saúde: Financiamento Restringido. 2019. Available at: http://idisa.org.br/files/anexos_domingueira/2019_EnAPG217_PUBLICADO_SITE.pdf

95. Jaccoud L, Vieira FS. Federalismo, integralidade e autonomia no SUS: desvinculação da aplicação de recursos federais e os desafios da coordenação. IPEA. Rio de Janeiro. 2018.

96. Rosa RS. Desafios para o financiamento da saúde com a PEC 55. Adverso. Porto Alegre. 2016.

97. Lima LD, Travassos C, Carvalho MS et al. 2016: a year of perplexity. Editorial Editor's Choice. Cadernos de Saúde Pública. V. 32. P. 1-2. 2016. Available at: https://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X2016001200201&lng=pt&tlng=pt

98. Funcia FR, Ocké-Reis CO. Efeitos da política de austeridade fiscal sobre o gasto público federal em saúde. In: Economia para Poucos: Impactos Sociais da Austeridade e Alternativas para o Brasil. 2018.

99. Organisation for Economic Co-operation and Development. OECD. Tackling Wasteful Spending on Health. OECD Publishing. Paris. 2017. Available at: http://dx.doi.org/10.1787/9789264266414-en

100. Direction de L'information Légale et Administrative. Vie Publique. Qui finance les dépenses de santé. 2016. Available at: https://www.vie-publique.fr/decouverte-institutions/protection-sociale/risque-sante/depenses-sante/qui-finance-depenses-sante.html

101. Organisation for Economic Co-operation and Development. Health at a Glance. 2017. OECD Indicators. OECD Publishing. Paris. 2017. Available at: http://dx.doi.org/10.1787/health_glance-2017-en

102. France. La Loi de financement de la sécurité sociale. 2017. Available at: https://solidarites-sante.gouv.fr/affaires-sociales/securite-sociale/article/presentation-de-la-loi-de-financement-de-la-securite-sociale

103. Ministère des Solidarités et de la Santé. Les chiffres clés de l'offre de soins. 2018. Available in: https://solidarites-sante.gouv.fr/ministere/organisation/directions/article/dgos-direction-generale-de-l-offre-de-soins

104. Mendes Á, Weiller J, Buso A. Fiscal waiver (tax spending) in health: effects on the financing of the SUS. Saúde Debate. Rio de Janeiro. V. 39. P. 491-505. 2015.

105. Tribunal de Contas da União TCU. Painel de renúncias tributárias federais. 2019. Available at: https://portal.tcu.gov.br/imprensa/noticias/tcu-lanca-painel-de-renuncias-tributarias-federais.htm

106. Setor Saúde. Saúde francesa "atacará" ineficiência e modelo de pagamento por volume (French health will attack inefficiency and model of volume payment). 2018. Available at: https://setorsaude.com.br/saude-francesa-atacara-ineficiencia-e-modelo-de-pagamento-por-volume/

107. Vieira FS, Piola SF, Benevides RPS. Vinculação orçamentária do gasto em saúde no Brasil: resultados e argumentos a seu favor. IPEA. Brasília/Rio de Janeiro. 2019.

108. Ministério da Saúde. Sobre a Vigilância de DCNT. 2019. Available at: http://www.saude.gov.br/noticias/43036-sobre-a-vigilancia-de-dcnt

109. Martins SCO, Sacks C, Hacke W et al. Priorities to reduce the burden of stroke in Latin American countries. The Lancet Neurology. V. 18. P. 674-683. 2019. Available at: https://pubmed.ncbi.nlm.nih.gov/31029579/

110. Garritano CR et al. Análise da tendência da mortalidade por acidente vascular cerebral no Brasil no século XXI. Arq. Bras. Cardiologia. V. 98. P. 519-527. 2012. Available at: <http://dx.doi.org/10.1590/S0066-782X2012005000041>.

111. Johnson W, Onuma O, Owolabic M et al. Stroke: a global response is needed. Bull World Health Organ. V. 94. P. 634–634. 2016.

112. World Health Organization WHO. Sixty-Sixth World Health Assembly: Resolutions and Decisions. Annex 4 - Global action plan for the prevention and control of noncommunicable diseases 2013–2020. Geneva. 2013.

113. Broussy-Boudeau S. Parcours Post-AVC, mesure des séquelles Post-AVC et lien entre parcours et séquelles à un an: enjeux conceptuels et méthodologiques résultats d'une cohorte rétrospective perspectives de recherche. (Thèse de Doctorat). Université de Bordeaux. 2019.

114. Ministério da Saúde. Ministério da Saúde cria linha de cuidados para tratar AVC. 2019. Available at: https://www.saude.gov.br/noticias/agencia-saude/46174-ministerio-da-saude-cria-linha-de-cuidados-para-tratar-avc

115. Ministério da Saúde. Brazil and eleven other countries sign document to prevent and cope with stroke. The Gramado Charter. 2018. Available at: http://www.saude.gov.br/noticias/agencia-saude/43985-ministerio-da-saude-e-signatario-da-carta-de-gramado-para-prevencao-e-enfrentamento-do-avcministerio-da-saude-e-signatario-da-carta-de-gramado-para-prevencao-e-enfrentamento-do-avc

116. Stevens E, Emmett E, Wang Y et al. The Burden of Stroke in Europe Report. King's College London and Stroke Alliance for Europe SAFE. 2017. Available at: https://strokeeurope.eu/burden-of-stroke-report-launched-in-eu-parliament/

117. Béjot Y, Bailly H, Durier J, Giroud M. Epidemiology of stroke in Europe and trends for the 21st century. Presse Med. V. 45. P. 391-398. 2016.

118. Timmis A, Townsend N, Gale C et al. European Society of Cardiology: Cardiovascular Disease Statistics. European Heart Journal. V. 39. P. 508–577. 2018. Available at: doi:10.1093/eurheartj/ehx628

119. Wilkins E, Wilson L, Wickramasinghe K el al. European Cardiovascular Disease Statistics. University of Oxford. Health Economics Research Centre. Brussels/Belgium. 2017. Available at: www.ehnheart.org

120. Stroke Alliance for Europe SAFE. Burden of Stroke Report Launched in EU Parliament. 2019. Available at: www.safestroke.eu

121. World Stroke Organization WSO. Statement of the World Stroke Organization. Copenhagen/Geneva. 2019. Available at: https://www.euro.who.int/en/media-centre/events/events/2019/09/69th-session-of-the-who-regional-committee-for-europe-event

122. European Stroke Conference. The European Registers of Stroke (EROS) Investigators. Incidence of Stroke in Europe at the Beginning of the 21st Century. Glasgow. By Wolfe CDA. 2007. Available at http://stroke.ahajournals.org DOI: 10.1161/STROKEAHA.108.535088

123. World Stroke Organization WSO. Statement of the World Stroke Organization and Europe Stroke Organization. WHO-EURO Regional Committee for Europe, 67th session, Budapest. 2017.

124. Organisation for Economic Co-operation and Development OECD. Health at a Glance: Europe 2018. State of Health in the EU Cycle. OECD Publishing. Paris. 2018. Available at: https://doi.org/10.1787/health_glance_eur-2018-en

125. Bensenor IM, Goulart AC, Szwarcwald CL et al. Prevalence of stroke and associated disability in Brazil: National Health Survey 2013. Arquivo Neuro Psiquiatria. São Paulo. V. 73. P. 746-750. 2015. Available at : http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0004-282X2015000900746

126. Murray CJL et al. Global, regional, and national disability-adjusted life years (DALYs) for 306 diseases and injuries and healthy life expectancy (HALE) for 188 countries, 1990–2013: quantifying the epidemiological transition. The Lancet. V. 386 P. 2145-2191. 2015.

127. Institut National de da Santé et de la Recherche Médicale INSERM - Accident vasculaire cérébral (AVC). La première cause de handicap acquis de l'adulte. 2019. https://www.inserm.fr/information-en-sante/dossiers-information/accident-vasculaire-cerebral-avc

128. Ministério da Saúde. Report on the 3rd forum on the strategic action plan to tackle Noncommunicable diseases in Brazil. Update on the Action Plan to Tackle Noncommunicable Diseases in Brazil. Presentation. By Silva JB. Brasilia. 2013–2018.

129. Ministério da Saúde. Strategic Action Plan to Confront Noncommunicable Chronic Diseases (NCDs). 2013-2019. 2013. http://www.saude.gov.br/vigilancia-em-saude/vigilancia-de-doencas-cronicas-nao-transmissiveis-dcnt/plano-de-acoes-estrategicas-para-o-enfrentamento-das-doencas-cronicas-nao-transmissiveis-dcnt

130. Silva GS, Rocha ECA, Pontes-Neto et al. Stroke Care Services in Brazil. Journal of Stroke Medicine. Indian Stroke Association. V. 1. P. 51-54. 2018.

131. Comissão Nacional de Incorporação de Tecnologias no Sistema Único de Saúde. Protocolos e Diretrizes. Linha de cuidados em Acidente Vascular Cerebral (AVC) na rede de atenção às urgências e emergências. 2020. Available at: http://conitec.gov.br/protocolos-e-diretrizes

132. Brazil. Portaria nº 664, de 12 de abril de 2012. Aprova o protocolo clínico e diretrizes terapêuticas - trombólise no acidente vascular cerebral isquêmico agudo. Brasilia. 2012.

133. Brazil. Portaria nº. 665, de 12 de abril de 2012. Dispõe sobre os critérios de habilitação dos estabelecimentos hospitalares como Centro de Atendimento de Urgência aos Pacientes com Acidente Vascular Cerebral (AVC), no âmbito do

Sistema Único de Saúde (SUS), institui o respectivo incentivo financeiro e aprova a Linha de Cuidados em AVC. Brasilia. 2012.

134. Ministère de la Santé et des Sports, Ministère du Travail, de la Solidarité et de la Fonction Publique, Ministère de L'enseignement Supérieur et de la Recherche. Plan d'actions national accidents vasculaires cérébraux 2010-2014. France. 2010.

135. Circulaire DGOS/R4/R3/PF3 n°2012-106 du 6 mars 2012 relative à l'organisation des filières régionales de la prise en charge des patients victimes d'accident vasculaire cérébral AVC). BO Sante, protection sociale, solidarité n°2012/4 du 15 mai 2012.

136. Loi n°2004-806 du 9 aout 2004 relative à la politique de sante publique (version consolide du 8 décembre 2011) JO. 2004.

137. Ministério da Saúde. Report on the 3rd forum on the strategic action plan to tackle Noncommunicable diseases in Brazil. Brasilia. 2013 – 2018. 2018.

138. Ministério da Saúde. Health of People with Disabilities: guidelines, policies, and actions. 2020. https://saude.gov.br/saude-de-a-z/saude-da-pessoa-com-deficiencia

139. Borba SRC, Lamy M. Internação a longo prazo de portadores de sequelas neurológicas após acidentes vasculares cerebrais no Rio Grande do Sul: um problema de saúde pública. Unisanta Law and Social science. V. 7. P. 97-119. 2018

140. Com-Ruelle L, Nestrigue C, Le Guen N et al. Parcours de soins des personnes hospitalisées pour un accident vasculaire cérébral. Premiers résultats. Questions d'économie de la santé n° 234. 2018. Available at : https://www.irdes.fr/recherche/2018/qes-234-parcours-de-soins-des-personnes-hospitalisees-pour-un-accident-vasculaire-cerebral.html

141. Haute Autorité de Santé. Service communication. Accident vasculaire cérébral: prise en charge précoce (alerte, phase préhospitalière, phase hospitalière initiale, indications de la thrombolyse). 2009. Available at: www.has-sante.fr

142. Agence Nationale d'Accréditation et d'Évaluation en Santé (ANAES). Recommandations pour la pratique clinique. Prise en charge initiale des patients adultes atteints d'accident vasculaire cérébral - aspects paramédicaux – Argumentaire. 2002.

143. Agence Nationale d'Accréditation et d'Évaluation en Santé (ANAES). Prise en charge initiale des patients adultes atteints d'accident vasculaire cérébral - Aspects médicaux - Recommandations. 2002.

144. Ministère de la santé. Le dispositif réglementaire et juridique pour la prise en charge des malades atteints d'AVC. 2016. Available at : https://solidarites-sante.gouv.fr/soins-et-maladies/maladies/maladies-cardiovasculaires/accident-vasculaire-cerebral-avc/article/le-dispositif-reglementaire-et-juridique

145. World Health Organization WHO. Global Report. Noncommunicable diseases country profiles. Geneva. 2011. Available At: https://www.who.int/nmh/publications/ncd_profiles2011/en/

146. World Health Organization WHO. Library Cataloguing-in-Publication Data. Global status report on noncommunicable diseases 2014. WHO. Geneva. 2014.

147. World Health Organization WHO. Noncommunicable diseases progress monitor 2020. Geneva. 2020.

148. World Health Organization WHO. World Health statistics. WHO. Geneva. 2018. Available at: https://apps.who.int/iris/bitstream/handle/10665/272596/9789241565585-eng.pdf?ua=1

149. Departamento de Informática do SUS DATASUS. Produção Hospitalar. 2019. Available at: http://www2.datasus.gov.br/DATASUS/index.php?area=0202

150. Agence Technique de L'Information sur L'hospitalisation ATIH. SCANSANTÉ. MCO par diagnostic ou acte. 2019. Available at: https://www.scansante.fr/applications/statistiques-activite-MCO-par-diagnostique-et-actes?secteur=MCO

151. Programme de Médicalisation des Systèmes d'Information PMSI. Fédération Hospitalière de France. 2020. Available at : https://www.fhf.fr/gestion-hospitaliere/pmsi.html

152. Lima CP. Comparando a saúde no Brasil com os países da OCDE: explorando dados de saúde pública. (Dissertação mestrado). Fundação Getulio Vargas. Escola de Matemática Aplicada. 2016. Available at: https://bibliotecadigital.fgv.br/dspace/handle/10438/16503

153. Sistema de Informação em saúde para a atenção básica SISAB. 2015. https://sisab.saude.gov.br/

154. Starfield B, Shi L, Macinko J. Contribution of Primary Care to Health Systems and Health. The Milbank Quarterly. Blackwell Publishing. V. 83. P. 457–502. 2005.

155. Baroni LL. 6 programas de saúde pública no Brasil considerados referência no mundo. UOL. São Paulo. 2018. Available at: https://noticias.uol.com.br/saude/ultimas-noticias/redacao/2018/06/05/6-programas-de-saude-publica-do-brasil-considerados-referencia-no-mundo.htm

156. Ministério da Saúde. Estratégia de Saúde da Família. 2013. Available at: https://www.saude.gov.br/acoes-e-programas/saude-da-familia

157. Lemke RA, Silva RAN. The active search as political principle of practices of care in the territory. Estudos e Pesquisas em Psicologia. UERJ. V.1. P. 281-295. 2010.

158. Mattos RA. Os sentidos da integralidade: algumas reflexões acerca de valores que merecem ser defendidos. In: Pinheiro R; Mattos, RA. Os sentidos da integralidade na atenção e no cuidado à saúde. Rio de Janeiro. UERJ. ABRASCO. 2001.

159. Pereira MO, Amorim A, Vidal V. et al. Busca ativa para conhecer o motivo da evasão de usuários em serviço de saúde mental. Acta Paulista Enfermagem. São Paulo. V. 26. P. 409-412. 2013.

