Theoretical and Practical Research in Economic Fields

ASERS
Publishing

is an advanced e-publisher struggling to bring further worldwide learning, knowledge and research. This transformative mission is realized through our commitment to innovation and enterprise, placing us at the cutting-edge of electronic delivery in a world that increasingly considers the dominance of digital content and networked access not only to books and journals but to a whole range of other pedagogic services.

In both books and journals, ASERS Publishing is a hallmark of the finest scholarly publishing and cutting-edge research, maintained by our commitment to rigorous peer-review process.

Using pioneer developing technologies, ASERS Publishing keeps pace with the rapid changes in the e-publishing market.

ASERS Publishing is committed to providing customers with the information they want when they want it and how they want it. To serve this purpose, ASERS publishing offers digital Higher Education materials from its journals, courses, and scientific books, in a proven way in order to engage the academic society of the entire world.

Table of Contents:

Many economists today are concerned by the proliferation of journals and the concomitant labyrinth of research to be conquered in order to reach the specific information they require. To combat this tendency, **Theoretical and Practical Research in Economic Fields** has been conceived and designed outside the realm of the traditional economics journal. It consists of concise communications that provide a means of rapid and efficient dissemination of new results, models, and methods in all fields of economic research.

Theoretical and Practical Research in Economic Fields publishes original articles in all branches of economics – theoretical and practical, abstract, and applied, providing wide-ranging coverage across the subject area.

Journal promotes research that aim at the unification of the theoretical-quantitative and the empirical-quantitative approach to economic problems and that are penetrated by constructive and rigorous thinking. It explores a unique range of topics from the frontier of theoretical developments in many new and important areas, to research on current and applied economic problems, to methodologically innovative, theoretical, and applied studies in economics. The interaction between practical work and economic policy is an important feature of the journal.

Theoretical and Practical Research in Economic Fields is indexed in SCOPUS, RePEC, ProQuest, Cabell Directories and CEEOL databases.

The primary aim of the Journal has been and remains the provision of a forum for the dissemination of a variety of international issues, practical research, and other matters of interest to researchers and practitioners in a diversity of subject areas linked to the broad theme of economic sciences.

At the same time, the journal encourages the interdisciplinary approach within the economic sciences, this being a challenge for all researchers.

The advisory board of the journal includes distinguished scholars who have fruitfully straddled disciplinary boundaries in their academic research.

All the papers will be first considered by the Editors for general relevance, originality, and significance. If accepted for review, papers will then be subject to double blind peer review.

To prepare your paper for submission, please see full author guidelines in the following file: TPREF_Full_Paper_Template.docx, on our site.

Health Financing and Household Financial Protection in D.R. Congo: A Vector Autoregressive Model (VaR) Analysis

Emmanuel BINENE SABWE
Quantitative Economics Research Unit, Institute of Economic and Social Research
Faculty of Economics and Management, University of Kinshasa, D.R. Congo
emmanuelbinene08@yahool.fr

Logas LOWENGA KOYAMODJA
Quantitative Economics Research Unit, Institute of Economic and Social Research
Faculty of Economics and Management, University of Kinshasa, D.R. Congo
logas.lowenga@unikin.ac.cd, lowengak@gmail.com

Yannick LUBONGO MBILU
Public Economics Research Unit, Institute of Economic and Social Research
Faculty of Economics and Management, University of Kinshasa, D.R. Congo
yannick.mbilu@unikin.ac.cd, yannickmbilu@gmail.com

Floribert NTUNGILA NKAMA
Public Economics Research Unit, Institute of Economic and Social Research
Faculty of Economics and Management, University of Kinshasa, D.R. Congo
floribert.ntungila@unikin.ac.cd

Abstract: This paper examines the health-related expenditures of economic agents in the Democratic Republic of Congo (households, government and its external technical and financial partners). Given health care high costs of health care in the DRC, access to appropriate health care is hindered due to low income. As a result, government and its external technical and financial partners indispensably step in to ensure that vulnerable households are protected from ruinous expenses.

At the same time, the paper provides an overview of public finances in the DRC health sector using a theoretical approach and analyzes government intervention effects and their external technical and financial partners intervention effects using a vector autoregressive model (VaR) through random shock simulations and variance decomposition. This analysis is carried out assuming that socioeconomic environment is constant "all things being equal".

The result is that household health-related expenditure per capita forecasts can be significantly improved at 0.05 threshold by public health-related expenditure per capita and by health-related expenditure per capita forecasts engaged by external technical and financial partners.

Introduction

Health financing remains complex. It is a cross-cutting issue in several Sub-Saharan African countries with multidisciplinary constraints (socioeconomic, political, environmental, health, etc.). In many cases, there is a gap between scarce available resources and multiple health care needs (International Labor Office, 2008) and this requires governments to make rational choices about health financing.

