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Association of human capital development and women's employment in China, 1990-2020: An empirical assessment

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Abstract

This study was designed to assess the connection between human capital development and the employment of women in China from 1990 to 2020. Data was collected from the World Development Indicators, after which it was subjected to Dynamic Ordinary Least Squares and Granger causality econometric analysis. The results from the study showed that human capital development and women employment had a negative but insignificant relationship. Similarly, a unidirectional relationship existed between female employment and government capital expenditure in China, while a bidirectional association ran between women employment and government expenditure on education in the country. Therefore, it is concluded that human capital development and government expenditure on education are the strong motivating factors that drive GDP growth rate and women employment in China. Consequently, we recommend that policymakers in China should consider massive investment in human capital development in order to enhance women employment in the country. Additionally, policymakers should embark on policies and programmes that foster the expansion of China`s GDP growth rate as a measure to increase employment opportunities for women. *(Afr J Reprod Health 2024; 28 [6]: 39-46).*

Keywords: Health expenditure, education expenditure, women employment, Human Development Index, China

Résumé

Cette étude a été conçue pour évaluer le lien entre le développement du capital humain et l'emploi des femmes en Chine de 1990 à 2020. Les données ont été collectées à partir des indicateurs de développement mondial, après quoi elles ont été soumises à une analyse économétrique des moindres carrés ordinaires dynamiques et de la causalité de Granger. Les résultats de l'étude ont montré que le développement du capital humain et l'emploi des femmes entretenaient une relation négative mais insignifiante. De même, il existait une relation unidirectionnelle entre l'emploi des femmes et les dépenses publiques en capital en Chine, tandis qu'une association bidirectionnelle existait entre l'emploi des femmes et les dépenses publiques d'éducation dans le pays. Par conséquent, nous concluons que le développement du capital humain et les dépenses publiques consacrées à l'éducation sont les principaux facteurs de motivation qui déterminent le taux de croissance du PIB et l'emploi des femmes en Chine. Par conséquent, nous recommandons aux décideurs politiques chinois d'envisager des investissements massifs dans le développement du capital humain afin d'améliorer l'emploi des femmes dans le pays. En outre, les décideurs politiques devraient se lancer dans des politiques et des programmes qui favorisent l'expansion du taux de croissance du PIB chinois afin d'augmenter les opportunités d'emploi pour les femmes. *(Afr J Reprod Health 2024; 28 [6]: 39-46).*

Mots-clés: Dépenses de santé, dépenses d'éducation, emploi des femmes, indice de développement humain, Chine

Introduction

The ascendency of China, as a superpower, in the global political economy has made it a fertile ground for research in the social science disciplines. Particularly, management scholars and researchers are interested in knowing how Chinese managers were able to develop their country's human capital, in a quest to transform the erstwhile economically weak China[1] to a modern economic hub and haven. Many agree that a nation's economic prosperity is a function of human capital development which measures human development in terms of education, health and living standard respectively[2]. Hence, it is plausible that China's economic cutting edge performance was fundamentally derived from investments in human capital development. But it is important to know the extent to which these human capital development investments have affected the employment of women in modern China. This is the

focus of this paper. Before the advent of the Chinese economic hegemony, there had been an official commitment to gender quality in the country[3]. Mao Zedong's famous phrase: 'Chinese women hold up half of the sky' showed the extent to which the economic policies in primordial China were equally favourable to both men and women[1].

In the 1980s, China's the participation of women in the labour force exceeded that in several economically developed countries (84% in China versus 61% in the Organization for Economic Cooperation and Development) and the gender pay gap was tinier[1]. There was also close to gender parity in the share of men and women holding professional jobs (6% versus 4% respectively) and in completing high school (11% versus 10% of the male and female population respectively[1]. These success stories were largely attributable to strong government commitment towards promoting gender equality in China[1].

Nevertheless, the economic reforms which China undertook in the early 1980s have somewhat reversed this trend[4]. Increasing gender gaps are being observed within many sectors in the labour market in China[4]. Even though female labour force participation rate in China is relatively huge, both women's labour force participation and the employment–to–population rate have dwindled at a faster rate than those of men. Women are now more likely to be involved in low output sectors[4]. Yet, gender equality within the labour market is a sine qua non for long term sustainable economic development of any country[5], and China must not be an exception in this regard. Gender equality is more than a moral issue; it is a vital economic issue. In order for the global economy to reach its potential, countries need to create conditions in which all women can reach their highest potentials[6].