160. Assurance Maladie AMELI. La rémunération sur objectifs de santé publique en 2018. Bilan a un an du nouveau dispositif. 2018.

161. World Health Organization WHO. Tobacco control in Brazil. 2015. Available at: https://www.who.int/tobacco/about/partners/bloomberg/bra/en/

162. Henning K. Global Health Checkup: Seven Steps to Tackle NCDs in Brazil. Bloomberg Philanthropies Public Health. 2018. Available at: https://www.bloomberg.org/blog/global-health-checkup-seven-steps-tackle-ncds-brazil/

163. Moura MC, Casulari LA. Impacto da adoção de medidas inespecíficas no tratamento do acidente vascular cerebral isquêmico agudo em idosos: a experiência do Distrito Federal, Brasil. Revista Pan-americana de Salud Publica. V. 38. P. 57–63. 2015.

164. Shi L. The Relationship between Primary Care and Life Chances. Journal of Health Care for the Poor and Underserved. V. 3. P. 321–35. 1992.

165. Shi L. Primary Care, Specialty Care, and Life Chances. International Journal of Health Services. V. 24. P. 431–458. 1994.

166. Shi L, Starfield B, Kawachi I. et al. Income Inequality, Primary Care, and Health Indicators. Journal of Family Practice. V. 48. P. 275–284. 1999.

167. Shi L, Starfield B. Primary Care, Income Inequality, and Self-Rated Health in the United States: A Mixed-Level Analysis. International Journal of Health Services V. 30. P. 541–555. 2000.

168. Weiner JP, Starfield B. Measurement of the Primary Care Roles of Office-Based Physicians. American Journal of Public Health. V. 73. P. 666–671. 1983.

169. Shi L, Macinko J, Starfield B. et al. Primary Care, Income Inequality, and Stroke Mortality in the United States. A Longitudinal Analysis. 1985–1995. Stroke V. 34. P. 1958–1964. 2003.

170. Gulliford MC, Jack RH, Adams G. et al. Availability and Structure of Primary Medical Care Services and Population Health and Health Care Indicators in England. BMC Health Services Research. V. 4. P. 1-8. 2004. Available at: https://bmchealthservres.biomedcentral.com/articles/10.1186/1472-6963-4-12

171. O'Malley AS, Forrest CB, Politzer RM. et al. Health Center Trends, 1994–2001: What do they portend for the Federal growth initiative? Health Affairs. V. 24. P. 465–472. 2005.

172. United Nations. Human Development Reports. Brazil. 2020. Available at: http://hdr.undp.org/en/countries/profiles/BRA

173. United Nations. Human Development Reports. France. 2020. Available at: http://hdr.undp.org/en/countries/profiles/FRA

174. World Health Organization WHO. Library Cataloguing-in-Publication Data. Handbook on health inequality monitoring: with a special focus on low- and middle-income countries. WHO. Geneva. 2013.

175. Paim JS. Equity and reform in the health services system: the case of the Unified Health System of Brazil. Saude Sociedade. São Paulo. V.15. P. 34-46. 2006. Available at: https://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-12902006000200005

176. Ministério da Saúde. Painel de Indicadores do SUS. Temático Saúde da Família. Brasília. 2007.

177. Lopes SMSC. O reflexo das desigualdades sociais no atendimento básico do serviço de saúde do SUS. Âmbito jurídico. 2016.

178. Aly CMC, Reis AT, Carneiro SAM. et al. The Unified Health System in a historical series of indicators: a national perspective for action. Saúde Debate. Rio de Janeiro, V. 41. P. 500-512. 2017. Available at: https://scielosp.org/article/sdeb/2017.v41n113/500-512/

179. Revil H. Le « non-recours » à la couverture maladie universelle et sa mise à l'agenda de l'Assurance maladie: un phénomène qui travaille l'institution». La Revue de l'Ires. V. 2. P. 3-32. 2014. Available at: https://www.cairn-int.info/revue-de-l-ires-2014-2-page-3.htm

180. Centre d'observation de la société. Quelle part de la population renonce à se soigner faute d'argent en France? 2020. Available at: http://www.observationsociete.fr/revenus/pauvrete/qui-renonce-a-se-soigner-faute-dargent-en-france.html

181. Vieira FS. Produção de informação de custos para a tomada de decisão no sistema único de saúde: uma questão para a política pública. Texto para discussão. IPEA. Brasília/Rio de Janeiro. 2017.

182. Beulke R, Berto DJ. Gestão de custos e resultado na saúde: hospitais, clínicas, laboratórios e congêneres. Saraiva. São Paulo. 2005.

183. Ministério da Saude. Blog da Saude. Programa Nacional de Gestão de Custos ajuda a melhorar as Unidades de Saúde. 2017. Available at: http://www.blog.saude.gov.br/index.php/entenda-o-sus/52227-entenda-como-o-programa-nacional-de-gestao-de-custos-ajuda-a-melhorar-as-unidades-de-saude

184. Ministério da Saúde. Secretaria de Ciência, Tecnologia e Insumos Estratégicos. Departamento de Economia da Saúde. Programa Nacional de Gestão de Custos. Manual técnico de custos – conceitos e metodologia. Brasília. 2006.

185. XXIV Congresso Brasileiro de Custos. Experiência da implantação do sistema de apuração de custos em dois hospitais de referência de ensino e pesquisa da Fiocruz. By Jaques ND, Simões GL, Santos MS. Florianópolis. Brasil. 2017.

186. Ministerio da Saúde. Como Implantar o PNGC. 2017. Available at: https://www.saude.gov.br/acoes-e-programas/pngc/como-implantar-o-pngc

187. Secretaria de Saúde. SUS. 2020. Available at: https://www.saude.mg.gov.br/sus

188. Ministério da Saúde. Gasto Médio (SUS) por Internação Hospitalar. Ficha de qualificação. 2000. Available at: http://tabnet.datasus.gov.br/cgi/idb2000/fqe11.htm

189. Ministério da Saúde. Introdução à Gestão de Custos em Saúde. Organização Pan-Americana da Saúde. Brasília. 2013.

190. Pouvourville G. La régulation financière de l'hôpital par les DRG: enjeux, principes, faisabilité. Gérer l'hôpital: outils et modes d'emploi. Sciences sociales et santé. V. 8. P. 33-65. 1990. Available at : https://www.persee.fr/doc/sosan_0294-0337_1990_num_8_2_1160

191. Pouvourville G. Les hôpitaux français face au paiement prospectif au cas. La mise en oeuvre de la tarification à l'activité. Presses de Sciences Po Revue économique. V. 60. P. 457-470. 2009. Available on: https://www.cairn.info/revue-economique-2009-2-page-457.htm

192. Agence Technique de L'Information sur L'hospitalisation ATIH. Guide de L'étude Nationale des Coûts (ENC). 2018. Available at: https://www.atih.sante.fr/enc-mco-donnees-2018

193. Agence Technique de L'Information sur L'hospitalisation ATIH. Rapport d'activité Année 2011. Paris, France. 2012. Available on : http://www.atih.sante.fr/index.php?id=0001F0000DFF.

194. Or Z et Bellanger M. France: Implementing homogeneous patient groups in a mixed market. In: Busse R et al. Diagnosis-related groups in Europe: Moving towards transparency, efficiency, and quality in hospitals. Maidenhead. Open University Press. United Kindown. 2011.

195. Agence Technique de L'Information sur L'hospitalisation ATIH. SCANSANTÉ. Analyse de coûts. 2010-2017. 2020. Available on : https://www.scansante.fr/applications/enc-mco

196. Agence Technique de L'Information sur L'hospitalisation ATIH. Guide de L'étude Nationale des Coûts (ENC). 2019. Available on: https://www.atih.sante.fr/enc-mco-donnees-2019

197. Organisation for Economic Co-operation and Development OECD. Data. Purchasing Power Parities (PPP). 2019. Available on : https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm

198. Mendes EV. As Redes de atenção à saúde. Organização Pan-Americana da Saúde. Representação Brasil. 2011.

199. Souza PC, Scatena JHG. É economicamente viável regionalizar a atuação de um hospital público de médio porte? Physis Revista de Saúde Coletiva. Rio de Janeiro. V.20. P. 571-590. 2010.

200. Yamada JN. Economias de escala e eficiência de gastos na saúde: novas evidências. Dissertação (mestrado profissional). Escola de Economia de São Paulo. 2011.

201. Ribeiro JM; Costa NR. Regionalização da assistência à saúde no Brasil: os consórcios municipais no Sistema Único de Saúde (SUS). Planejamento e políticas públicas. 2000

202. Noronha MF. Classificação de hospitalizações em Ribeirão Preto: Os *Diagnosis Related Groups.* (Tese de Doutorado). Faculdade de Saúde Pública da Universidade de São Paulo. São Paulo. 2001.

203. Centre d'observation de la société. L'espérance de vie en bonne santé progresse. 2020. Available on: http://www.observationsociete.fr/population/lesperance-de-vie-en-bonne-sante-progresse.html

ANNEXES

Rita Nugem ; Ronaldo Bordin ; Christophe Pascal ; Anne-Marie Schott-Pethelaz ; Beatrice Trombert-Paviot ; Vincent Piriou ; Philippe Michel. Article Stroke Care in Brazil and France: National Policies and Healthcare Indicators Comparison. Journal of Multidisciplinary Healthcare v. 13. pp. 1403-1414. November 2020.
DOI: 10.2147/JMDH.S262900. Available on :
https://www.researchgate.net/publication/345319512_Stroke_Care_in_Brazil_and_France_National_Policies_and_Healthcare_Indicators_Comparison

Rita de Cassia Nugem ; Ronaldo Bordin ; Anne-Marie Schott-Pethelaz ; Vincent Piriou and Philippe Michel. National Health Systems of Brazil and France: A Comparative Analysis. World Journal of Advance Healthcare Research. V. 3. Issue: 6. pp. 50-61. 2019. ISSN: 2457-0400. Available on:
https://www.researchgate.net/publication/337011362_NATIONAL_HEALTH_SYSTEMS_OF_BRAZIL_AND_FRANCE_A_COMPARATIVE_ANALYSIS

NATIONAL HEALTH SYSTEMS OF BRAZIL AND FRANCE: A COMPARATIVE ANALYSIS

Rita de Cassia Nugem*[1,2], Ronaldo Bordin[1], Anne-Marie Schott-Pethelaz[2], Philippe Michel[2], Vincent Piriou[2]

1Universidade Federal do Rio Grande do Sul UFRGS. Escola de Administração PPGA.

2Université Claude Bernard Lyon1 UCBL. Health Services and Performance Research HESPER.

*Corresponding Author: Dr. Rita de Cassia Nugem
Universidade Federal do Rio Grande do Sul UFRGS. Escola de Administração PPGA and Université Claude Bernard Lyon 1. HESPER Laboratory.

ABSTRACT: Traditionally, healthcare systems can be classified into three ideal models: free-market, compulsory social insurance, and publicly funded. Varying from country to country, has made it difficult to categorize a country strictly into one of these three models. Comparing is understood as the act of seeking similarities, differences or relationships between something that can be described to seek a general understanding. The objective was to compare the national healthcare systems of France and Brazil through a descriptive study. As a result, it was understood both healthcare systems were structured as universal access and comprehensive care attention. They have the same operational design: hierarchized by the level of health care, politically and administratively decentralized, where health is perceived as a citizens' right, based on solidarity. Brazil began the twentieth century with a model closer to the Bismarckian and, in the 1980s, broke completely with this model, starting a universal and free healthcare system. Today, Brazil is seeking to merge both public and private health services, approaching the Bismarckian model again. The French healthcare system tries to achieve the principles of "Beveridgian" universalism by the "Bismarckian" model. Regarding the facilities for health services, both countries have similarities, such as hospitals, health centers, emergency rooms, GP's offices, etc. To conclude, both health systems are constantly changing to meet new needs and to obtain sufficient financial resources to provide a quality service to their population.

KEYWORDS: Health Care Research, Health Care Facilities, Health Professionals, Healthcare Financing, Brazil, France.

INTRODUCTION

The definitions, concepts, and categories used to define or analyze Healthcare Systems vary according to values, principles, and conceptions about what health is and the State responsibility in the health of the population. [1,2] Health Systems services are a combination of resources, organization, financing, and management that results in health care services for the population. [3]

Traditionally, healthcare systems can be classified into three ideal models: permissive or free-market, compulsory social insurance, and publicly funded.[1] More recently, varying from country to country, the role of the State and its power of intervention, the shaping of the public-private mix of service providers, and whether or not the user is free of charge, among other variables, has made it difficult to categorize a country strictly into one of these three models. Comparing is understood as the act of seeking similarities, differences or relationships between something that can be described to seek a general understanding.[4] The comparative research can contribute to improved health services and generates new public policies, new work processes, and other benefits.

In this regard, WHO has been doing and publishing reports and studies comparing the health services in countries for decades, such as statistical surveys on life expectancy, child and adult mortality, maternal mortality, etc. For example: The Global Health Observatory (http://www.who.int/gho/countries/en/), showing the current status reports and priorities on health issues, describes the standards to be used in health research as the data collection and analysis; the Global Health Estimate (http://www.who.int/gho/publications/mdgs-sdgs/en/), which systematized the global disease burden from 2000 to 2015 by country, region and global total; the annual World Health Statistics publication compiles indicators and assesses the progress of the health-related Millennium Goals (https://www.who.int/gho/publications/world_health_statistics/en/);

the Health Equity Monitor (https://www.who.int/gho/health_equity/en/), which measures the inequity of maternal, reproductive, newborn and child health interventions.[5]

So, the objective was to compare the national healthcare systems of France and Brazil through a descriptive study. Both systems were structured as public, with universal access and comprehensive attention. They have the same operational design: hierarchized by the level of health care, politically and administratively decentralized, where health is perceived as a citizens' right, based on solidarity.

MATERIALS AND METHODS

This is a comparative descriptive research which sought to update knowledge by describing the characteristics, properties or relationships existing between both healthcare systems under study. The data used in this study were collected from Federal governments and Public health organizations websites in both countries.

For Brazil, the research was based on official data from the Ministry of Health, available at DATASUS - Department of Informatics of the Unified Health System is responsible for providing SUS with information and informatics support and technology. For France, the data were collected from the websites of the Ministry of Solidarity and Health, L'Assurance Maladie (AMELI), Institut National d'Hygiène (INSERM), Santé Publique France and other health-related websites such as the European Observatory on Health Systems and Policies. General data from both countries were collected directly from the WHO and the World Bank websites. To the literature was used several scientific articles that deal with the theme of healthcare systems in Brazil and France.

RESULTS AND DISCUSSION

Brazil and France: some demographic and health statistics

Brazil and France have structured social security programs to ensure health care, social security, and welfare. Both share the principles of equity in coverage and solidarity in financing.[6] Specifically, regarding the healthcare system, both countries are struggling to find a strategy to control the supply and

demand for services because of rising maintenance costs.

Table 1: Demographic and Health Statistical Data - Brazil and France, 2018.