The WHO conceptual framework describes the health system as a whole based on several pillars, including financing, which is one of the core pillars of universal coverage and households' financial protection.

In the specific case of the DRC, health financing remains a stumbling block to quality of care in health facilities, whether public or private, as the public resources allocated to the health sector and their disbursement are so low. Risk-sharing mechanisms are almost non-existent, ranging from 5% to 7% of coverage[1].

As the literature indicates, the health problem is identified in economics by issues related to financing, costs, supply and demand, production and consumption of goods and health services, quality and pricing of health services, as well as low households' income and financial inaccessibility to health care (Ntungila 2023, 6). Therefore, to address them, governments must intervene directly and indirectly.

However, it is important to conduct analyses of the evolution of public finance aggregates in the health sector in order to fully understand the behavior of health care supply and demand in the DRC. In the same vein, it is appropriate to ask questions about the financial protection of households against the costs of health care.

But also, the financing gap for health coverage, which we qualify as the financing needs of the health sector to redress the current precariousness of access to health care in a medium- or long-term perspective.

The objectives of this reflection are:

i. to draw up an inventory of public finances in the health sector in terms of public, private and external expenditure

ii. to analyze the relationship between household financial protection and health financing in DR Congo for the period under study.

The study examines the direct effects of health financing by economic agents on household income protection in the DRC. It hypothesizes that increased public spending on health per capita would positively influence household income protection in the DRC.

1. Literature Review

Current reflections in the debate demonstrate that a key question several Sub-Saharan African countries are facing is: how to achieve the goal of universal health coverage adopted since December 2012 by the United Nations General Assembly[2]? We know that a financing system that relies primarily on out-of-pocket payments does not only prevent the poor from accessing health care but further impoverishes them (Iyeti 2013, 2).

The Enabel Report on access to health care in the DRC reveals that health care commercialization plays a role in amplifying inequalities between rich and poor, the weakly regulated fee-for-service system engages a vicious cycle leading to a progressive deterioration of access to quality health care (Enabel, 2015).

The National Health Accounts provide information that is used in the decision-making process, because it is an assessment of current resource use, and can also be used to compare the DRC's health financing system with that of other countries (Ministry of Public Health-DRC, 2022).

2. Methodology

Analytical and descriptive methods are adopted to calibrate this reflection, combined with the documentary technique and the econometric analysis, with a Vector autoregressive (VaR) model, to verify the significance of the health expenditure forecasts influence for each economic agent on the household income protection captured by the per capita income. Observations are considered quarterly for the period 2011 - 2020.

3. Presentation and Results Analysis

3.1. Overview of Selected Public Finance Indicators in the Health Sector in the DRC from 2012 - 2017 *(in millions of $USD and % of GDP).*

Health financing consists of mobilizing the resources necessary to implement preventive measures and medical care that meet the needs of households (World Bank 2015).

According to the law on the organization of the health system in the DRC, health financing in the DRC relies mainly on public financing (central government budget, provincial government and/or decentralized territorial entities budgets), private financing (direct payment by households, community participation or mutual health insurance companies and businesses), and external financing (donations and official development aid, special funding and programs).

---

[1] *Ministry of Health-DRC, Study on the budgetary space of the health sector in the DRC, it can if it wants to achieve Universal Health Coverage, letter n°1, 2019.*

[2] *Resolution adopted by the United Nations General Assembly at the sixty-seventh session, 67/81, global health (universal health coverage) and foreign policy, in December 2012.*

3.1.1. Health Expenditure by Economic Agent: State - Households – External

The balanced health stock of the population reflects the need for the actors; this explains the need for their involvement through health expenditures to maintain this balance.

Private and household financing of health care includes the various categories of individuals or legal entities involved in this sector like mutual health insurance companies, religious denominations (churches), private companies and households.

External financing is provided by bilateral and multilateral partners and cooperation agencies that support health financing in the DRC through donations and Official Development Aid (ODA). Among the direct stakeholders: Governments (from USA, Europe, Africa and Asia); regional organizations, Agencies and NGOs.