It has been noted that industries with more women than men seem to expand significantly faster compared to economies with higher inequality in gender[7]. This conclusion implies that observed patterns of realised growth rate differentials are systematic and that the impact of gender inequality on employment is specifically injurious to industries that typically have a high proportion of men within their internal labour markets[7]. Consequently, the gradual decline of women's employment in China, gives cause for concern. We hypothesise that negative distortions in China's human capital development investments, may have hampered women's employment in the country. It is therefore the objective of this article to examine the degree to which human capital development has affected women employment in China.

Literature review

Studies have consistently shown that human capital development and women's employment in China are closely linked. Li *et al*.[8] found that education and skills training significantly improved women's job prospects, as they were more likely to find employment with higher wages and better working conditions. Furthermore, human capital development has also been found to alleviate gender-related barriers to employment. Wang *et al*.[1] highlighted that women who received higher education and vocational training were better equipped to overcome societal and cultural biases that often limited their job prospects.

Chen and Huang[9] found that women with higher levels of education were more likely to be employed and had a better chance of getting a professional or managerial job. Furthermore, education also acted as a key factor in reducing gender wage gaps, as educated women commanded higher salaries compared to their less-educated counterparts[10] Another critical determinant of human capital development in Africa is health. Poor health reduces productivity, increases absenteeism, and lowers life expectancy, leading to lower levels of human capital development. Studies have shown that access to healthcare services is a critical factor that influences health outcomes in Africa[11]. Adebowale *et al*.[11] examined the factors that influence access to healthcare services in Nigeria by conducting a multilevel logistic regression analysis. Their study found that household income, geographic location, and maternal education were significant determinants of access to healthcare services in Nigeria.

Apart from formal education, technical and vocational training programs have emerged as critical pathways for women's employment in China. These programmes allow individuals to acquire specialised skills that are in demand in various sectors, providing them with better job prospects. Zhang and Su[12] emphasised the importance of technical and vocational training in enhancing women's employability. Women who

participated in such training programs were more likely to find jobs in skill-intensive industries, as shown by their higher labor force participation rate.

Nwokolo and Uchenna[13] investigated the ways in which remittances contribute to human capital development in Nigeria. Remittances have been shown to have a positive impact on human capital development in Nigeria. A study using cross-sectional data found that remittances are associated with increased household spending on education and health. This can lead to improvements in literacy rates, school enrollment, and health outcomes. Another factor that has been identified as a determinant of human capital development in Africa is health. Health is important because it affects the productivity of individuals and their ability to learn and acquire new skills. Muoghalu *et al*.[14] conducted a study on the relationship between health and human capital development in Africa. The study examined the impact of health on human capital development in 20 African countries. The findings showed that health is a major contributor to human capital development in Africa. The role of technology in promoting human capital development has also been studied. A study by Alabi *et al*.[15] examined the effect of digital literacy on human capital investment in Nigeria. The authors used cross-sectional data and found that digital literacy positively and significantly impacts human capital development in Nigeria, especially in terms of enhancing skills and knowledge in the use of digital technologies.

Methods

Research design

Given the technical nature of addressing the study's objectives, an ex post facto research strategy was selected as the best option for this inquiry. Secondary data that covered the years 1990 to 2020 were used to examine the relationship between female employment and human capital development. These data were obtained from the World Development Indicators (WDI) published by the World Bank[16]Consequently, Female employment was considered as the dependent variable while human capital development, government expenditures on education, GDP growth rate, government capital expenditure and trade openness were used as independent variables in this study.

Model specification

In assessing the nexus between human capital development and women employment, the estimating model of this study was adapted from Oloke*et al.*[17], Aderemi *et al.*[18], Aderemi *et al.*[19], Olowookere*et al.*[20] and Obiakor*et al.*[21] as follows;

Women Employment = f (Human Capital Development) (1)

Model one could be explained as women employment is a function of human capital development, which was further decomposed as follows;

FLF = f (HCD, GEE) (2)

In model 2, FLP was used to proxy female employment which was operationally defined as percentage of female employment in total employment in the country. Also, HCD and GEE represent human capital development and government expenditures on education respectively.

Furthermore, to enhance the robustness of the model, some control variables such as GDP growth rate, government capital expenditure and trade openness were included, as such, model 3 was evolved.