Demographic and health statistics	Brazil	World ranking position*	France	World ranking position *
Population estimated	212 393 000	5°	65 481 700	22°
Population over 65 years	9,52%	6°	5,99%	10°
Birth rate per 1000 inhabitants	13,4	132°	11,6	153°
Number of children per woman	1,69	159°	1,97	120°
Average life expectancy	76,1	81°	83	10°
Infant mortality rate / 1000 live births	12,4	106°	2,7	180°
Mortality rate per 1000 inhabitants	6,4	128°	9,1	55°
HDI (Human Development Index) (2017)	0,759	79°	0,901	24°

The world ranking consists of 201 countries. Source: 7, 8, 9, 10. Made by the author.

Brazil is the 5th largest country in the world in extension and the 5th most populous. France is the 48th in extension and the 22nd in the population.[7] Above, Table 1 shows some demographic and health indicators for the two countries.

Despite differences in territorial extension and population, they have indicators that are close (eg, birth rate) and completely different (eg, infant mortality rate). Special attention is drawn to the lower number of children by women, the lower overall mortality rate and the aging of the Brazilian population. The population over the age of sixty is growing worldwide. It is estimated that by 2050 people over the age of 60 will outnumber young people up to 14 years old worldwide, but in Brazil, this transition is expected to occur until 2030, 20 years before.[7]

Brazilian Public Healthcare System (Unified Health System)

The Brazilian Public Healthcare System (SUS, in Portuguese) is part of social security and is guided by the doctrinal principles of universality in access to free health services, comprehensiveness in health actions and services and equity in care. Health is seen as a citizen's right and the state must meet these needs.[11,12] The health care services are offered by public healthcare centers, public hospitals, profit or non-profit hospitals. The three spheres of government - federal, state and municipal - finance the Unified Health System (SUS), generating the revenue necessary to cover expenses with actions and public health services.

The organization of health services respects criteria of regionalization and hierarchy, which allows a greater knowledge of the health problems of the population from the delimited area, favoring actions of epidemiological surveillance, vector control, health education, as well as outpatient and hospital care actions in all complexity levels. It is decentralized regarding the distribution

of responsibilities for health actions and services among the various levels of government - municipal, state and federal. Citizen participation is part of the process through the Health Councils. The private health sector complements when there is insufficient service in the public sector.[12]

From a total of 1 310.588 deaths in 2018, the main causes were: Circulatory system diseases (27% - heart ischemia accounted for 32% and cerebrovascular diseases for 28% of these), cancer (17%) and respiratory diseases (11%).[13]

French Healthcare System

In France, the health system is part of the Social Security System and has the coexistence of the private sector provision. The French national healthcare system is structured according to its doctrinal principles of equal access, quality of care and solidarity.[14] The health care services are offered by private physicians, public hospitals, profit or non-profit hospitals. The funding is made by equal contributions from employers and employees on the payroll. The state, guided by social solidarity, is responsible for financing the insurance for unemployed workers. This combination of formal employers/employees co-financing and public funding for the unemployed provides health care for the population.[15]

The users have a free choice of health professionals and facilities; however, a general practitioner should be referred to. The physicians have the autonomy to set up private offices, and the payment of consultations is made directly by the user, with partial reimbursement of these expenses by *Assurance Maladie*. A consultation with a general practitioner costs 25 euros (usually), which is paid directly to the professional. The *Assurance Maladie* covers 17 euros of this total and the rest is up to the user to payout ("Out-of-pocket"). Most of the users also buy private insurance (mutual insurance associations) that will cover this "Out-of-pocket". In general, the *Assurance Maladie* covers 77.8% of the value, mutual insurance associations 13.2% and 7.5% goes to out-of- pocket. If you consult with your referred GP, the *Assurance*

Maladie covers 70% and mutual insurance covers 30%, leaving no charges to the user.[14,16]

According to INSEE (2019), in 2016, from all the 579.230 deaths, the main causes were: Cancer (28%), circulatory system diseases (24% heart ischemia accounted for 23% and cerebrovascular diseases for 18% of these) and respiratory diseases (4%).[17,18]

Historical Background

To understand a health system in a country one needs to know the history of this system. The needs and desires of the population contribute (and sometimes force) the elaboration of public policies, as much as the budget that the State has available for this purpose. Epidemics were often responsible for the primary elaboration of what would later be a national health system. Regardless the classification or nomenclature is given to this system, the historical context was responsible for its planning, and creation, either because of social pressure or need to combat certain diseases that threatened the population.

The current Brazilian health system (Unified Health System - SUS) was created from the 1988 Federal Constitution but, since 1923, Brazil had the Retirement and Pension Funds (CAPs), similar to the French "cashiers", which were funds that provided the services for funeral homes, physicians and some medicines for workers and their families.[19] In the 1930s, the first Institutes of Retirement and Pension (IAPs) emerged, partially funded by the government, as a social policy and directed to urban workers by professional category (seafarers, traders, bankers) who contributed to Social Security. The institutes absorbed most of the old CAP's. [20,21].

From 1938 to 1945 the sanitary actions provided by the government were expanded throughout Brazil. In 1960 the range of health services from the Retirement and Pension Institutes was standardized for all insured persons, and agricultural workers were insured by the Rural Worker Assistance Fund (Funrural) in 1963.[20,21]

The military dictatorship took over the government in 1964 and, in 1966, created the National Institute of Social Welfare (INPS) uniting all Institutes of Welfare, establishing agreements and contracts with physicians and hospitals, paying them for the services rendered[19,21] consolidating organized social protection in form of insurance. The social security benefits, pensions, and medical assistance were restricted to formal workers.[21,22]

In 1977, INPS becomes the National Institute of Social Welfare Medical Assistance (INAMPS), which articulated health actions and a set of social protection policies.[20] For those who did not have a formal job, there was health care as charity and philanthropy way. However, actions aimed the collective health were universal and provided by the Ministry of Health.[21] The military dictatorship ended in March 1985, by the establishment of the "New Republic". In 1986, the VIII National Health Conference was the inspiration for the creation of a universal access healthcare system.[20,22]

The creation of the Unified Health System (SUS), formalized in 1990, established the principles of universality, equity, and comprehensiveness - a wide range of services covering all dimensions of health (prevention, cure, and rehabilitation). It is up to the State to provide services and products directly or through the hiring of private actors, but completely free of charge. Covering over 200 million people, SUS can be considered the largest universal health system in the world. The establishment of this system represented a radical break with what was a low institutionality and based on philanthropic or private providers and insurers, and access to health services restricted to certain

groups. SUS administration, provision, and financing are decentralized, with shared responsibility between the Union (State), the 26 states (federal states) and more than 5 570 municipalities.[6]

France, in 1930, by law, created social insurers, marking the beginning of social protection - a compulsory protection scheme for wage earners in industry and commerce, in case of sickness, maternity, disability, aging, and death. Even before World War II, two-thirds of the French benefited from social coverage in the event of illness, and the choice of a mutualist and the philanthropic insurer was essentially free.[15,23,24]

The French Social Security System, which includes the health system, was established after the end of World War II in 1945. In the early years, the priority was given to the reconstruction of social security, focusing initially on workers and their families. Influenced by the welfare states in various countries of Europe and the idea of social democracy, a network of Social Security Funds (or "cashiers") was created with management boards (employees' and employers' representatives).[6,23] These Social Security Funds ensured coverage of care expenses and the financing involved the payment of a contribution.[15,23]

The principle of expanding the coverage to the entire population was born in 1945, but was put into practice in stages, being extended to agricultural workers in 1961, self-employed and/or non-agricultural workers in 1966 and, in 1974 the establishment of a personal insurance system for all those who were not in any of the categories covered so far. In the 1980s, protection confronted the rise in the unemployed who were deprived of the rights to health services.[15,25]

In the early 1990s, laws eased the conditions for access to health services. In 1996, institutions and powers were reorganized, a

fact that was perceived as nationalization of the healthcare system by the growing role of the State in reinforcing the role of Parliament in defining health and financial objectives and the establishment of regional hospitalization agencies. In the financing, part of the salary contributions was replaced by income contribution (tax). In 199, law created universal coverage (Couverture Maladie Universelle - CMU), effective from 2000, on the condition that the person must have a regular residence in France. This reform changed the occupational health insurance system to a universal health system. There are 3 moments in this process: the universality of health services covered by the residence criterion; the replacement of salary contributions by a tax on financing; and, Parliament's intervention in orienting and setting spending objectives.[15,25]

The French security system is decentralized from a local and institutional point of view and is divided into three main schemes: a) General Scheme; b) Agricultural workers; and c) Financing funds, divided into national and local independent bodies. For medical coverage, there are three insurers that provide comprehensive medical coverage: i) Protection Universelle Maladie - PUMA: intended for legal residents who are not initially affiliated with any of the existing schemes; ii) Couverture Maladie Universelle Complémentaire - CMU-C: who cannot afford the remains to be paid and whose income is below a certain threshold; and (iii) Aide à l'Acquisition d'une Complémentaire Santé - ACS: Complementary insurance. There is also Aide Médicale de l'État - AME, which assumes the costs of health services for undocumented migrants.[6,15,25] Below, Frame 1 summarizes the historical context which reflected in the creation of the healthcare systems in Brazil and France. The table seeks to show that the process of building these systems was similar even though they followed different paths.

Frame 1: Evolution of the Health Care Systems historical context in Brazil and France

Date	Brazil	Date	France
1923	Social Security Funds (CAPs)		
1930	Retirement and Pension Institutes (IAPs)	1930	Social Security Funds (Cashiers)
1938-1945	Health actions in all Brazil		
1960	Standardization of health services	1961	Social Security coverage to agricultural workers
1963	Social Security Coverage to agricultural workers		
1966	National Institute of Social Security - Social security coverage to Employed	1966	Social security coverage to Self Employed and / or Non- agricultural workers
1977	National Institute of Social Welfare Medical Assistance - Social security coverage for all workers	1974	Social security coverage for all workers
		1980	Social Security coverage to unemployed
1986	VIII National Health Conference – SUS proposition	1986	Parliament has a sanitary and financial role
1988-1990	Federal Constitution and SUS / Universal Coverage	1999-2000	Universal Coverage (CMU)
2016	NBFR- Constitutional amendment 95/2016	2004	Douste-Blazy Reform

Sources: 6, 20, 21, 25.

In Frame 1 it is clear that both healthcare systems started through social contributions, based on the Bismarckian model by compulsory social insurance. Over time and influenced by the international scenario both health systems were approaching the Beveridge model seeking universal access, the provision and financing of health care services by the State. Brazil began its universal healthcare system from 1988 by the Federal Constitution, defining health as a duty of the State and a citizen right. In France, the universality was implemented in the 2000s, through the law that gives the right to health care services to all residents and social protection.

One can say there is a difficulty to categorize both national healthcare systems in a single model because they need the ability to adapt to social and economic changes. New global financial crises lead to think again about the role of the State concerning the population's health in the face of new technologies and high costs to be efficient and effective in their management. They seek to spend as little as possible on their actions through the best-known process, aiming at the best possible results, which are reflected in the quality of the care and health actions.

Organizational Structure and Human Resource Management

The Unified Health System (SUS) encompasses all health services: from blood pressure assessment to organ transplantation. The health care is comprehensive from pregnancy and throughout life, aiming at prevention and health promotion. The management of health actions and services is solidary and participatory among the three entities of the Federation: The Union, the States, and the municipalities. The network that makes up the SUS is broad and includes actions as well as health services. SUS has primary, medium, and high complexities, urgency and emergency services, hospital care, epidemiological, sanitary and environmental surveillance actions and services, and pharmaceutical assistance.[26]

As a management structure, the SUS is composed of the Ministry of Health, being the national manager and responsible for planning, standardizing, supervising, monitoring and evaluating policies and actions, and using instruments for SUS control, in articulation with the National Council of Health. Integrate its structure: Oswaldo Cruz Foundation - FIOCRUZ, National Health Foundation, National Health Surveillance Agency, National Agency for Supplementary Health, Brazilian Company of Hemoderivatives and Technology, National Cancer Institute, National Institute of Traumatology and Orthopedics and federal hospitals. It formulates the national health policies but does not perform the actions, for this, it counts on the partnership of the states, municipalities, NGOs, foundations, companies, etc.[26]

The State Health Secretariats (one for each of the 26 states) formulate their state's health policies and actions and support the municipalities. They coordinate and plan the SUS' strategy and are responsible for the organization of health care in its territory. The Municipal Health Secretariats (SMS) plan, organize, control, evaluate and execute health actions and services. The municipality prepares health policies, coordinates and plans the SUS at the municipal level, by federal laws. It can establish partnerships with other municipalities to ensure the comprehensive care of its population, of its population, integrating an "inter-municipal health consortium".[26]

SUS consists of low, medium and high complexity. The low complexity, or Primary Health Care, is composed of Family Health Units (USFs) and Basic Health Units (UBSs). They provide vaccinations, rapid tests, medicines delivery, injections, as well medical, dental and nursing care, characteristic of primary care. The UBSs are responsible for the health of children, women, adults and the elderly, as well as dentistry, examination requests, and medicines. The professional team consists of pediatricians, obstetrician-gynecologist and general practitioners. In some UBSs, there are nutritionists, psychologists, and home care. The general practitioner arranges appointments for elective procedures and more specific examinations with specialists in the public network or in private clinics who provide health services to the municipalities. The estimated UBS' population coverage is 74,35% of the Brazilian population. The USF provides care and accompanies patients with chronic diseases, such as diabetes and hypertension. The team consists of a general practitioner, general nurse, nursing assistant or technician, and community health agents. The Units may also contain dentists, dental assistants and/or oral health technicians. USFs are responsible for promoting health prevention through community health agents. There are 298 610 USF's teams.[26,27,28]

Medium complexity or Secondary Attention is triggered for specialist consultations, complementary exams and hospital admissions that don't need a high-tech level. The 24h Emergency Care Units are responsible for providing care of medium complexity in cases of accidents' victims, heart problems, urgencies, etc. The user may remain under observation for up to 24 hours or be relocated to the referral hospital.[26]

The High complexity or Tertiary Care is responsible for the treatment that requires the use of high-cost technological resources such as surgery, cancer treatment, dialysis procedures, chemotherapy, radiotherapy, and

hemotherapy. For all emergencies that require hospitalization, surgeries, maternity or more elaborate imaging tests, urgency and emergency services. Brazil also has the Mobile Emergency Care Service (SAMU) placed in 2005, which aims to provide rapid relief to the victim after an emergency. SAMU addresses situations of clinical, surgical, traumatic, obstetric, pediatric, psychiatric care among others. SAMU serves anywhere and the teams are made up of physicians, nurses, nursing assistants, and first aid drivers.[26]

In Brazil, the private health services sector is made up of 759 health insurance operators (some are clinics, hospitals, medical and dental offices, examination and imaging laboratories) with about 17 800 different health insurance, composed by a variation in the range of health services coverage, reaching about 47.000.000 Brazilians (25% of the population), 24 799 687 in exclusively dental insurance.[29] The sector is regulated by the National Supplementary Health Agency (ANS) through a set of Government measures and actions: the creation of rules, control, and supervision of the sector operated by companies to ensure the public interest. It is linked to the Ministry of Health and responsible for the health insurance sector (or private insurance). This sector of health services had been thought of as a way to complement the health system at the SUS' beginning, nowadays it acts in a supplementary way. The choice of health insurance is free and dependent on purchasing power. Even if people have health private insurance, they are not excluded from SUS's free services. SUS users have complete coverage to use all health services: promotion, prevention or recovery.[11]

The French National Healthcare System provides the user's freedom choice by a general practitioner, specialists, health facility, etc. both in the public and private sectors. The goal of the healthcare system is to prevent, cure and globally monitor users in their needs. The management of health actions and services is carried out at national, regional and local levels for the coordination of all actors involved.[24]

The Parliament has control of the National Health System, its resources and its priority public health policies. The Ministry of solidarity and health is the central administration and comprises four directorates: Directorate General of Health (*Direction générale de la santé*); Directorate General of the Care Organization (*Direction générale de l'organisation des soins*); Social Security Directorate (*Direction de la securité sociale*); and the General Directorate of Social Policy (*Directorate General of Social Cohesion*).[15] The State intervenes directly in the health financing, medical facilities, in setting service tariffs, in managing health costs and in organizing the service provision. The ministry is responsible for the management and implementation of health policies. The ministry has the support of Health Agencies, which are public operators and partners, such as the High Authority of Health (HAS). It is still responsible for overseeing care facilities and health insurance organizations and for monitoring and training health professionals.[24,30]

The Regional level has the responsibility to manage the health and social-medical system through the Regional Health Agencies (ARS) which coordinates the prevention, follow-up care and manages the resources to enable equal access to all and continuous care with quality and safety. The agencies adapt national policies to their needs and characteristics. At the local or municipal level, the establishments and professionals are organized under ARS supervision. Primary care is offered by general practitioners (first resource) who make referrals to specialists (second resource) or a health facility (third resource). It is made up of the following structures: Municipal or outpatient structure where self- employed and salaried professionals work individually in their office, or a coordinated group in a nursing home or health center. The health care professionals are general practitioners and specialists, dentists, pharmacists, midwives, nurses, physiotherapists, pediatricians, etc [24,30].

