

**Fertility and under five children's well-being in Morocco:
is there a link?**

**Fécondité et bien-être des enfants de moins de cinq ans au Maroc :
y'a-t-il une relation ?**

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Subject: To study the relation between fertility and under five Moroccan children's well-being.

Abstract: Statistical data come from the ENPSF-2011² and RGPH-2014. Individual information about under five children's coming from the ENPSF-2011 transformed in municipal indicators. Then they coupled with those of the RGPH-2014 in order to generate the indicators of children's well-being. These last submitted among others at the ACP.

Results: The resident children in urban municipalities have a better chance to enjoy a greater level of well-being. The coexistence of all sorts of well-being in the same municipalities is not evident. The well-being of children and fertility measured by the ISF and the average parity of women 45 to 49 years of age progress in two opposite directions. The well-being of the household positively affects the well-being of children. However, the more illiteracy was raging in municipality the more well-being of children was uncertain. This conclusion change by the percentage of children 7 to 12 years of age in full-time education: the higher it is the well-being of children increase.

Conclusion: Existence of some correlation between the under five children's well-being and fertility.

Keywords: Children's well-being, fertility, malnutrition, vaccination, social interest.

Objectif : étudier la relation entre la fécondité et le bien-être des enfants marocains de moins de cinq.

Résumé : Les données proviennent de l'ENPSF-2011 et du RGPH-2014. Les informations individuelles, relatives aux enfants de moins de cinq ans, issues de l'ENPS-2011 ont été transformées en indicateurs communaux et couplés avec ceux du RGPH-2014 afin de générer des indicateurs du bien-être des enfants qu'on a soumis ,entre autres, à l'ACP.

Résultats : Les enfants résidants dans des communes à caractère urbain ont plus de chance de jouir d'un niveau élevé du bien-être. La coexistence de toutes les formes du bien-être dans les mêmes communes n'est pas évidente. Le bien-être des enfants et la fécondité, mesurée par l'ISF et par la parité moyenne des femmes 45-49 ans, évoluent dans deux sens opposés. Le bien-être du ménage affecte positivement le bien-être des enfants. Par contre, plus l'analphabétisme sévit dans la commune, plus le bien-être de l'enfant est incertain. Conclusion qui change avec le taux de scolarisation des enfants 7-12 ans : plus il est élevé, plus le bien-être des enfants augmente.

Conclusion : existence d'une certaine liaison entre le bien-être des enfants de moins de cinq ans et la fécondité.

Mots clés : bien-être des enfants, fécondité, malnutrition, vaccination, intérêt- social.

1- Introduction

In recent years, the well-being deeply ingrained in academic and political discourse as reflected by the increasing number of publications, reviews and conferences. It is more and more popular as an integrated concept in many areas of social policy, international development and recently in the development of children (McGillivray and al., 2006; Brown, 2007). The well-being begin now to use in empirical research (Jones and Sumner, 2008) in (Streuli, Woodhead and Camfield 2009). White (2010) has provided a useful framework for embracing the diversity of concepts of the well-being by distinguishing between to have a good life (material well-being and standards of living), to lead a good life (values and ideals) and to situate one's life (experience and subjectivity).

Simple as the case seems now there may be the concept well-being has not a single and conventional measurement in special literature. In the last decades, the well-being of children in particular had been widely discussed, without reaching a clear consensus about how it can be define and evaluate.

A recent review of the literature on the well-being of children highlighted on children rights-based approach and looked for the positive side of their well-being. The foundations of this approach arise from the Convention of the Rights of Child approved on 20 November 1989, in resolution 44/25, by the United Nations General Assembly. In article 7, this convention recognize the rights of child to be registered as soon as possible after his or her birth, to acquire a name and nationality, and to know his or her parents, as far as possible, and to be cared by them. Article 18 of the same convention stressed that the parents of child or if necessary his or her legal representative had the primary responsibility to raise him and ensure his development. The best interests of the child will be their basic concern. Article 24 concerning the health and medical services also states that the child has a right to enjoy the highest attainable standard of health and to benefit from medical services. In order to diminish infant and child mortality the State should make efforts to provide all children with the necessary medical assistance and health care. To achieve this:

- primary health care should be expanded,
- fight against disease and malnutrition,
- provide mothers with appropriate prenatal and postnatal care,
- and encourage breastfeeding.

The convention also recognize in article 26 on social security that the child has the right to benefit from social security, including social insurance. For its parts, article 27 affirms the right of the child to living favourable to his physical, mental, spiritual, moral and social development. The parents remain primarily responsible for ensuring this standard of living and the State has a duty to ensure that this responsibility can assumed. The right of the child to leisure, play and participate in age-appropriate recreational activities was ensured by article 31 of the same convention.