Graph 1. Public Health Expenditures 2012 - 2017 (in millions of $USD and as % of GDP)
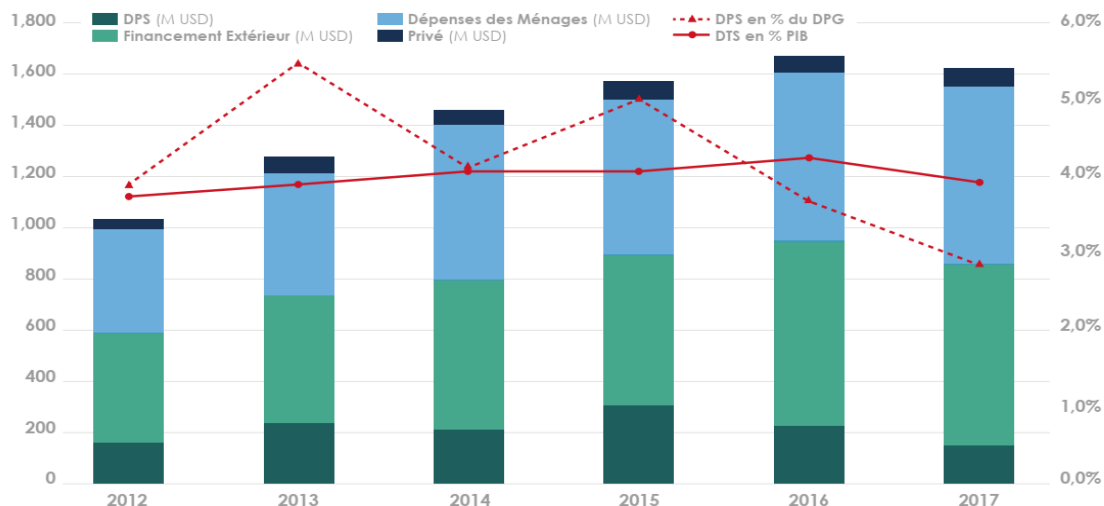
Source: DRC, Ministry of Public Health (2019)

The above graph shows that the health sector has several constraints, including: low budget allocation; low spending of between USD 100,000 and 400,000. Between 3% and 6% of overall spending, averaging 4% of public health spending over the sub-observation period.

Graph 2. Budget execution rate for the health sector (administration and function)
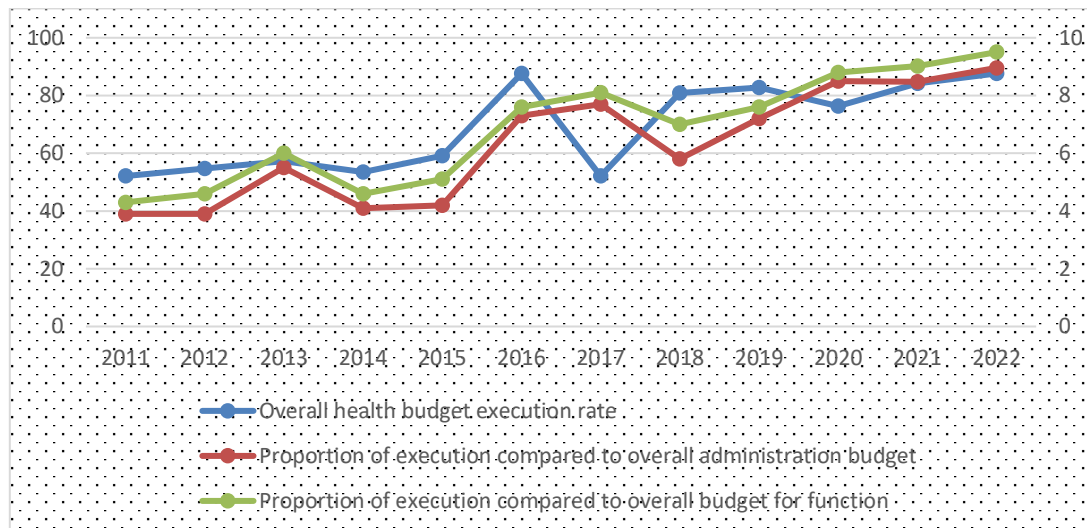
Source: DRC, Ministry of Budget (2020)

They did not reach 5% of GDP and represent nearly 3.7% of GDP for the same observed period. Households spending is very high, close to 6% of SDRs and in thousands of USD amounts to between 600,000 and 1,600,000 associated with those of the private. Also, a dependence on external financing for this sector.

The health budget execution rate varies from year to year, both up and down. It ranges from 52% to 90% and did not reach 100% implementation during the period under observation. The execution rates of the health budget for the administration and the function remain low, between 2% and 10%, to meet the health needs of households and even to protect their income.

3.1.2. Health Sector Financing Deficit

The health financing gap reflects, to some extent, the sector's need for financing to achieve financial protection and universal coverage.