The hospitals are divided into 3 categories: Public; private for-profit and non-profit, clinics and collective interest private institutions (private hospitals, cancer treatment or dialysis centers, etc.). Public hospitals are also responsible for vocational education, scientific and medical research. There is also Emergency Medicine, through

SAMU (*Service d´Aide Médicale Urgente*) and SMUR (*Services mobiles d´urgence et de réanimation*).[24,30]

The social-medical establishments are responsible for the care of the vulnerable, precarious, excluded, elderly and disabled. They may perform outpatient surgeries, telemedicine, home hospitalization, temporary care, and home nursing care. In addition, specialized structures accommodate certain patients or residents adequately: Neurovascular units, centralized specialized pain consultations, integrated and specialized centers for the obese, centers for rare diseases; memory and research resource centers and consultations (CM2R); cognitive- behavioral units (UCC) and the Houses for Autonomy and Integration for Alzheimer's (MAIA). There are the poles of activity and care adapted (PASA) and the reinforced shelter units (UHR) which favor the articulation, information and follow-up between the structures[24,30]

So, to illustrate the facilities and the professional teams, Tables 2 and 3 show the quantitative basic facilities and health professionals from both healthcare systems. The health professionals listed do not match all categories of health professionals in both countries. The fact is that both have multidisciplinary teams in the provision of health services and distinct structures designed to offer these services. Tables 2 and 3, showed below, do not reflect the full installed capacity and facilities of health care services in both countries. Brazil has a continental size and large municipalities. Therefore, the country has large hospitals that serve several municipalities at the same time. One may be wrong if to compare the number of hospitals, once the physical structure may vary by region and population. However, it can be said that most parts of the health facilities are in urban cities since Brazil has about 84% of its population in urban areas.[32,33]

Table 2: Health Facilities in Brazil – 2018.

Facilities	SUS	For-profit	Non-Profit	Total
High Complexity				
Hospitals	594	930	611	2 135
Ambulatories	3 310	5 241	1 112	9 909
Medium Complexity				
Hospitals	3 394	3 006	1 848	8 248
Ambulatories	47 140	193 214	6 043	247 731
Low Complexity				
Health Center / Basic Health Unit	37 216	190	107	37513
Medical Office	950	165 399	998	167 338
Health Center	8 852	28	44	8 924
Indigenous Health Care	893	-	-	893

Source: 31.

Table 3: Health Facilities in France – 2017

Facilities	FNH	For-Profit	Non-Profit	Total
Third Resource				
Hospitals	1364	1 002	680	3 046
Second Resource				
Cancer-Fighting Centers			21	21
Follow-up care and rehabilitation		350	371	721
Short-term or multidisciplinary care facilities		498	143	541
Long-term care		7	19	26
Mental Illness Institutions		145		
First Resource				
Health Homes		910	-	910
Medical Office		36 500	-	36 500
Nurse Office		48 700	-	48 700
Midwife Office		3 811	-	3 811

Source: 34, 35, 36, 37, 38.

Table 4: Comparison of the Number of Health Professionals Per 1000 Inhabitants and Vinculation to the National Healthcare System Percentage - Brazil and France, 2018.

Indicator by 1000/inhabitants	Brazil	SUS	France	FNH
Physicians	2,2	62.7%	3,4	70.3%
Nurses	2,5	49.1%	10,0	35.4%
Dentists and Dental Surgeons	1,5	42%	0,6	85%
Pediatricians	0,1	74.2%	0,08	79.6%
Pharmacists	1,0	16%	1,1	7%
Nursing Technicians	5,9	37%	6,0	58%

Source: 31, 34, 35, 36, 39, 40, 41, 42, 43, 44.

Despite the difference in size and population, Brazil and France bring similarities in the number of pediatricians, pharmacists, and nursing technicians. Brazil has more than twice as many dentists compared to France. France has more physicians and four times more nurses per 1000 inhabitants. A curiosity is that in Brazil midwives are not recognized as professionals, although there are valued traditional midwives, mainly in the Amazon region, in the indigenous and quilombolas[1] communities and, in France, the profession is regulated by adding more than 20 thousand midwives.[45]

Financing

To understand SUS funding, we need to understand the Brazilian geographical and political context. Brazil is a Federation composed of the Union, 26 states, the Federal District and 5 570 municipalities. The 1988 Federal Constitution determines the entities' joint action, with joint responsibilities regarding access to health services, in a universal, equal and comprehensive way. The SUS is funded by these three managers: Union, states and municipalities, forming cooperative federalism, in which all federated entities must promote, protect and restore health. There is autonomy in the management of the healthcare system in each "government sphere" within its territory, constituting the Brazilian sanitary federalism. This amount should finance animal and human vaccines, simple and specialized consultations, blood and imaging tests, transplant surgeries, supplies of materials and medicines to the population, sanitary surveillance at ports, airports and establishments that handle market food, among other activities of public interest[46,47]

For the health financing, investment percentages were set by law in 2012, in which municipalities and Federal District must annually apply at least 15% of the taxes collection on actions and public health services; states 12% and, Union the amount invested should correspond to the amount committed in the previous financial year, plus the percentage of Gross Domestic Product (GDP) from preceding year. However, the Brazilian economic policy adopted in 2015 has influenced public revenue and health financing in the three spheres of government.[47]

From 2017, the Constitutional Amendment 95/2016 - New Brazilian Fiscal Regime - was set a ceiling for government spending until 2037. The main objective was to stabilize the growth of primary spending to contain the increase in public debt. The consequence is

that resources to health will no longer be linked to the minimum established by law, with restrictive effects on the healthcare financial availability.[48] The vast majority of Brazilian municipalities depend on transfers from the Union to provide health services. The economic crisis and a political and institutional rupture after impeachment in 2016 marked an adverse scenario for social rights established by the 1988 Federal Constitution and menaces the Unified Health System.[49] The participation in SUS financing, in 2017, was 43% from the Federal government, 26% from the states and 31% from the municipalities (that spent about plus 25% over the minimum set at 15% by the law). This shows that the Union has reduced health investment, leaving a greater burden on municipalities for health services and actions [46, 50]. The solution found for the economic crisis through an austerity regime and fiscal adjustments for the next 20 years, with significant cuts in public spending will bring serious limitations to guarantee social rights and the SUS.[49] The financing of the French national healthcare system (FNH) comes from the Social Insurance (*L'Assurance Sociale*), with an important role of the State that shares the management with the Health Insurance (*L'Assurance Maladie*).[15,25,51]

Funding is made through contributions from employers and taxpayers income-based, and others as specific such as tobacco and alcohol and the pharmaceutical industry taxes. The complementary health insurance reimburses copayments made by users for health services and the purchase of medicines that are not completely covered by the health system.[52,53]

Social Security finances most of the services and health goods, by 2018 it reached 78% of health expenses. The complementary insurance finances about 14% of expenditures, the State 1.5% on average, and the rest is paid directly by households.[54] The State finances the prevention, training, medical research and health services for the vulnerable through CMU-C and AME.[15,16,25]

Table 5 compares what each government invests in health on a percentage of GPD. In this case, there is a gap between Brazil and France. The Brazilian GDP in 2016 was PPP\$ 3.161 trillion

(current international $) and the French GDP was PPP$ 2 811 trillion.[55,56]

This shows that much of Brazil's health expenditure is spent on private health services. However, because health in Brazil is a federally guaranteed right, all tax-paying citizens are entitled to reimbursement of health expenses (consultations, exams, hospitals, insurances – no refunds for medicines). This is called a health tax waiver (tax expense) and is a practice that has been growing over the last years, reaching the level of US$ 9 482 billion in 2018. Both citizens and companies have part of reduced income tax payments without a maximum discount ceiling, creating the possibility of unbridled growth in tax exemptions.[57,58]

In another study on public health spending from 2000 to 2014, Brazil was the country with the lowest public health spending, unlike other countries with universal and public healthcare systems. This means a reduction in the State's role as provider and financier of public health actions and services and, after the implementation of the 'New Brazilian Fiscal Regime', public health spending is expected to decline further. As well as the excessive government incentives for the pro-profit health services which contribute to the reduction of public spending and, hinders the implementation of SUS as a universal health system, as provided for in the 1988 Constitution. [59]

On the one hand, the lack of funding implies the quality and quantity of public health services. Although SUS benefits millions of people in Brazil, there had always been a discussion about central problems for the proper SUS financing.

In February 2018, the French government established its priority list, ranging from health education reform to hospital funding review, through a renewal of human resources policy and a review of the territorial organization of the healthcare system. The hospitals are responsible for about 40% of health care expenses. France remains the third OECD country with the longest average stay (10 days, compared to

7.8 in other countries) (http://www.oecd.org/els/health-systems/health- data.htm). The rate of outpatient surgery remains lower than in neighboring countries. In 2018 hospitals totaled about 1.6 billion euros deficit. Reports have shown that about 25% of health expenditure is related to unnecessary or redundant acts and the healthcare system restructuring is being discussed. [37,60]

Another point that needs to be highlighted is the gratuity of the Brazilian health system. The user does not need money to consult with any kind of physician or any other health procedure like surgeries, cancer or HIV/AIDS treatment, vaccines, etc. and, there is no daily limit for hospitalizations. In France, even if you have private insurance, for the most of the appointments and exams there is a fee to be paid, which will be reimbursed by FNH later but, this refund, the most of times, is partial and not integral of the expenses, leading to out-of-pocket payment. This influences the demand for services and penalizes low-income people.

Therefore, for a better comparison among countries with regard to spending and its financing, the following factors could be employed: the level of national and personal income; demographic and epidemiological profiles; differences in system coverage, quantity, diversity and quality of services offered and; differences in the mechanisms of financing, organization and provision of health services. Gerdtham's research (2000), on the organization and provision of health services by comparing data from 22 OECD countries, highlights the importance of factors linked to the institutional characteristics of each country's healthcare system. In this sense, the evidence showed that the results are related to the characteristics of the countries and the conclusion states that: i) the higher the public participation, the lower the total expenditure; ii) hospital- centric systems tend to spend more; iii) countries where primary care is a filter for other levels of care tend to have a lower level of spending; and iv) the form of payment of general practitioners by capitation (a fixed amount per patient) induces a lower provision and therefore a lower expense than in systems with payment for service or act.[61]

Table 5: Brazil and France Health Expenditure, 2016

Health Expenditure	Brazil	France
Domestic general government health expenditure (% of current health expenditure)	33,22	82,89
Domestic private health expenditure (% of current health expenditure)	66,69	17,10
Domestic general government health expenditure per capita, PPP (current international $)	590,54	3 964,31
Current health expenditure per capita (current US$)	1.015,93	4.263,36

Source: 55, 56.

CONCLUSION

Through this descriptive study, it is clear that even universal access healthcare systems have such distinct characteristics that it is no longer possible to categorize them as a single model. The attempt to curb public health spending is reflected in several public policies that change over the years on the international scene. Sometimes these policies seek to reduce the equity of access to the healthcare system; sometimes they seek to contain spending on health care services.

So, comparing both healthcare systems suggests that there are similarities between them in terms of structure and management: both have three levels of care - primary, secondary and tertiary; they are regionalized and decentralized; they have funding based on solidarity; they have specific public policies directed to specific groups, etc. They also share the same problems as an aging population and increasing spending on new technologies.

Brazil began the twentieth century with a model closer to the Bismarckian and, in the 1980s, broke completely with this model, starting a universal and free healthcare system. Today, Brazil is seeking to merge both public and private health services, approaching the Bismarckian model again. The French healthcare system tries to achieve the principles of "Beveridgian" universalism by the "Bismarckian" model.

Regarding the facilities for health services, both countries have similarities, such as hospitals, health centers, emergency rooms, doctor's offices, etc. The difference is that in Brazil there are public free medical offices that belong to the SUS. In Brazil, there are also private offices of professionals and health insurance medical offices. So, there are three different types of medical care: free, private health insurance, and out-of- pocket; this applies to medical appointments (GP or specialists), exams, hospital admissions, and emergencies. In France, has a large part of private medical offices, with self-employed professionals receiving a payment from the user that will be reimbursed by FNH posteriorly. Both in Brazil and France, it is encouraged to consult with the general practitioner before being referenced to other instances of the System (referral and counter-referral process).

The percentage of GDP spent on health services may not be the best way to understand a country's health financing because each country has a different GDP, leading to the belief that a higher percentage of spending means a better healthcare system, restricting them to economic criteria when the performance also need contemplate quality and effectiveness. To conclude, both healthcare systems are constantly changing to meet new needs and to obtain sufficient financial resources to provide a quality service to their population.

REFERENCES

1. Almeida C; Szwarcwald CL; Travassos C. et al. Desenvolvimento de metodologia de avaliação do desempenho do sistema de saúde brasileiro, 2003. PRO-ADESS Relatório Final FIOCRUZ. Rio de Janeiro.
2. Smith P C; Papanicolas I. Health system performance comparison: an agenda for policy, information, and research. 2012. World Health Organization - Observatory on Health Systems and Policies.
3. Immergut EM. Health Politics - Interests and Institutions in Western Europe. 1992. Cambridge Studies in Comparative Politics. New York: Cambridge University Press.
4. Conill E; Hortale VA; Pedroza M. Desafios na construção de um modelo para análise comparada da Organização de Serviços de

Saúde. Cadernos de Saúde Pública, 1999; 1(15): 79-88.