In addition to the Convention on the Rights of Children, the pursuit of the well-being of children in particular and for the general population has been set as one of the sustainable development goals. Millennium Development Goals (MDGs) endorsed by all countries of the world and by the entire world's major development institutions achieved their 2015 target year. Then in collaboration with governments, civil society and the various partners the United Nations developed an ambitious post-2015 program. The latter based on 17 Global Goals for Sustainable Development whose goal 3: "Ensure healthy lives and promote the well-being of all at all ages". We can recalled other goals in the context of this work, such as goal 1: "Eradicate poverty in all its forms and around the world" and goal 6: "Ensure availability and sustainable management of water and sanitation for all".

It should note that the factors affecting the quality of life of children are numerous and fall under different levels including:

- political, economic, cultural and natural contexts,
- family, school and community environments,
- systems that flow from policy frameworks,
- values of the country and society as a whole.

These factors affect well-being whether directly or indirectly through their effects on behaviour, including fruitful behaviour. Initially, demographers were involved in the search for explanatory models of declining fertility (Vimard 1997, p. 12). In recent decades, research areas on the transition of fertility has multiplied and particular attention has given to the potential impact of these changes on the well-being of children.

1.1- A brief Literature review

Numerous studies have been interested in associations and links between fertility decline and changes in child well-being. It emerged from these studies that declining fertility reduces the risk of maternal-related death (Ross and Blanc 2012). These variations in fertility also have a positive impact on reproductive health of women's and on their nutritional status that could be exhausted following successive deliveries and breastfeeding (King 2003). In turn, gains in maternal survival, health and nutrition should improve the survival, health and nutrition of all children.

Furthermore, the spacing of births positively influences the anthropometric status of the mother, number of micronutrients and blood haemoglobin level (Conde-Agudelo and al. 2012). Other analyses have also shown that the

decline in the Maternal Mortality Ratio was associated with an increasing likelihood of under five children survival (Shen and Williamson, 2001). Other studies indicate that as women's parity declines, they will spend more time caring for their children (Reher, 2011). According to Lee (2003), women who expected to spend 70% of their adult life, giving birth and raising young children before the demographic transition (in 1800), only spend 14% today. A study carried out between 1994 and 2004 in 19 countries demonstrated a negative link between the total fertility index and human capital expenditure per child (public and private) (Lee and Mason, 2010). In addition, vaccination has been shown to be less likely for high-ranking children (De and Bhattacharya 2002; Parashar 2005).

Similarly, the risk of death during the infant period is higher when the age of the mother exceeds 35 years and reproductive intervals are less than 24 months (Rutstein 2000). For its part, contraceptive prevalence seems negatively correlated with infant mortality (Shen and Williamson, 2001). In a multilevel analysis of DHS data from 42 countries since 1990, it has observed that the risk of infant and young child mortality and stunting is inversely proportional to the length of the inter-reproductive intervals (Heaton et al. 2005). Finally, in another multilevel analysis of DHS data from 35 countries since 2000, mean age at first union and mean inter-reproductive interval measured at the community level were positively associated with Z-size scores for age in under five children (Fox and Heaton 2012) in (Yount and al. 2014).

Giroux (2008), Kravdal and Kodzi (2011) examined the effect of fertility and the number of siblings on stunting children in sub-Saharan Africa. Although they found a strong association at the aggregate level, their estimates of the magnitude of the effect are quite low at the household level. Kravdal and Kodzi used household level data from 23 countries and found that an additional brother or sister increased the chances of stunting by about 2%, whereas Giroux believed that the chances of stunting in six countries augmented by about 3% for each additional child. Kravdal and Kodzi founded important effects of very short inter-generational intervals on the risk of stunting. The reduction in fertility leads to greater spacing of births, a diminution in the number of siblings and acts accordingly on the size of the child.

Lower fecundity may lead to higher activity rates, particularly for women. Reducing youth dependency rates can also lead increased investments in health and rehabilitation of every child growing the productivity of children when they enter the labour market. Finally, there may also be a positive feedback effect between demographic and economic transitions: lower fertility leads to improved health, education, women's participation in the labour market and economic growth. These improvements in turn lead to further reductions in fertility and additional economic benefits (Karra, Canning, et Wilde 2017).

1.2- Trends in fertility and selected indicators of Moroccan child well-being

After this brief overview of the statistically validated links between fertility and the well-being of children, we will focus on Morocco, which is no exception compared to the standard fertility transition scheme. Until the early sixties, the fertility of Moroccan women was comparable regardless of the environment of residence (~ 7 children per woman). Fifteen years later, rural women were still keeping their fertility levels, while urban women had only 4.4 children. The decline only became noticeable in rural areas at the end of the 1980s (6.7 children per woman according to ENPS-I 1987) with an increasingly accelerated rate resulting in an ISF of 2.8 children per rural woman according to EPSF 2018 (0.7 more children than their fellow citizens). The fertility of urban women is currently approaching that of developed countries and has even crossed the threshold of replacement of generations for some categories of population, such as women with secondary education or more (1.64 children/ woman). This decline seems to be accompany, at the macro level, by an improvement in all indicators relating to the survival and well-being of under five children.