Graph 3. Health sector financing gap in 2030 perspective (in millions of USD and as a % of GDP)
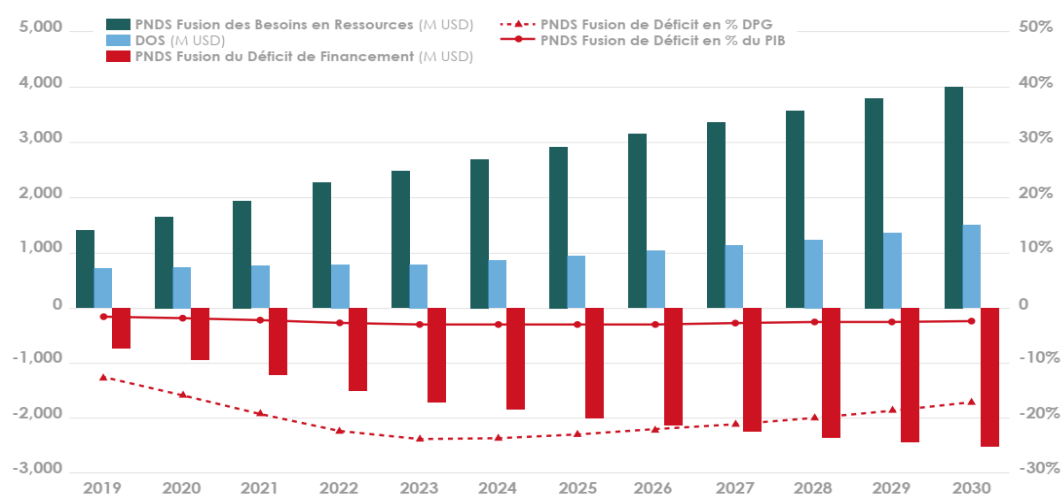
Source: DRC, Ministry of Public Heath (2019)

According to the Ministry of Public Health, the priorities have been defined in the National Health Development Plan (PNDS)/2019-2022. This PNDS gives an average financing gap of US$1.8 billion per year from 2019 to 2030. The financing gap is equivalent to 20% of the budget and 2.4% of GDP over this period, combined with the health sector growing needs which may reach 40% in order to achieve universal health coverage by 2030.

3.2. Descriptive Statistics

Table 1. Descriptive Statistics

	Ext. Health Exp. /capita.	Pub. Health Exp. /capita.	Household Health Exp. /capita.	Rehab.
Mean	8.111828	3.099152	8.199610	395.8998
Median	8.370000	3.150000	8.760000	408.1072
Maximum	9.760000	4.300000	10.20610	423.6403
Minimum	5.950000	1.500000	5.300000	345.2661
Observations	10	10	10	10

Source: Authors using EVIEWS software

On average, each economic agent in this study spends USD 8.2, USD 8.11 and USD 3.1, respectively the households, the external financial and technical partners system and all governmental sources.

Table 2. Comparisons of the level of health expenditures in some Central African countries

Country	Public health expenditure per capita	Household expenditure on health per capita	External health expenditure per capita
Republic of Congo	18%	82%	4.02%
Angola	24%	64%	2.63%
Gabon	22%	68%	0.82%
D.R Congo	39%	37%	38.7%

Source: Authors based on Global Fund statistical report

Considering other Sub-Saharan African countries, the DRC public spending on health is lower than comparable countries. Households bear the brunt of health expenditures and depend on the external financial and technical partners system for health care.

3.3. Econometric Results

The econometric analysis establishes causal relationships between per capita income and health expenditures for each economic agent (government, households and external partners).

Table 3. Results of the ADF test stationarity

Variables	Model[3]	optimal Lag	T-Student	Decision
Per capita income	2	1	-2.3138	I(2)
Public expenditure per capita	1	1	0.0749	I(1)
Household expenditure per capita	2	2	-0.8260	I(2)
external expenditure per capita	1	9	0.1904	I(2)

Source: From authors using EVIEWS software

The table above informs us that no variable is stationary, and the different variables are integrated of order 2 except for public expenditure per capita which is integrated of order 1.

Table 4. Determination of the optimal Lag

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-69.33550	NA	0.000776	4.190600	4.368354	4.251961
1	-32.34322	63.41533*	0.000236*	2.991041*	3.879812*	3.297845*
2	-31.03584	1.942396	0.000568	3.830620	5.430406	4.382866
3	-22.99683	10.10618	0.000991	4.285533	6.596336	5.083222

* indicates lag order selected by the criterion

Source: From authors from EVIEWS, NHA data, 2021

Looking at the table above we notice that the optimal number of lags for our VaR model is 1.
Causality analysis allows us to know whether the prediction of the health expenditures of an economic agent can be significantly improved by considering the expenditures of another economic agent.