5. World Health Organization – WHO. Reports. 2019. Available at: https://www.who.int/gho/publications/en/

6. Cordilha AC; Lavinas L. The reshaping of healthcare systems in the age of financialization. Lessons from France and Brazil. Ciência & Saúde Coletiva, 2018; 7(23): 2147-2158. Available at: http://www.scielo.br/pdf/csc/v23n7/1413-8123-csc- 23-07-2147.pdf

7. IBGE - Instituto Brasileiro de Geografia e Estatística – Países. 2019. Available at: https://paises.ibge.gov.br/#/

8. INSEE- Institut National de la statistique et des études économiques. Population par sex et groupes d'âges en 2019. 2019. Available at: https://www.insee.fr/fr/statistiques/2381474

9. Pison G. Tous les pays du monde (2019). 2019. Populations et Sociétés. n. 569. Available at: https://www.ined.fr/fichier/s_rubrique/29504/569.population.societes.tous.pays.monde.2019.fr.pdf

10. United Nations. United Nations Development Programme. Human Development Index and its components. 2017. Available at: http://hdr.undp.org/en/composite/HDI

11. BRAZIL. Constituição da República Federativa do Brasil– Brasília: Senado Federal, Coordenação de Edições Técnicas, 1990. Brazil. Law 8080. 1990. Dispõe sobre as condições para a promoção, proteção e recuperação da saúde, a organização e o funcionamento dos serviços correspondentes e dá outras providências. Available at: http://www.planalto.gov.br/ccivil_03/leis/l8080.htm

12. BRAZIL. DATASUS. Painéis de monitoramento (SVS). Painel de Monitoramento da Mortalidade CID-10. 2019. Available at: http://svs.aids.gov.br/dantps/centrais-de-conteudos/paineis-de-monitoramento/mortalidade/cid10/

13. AMELI - L'Assurance Maladie - Histoire de l'Assurance Maladie. 2018. Available at:https://www.ameli.fr/l-assurance-maladie/connaitre-l-assurance-maladie/missions-et-organisation/la-securite-sociale/

14. European Observatory on Health Systems and Policies. Health Systems in Transition (HiT) profile of France. Available at: https://www.hspm.org/countries/france25062012/livinghit.aspx?Section=1.1%20Geograph y%20and%20sociodemography&Type=Section

15. Ministère des Solidarités et de la Santé – Missions du Ministère. 2015. Available at: https://solidarites-sante.gouv.fr/ministere/missions-du-ministere/

16. INSEE- Institut National de la statistique et des études économiques. Population par sex et groupes d'âges en 2019. 2019. Available at: https://www.insee.fr/fr/statistiques/2381474

17. INSERM -CépiDc- Centre d'épidémiologie de l'Inserm. Interrogation des données sur les causes de décès de 1980 à 2016. Available at: http://cepidc-data.inserm.fr/cgi-bin/broker.exe

18. Polignano, MV. Histórias das Políticas de Saúde no Brasil: Uma Pequena Revisão. 2001. Cadernos do Internato Rural - Faculdade de Medicina - UFMG. Available at:http://www.saude.mt.gov.br/upload/documento/16/historiadas-politicas-de-saude-no-brasil-

19. Carvalho AI; Barbosa PR. Políticas de saúde: fundamentos e diretrizes do SUS. 2010. Florianópolis: Departamento de Ciências da Administração / UFSC. Brasília. CAPES: UAB, 82.

20. Souza, RR. O Sistema Público de Saúde Brasileiro. 2002. Ministério da Saúde – Brasil. Seminário Internacional Tendências e Desafios dos Sistemas de Saúde nas Américas. São Paulo, Brasil.

21. Mathias M. Antes do SUS: Como se (des)organizava a saúde no Brasil sob a ditadura. 2018. Centro de Estudos Estratégicos Fiocruz. Fundação Oswaldo Cruz. FIOCRUZ. Available at: https://cee.fiocruz.br/?q=antes-do-sus

22. Sandier S; Paris V; Polton; Thomson S; Mossialos et al. Health care systems in transition: France. 2004. WHO Regional Office for Europe. Available at: https://apps.who.int/iris/handle/10665/107575

23. France. Ministère de Solidarité et de la Santé. Système de santé, médico-social et social. 2017. Available at: https://solidarites-sante.gouv.fr/systeme-de-sante-et-medico-social/systeme-de-sante-et-medico-social/article/systeme-de-sante-medico-social-et-social

24. Chevreul K; Berg BK; Durand-Zaleski I, Hernández-Quevedo C. France: Health system review. 2015. Health Systems in Transition, 2015; 3(17): 1–218.

---

25. BRAZIL. Ministério da Saúde. Estrutura do SUS. Atenção Especializada. 2013/2019. Available at: http://www.saude.gov.br/sistema-unico-de-saude/estrutura-do-sus/770-sistema-nacional-de-saude/40317-atencao-especializada

26. BRAZIL. Ministério da Saúde. O que é Atenção Básica? 2017. Available at: http://aps.saude.gov.br/smp/smpoquee

27. BRAZIL. Ministério da Saúde. Secretaria de Atenção Primária em Saúde. 2019. Available at: http://aps.saude.gov.br/ape/esf/

28. BRAZIL. Agência Nacional de Saúde Suplementar ANS – 2019. Sala de Situação. Dados sobre ao setor de serviço privados. Available at: http://www.ans.gov.br/perfil-dosetor/dados-e-indicadores-do-setor/sala-de-situacao

29. FRANCE. Ministère de Solidarité et de la Santé. Système de santé, médico-social et social. 2017. Available at: https://solidarites-sante.gouv.fr/systemede-sante-et-medico-social/systemedesante-et-medico-social/article/systeme-de-sante-medico-social-et-social

30. DATASUS. Histórico/Apresentação. 2019. Available at: http://datasus.saude.gov.br/datasus

31. Nugem, RC. Doenças Relacionadas ao Saneamento ambiental inadequado (DRSAI) em Porto Alegre/RS. 2015. Dissertação de mestrado apresentada ao Programa de Pós-Graduação em Saúde Coletiva pela Escola de Enfermagem. UFRGS. SABI.

32. IBGE Projeção da população. 2019. Available at: https://www.ibge.gov.br/apps/populacao/projecao/

33. France. Ministère des Solidarités et de la Santé. Les établissements de santé – édition 2018. Available at: https://drees.solidarites-sante.gouv.fr/etudes-et-statistiques/publications/panoramas-de-la-drees/article/les-etablissements-de-sante-edition-2018

34. France. Ministère des Solidarités et de la Santé. La démographie des médecins. 2016. Available at: https://drees.solidarites-sante.gouv.fr/etudes-et-statistiques/open-data/professions-de-sante-et-du-social/la-demographie-des-professionnels-de-sante/la-demographie-des-medecins-rpps/

35. France. Ministère des Solidarités et de la Santé. La démographie des autres professions de santé. 2015. Available at: https://drees.solidarites-sante.gouv.fr/etudes-et-statistiques/open-data/professions-de-sante-et-du-social/la-demographie-des-professionnels-desante/la-demographiedesautresprofessions-de-sante-rpps-et-adeli/

36. STATISTA - Nombre d'établissements de santé avec capacités d'hospitalisation en France en 2017, selon le secteur. 2017. Available at: https://fr.statista.com/statistiques/514779/nombre-etablissements-sante-capacitehospitalisation-secteur-france/

37. France. Ministère Chargé de la Santé. Les chiffres clès de l'offre de soins. 2018. https://solidarites-sante.gouv.fr/IMG/pdf/dgos_cc_2018_02_16_a_web_pages_hd.pdf

38. Conselho Federal de Medicina – CFM. Estatística. 2019. Available at: https://portal.cfm.org.br/index.php?option=com_estatistica

39. Conselho Federal de Odontologia. Estatísticas. 2019. Available at: http://cfo.org.br/website/estatisticas/quantidade-geral-de-entidades-e-profissionais-ativos/

40. Conselho Federal de Farmácia. Dados 2018. Available at: http://www.cff.org.br/pagina.php?id=801&menu=801&titulo=Dados+2018

41. Conselho Federal de Nutricionistas. Quadro Estatístico. 2018. Available at: http://www.cfn.org.br/index.php/estatistica

42. Conselho Federal de Psicologia. A Psicologia Brasileira apresentada em números. 2019. Available at: http://www2.cfp.org.br/infografico/quantos-somos/

43. Conselho Federal de Enfermagem. Enfermagem em números. 2019. Available at: http://www.cofen.gov.br/enfermagem-em-numeros?undefined=undefined

44. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Ações Programáticas Estratégicas. Livro da parteira tradicional. Brasília. 2012.

45. Funcia FR; Bresciani LP. A Gestão Recente do Sistema Único de Saúde: Financiamento Restringido. 2019. Available at: http://idisa.org.br/files/anexos_domingueira/2019_EnAPG217_PUBLICADO_SITE.pdf

46. Jaccoud L; Vieira FS. Federalismo, integralidade e autonomia no SUS: desvinculação da aplicação de recursos federais e os desafios da coordenação. 2018. Rio de Janeiro: Ipea n. 2399.

47. Rosa RS. Desafios para o financiamento da saúde com a PEC 55. In: PEC 55 Que bicho é esse? Adverso. Porto Alegre. n. 223. 2016

48. Lima LD; Travassos C; Carvalho MS; Coeli CM. 2016: a year of perplexity. Editorial (Editor's Choice). Cadernos de Saúde Pública. v. 32 n. 12. 2016.

49. Funcia, FR; Ocké-Reis CO. Efeitos da política de austeridade fiscal sobre o gasto público federal em saúde. 2018. In: Economia para Poucos: Impactos Sociais da Austeridade e Alternativas para o Brasil. p. 83-98. Organizadores: Rossi P; Dweck E; Oliveira ALM. São Paulo. Autonomia Literária. 374 p.

50. Direction de L'information Légale et Administrative. Vie Publique. Qui finance les dépenses de santé. 2016. Available at: https://www.vie-publique.fr/decouverte-institutions/protection-sociale/risque-sante/depenses-sante/qui-financedepenses-sante.html

51. OECD. Tackling Wasteful Spending on Health. 2017. OECD Publishing, Paris. Available at: http://dx.doi.org/10.1787/9789264266414-en

52. France. La Loi de financement de la sécurité sociale. 2017. Available at: https://solidarites-sante.gouv.fr/affaires-sociales/securite-sociale/article/presentation-de-la-loi-de-financement-de-la-securite-sociale

53. France. DREES. Ministère des Solidarités et de la Santé. Les chiffres clés de l'offre de soins.2018. Available in: https://solidarites-sante.gouv.fr/ministere/organisation/direction s/article/dgos-direction-generale-de-l-offre-de-soins

54. The World Bank - Domestic general government health expenditure (% of current health expenditure). 2019. World Health Organization Global Health Expenditure database. Available at: https://data.worldbank.org/indicator/SH.XPD .GHED.CH.ZS

55. The World Bank - Current health expenditure (% of GDP). World Health Organization Global Health Expenditure Database. 2019. Available at: https://data.worldbank.org/indicator/SH.XPD .CHEX.GD.ZS

56. Mendes Á; Weiller J; Buso A. Fiscal waiver (tax spending) in health: effects on the financing of the SUS. Saúde Debate. Rio de Janeiro, 39(105): 491-505. 2015.

57. Tribunal de Contas da União. TCU. Painel de renúncias tributárias federais. Available at: https://portal.tcu.gov.br/imprensa/noticias/tcu - lanca-painel-de-renuncias-tributarias-federais.htm

58. Figueiredo JO; Prado NMBL; Medina MG; Paim, JS. Public and private health expenditures in Brazil and selected countries. Saúde Debate. Rio de Janeiro, 2019; 42(2): 37-47. 2018.

59. Setor Saúde. Saúde francesa "atacará" ineficiência e modelo de pagamento por volume (French health will attack inefficiency and model of volume payment). 2018. Available at: https://setorsaude.com.br/saude-francesa-atacara-ineficiencia-e-modelo-de-pagamento-por-volume/

60. Vieira FS; Piola SF; Benevides RPS. Vinculação orçamentária do gasto em saúde no brasil: resultados e argumentos a seu favor. Instituto de Pesquisa Econômica Aplicada IPEA. Brasília: Rio de Janeiro. 2019.

Open Access Full Text Article

REVIEW

Stroke Care in Brazil and France: National Policies and Healthcare Indicators Comparison

Rita Nugem [1,2]

Ronaldo Bordin [1]

Christophe Pascal [3]

Anne-Marie Schott-Pethelaz [2]

Beatrice Trombert-Paviot[4]

Vincent Piriou[2]

Philippe Michel[2]

[1]Post-Graduate Program in Management – PPGA, Federal University of Rio Grande do Sul. Porto Alegre, Rio Grande do Sul, Brazil; [2]Health Services and Performance Research – HESPER, Université Claude Bernard Lyon 1. Faculté de Médecine, Lyon, Rhône-Alpes, France; [3]Institut de Formation et de Recherche Sur les Organizations Sanitaires e Sociales – IFROSS, Université Jean Moulin Lyon 3, Lyon, Rhône-Alpes, France; [4]Host Research Team EA4607 SNA-EPIS, PRES Lyon, Jean Monnet Université, Lyon, Department of Public Health and Medical Informatics, University of Saint-Etienne, Saint-Etienne, Rhône-Alpes, France

Correspondence: Rita Nugem
Faculté de Médecine, HESPER,
8, Avenue Rockefeller, Lyon,
CP 69008, France
Tel +330658818090
Email rcnugem@gmail.com
This article was published in the following Dove Press journal:
Journal of Multidisciplinary Healthcare

Objective: To identify the commonalities and discrepancies between national health policies to combat stroke in France and Brazil.

Justification: Both healthcare systems were structured as universal access and comprehensive care attention, hierarchized by the level of care, politically and administratively decentralized. France is an industrialized, high-income country, with health care involving copayment and reimbursement of expenses, and spontaneous demand for services. Brazil is a member of the BRICs, of upper middle income with totally free health care, with an active search for hypertension and diabetes in the general population.

Methods: Data regarding policies, risk factors, and health indicators about stroke care, from 2010 to 2017, were obtained from both countries (publicly accessible information or on request) from the respective Ministries of Health or international agencies.

Results: About acute stroke hospitalizations, on average, Brazil has 0.75 per 1000 annual population hospitalizations versus 1.54 per 1000 in France. Brazil has 0.21 per 1000 population deaths per year versus 0.40 per 1000 in France. The in-hospital mortality rate in Brazil has 139 per 1000 hospitalized people versus 263 in France. The average length of stay of acute hospitalizations was 7.6 days in Brazil versus 12.6 in France. The prevalence of strokes by age group shows from 0 to 39 years old (this rate is stable); 40–59 years (it is increasing in both countries); and 60–79 and 80+ years (this rate has been increasing in France and decreasing in Brazil).

Conclusion: No major differences were found about the health policies and the National Health Plans related to stroke. However, the data directly linked to the period of hospitalization differed substantially between countries. Subsequent studies can be implemented to identify the explanatory factors, notably among the risk factors and actions in primary care, and the moments after hospital care, such as secondary prevention and palliative care.