FLF = f (HCD, GEE, GDP, GCE, TO) (3)

In linearizing the model 3, the model 4 is emerged as follows;

$$FLF = HCD_t = \alpha_0 + \beta_1 GEE_t + \beta_2 GDP_t + \beta_3 GCE_t + \beta_4 TO_t + \mu_t \quad (4)$$

However, in examining direction of causality that exists between human capital development and women employment, the technique of Granger causality was utilised as the study follows the works of Opele*et al*.[22], Aderemi *et al*.[23], Lawal *et al*.[24] and Aderemi *et al*.[25]. The model is stated as follows:

$$FLF_t = \beta_0 + \sum_{i=1}^{m} \beta_1 FLF_{t-i} + \sum_{j=1}^{n} \beta_2 HCD_{t-j} + \sum_{k=1}^{O} \beta_3 GDP_{t-k} + \sum_{l=1}^{P} \beta_4 GEE_{t-l} + \sum_{l=1}^{P} \beta_4 GCE_{t-l} + \mu_{1t} \quad (5)$$

$$HCD_t = \beta_0 + \sum_{i=1}^{m} \beta_1 HCD_{t-i} + \sum_{j=1}^{n} \beta_2 FLF_{t-j} + \sum_{k=1}^{O} \beta_3 GDP_{t-k} + \sum_{l=1}^{P} \beta_4 GEE_{t-l} + \sum_{l=1}^{P} \beta_4 GCE_{t-l} + \mu_{1t} \quad (6)$$

$$GDP_t = \beta_0 + \sum_{i=1}^{m} \beta_1 GDP_{t-i} + \sum_{j=1}^{n} \beta_2 FLF_{t-j} + \sum_{k=1}^{O} \beta_3 HCD_{t-k} + \sum_{l=1}^{P} \beta_4 GEE_{t-l} + \sum_{l=1}^{P} \beta_4 GCE_{t-l} + \mu_{1t} \quad (7)$$

$GEE_t=\beta_0+\sum_{i=1}^{m}\beta_1 GEE_{t-i}+\sum_{j=1}^{n}\beta_2 FLF_{t-j}+\sum_{k=1}^{O}\beta_3 HCD_{t-k}+\sum_{l=1}^{P}\beta_4 GDP_{t-l}+\sum_{l=1}^{P}\beta_4 GCE_{t-l}+\mu_{1t}$ (8)

$GCE_t=\beta_0+\sum_{i=1}^{m}\beta_1 GCE_{t-i}+\sum_{j=1}^{n}\beta_2 FLF_{t-j}+\sum_{k=1}^{O}\beta_3 HCD_{t-k}+\sum_{l=1}^{P}\beta_4 GDP_{t-l}+\sum_{l=1}^{P}\beta_4 GEE_{t-l}+\mu_{1t}$ (9

Models 5 to 9 were used to capture *Granger causality, which is an* econometric test used to verify the usefulness of one variable to forecast another. Therefore, the models were used to *determine* female employment if human capital development, government expenditures on education, GDP growth rate, government capital expenditure and trade openness could successfully predict another in China, It is important to state that Eviews 10 soft ware was used to estimate these models.

Table 2 provides detailed information regarding the operational definitions of all the variables in this study.

Source of data and scope of the study

Secondary data was utilised in this study which is in the form of annual time series spanning between the periods of 1990 and 2020. And as such, the data was sourced from World Development Indicators (WDI).

Table 1: A priori expectations and data source

Abbreviation	Variables	Parameters	Expected Value
HCD	Human Capital Development	β_1	Positive (+)
GEE	Government Expenditures on Education	β_2	Positive (+)
GDP	Gross Domestic Product Growth Rate	β_3	Positive (+)
GCE	Government Capital Expenditure	β_5	Positive (+)
TO	Trade Openness	β_5	Positive (+)

Table 2: Measurement and operation definitions of variables

Abbreviation	Description of Variables
FLF	Female employment which is measured as percentage of female employment in total employment.
GEE	Government expenditures on education as percentage of total government expenditure.
GDP	Gross domestic product growth rate.
GCE	Government capital expenditure as percentage of total expenditure.
HCD	Human capital development is proxied with human capital index which measures human development in terms of education, health and living standard respectively.
TO	Trade openness- imports plus exports as percentage of GDP

Estimation procedures

To estimate the dependent variable and set of the independent variables, this study embarks on preliminary analyses performed on the data, they included:

Descriptive Statistics**:** These were used to describe the main characteristics of data in a study, and they provide succinct summaries of the sample. The statistics provide comprehensive information regarding the characteristics, distribution, and behavior of the variables under consideration by presenting statistics such as the mean, median, kurtosis, skewness, standard deviation, maximum and minimum value among others.