Table 5. Causality Analysis

Null Hypothesis:	Obs	F-Statistic	Prob.
D(DEP_PUB,1) does not Granger Cause D(REVENU_HAB,2)	37	2.04666	0.1617
D(REVENU_HAB,2) does not Granger Cause D(DEP_PUB,1)		0.02766	0.8689
D(DEP_MEN,2) does not Granger Cause D(REVENU_HAB,2)	37	0.00924	0.9240
D(REVENU_HAB,2) does not Granger Cause D(DEP_MEN,2)		0.01076	0.9180
D(DEP_EXT,2) does not Granger Cause D(REVENU_HAB,2)	37	0.08751	0.7692
D(REVENU_HAB,2) does not Granger Cause D(DEP_EXT,2)		0.01055	0.9188
D(DEP_MEN,2) does not Granger Cause D(DEP_PUB,1)	37	0.24682	0.6225
D(DEP_PUB,1) does not Granger Cause D(DEP_MEN,2)		6.09281	0.0188
D(DEP_EXT,2) does not Granger Cause D(DEP_PUB,1)	37	0.36014	0.5524
D(DEP_PUB,1) does not Granger Cause D(DEP_EXT,2)		5.81928	0.0214
D(DEP_EXT,2) does not Granger Cause D(DEP_MEN,2)	37	0.00106	0.9742
D(DEP_MEN,2) does not Granger Cause D(DEP_EXT,2)		0.00997	0.9211

Source: From authors using EVIEWS software

Considering the variables under study, according to the causality analysis resulting from the above table, public health expenditure per capita does not significantly improve, at the 5% threshold, the prediction of income per capita. We also find that household health expenditure per capita and external health expenditure per capita do not significantly improve per capita income at the 5% threshold. However, public spending on health per capita

---

[3] There are three models to check the stationarity, more details see Bosonga 2021

significantly improves, at the 5% threshold, not only the forecast of household spending on health per capita but also external spending on health per capita.

3.3.1. Impulse Analysis

Graph 4. Response of per capita income to the shock on per capita public health expenditure
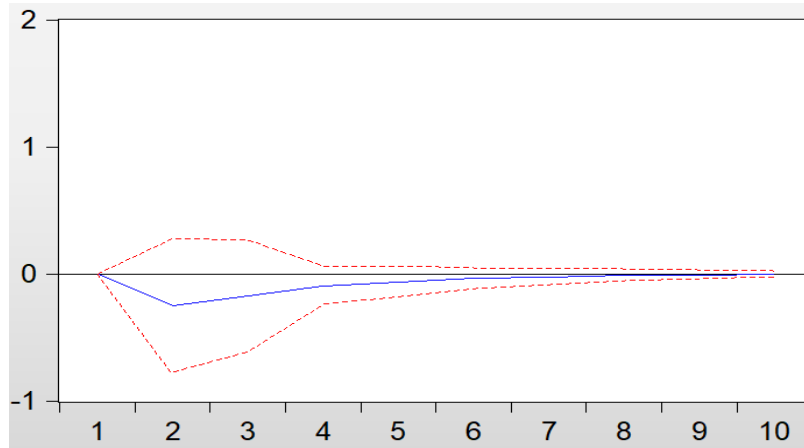
Source: From the authors from EVIEWS software

The above graph shows that if the government decides to increase public spending on health per capita, this will have a negative impact on per capita income from the first quarter until it returns to its equilibrium level between the seventh and eighth quarters. He thus translates that public intervention is important since, at first sight, it negatively influences per capita income, before returning to equilibrium.

Graph 5. Response of per capita income to the shock on per capita household spending on health
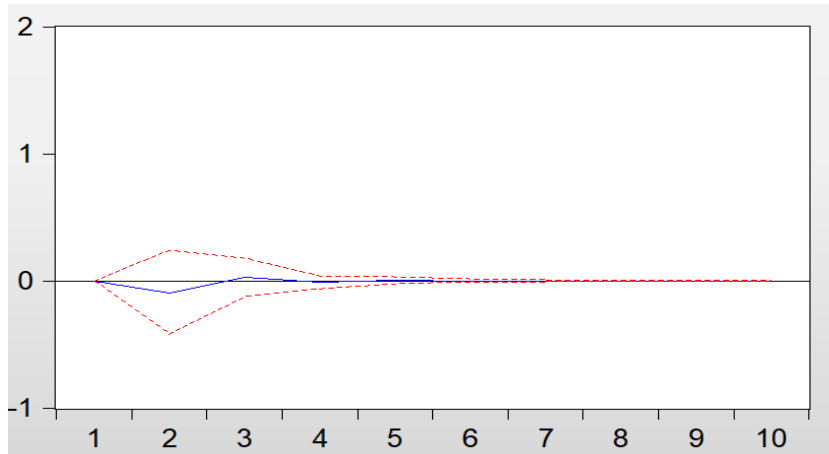
Source: From authors using EVIEWS software