Keywords: stroke, risk factors, health policies, health care, Brazil, France

Introduction

Stroke is a non-communicable disease that results from an interruption of blood circulation in the brain, usually when a blood vessel ruptures, or a clot blocks it. The most common symptoms of a stroke are a sudden weakness or a loss of sensation in the face or limb, most often on one side of the body. A stroke's consequences depend on the part of the brain affected and the delay in care.[1] In Brazil, stroke is the leading cause of death – 40,019 deaths and 149,333 acute hospitalizations in the Unified Health System (SUS) in 2016.[2] In France, stroke is the second leading cause of death; approximately 30,000 people die each year, about 110,000 people are hospitalized each year.[3]

According to WHO, the Global Noncommunicable Diseases Action Plan to the period 2013–2020 expected a 25% reduction in premature mortality and reduced the risk factors associated with stroke and other NCDs:

> Laws, policies, and regulations have important roles in the prevention and control of diseases. Only governments can legislate for health warnings, introduce mandatory standards and labeling and health policies. Often governments are the main providers of health care – prevention, treatment, research, and training.[4]

This paper's goal was to compare the commonalities and discrepancies of the health policies in the process of stroke control and management, and some endpoint health indicators in France and Brazil, to better inform the policymaking in each country.

Methods

The method proposed was a comparison between Brazil and France about stroke care by collecting secondary data (already existing in the national databases or on request). The health policies concerning stroke care developed in both countries (care and prevention) and the health indicators related to care to better management were studied to achieve the objective. The populations under analysis comprise the entire population of metropolitan France and Brazil. The period analyzed was 2010 to 2017.

The data for the National healthcare policies from Brazil and France were searched in the Ministry of Health websites (National Health legislation – Circulaire DGOS/R4/ R3/PF3 n°2012-106; Loi n°2004-806 du 9 août 2004 (France)); Portarias n°664 and 665/2012 (Brazil). From a careful reading, the main points related to stroke care were described in Table 1. It was sought to extract from only the text related to general stroke care, be it prehospital, hospitalization, and after discharge. The stroke care for certain more specific cases was not considered in this study because it is the exception, and because they were varied, what could change the focus of the subject. Those guidelines must be respected in both countries.

The figures were composed of information from both national health plans for stroke care in both countries, and the general steps to be followed for the stroke care were shown.

About the healthcare indicators, the following were chosen: number of acute hospitalizations, average length of stay, and in-hospital mortality rate, the reason for this choice were due to these data were available for both countries and are part of the effectiveness indicators related to the management. Data about stroke's prevalence by age group (total cases in a year) were collected from the Hospitalization

System of the Unified Health System, obtained in monthly files, according to the principal diagnosis of the discharge note. These files were consolidated in annual periods. For France, data were obtained by request to the Programme de Médicalisation des Systèmes d'Information PMSI.

The data for the acute hospitalizations and the hospital mortality rate per 1000 inhabitants, the following formulas were applied:

Amount of acute hospitalizations rate = $\frac{\text{Stroke hospitalizations}}{\text{Total estimated population}}$ x 1.000

and;

Hospital mortality rate = $\frac{\text{Number of Deaths}}{\text{Total hospitalized patitents}}$ x 1.000

and;

Stroke′s prevalence by age group = $\frac{\text{Number of cases by age group}}{\text{Total estimated population}}$ x 10.000

For healthcare prevention, the data about risk factors indicators were collected from the WHO website.

The data referring to the estimated population were collected from the United Nations website. The lack of adjustment of differences in the case-mix and the absence of comparable indicators on post-stroke functional disability can be pointed out.

Results

Stroke Policies and Guidelines

In 2011, Brazil published the Strategic Action Plan for Fight Against Chronic Noncommunicable Diseases in Brazil 2011–2022, which aims to promote the development and implementation of effective, integrated, sustainable, and evidence-based public policies for the prevention and control of NCDs and their risk factors.[5,6,26] The Plan addresses four key modifiable risk factors: tobacco use, unhealthy diet, physical inactivity, harmful use of alcohol, which generate a significant portion of the burden of NCDs in Brazil. The National Plan has three pillars: health surveillance, monitoring, and evaluation; health prevention and promotion; and comprehensive care.[7] Exclusive for stroke there is the Cerebral

Table 1 Health National Actions Plans – Brazil and France

Country	Health Policies and Laws	Objective	Specific Objectives
Brazil	Cerebral Vascular Accident (CVA) Care Line in the Urgency and Emergency care network	Reduce stroke morbidity and mortality, through the Stroke Care Line in the Urgency and Emergency Care Network through the comprehensive care	- Disseminate the knowledge that stroke is a medical emergency; - Improve the population's knowledge about stroke, its signs and symptoms, risk factors, and the need for adequate control of them; - Increase the control of risk factors for vascular diseases in primary healthcare network; - Qualify SAMU 192 for proper stroke care; - Enable Type I, Type II, and Type III Stroke Urgent Care Units, to perform general care and thrombolytic therapy; - Expand the supply of hospital beds for chronic care and rehabilitation; - Establish an adequate outpatient clinic care after hospital discharge - rehabilitation, specialized care, home care, and social and work reintegration of individuals
France	Action National Plan - Stroke 2010–2014	Develop prevention and information to prevent strokes and limit their sequelae; Improve the organization of stroke care; Improve the offer of re-education, rehabilitation, and reintegration; Implement a research policy in the stroke field; Develop ethical thinking; Facilitate the accompaniment of patients and the action of patient associations; Contribute to changing the social outlook on disability.	- Take care of patient victim or suspect of stroke in an organized and territorially defined sector; - Reduce the time between the first symptoms and care, based on a positive diagnosis; - Increase the rate of thrombolysis in eligible patients; - Better coordinate the intervention of professionals at the interfaces between healthcare establishments and city, home, or medical-social sector; - Define a specific organization for the management of children's stroke; - Improve professional practices; - Improve information and training for professionals and carers people; - Increase research efforts on stroke due to its social burden;
Brazil	Ordinance No. 664, April 12, 2012	Approves the Clinical Protocol and Therapeutic Guidelines - Thrombolysis in Acute Ischemic Stroke	- The general concept of Acute Ischemic Stroke, diagnostic criteria, inclusion and exclusion criteria, treatment and regulation, control, and evaluation mechanisms. This protocol must be used by the Health Departments of the States, Federal District, and Municipalities. - Compliance with the Clinical Protocol and Therapeutic Guidelines - Thrombolysis in Acute Ischemic Stroke is mandatory in eligible patients. - It is mandatory to inform the patient or his legal guardian about the potential risks and side effects related to the use of recommended medication for the treatment of acute ischemic stroke; - State, district, and municipal managers of the Unified Health System (SUS) should structure the healthcare network, define referential services and establish flows for the care of patients described in the Annex to this Ordinance

submit your manuscript | www.dovepress.com

DovePress

Table 1 (Continued).		Note: [8–10,13,14,25,26].	Centers for stroke patients are part of the Stroke Care Line and are components of the Urgency and
Brazil	Ordinance No. 665, April 12, 2012	Provides the criteria for the qualification of hospital establishments such as the Urgent Care Center for Patients with Stroke, institutes the respective financial incentive, and approves the Stroke Care Line.	Emergency Care Network (RUE). - Treatment stroke patients, Urgent Care Centers, will be classified as Type I, Type II, or Type III. - Give to the Regional Hospitalization Agencies (ARH), to regional directorates of health and social affairs (DRASS), to the departmental directorates of health business and social services
France	Circular N ° DHOS/SDO/01/DGS/SD5D/DGAS/PHAN/3B/200 4/280; June 18, 2004	Establishes the organizational principles of health care, medical-social and social, traumatic brain, and spinal cord injuries. Emphasizes these injuries' characteristics and the need to provide speed, fluidity, relevance, and durability in their care also, physically, mentally, and socially. Recommends an organization in a network of experienced and identified actors for the reception, listening, information, and support for relatives of traumatized people.	(DDASS), and the organization of the care sector for traumatic brain injury and spinal cord injury which is a basis for the development of Regional Health Organization Schemes, in close collaboration with medical-social actors. Specifies in its appendices the care of all traumatized craniocerebral types and spinal cord injury. Presents the guide intended to provide methodological support to ARS in the organization of care for stroke victims. The purpose is to present the three major objectives of the plan: structuring the sectors, ensuring individualized and optimal care for all
France	Circular DGOS/R4/R3/PF3 n 2012–106. March 6, 2012	Relating to the organization of supply chains services for patients suffering from cerebrovascular accident (stroke) The Stroke Care Line is approved, to be observed by all health services enabled, - The Urgent Care	stroke victims, and developing telemedicine and information systems. It is supplemented by a methodological guide to help the regions in the implementation of these objectives.

vascular accident (CVA) care line in the emergency care network.[8] In Brazil, Ordinance nº664/2012 approves the Clinical Protocols and Therapeutic Guidelines for Stroke – thrombolysis in acute ischemic stroke and, the Ordinance nº665/2012 provides the criteria for qualifying hospital establishments as an Emergency Care Center for stroke patients in the Unified Health System (SUS). The compliance with this Clinical Protocol is mandatory.[9,10]

In France, the 2010–2014 National Stroke Action Plan was developed to the stroke prevention and care strategy. Its objectives are a program of operational and regional actions on a National and Regional scale and a toolbox including methods (regulations, good practice standards, guidelines). This Plan is centered on four main axes – improving the health prevention and public information before, during, and after the stroke; enforcing the healthcare channels and adapting information systems, providing information, training for professionals, promoting research, and ensuring demographic balances.[11,12,25] The law n°2004-806 Public Health Policy (August 9, 2004) sets five objectives relating to cardiovascular diseases, including one specific to stroke – reducing the frequency and severity of the functional sequelae associated and; the Circular of March 6/2012 organizes the regional networks and standard care for stroke patients from the emergency wards to the medico-social relay and the patient return to home.[13,14]

The national clinical and therapeutic protocols were established by the Ministry of Health from both countries and were implemented by law or by ministerial ordinance. Table 1 summarizes the main items of the Health Action Plans of both countries, and it seeks to

| Health prevention and Prehospital Care | • Primary Health Care Units (Basic Health Units)
• Anticoagulation Outpatient Clinic
• Emergency Mobile Component (Prehospital / SAMU 192)
• Telemedicine |

| Acute Hospital Care | • Emergency Care Units (UPA 24 hours) and Emergency Rooms of general hospitals (not referenced for stroke);
• Stabilization Room (SE);
• Hospitals with a Type I, Type II, and Type III Emergency Care Center for stroke patients;
• Specialized Care Units;
• Long term ward
• Anticoagulation Outpatient Clinic |

| After Acute Hospital care | • Home Care;
• Ambulatory and Hospital Rehabilitation Services;
• Social Reintegration Service;
• Regulation Centers;
• Anticoagulation Outpatient Clinic
• Primary Health Care Units |

Figure 1 Stroke Flow in a Comprehensive Health Care in Brazil.
Note: 9,19.

emphasize the points believed to strengthen health prevention, promotion, and recovery.[25,26]

Stroke Care in Brazil

In Brazil, the Stroke Care Line aims to provide integrated and continuous care within a hierarchical and regulated system and has the following components shown in Figure 1[8] The stroke prevention and promotion are made by Primary care through the Basic Health Units (UBS) facilities (pediatrics, gynecology, general practice, nursing, and dentistry). To promotion, prevention, and treatment-related to women's and children's health, mental health, family planning, cancer prevention, prenatal care, vaccines, laboratory tests, essential medication, and care for chronic diseases such as obesity, diabetes, and hypertension (follow-up care) that covers diagnosis, treatment, rehabilitation, harm reduction, in comprehensive care that positively impacts the population's health at all health prevention levels – primary, secondary, tertiary, and quaternary.[15–17]

In the case emergencies, such as strokes, the patient might be referred to a 24-hour Emergency Care Unit (UPA 24h) as a prehospital care, that includes ambulances and emergency mobile care service (SAMU), which transport the patient to a reference center or hospital as soon as possible, prioritizing potential patients for thrombolytic therapy. Telemedicine is expanding to qualified specialized assistance access, regardless of the physical distance. Thrombolytic therapy supported by telemedicine has successful experiences in Brazil, and it is a support for the diagnosis and treatment of acute stroke.[8,9] In the acute stroke event, the team often performs the first care, evaluates vital signs and blood glucose, does a brief neurological examination, and contacts the referral's central urgency regulation.[8,17]

The treatment is carried out in hospitals and specialized hospitals called Emergency Stroke Care Centers for Patients.

These centers are classified as Type I; Type II or Type III with a qualified staff, coordinated by a clinical neurologist and the following resources should be available 24h/7d: continuous cardiovascular and respiratory monitoring; Intensive Care Unit; Clinical pathology laboratory; CT scanner; Neurosurgical; hemotherapy service or transfusion agency, including cryoprecipitate. The number of Emergency Stroke Care Centers increased from 35 (2008) to 149 in 2017.[7,9,10]

After the stroke care, the treatment should be prescribed by a specialist, and the patient returns to primary attention to regular visits at the general practitioner and specialists. Secondary prevention is done through the control of hypertension, diabetes, and lipids, and anticoagulation therapy may be indicated for some and the control and treatment for platelet anti-aggregation, atrial fibrillation, cardiomyopathy, and other more specific procedures, depending on each case.[16,18]

The rehabilitation is carried out in the Specialized Rehabilitation Centers (CERS) for diagnoses and treatments and have the following care: physiotherapy, speech therapy, ergotherapy, psychomotricity, neuropsychology, psychology, and physicians considering the impact of the disability on their functionality, as well as the clinical, emotional, environmental and social factors involved that provide a better quality of life.[18]

The long-term care and end-of-life care are done, in large part, at the patient's residence, through a caregiver who can be a family member or a health professional according to the severity and complexity of the disability.