Consequently, the preferred methods of estimation for the study are dynamic ordinary least squares and granger causality. These are analytical techniques used to estimate unknown parameters in the study. This is a regression that includes deterministic variables, integrated processes and their powers as regressors. The errors are allowed to be correlated across equations, over time and with the regressors. Also, the regression is constructed in such a way that the usual least squares procedure yields asymptotically efficient estimators.

Ethical consideration

The data in the WDI were obtained using appropriate ethical procedures and guidelines. Consequently, further ethical issues were minimal. The data were completely anonymized, while the data was already freely available to the general

public. Hence, further ethical clearance was not obtained for this study.

Results

This section presents the descriptive statistics, pre-estimation tests, regression analysis and finally the granger causality test. Table 3 contains the description of the data used for the analysis. Firstly, female employment (FLF) has a mean value of 45%. GDP growth rate has an average value of 8.9% for the periods between 1990 and 2020. In the same vein, government capital expenditure as percentage of total expenditure has an average value of 97.04%. However, government expenditure on education has a mean value of 2.7%, whereas, the mean value of HDI is 0.64, and trade openness has 41.2% as its mean value.

Table 3: Descriptive statistics of the study's variables

	FLF (%)	GDP (%)	GCE (%)	GEE (%)	HCD (1-0)	TO (%)
Mean	45.06591	8.906447	97.04527	2.737258	0.64	41.2575
Median	45.10523	9.133631	97.47485	2.442344	0.65	37.63241
Maximum	45.63394	14.23086	101.6321	4.07743	0.76	64.47888
Minimum	44.34107	2.238638	91.47848	1.65456	0.48	22.19947
Std. Dev.	0.41408	2.898702	2.121877	0.912543	0.08	11.24959
Skewness	-0.188405	-0.143874	-0.93294	0.099363	-0.19	0.499106
Kurtosis	1.703414	3.087461	4.15382	1.175143	1.67	2.497369
Jarque-Bera	2.506793	0.124366	6.617607	4.633194	2.62	1.717467
Probability	0.285533	0.939711	0.03656	0.098609	0.26	0.423698
Sum	1487.175	293.9128	3202.494	90.32952	21.3	1361.498
Sum Sq. Dev.	5.4868	268.8792	144.0756	26.64751	0.25	4049.708
Observations	33	33	33	33	33	33

Table 4: Regression estimates of the nexus between human capital development and women employment in China Method: Dynamic Least Squares (DOLS)

Dependent Variable: FLF				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	0.056979	0.013779	4.135219	0.0025
GCE	-0.005836	0.015515	0.376172	0.7155
GEE	0.668057	0.064089	10.42392	0.0000
HDI	-0.239407	0.667754	0.358526	0.7282
TO	-0.024571	0.003023	8.127356	0.000
R-squared	0.995215	Mean dependent var		45.03976
Adjusted R-squared	0.984583	S.D. dependent var		0.420908
S.E. of regression	0.052262	Sum squared resid		0.024582
Long-run variance	0.000992			

Hint: (*) indicates significance at a 5% probability level

As shown in Table 4, it is only GEE and GDP that followed the aprori expectation, while the rest of the variables showed otherwise. The R-squared is 0.99% which indicates that human capital development and other control variables explained 99% of the variation in women employment in China.

Consequently, GDP growth rate has a positive and significant relationship with women employment in China. A unit change in GDP growth rate brings about 0.056% rise in women employment. Government capital expenditure and women employment have a negative relationship but the relationship is not significant 5% level of significant. Government expenditures on education and women employment have positive and significant relationship. A unit change in government expenditures on education will result into 0.66% rise in women employment in the country. However, human capital development and women employment have a negative but insignificant relationship. In the same vein, trade openness and female employment have negative but significant relationship.