Graph 6. Response of per capita income to the shock on external health expenditure per capita
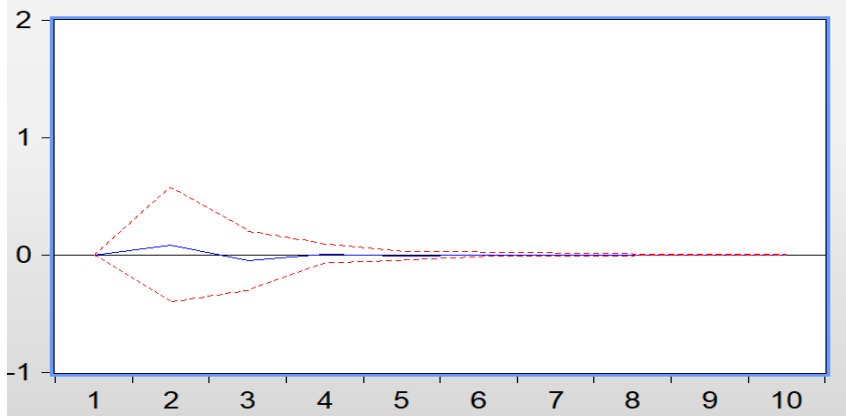
Source: From authors with EVIEWS, NHA data, 2021

Households' decision to increase their per capita spending on health causes a negative impact on per capita income from the first quarter onwards, followed by slightly positive effects from the third quarter onwards before returning to equilibrium. We note here that household spending on health is significant and could further keep households in a critical cycle.

If the external sector decides to increase its health spending, there will be positive effects on per capita income for a very short period, then upward fluctuations will occur before returning to equilibrium. External health spending per capita is only a stopgap measure and cannot be a real answer to the health sector in the DRC.

3.3.2. Variance Decomposition

In the context of this study, the analysis of the variance decomposition allowed us to identify the proportion of shocks on studied variables.

Table 4. Analysis of variance decomposition

Period	S.E.	D(REVEN...	D(DEP_P...	D(DEP_M...	D(DEP_E...
1	1.550924	100.0000	0.000000	0.000000	0.000000
2	1.612794	96.95267	2.462284	0.334330	0.250713
3	1.623612	95.66873	3.622599	0.352836	0.355834
4	1.626964	95.34929	3.937077	0.358601	0.355033
5	1.628332	95.20249	4.082296	0.358000	0.357215
6	1.628825	95.15204	4.132793	0.357996	0.357171
7	1.629018	95.13187	4.152928	0.357934	0.357269
8	1.629091	95.12433	4.160470	0.357919	0.357284
9	1.629118	95.12142	4.163377	0.357912	0.357294
10	1.629129	95.12031	4.164483	0.357909	0.357297
11	1.629133	95.11989	4.164907	0.357908	0.357298
12	1.629135	95.11973	4.165068	0.357908	0.357298

Cholesky Ordering: D(REVENU_HAB,2) D(DEP_PUB,1) D(DEP_MEN,...

Based on the above results table, for quarterly taken three years, we note that on average per capita income contributed 95.76% to its own forecast, per capita public health expenditure contributed only 3.60% and per capita household health expenditure 0.33% as well as per capita external health expenditure 0.32%.

Conclusion and Therapy

Concluding this study, which was devoted to the analysis of health financing dedicated to households' financial protection in the Democratic Republic of Congo using the VaR model, it emerged from theoretical analyses that public health financing faces several constraints, in particular low levels of expenditure allocation and execution, increased dependence on external resources and a relative financing deficit.

Health spending ranges from 3% to 6% of overall spending; on average 4% of overall public spending: it should be noted that it did not reach 5% of GDP during the period under review. It was also noted that the average financing gap is USD 1.8 billion a year for the period from 2019 to 2030. This represents almost 20% of the budget and 2.4% of GDP during the period (DRC Ministry of Public, 2019).

Considering the variables under study, according to the causality analyses, public health spending per capita does not significantly improve, at the 5% threshold, the per capita income forecast. We also find that household health expenditure per capita and external health expenditure per capita do not significantly improve per capita income at the 5% threshold. This effectively reflects the lack of income protection for households faced with high health care costs.

However, public spending on health per capita significantly improves, at the 5% threshold, not only the forecast of household spending on health per capita but also external spending on health per capita. All other things being equal, when governments increase their public health expenditure per capita, this effectively reduces the health expenditure borne by households as well as that borne by external technical and financial partners.