The Palliative Care program includes different levels of patient care: home care, outpatient care, procedures in bed- day. In both cases, depending on the patient's health status, he/she goes to control consultations at a UBS, or a team of health professionals goes to his/her home for medical monitoring. If the patient cannot return home due to insufficient autonomy or a disadvantaged social, it is usual to be housed in nursing homes. Usually, the patient is carried to the hospital for the end-of-life last care.[19]

Stroke Care in France

In France, the Stroke Care Line has the following components shown in Figure 2.[12] The treatment of stroke is carried out in acute care hospitals (either public or private for-profit or private not for profit) and in more specialized services called Neuro-Vascular Units (UNV). These units are reference centers that are labeled by the Ministry of Health. The number of Neurovascular Units increased from 33 in 2007 to 135 in 2014,[20] and the care is offered by medical and paramedical staff.[12,21,22]

The Care organization is based on coordination between the UNV and the various emergency services: SAMU, fire brigade, emergency reception, radiologists, neurologists, cardiologists, neurosurgery teams, resuscitators, Etc.[12,23,24] Telemedicine is an emergency service that aims to benefit patients with treatment in a shorter period until they arrive at the emergency ward or the UNV.[11]

After the care, the patient undergoes an evaluation to start his/her personalized program for health recovery and day-to-day activities, and secondary prevention is done by preventing cardiovascular risk

factors controlling blood pressure and blood sugar. These measures include taking anti-thrombotic treatment, statins, applying hygienic and dietary rules (stopping smoking, maintaining physical activity, controlling alcohol consumption), regular visits at the cardiologist, and general practitioner.[12,23]

The rehabilitation is carried out in the Reeducation and Re-adaptation Units, which are neurological or geriatric, and have the following care: physiotherapy, speech therapy, ergotherapy; psychomotricity, neuropsychology, psychology, and physicians.[12]

The long-term care and end-of-life care are done at the patient's residence, or home equivalent (home hospitalization – HAD) or in an institution, according to the severity and complexity of the disability. Also, in accommodation establishment for dependent elderly (EHPAD), specialized reception homes (MAS), nursing homes. If the patient cannot return home due to insufficient autonomy or a disadvantaged social, he/she can be referred to the healthcare structures. According to the needs they express, palliative care is based on support for the person and those around them to help them as best as possible. Hospital professionals, referring general practitioners, family, and relatives of the patient, participate in the patient's overall care.[12]

Results

Healthcare Indicators

Table 2 shows a comparison of the risk factor indicators tracked by WHO, they are essential for stroke control.
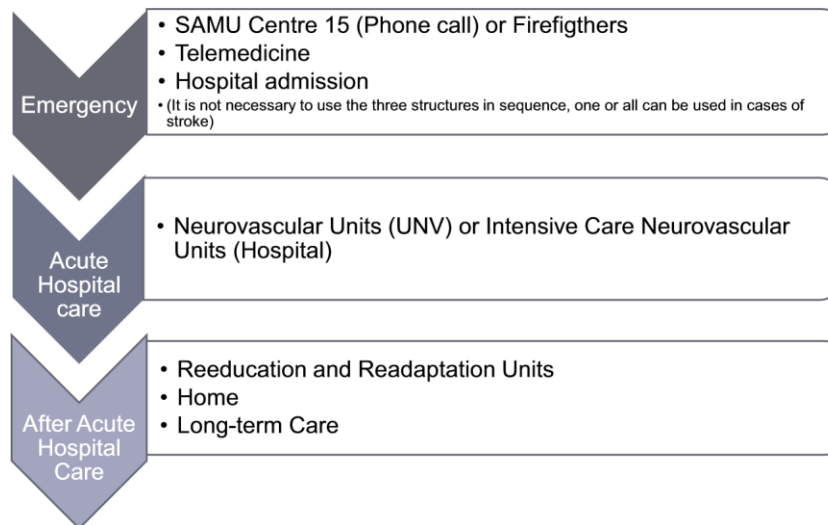
Figure 2 Stroke Flow in a Comprehensive Health Care in France.
Note: [13,22].

Table 2 Risk Factors Indicators Related to Stroke in Brazil and France, 2010 and 2016

Risk Factors	2010		2016	
	Brazil	France	Brazil	France
Total alcohol per capita consumption, adults aged 15+ (liters of pure alcohol) (world average is 6.4 liters)	8.7	12.2	8	13
Physical inactivity - adults aged 18+ (%) (recommended 150 minutes of moderate-intensity physical activity per week)	48.6	33	47	32
Salt/Sodium intake - (g/day) (recommendation - 5 g/day salt or 2g/day sodium)	x	x	10g	10g
Tobacco use - Current tobacco smoking, adults aged 15+ (%) (worldwide prevalence 20%)	14.1	23.6	14	28
Raised blood pressure - adults aged 18+ (%)	40.0	42.7	23	29
Diabetes - adults aged 18+ (%)	9.7	6.8	8	8
Obesity - adolescents aged 10–19 (%)	x	x	9	7
Obesity - adults aged 18+ (%)	18.8	18.2	22	23

Both countries are similar regarding salt consumption, diabetes, and obesity. France has higher alcohol consumption, tobacco smoking, and hypertensive adults. Brazil has a higher percentage of people who do not do physical activity.[1,4,33,34]

Table 3 shows the result of a historic series between the years 2010 to 2016 about Acute Stroke Hospitalizations, Average stay, and In-hospital mortality rate from Brazil and France. About Acute Stroke Hospitalizations, on average, Brazil has 0.75 per 1000 annual population hospitalizations versus 1.54 per 1000 in France. In-hospital mortality rate, Brazil has an average of 139 per 1000 hospitalized people versus 263 in France. The average length of stay of acute hospitalizations was about 7.6 days in Brazil versus 12.6 in France.

Table 4 shows the Stroke prevalence by age group in Brazil and France, 2010–2016. The prevalence of strokes by age group (Table 3) shows that this rate has remained practically stable from 0 to 39 years old, even with population growth. This rate for the age group 40–59 years has been increasing in both countries, and the age groups 60–79 and 80+ years, the rate has been increasing in France and decreasing in Brazil.

Stroke Care Comparation

The care offered in the event of a stroke is not very different from one country to another, as illustrated in Figure 3. This care is since both countries follow the guidelines outlined by WHO, which reflect standardized care and have consolidated national health policies in stroke care.

Discussion

This research is essential because several countries have programs for evaluating their healthcare systems based on data and indicators to know the quality of hospital and primary care, the whole system's performance or to evaluate specific parts, allocate resources, compare results, and promote policies. In Brazil, there is an effort to evaluate its healthcare system through indicators. The OECD evaluates the economic policies of its member countries intending to compare healthcare systems. Although Brazil is not a member, the OECD seeks to include it in calculating some indicators as it considers Brazil as one of the largest economies, and there is a good representation of indicators calculated for Brazil. Thus, Brazil has its healthcare system compared to other countries, pointing out areas that can be improved and its good results.[35] This research is characterized as unprecedented and innovative because that compares the National health policies and the stroke care in two universal healthcare systems, and it had not been done before.

Laws and policies guide every public healthcare system, so the core policies developed follow the WHO recommendations based on each country's experiences and health characteristics. The law refers to reducing the functional sequelae's frequency and severity and organizing the networks and standard care. In both ministries of health websites, there is information about stroke – how it occurs, signs and symptoms, risk factors, prevention, and how to call for help, emphasizing the importance of the care as soon as possible to avoid sequels and premature death. There are no significant differences between policies and laws related to stroke prevention and treatment in both countries, but the health strategies are different.[25,26]

Concerning the indicators related to stroke care, a hypothesis for lower rates in Brazil, as a lower prevalence (Table 4) and Acute Stroke Hospitalizations (Table 3), could be associated with the intense work of UBSs, which mitigates risk factors.[36] These services are also provided "on the move" in their territory in an attitude of "active search" in an asymptomatic population beyond spontaneous demand.[37–40]

Table 3 Acute Stroke Hospitalizations, Average Stay, Hospital Deaths and Hospital Mortality Rate from Brazil and France, 2010–2017

Year	Acute Hospitalizations (Total Amount = Prevalence)		Average Stay (Days)		Hospital Deaths		Acute Hospitalizations Rate per 1.000 Inhabitants		Hospital Mortality Rate of 1.000 Inhabitants		Estimated Population (in Thousands)	
	Brazil	France	Brazil	France	Brazil	France	Brazil	France	Brazil	France	Brazil	France
2010	116,633	101,982	7,5	12,74	20,018	28,559	0.59	1.62	0.102	0.454	195,714	62,880
2011	124,143	101,359	7,5	16,36	20,944	28,529	0.62	1.60	0.106	0.451	197,515	63,222
2012	127,512	105,269	7,6	10,71	21,082	28,141	0.63	1.65	0.105	0.442	199,287	63,564
2013	133,930	108,514	7,6	11,34	21,406	28,495	0.66	1.69	0.106	0.445	201,036	63,894
2014	142,403	110,439	7,7	13,35	22,134	28,550	0.70	1.72	0.109	0.444	202,764	64,194
2015	145,276	112,188	7,7	13,34	23,388	28,391	0.71	1.74	0.114	0.440	204,472	64,453
2016	149,333	115,460	7,7	10,63	24,154	28,301	0.72	1.78	0.117	0.437	206,163	64,668
Total	1,095,721	755,211	–	–	153,126	198,966	–	–	–	–	–	–

Note: [29–31].

Table 4 Stroke's Prevalence by Age Group in Brazil and France, 2010–2016 (Total Cases in a Year and Prevalence per 10.000 Inhabitants, by Age Group)

Year	Prevalence (Number of Cases) 0–39 Years Old		Prevalence per 10,000 Inhab.		Prevalence (Number of Cases) 40–59 Years Old		Prevalence per 10,000 Inhab.		Prevalence (Number of Cases) 60–79 Years Old		Prevalence per 10,000 Inhab.		Prevalence (Number of Cases) 80+ Years Old		Prevalence per 10,000 Inhab.	
	BR	FR	BR	FR	BR	FR	BR	FR	BR	FR	BR	FR	BR	FR	BR	FR
2010	6578	4919	0.05	0.15	35.147	19.522	0.78	1.14	75.184	46.658	6.07	4.18	34,337	48,495	13,89	14,44
2011	6801	4550	0.05	0.14	37.148	18.906	0.81	1.11	78.977	45.634	6.15	4.01	35,913	49,490	13,67	14,26
2012	7183	4798	0.05	0.15	37.706	19.855	0.79	1.16	79.877	47.450	6.00	4.10	36,731	51,848	13,28	14,51
2013	7357	4804	0.05	0.15	38.747	20.564	0.81	1.19	83.545	49.502	6.04	4.18	38,147	53,350	13,18	14,54
2014	7722	4676	0.05	0.14	40.665	20.872	0.84	1.21	87.870	50.723	6.11	4.20	39,198	54,492	12,96	14,51
2015	7752	4478	0.05	0.14	40.775	21.035	0.82	1.22	89.710	52.440	5.97	4.26	40,194	55,943	12,71	14,62
2016	7989	4778	0.06	0.15	41.697	21.926	0.83	1.27	92.391	55.983	5.91	4.47	41,386	59,154	12,25	15,16

Note: [29,31,32].
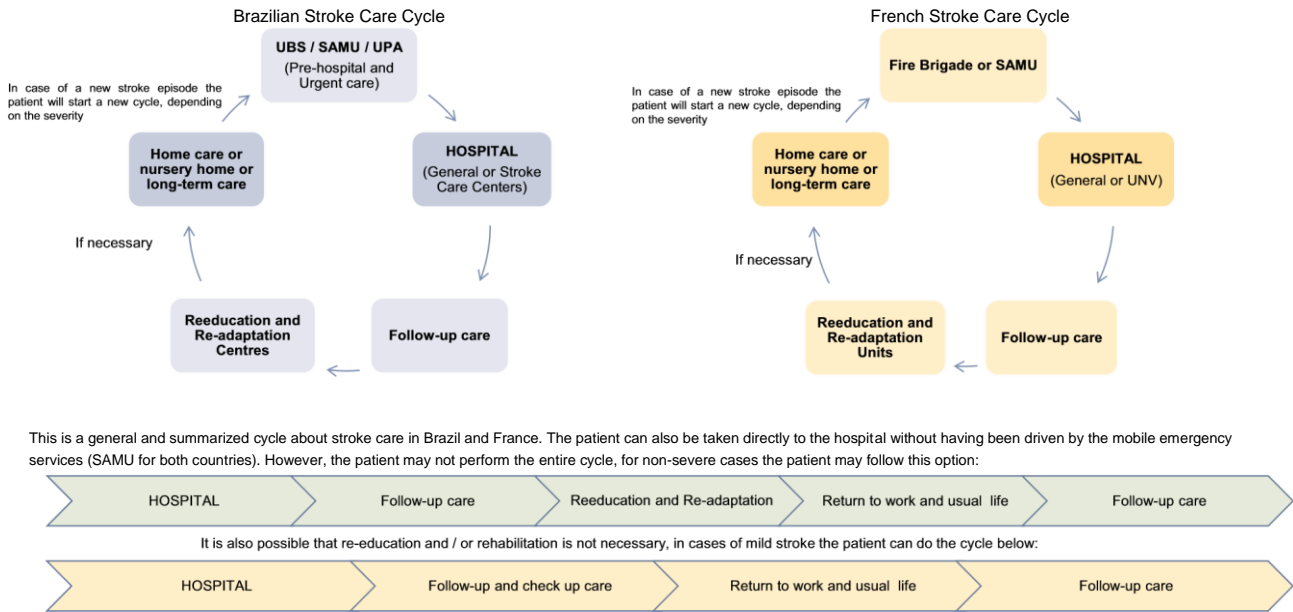
Figure 3 Stroke Care in Comparation.
Note: 8,12,16–18,23,24. made by the author.

Regarding the average length of stay due stroke, Brazil has 7.6 days, and France has 12.63 days. The French hospital length of stay average is about 61% higher than Brazilian. In Brazil, the stroke centers' treatment was associated with a reduction of 2 to 10 days of hospitalization due to work carried out by the multidisciplinary team specialized within an average period of 7 days.[41] Usually, the reasons for a longer ALS (average length of stay) are different in case mix, age, access to the healthcare system, and duration to the transfer to the rehabilitation structures. The age structure partly explains this difference: in Brazil, a stroke occurs at most in the age group between 60 and 79 years (5.91/10000 in Brazil against 4.47/10,000 in France) and, in France, the age group is people over 80 years old (15.16/10,000 in France against 12.25/10,000 in Brazil).

The in-hospital mortality due to stroke, Brazil, has an average of 1.08 per 10,000 inhabitants, and France has 4.44. Although patients stay longer in hospitals in France, the Brazilian in-hospital mortality rate is lower, and a hypothesis to explain this fact could be due to health prevention in the Brazilian primary care that improves the population's health. Another hypothesis is even social inequalities in France are lower than in Brazil (Inequality-adjusted HDI is 0.574 in Brazil and France is 0.809 - closest one better the index),[42,43] France has a healthcare system universal, but with copayment rates. That could repress the demand for health services.[44,45] To alleviate these inequalities, SUS is free of charge, including consultations, medications, transportation, hospitalizations, surgeries.[46] According to WHO, Brazil has one of the ten best health programs in the world for its effectiveness in controlling chronic diseases. The policies to reduce tobacco use and curb diet- related diseases like diabetes and hypertension made Brazil a country known for its progressive action to prevent non-communicable diseases.[47–49] This effort in Brazil may be partly due to higher risk factors in France – a higher percentage of alcohol consumption, tobacco smoking, and hypertensive

adults. The positive influence of SUS primary care has been proven to improve Brazilians' health and the strengthening of primary health care for reducing inequalities and health-promoting and preventing.[50–53]

The care offered in the event of a stroke is not very different from one country to another, as illustrated in Figure 3. Both countries follow the guidelines outlined by WHO, reflecting standardized care, and consolidating national health policies in stroke care. Brazil aims the health prevention and control of NCDs in comprehensive care through the modifiable risk factors: tobacco use, unhealthy diet, physical inactivity, harmful use of alcohol. France aims the stroke prevention and care strategy through a program of operational and regional actions seeking to improve health promotion and prevention. Brazil shows promising results in care when compared to France – lower prevalence, acute hospitalization, and in- hospital mortality rates due to stroke. There is no pre- determined flow, as shown Figure 3, SAMU can assist the patient if the event occurs on the street as the patient can be taken directly to a hospital or an Urgent Care Center for Patients with Stroke. In France, the most common way is to call the fire brigade or SAMU, which will transport the patient to the emergency department of the nearest hospital or a UNV if there is one nearby. In both countries, it depends on the patient's location and who will call for help. The care after stroke hospitalization is very similar for both countries. As an emerging country, Brazil shows promising results from its care in stroke and is comparable to the care in France. This research is essential to know if the Brazilian healthcare system is on the right track.

Conclusion and Implications

No significant differences were found about the health policies and the National Health Plans related to stroke. However, the data directly linked to the period of hospitalization differed substantially between countries. Subsequent studies can be implemented to identify the explanatory factors, notably among the risk factors and actions in primary care, and the moments after hospital care, such as secondary prevention and palliative care. This research can collaborate to improve the healthcare systems and health policies of both countries in stroke care.