Table 5: Pairwise granger causality tests between human capital development and women employment in china

Null Hypothesis:	Obs	F-Statistic	Prob.
GDP ← FLF	31	0.09723	0.9077
FLF← GDP		1.60956	0.2193
GCE← FLF	31	1.80877	0.1839
FLF ← GCE		6.19953	0.0063
GEE ← FLF	31	5.43633	0.0107
FLF← GEE		4.25392	0.0252
HDI ← FLF	31	6.53884	0.0051
FLF ← HDI		2.04416	0.1498
GCE ← GDP	31	0.10381	0.9018
GDP ← GCE		1.79192	0.1866
GEE ← GDP	31	2.61999	0.0919
GDP ← GEE		3.50923	0.0448
HDI← GDP	31	4.37687	0.0232
GDP ← HDI		1.32563	0.2831
GEE← GCE	31	0.62529	0.5433
GCE ← GEE		3.27935	0.0537
HDI ← GCE	31	0.08448	0.9192
GCE ← HDI		8.33952	0.0016
HDI ← GEE	31	3.83116	0.0348
GEE ← HDI		0.18018	0.8362

Hint: (*) (**) indicate significance at 5% level and 10% level respectively. ← does not Granger

If trade openness changes by a unit, women employment will be reduced by 0.02% in China.

In accounting for the causal relationship that exists among human capital development, women employment and other variables in the study, Granger causality was estimated with the presentation of the results in Table 5. From the table, the following inferences were drawn; a uni-directional causality flows from female employment to government capital expenditure in China. But a bidirectional causality flows between women employment and government expenditure on education in the country. Also, human capital development Granger causes female employment, and as well Granger causes GDP growth rate whereas, female employment does not Granger cause human capital development in China. GDP growth rate does Granger cause government expenditure on education. Also, there is a unidirectional causality flowing from government expenditure on education to human capital development. From the findings, it could be inferred that human capital development and government expenditure on education are the strong motivating factors that drive GDP growth rate and women employment in China.

Discussion

Discussing these findings within the context of the research question and objective of this study. Firstly, female employment (FLF) has a mean value of 45%. This implies that women constituted about 45% of workforce in China. This is a little bit higher than the mean value 44.96% obtained in the Asia region in 2022. This is an indication that women are actively participating in the Chinese labour market. However, in terms of regional and sub regional comparison, female employment in China is less than 54.69% and 58.1% in South East Asia and ASEAN respectively. Meanwhile, GDP growth rate has an average value of 8.9% for the periods between 1990 and 2020. This is greater than the GDP growth rate in South Asia (6.5%) and ASEAN (5.5%) in 2022 (World Bank[16]).

Consequently, human development index has a mean value of 0.64. This shows that the level of human capital development in China is considerably high, because it is greater than the global average benchmark of 0.5 [16]. The improvement in human development index in China could be a direct link to the continuous investment in health, education and living standard of the people in the country. In the same vein**,** government capital expenditure and government expenditure on education have mean of 97.04% and 2.7% respectively. This shows that capital expenditure constitutes the biggest proportion of the Chinese annual budget. Also, trade openness has an average value of 41.2%. This is an evidence that Chinese economy is reasonably opened to the rest of the world through international trade over the years.

Similarly, human capital development and women employment in China have an insignificant negative relationship. This implies that the current level of human capital development in China does not have capacity to enhance expansion of women employment in the country. This finding contradicts the submission of Li *et al*.[8] Meanwhile, further evidence from Granger causality proves that a uni-directional causality flows from female employment to government capital expenditure in China in one hand, but a bidirectional causality flows between women employment and government expenditure on education in the country on the other hand. Therefore, human capital development and government expenditure on

education are the strong motivating factors that drive women employment in China. Therefore it is important to stress that policymakers in China should consider massive investment in human capital development in order to enhance women employment in the country. In the same vein, the policymakers should prioritize more investment on women education as a strategic part of human capital, this will further catalyze the expansion of China`s employment opportunities for women in the country.

Strengths and limitations

This study possesses a clear and concise research question alongside a robust analysis. This serves as the study's strengths. Also, the emergence of a new empirical evidence in the study also consolidates the strength of this study. The limitation of study is primarily attributed to its scope, as the study focuses on only China. Further studies could therefore be carried out on the Asia to provide a wider policy implication for the entire continent.

Conclusion

This study therefore concludes that on an average basis, women constituted about 45% of workforce in China between 1990 and 2020.Human capital development in China is considerably high. Capital expenditure constitutes the biggest proportion of the Chinese annual budget. However, the current level of human capital development in China does not have a strong capacity to enhance expansion of women employment in the country.

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