These results show that it is imperative for the government to increase its per capita health expenditure in order to significantly improve the health situation in the DRC. Our conclusions are supported by the WHO (2022), which noted that the proportion of the population in financial difficulty tends to be lower in countries that rely more on a public health expenditure policy. Indeed, these countries demonstrate that the health coverage of the population must imperatively pass through a political consensus aiming at limiting the participation of households in health expenditure and through efficient health financing measures (targeting of beneficiaries, exhaustiveness

of benefits, free mother-child care, etc.). These are all essential elements to advocate for an increase in public spending on health in the DRC.

As with other developing regions, further reflection on reducing the gap in outpatient drug coverage would be crucial in the case of the DRC to reduce the financial hardship of financially vulnerable households. Recent evidence confirms the importance of medicines as a factor in direct health spending and is consistent with existing evidence from around the world.
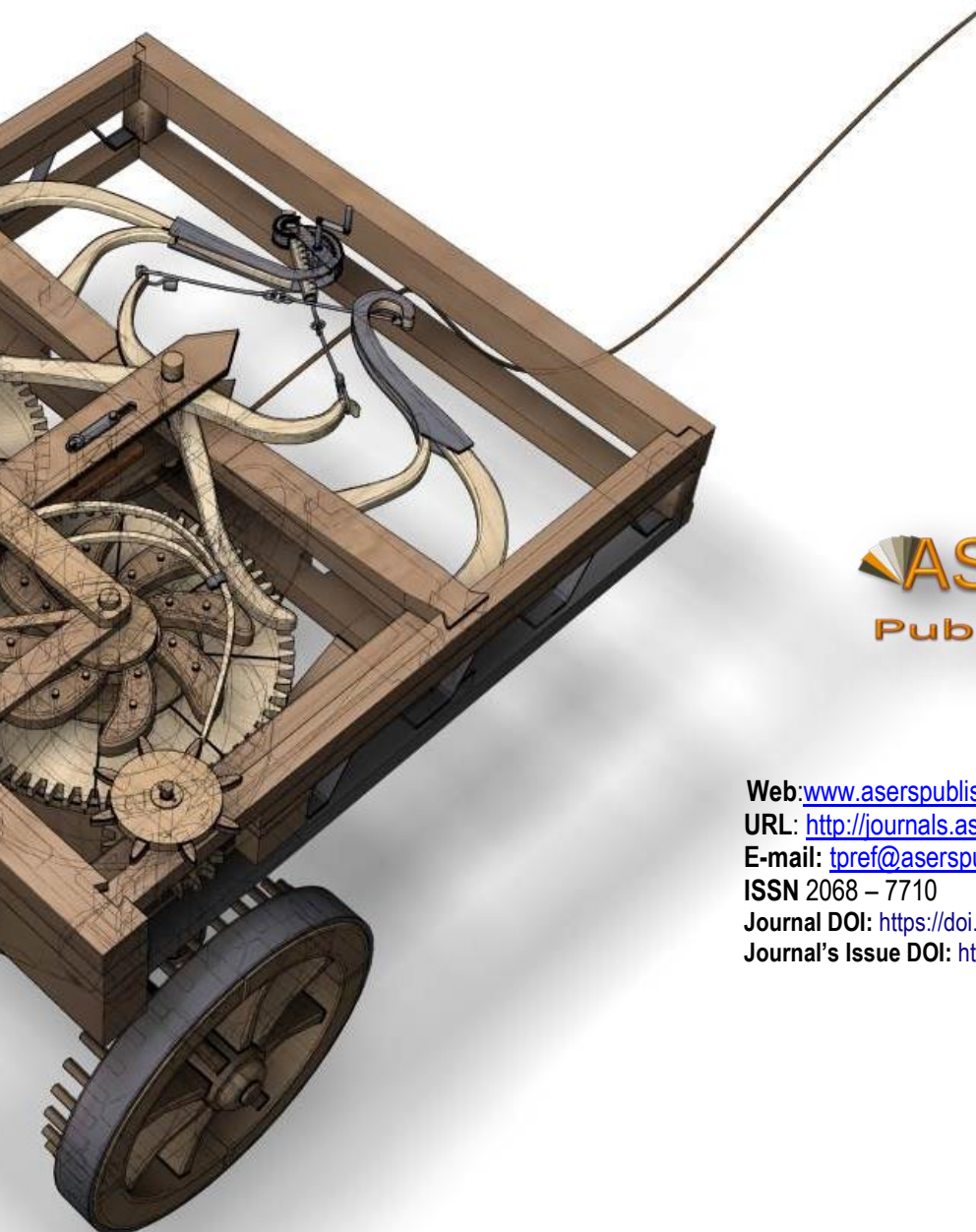
References

[1] Bosonga, J-P. 2021. *Manuel d'Économétrie*. Terabyte edition, Kinshasa, p.352.

[2] Gallais, J.L. 2009. *Santé et Économie: principes et indicateurs généraux*, documentation SFMG.