Funding

Disclosure

The authors report no conflicts of interest in this work.

References

1. World Health Organization WHO. *World Health Statistics*. Geneva; 2018. Available from https://apps.who.int/iris/bitstream/handle/10665/272596/ 9789241565585-eng.pdf?ua=1. Accessed October 2019.

2. *Brasil e Mais Onze Países Assinam Documento Para Prevenção e Enfretamento Do AVC*. Brasil: Ministério da Saúde; 2018. Available from: http://www.saude.gov.br/noticias/agencia-saude/43985-ministerio- da-saude-e-signatario-da-carta-de-gramado-para-prevencao-e-enfrenta mento-do-avcministerio-da-saude-e-signatario-da-carta-de-gramado-para- prevencao-e-enfrentamento-do-avc. Accessed October 2019.

3. FRAVC – Fondation pour la recherche sur les AVC. Fréquence. 2020? Available from: http://www.fondation-recherche-avc.org/fr%C3%A9quence. Accessed October 2019.

4. World Health Organization WHO. *WHA66/2013/REC/1. Sixty-Sixth World Health Assembly: Resolutions and Decisions, Annexes. Annex 4 - Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2020*. 2013. Geneva. Available from: http://apps.who.int/gb/ebwha/pdf_files/WHA66-REC1/A66_ REC1-en.pdf?ua=1&ua=.1. Accessed October 2019.

5. Bensenor IM, Goulart AC, Szwarcwald CL, et al. Prevalence of stroke and associated disability in Brazil: national Health Survey – 2013. *Arquivo Neuro Psiquiatria*. 2015;73(9):746–750. doi:10.1590/ 0004-282X20150115

6. Silva JB Update on the Action Plan to Tackle Noncommunicable Diseases in Brazil. Presentation. Report on the 3rd forum on the strategic action plan to tackle Noncommunicable diseases in Brazil. 2013 – 2018 Brasilia:Ministry of Health of Brazil. Available from: http://portalms.saude.gov.br/images/pdf/2018/junho/19/INGLES- REPORT-3RD-FORUM-DCNT-19jun18-cs-ISBN-web.pdf. Accessed October 2019.

7. Silva GS, Rocha ECA, Pontes-Neto OM, Martins SO. Stroke care services in Brazil. *J Stroke Med*. 2018;V1(1):51–54. doi:10.1177/ 2516608518776162

8. CONITEC. *Comissão Nacional de Incorporação de Tecnologias no Sistema Único de Saúde. Protocolos e Diretrizes*. Linha de cuidados em Acidente Vascular Cerebral (AVC) na rede de atenção às urgências e emergências; 2020. Available from http://conitec.gov.br/protocolos-e-diretrizes. Accessed October 2019.

9. Brazil. Portaria nº 664, de 12 de abril de 2012. Aprova o protocolo clínico e diretrizes terapêuticas - trombólise no acidente vascular cerebral isquêmico agudo. Brasilia. 2012a. Available from: http:// bvsms.saude.gov.br/bvs/saudelegis/gm/2012/PRT0664_12_04_2012. html. Accessed October 2019.

10. Brazil. Portaria nº. 665, de 12 de abril de 2012. Dispõe sobre os critérios de habilitação dos estabelecimentos hospitalares como Centro de Atendimento de Urgência aos Pacientes com Acidente Vascular Cerebral (AVC), no âmbito do Sistema Único de Saúde (SUS), institui o respectivo incentivo financeiro e aprova a Linha de Cuidados em AVC. Brasilia. 2012b. Available from: http://bvsms. saude.gov.br/bvs/saudelegis/gm/2012/PRT0665_12_04_2012.html. Accessed October 2019.

11. Ministère de la Santé et des Sports, Ministère du Travail, de la Solidarité et de la Fonction Publique, Ministère de L'enseignement Supérieur et de la Recherche. Plan d'actions national accidents vasculaires cérébraux 2010–2014. France. 2010. Available from: https://www.cnsa.fr/documentation/plan_actions_avc_-_17avr2010.pdf. Accessed October 2019.

12. Broussy-Boudeau S. Parcours Post-AVC, mesure des séquelles Post- AVC et lien entre parcours et séquelles à un an: enjeux conceptuels et méthodologiques résultats d'une cohorte rétrospective perspectives de recherche. Thèse de Doctorat De L'Université de Bordeaux. Ecole Doctorale de Sante Publique et Science Politique. Discipline: Epidémiologie. 2019. Available from:: http://www.theses.fr/ 2019BORD0414. Accessed January 2020.

13. Circulaire DGOS/R4/R3/PF3 n°2012-106 du 6 mars 2012 relative à l'organisation des filières régionales de la prise en charge des patients victimes d'accident vasculaire cérébral AVC. BO Sante, protection sociale, solidarité n°2012/4 du 15 mai 2012. Available from: https://solidarites-.gouv.fr/fichiers/bo/2012/12-04/ste_20120004_0100_ 0081.pdf. Accessed January 2020.

14. Loi n°2004–806 du 9 aout 2004 relative à la politique de sante publique (version consolide du 8 décembre 2011) JO. 2004. Available from: https://www.legifrance.gouv.fr/affichTexte.do? cidTexte=JORFTEXT000000787078&categorieLien=id. Accessed January 2020.

15. *Sobre a Vigilância de DCNT*. Brazil: Ministry of Health; 2019. Available from: http://www.saude.gov.br/noticias/43036-sobre-a-vigilancia-de-dcnt. Accessed January 2020.

16. Nugem RC, Bordin R, Schott-Pethelaz AM, Michel P, Piriou V. National Health Systems of Brazil and France: a comparative analysis. *World J Advan Healthcare Res*. 2019;3:50–61.

17. Ministry of Health of Brazil. Report on the 3rd forum on the strategic action plan to tackle Noncommunicable diseases in Brazil. 2013 – 2018. Brasilia. 2018. Available from: https://wwwsaude.gov.br/ images/pdf/2018/junho/19/INGLES-REPORT-3RD-FORUM-DCNT-19jun18-cs-ISBN-web.pdf. Accessed January 2020.

18. Ministry of Health of Brazil. The health of People with Disabilities: guidelines, policies, and actions. 2020. Available from: https://saude.gov.br/saude-de-a-z/saude-da-pessoa-com-defi ciencia. Accessed January 2020.

19. Borba SRC, Lamy M. Internação a longo prazo de portadores de sequelas neurológicas após acidentes vasculares cerebrais no Rio Grande do Sul: um problema de saúde pública. Long-term admission of neurological sequelae patients after stroke in Rio Grande do Sul: a public health problem. *Unisanta Law Soc Sci*. 7(3):97–119.

20. Com-Ruelle L, Nestrigue C, Le Guen N, et al. Parcours de soins des personnes hospitalisées pour un accident vasculaire cerebral. Premiers résultats. Questions d'économie de la santé. N. 234. 2018. Available from: https://www.irdes.fr/recherche/questions-d- economie-de-la-sante/234-parcours-de-soins-des-personnes-hospita lisees-pour-un-accident-vasculaire-cerebral.pdf. Accessed January 2020.

21. Ministère de la santé. La prise en charge des AVC. 2019. Available from: https://solidarites-sante.gouv.fr/soins-et-maladies/maladies/ maladies-cardiovasculaires/accident-vasculaire-cerebral-avc/article/ la-prise-en-charge-des-avc. Accessed January 2020.

22. Haute Autorité de Santé. Service communication. Accident vasculaire cérébral: prise en charge précoce (alerte, phase préhospitalière, phase hospitalière initiale, indications de la thrombolyse). 2009. Available from: www.has-sante.fr. Accessed January 2020.

23. Agence Nationale d'Accréditation et d'Évaluation en Santé (ANAES). Recommandations pour la pratique clinique. Prise en charge initiale des patients adultes atteints d'accident vasculaire cérébral - aspects paramédicaux – argumentaire. 2002a. Available from: https://www.has-sante.fr/jcms/c_451113/fr/avc-aspects-parame dicaux-recommandations. Accessed January 2020.

24. Agence Nationale d'Accréditation et d'Évaluation en Santé (ANAES). Prise en charge initiale des patients adultes atteints d'accident vasculaire cérébral - Aspects médicaux - Recommandations. 2002b. Available from: https://www.has-sante.fr/jcms/c_272249/fr/ prise-en-charge-initiale-des-patients-adultes-atteints-d-accident-vascu laire-cerebral-aspects-medicaux. Accessed February 2020.

25. Ministère de la Sante et des Sports - Ministère du Travail, de la Solidarité et de la Fonction Publique - Ministère de L'enseignement Supérieur et de la Recherche. Plan d'actions national "accidents vasculaires cérébraux" 2010–2014. 2010. Available from: https://www.cnsa.fr/documentation/plan_actions_avc_-_17avr2010.pdf. Accessed February 2020.

26. Ministry of Health of Brazil. Strategic action plan to confront Non- communicable Chronic Diseases (NCDs). 2013–2019. Available from: http://www.saude.gov.br/vigilancia-em-saude/vigilancia-de- doencas-cronicas-nao-transmissiveis-dcnt/plano-de-acoes-estrategi cas-para-o-enfrentamento-das-doencas-cronicas-nao-transmissiveis- dcnt. Accessed February 2020.

27. World Health Organization WHO. Global Report. Noncommunicable diseases country profiles. 2011. Available from: https://www.who.int/ nmh/publications/ncd_profiles2011/en/. Accessed February 2020.

28. World Health Organization - Noncommunicable Diseases (NCD) Country Profiles. 2018. Available from: https://apps.who.int/iris/han dle/10665/274512. Accessed February 2020.

29. DATASUS. Produção Hospitalar. 2019. Available from: http://www2. datasus.gov.br/DATASUS/index.php?area=0202. Accessed February 2020.

30. ATIH. SCANSANTÉ. MCO par diagnostic ou acte. 2019. Available from: https://www.scansante.fr/applications/statistiques-activite-MCO-par-diagnostique-et-actes?secteur=MCO. Accessed February 2020.

31. PMSI. Fédération Hospitalière de France. 2020. Available from: https://www.fhf.fr/gestion-hospitaliere/pmsi.html. Accessed February 2020.

32. United Nations. World Population Prospects 2019. Available from: https://population.un.org/wpp/. Accessed February 2020.

33. World Health Organization WHO. Global status report on noncommunicable diseases. 2014. Available from: https://www.who.int/nmh/ publications/ncd-status-report-2014/en/. Accessed February 2020.

34. World Health Organization WHO. Noncommunicable diseases progress monitor 2020. Geneva. 2020. Available from: https://www.who. int/publications-detail-redirect/ncd-progress-monitor-2020. Accessed 1 March 2020.

35. Lima CP Comparando a saúde no Brasil com os países da OCDE: explorando dados de saúde pública. Dissertação (mestrado) - Fundação Getulio Vargas. Escola de Matemática Aplicada. 140 f. 2016. Available from: https://bibliotecadigital.fgv.br/dspace/handle/ 10438/16503. Accessed March 2020.

36. Ministério da Saúde. Estratégia de Saúde da Família. 2013. Available from: https://www.saude.gov.br/acoes-e-programas/saude-da-familia. Accessed March 2020.

37. Schnitzler A, Erbault M, Solomiac A, et al. Impact of the stroke plan on the management of acute ischemic stroke in France: trends of assessment indicators of the French national authority for health from 2011 to 2016. BEH. 2018;5:78–84.

38. Ministério da Saúde. Estratégia de Saúde da Família. 2013.Available from: https://www.saude.gov.br/acoes-e-programas/saude-da-familia. Accessed March 2020.

39. Lemke RA, Silva RAN The active search as political principle of practices of care in the territory. Estudos e Pesquisas em Psicologia, UERJ. 1, P. 281–295. 2010. Available from: http://www.revispsi.uerj. br/v10n1/artigos/pdf/v10n1a18.pdf.

40. Mattos RA. Os sentidos da integralidade: algumas reflexões acerca de valores que merecem ser defendidos. In: Pinheiro R, Mattos RA, editors. Os Sentidos da integralidade na atenção e no cuidado à Saúde. Rio de Janeiro: UERJ;2001:39–63. Available from: https:// www.cepesc.org.br/wp-content/uploads/2013/08/Livro-completo.pdf. Accessed March 2020.

41. Moura MC, Casulari LA. Impacto da adoção de medidas inespecíficas no tratamento do acidente vascular cerebral isquêmico agudo em idosos: a experiência do Distrito Federal, Brasil. Rev Panam Salud Publica. 2015;38(1):57–63.

42. Schnitzler A, Erbault M, Solomiac A, et al. Impact of the stroke plan on the management of acute ischemic stroke in France: trends of assessment indicators of the French national authority for health from 2011 to 2016. BEH 5. 78–84. 2018. Available from: http:// beh.santepubliquefrance.fr/beh/2018/5/pdf/2018_5.pdf. Accessed March 2020.

43. United Nations. Human development reports. Brazil. 2020. Available from: http//hdr.undp.org/en/countries/profiles/BRA. Accessed April 2020.

44. Human Development Reports. France: United Nations; 2020. Available from: http//hdr.undp.org/en/countries/profiles/FRA. Accessed April 2020.

45. Bayle-Iniguez A. Un français sur trois renonce à des soins pour des raisons financières. Le Quotidien du Médecin.fr. 2018. Available from: https://www.lequotidiendumedecin.fr/actus-medicales/poli tique-de-sante/un-francais-sur-trois-renonce-des-soins-pour-des-rai sons-financieres. Accessed May 2020.

46. Revil H. Le "non-recours" à la Couverture maladie universelle: émergence d'une catégorie d'action et changement organisationnel. Science politique. Université de Grenoble, 2014. Available from: https://www.theses.fr/2014GRENH033.pdf.

47. World Health Organization WHO. Handbook on Health Inequality Monitoring: With a Special Focus on Low- and Middle-Income Countries. Geneva; 2013. Available from: https://www.who.int/ docs/default-source/gho-documents/health-equity/handbook-on- health-inequality-monitoring/handbook-on-health-inequality-monitor ing.pdf?sfvrsn=d27f8211_2. Accessed April 2020.

48. Baroni LL. 6 Programas De Saúde Pública No Brasil Considerados Referência No Mundo. São Paulo: UOL; 2018. Available from:: https://noticias.uol.com.br/saude/ultimas-noticias/redacao/2018/06/ 05/6-programas-de-saude-publica-do-brasil-considerados-referencia-no-mundo.htm. Accessed April 2020.

49. Henning K. Global health checkup: seven steps to tackle NCDs in Brazil. Bloomberg Philanthropies Public Health. 2018. Available from: https://www.bloomberg.org/blog/global-health-checkup-seven- steps-tackle-ncds-brazil/. Accessed April 2020.

50. World Health Organization WHO. Tobacco control in Brazil. 2015. Available from: https://www.who.int/tobacco/about/partners/bloom berg/bra/en/. Accessed April 2020.

51. Paim JS. Equity and reform in the health services system: the case of the Unified Health System of Brazil. Saude Sociedade. 2006;15(2).

52. Ministério da Saúde. Painel De Indicadores Do SUS. Temático Saúde Da Família. Vol. 2. Brasília; 2007.

53. Lopes SMSC. O reflexo das desigualdades sociais no atendimento básico do serviço de saúde do SUS. Âmbito Jurídico. 2016.