[3] Haurie, A. 1973. La théorie des systèmes et l'analyse des dépenses publiques, *L'Actualité économique*, 49(1): 68-92. DOI: https://doi.org/10.7202/802980ar

[4] Iyeti, M.A. 2013. Éditorial le financement des systèmes de la santé dans les pays à faible revenus: réflexions inspirées de la situation de la RDC, p.2.

[5] Lututala, M.B. *et al.* 2004. *Les coûts annexes des soins d'hospitalisation des malades dans le réseau BDOM-Kinshasa*, Ires, Unikin, p.14.

[6] Nicolas, T. 1994. *Économie de la santé.* Armand Colin, Paris-France, p.5

[7] Ntungila, F. 2023. *Introduction à l'économie de la santé.* Student's handbook, Unikin, Faseg, p.6

[8] Ntungila, N.F, and Lubongo, Y.L. 2017. Assurance santé et accès aux soins en R.D. Congo: pour un meilleur soutien à ceux qui en ont le plus besoin, Cahiers Economiques et sociaux, Numéro spécial «60ème Année», Presse universitaire de Kinshasa-IRES, FASEG Unikin, p.8-12.

[9] Phelps, C. 1995. Fondement de l'économie de la santé, Publi-Union, p.14.

[10] Philippe, U. 1999. Les relations entre santé et croissance dans les pays développés. *Les Cahiers du Gratice,* 15, p.9.

[11] Uctum, R. 2007. Économétrie des modèles à changement de régimes: un essai de synthèse. *L'Actualité économique*, p.1 et 4. DOI: https://doi.org/10.7202/019389ar

[12] ***Assurance complémentaire, "Mutuelle complémentaire, Guide de mutuelle Available at: http://www.lecomparateurassurance.com

[13] *** Enabel. 2015. Accès aux soins de santé en RDC. ENABEL. Available at: https://www.enabel.be/fr/nos-actions/offrir-une-expertise/sante/

[14] *** Tableau de bord de l'Afrique sur les financements nationaux pour la santé. 2019. Available at: https://www.theglobalfund.org/media/8496/oig_gf-oig-19-013_report_fr.pdf

[15] *** International Labor Office. 2003. Guide des mutuelles de santé en Afrique, Geneva STEP, p.7.

[16] *** Ministry of Planning-RDC. 2014, Enquête 1-2-3, p.18.

[17] *** Ministry of Public Health-DRC. 2019, Étude sur l'espace budgétaire du secteur de la santé en RDC, elle peut si elle le veut réaliser la Couverture Santé Universelle, *letter n°1*, p.2-3.

[18] *** Ministry of Public Health-DRC. 2021. Rapport narratif des comptes nationaux de la Santé, p.2 and 4.

[19] *** Ministry of Public Health-DRC. 2022. Rapport sur régime de financement de la Sante et les indicateurs de Protection financière dans le cadre la CSU, RDC, p.2.

[20] *** OMS et Banque Mondiale, 2022. *Rapport mondial de suivi sur la protection financière en santé 2021*: résumé d'orientation [Global monitoring report on Financial protection in health 2021].

[21] *** OMS-RDC. 2017. Stratégie de coopération de l'OMS avec la RDC 2017-2021,

[22] *** World Bank. 2015. Revue des Dépenses Publiques de la RDC, (Volume I), p.17.

[23] *** http://www.iniaina.com/2015/03/23/emploi-et-finance/les-differents-types-de-mutuelle/

[24] *** http://www.mataf/edu.net/fr/edu/glossaire/financement

[25] *** https://www.who.int/fr/news-room/fact-sheets/detail/universal-health-coverage-(uhc)

List of abbreviations

ODA   : Official Development Assistance
BCC   : Central Bank of Congo
ILO   : International Labor Office
NHA   : National Health Accounts
UHC   : Universal Health Coverage
Ext. health exp./ capita   : External health expenditure per capita
Households' heath exp. / capita: Household health expenditure per capita
Pub. health exp. per capita : Public health expenditure per capita
GHE   : Global Health Expenditure
PHE   : Public Health Expenditure
THE   : Total Health Expenditure
FASEG   : Faculty of Economics and Management
Min. PH   : Ministry of Public Health
SDG   : Sustainable Development Goals
WHO   : World Health Organization
AIMP   : Aid and Investment Management Platform
GDP   : Gross Domestic Product
GDP/capita or Rev/capita   : Income per capita
NHDP   : National Health Development Plan
TFP   : Technical and Financial Partners
DRC   : Democratic Republic of Congo
SCP   : WHO Country Cooperation Strategies
UNIKIN   : University of Kinshasa
USD   : US Dollar

ASERS

ASERS
Publishing