Secondary information, used to retrace the trend and evolution of fertility and child well-being, comes from population and family health surveys carried out in Morocco during the period 1987-2018. This approach has the advantage of using comparable indicators developed using the same methodology (same sampling technique, questionnaires conforming to the international standard, same profile of persons responsible for data collection, same procedure for data entry and processing,...). These indicators, while making it possible to study the evolution and trends of Moroccan children well-being level in recent decades, also used to study their possible links with fertility decline (table1).

The analysis of these secondary data shows that almost all the indicators relating to children well-being available in published reports are correlated with the Synthetic Fertility Index and this correlation is statistically significant ($p < 5\%$). Thus, we can say that the chance to be fully vaccinated³; to be assisted by qualified personnel at childbirth; to have benefited from a medical prenatal consultation; to be managed by a health professional in case of pneumonia or diarrhea increases with the decrease in fertility. On the other hand, if the fertility rate is higher, the risk of suffering from malnutrition in its various forms is higher too (Table 2).

3- A child fully vaccinated if he or she has received all the vaccines selected by Ministry of Health Immunization Program.

Table 1: levels and trends of child well-being indicators related to health and nutrition, and total fertility index by place of residence, Morocco 1987-2018

area	year	ISF	CV	AA	CP	IPM	IPS	RCM	RCS	EM	ES	RSP	RSD
URBAN	1987	3,2	82,8		56	49	68	1,2	17,2	53	1,9	0,5	23,5
	1992	2,5	93,7		63,7	61	3,3	0,6	13,1	3,1	1,9	0,4	23,9
	1997	2,3	94,4		80,7	85	4,1	0,5	15	10,6	2,7	0,7	41,7
	2004	2,1	93,5		85,3	85	6,5	1,1	12,9	3,8	7,6	1,8	43,3
	2011	2,2	95,2		92,1	91,6	1,7	0,5	8,6	2,5	1,6	0,7	63,9
	2018	2,1			96,6	96,6	2	0,7	10,4	3,5	2,5	1	43,4
RURAL	1987	5,8	57,6		11	13	14,9	4,8	29,8	11,4	4,7	0,8	10,5
	1992	5,5	66,7		13,8	18	12	2,4	27,7	10,6	2,4	0,5	13,6
	1997	4,1	80,9		27,9	40	9,1	2,6	14	8,6	3,4	0,8	16,7
	2004	3	84,1		39,5	48	14,1	2,9	23,6	9,2	11,1	3,2	24,5
	2011	3,2	86,5		35	62,7	4,3	1,1	20,5	6,4	3	1,3	54,1
	2018	2,8			74,2	79,6	3,8	0,6	20,5	5,9	2,7	1,2	44,4
NATIONAL	1987	4,8	69,8		26	25	12,1	3,6	25,5	9,5	3,7	0,7	15,1
	1992	4	75,7		31	32	9	1,8	22,6	8	2,3	0,4	18,7
	1997	3,1	87,1		48,4	58	7,1	1,8	14,5	9,6	3,1	0,8	28,3
	2004	2,5	89,1		62,6	68	10,2	2	18,1	6,5	9,3	2,5	34,5
	2011	2,6	90,9		73,6	77,1	3,1	0,8	14,9	4,5	2,3	1	60,3
	2018	2,4			86,6	88,5	2,9	0,7	15,1	4,7	2,6	1,1	47
ISF	Synthetic Fertility Index					IPM	Moderate underweight IPM (%)				EM	Moderate wasting (%)	
CV	Fully vaccinated (%)					IPS	Severe underweight IPS (%)				ES	Severe wasting (%)	
AA	Delivery assisted by a health professional (%)					RCM	Moderate growth retardation (%)				RSP	Seeking care for pneumonia (%)	
CP	Qualified prenatal consultation (%)					RCS	Severe growth retardation (%)				RSD	Seeking care for diarrhea (%)	

Table 2: correlation coefficient of child well-being indicators and ISF, Morocco 1987-2018

<i>Well-being indicator</i>	<i>Correlation</i>	<i>Well-being indicator</i>	<i>Correlation</i>
Place of residence	0,305	Moderate stunting	,830**
Fully vaccinated child	-,979**	Severe stunting	,723**
Delivery assisted by a health professional	-,908**	Moderate emaciation	-0,072
Qualified prenatal consultation	-,936**	Severe emaciation	-0,302
Seeking care for pneumonia	-,682**	Moderate underweight	,763**
Seeking care for diarrhea	-,723**	Severe underweight	,832**
**. The correlation is significant at level 0.01 (bilateral).			

After this brief macro level analyse of trends in fertility and some selected indicators of children's well-being, over the past three decades, we move on to the analysis of the probable impact of the fertility level on the well-being of children at a micro level. In others words, these simultaneous changes in the fertility and well-being of under five children and these links validated statistically based on secondary and aggregated data at national level, suggest the use of a more detailed analysis by introducing, in an individual child data base, some contextual indicators measured at the municipal level to verify the following assumptions:

Assumption 1: the child residing in a low-fertility municipality is more likely to benefit from curative and preventive health care;

Assumption 2: the child residing in a low-fertility municipality has a greater social interest on the part of his parents and other household members;

Assumption 3: the prevalence of malnutrition during the infant- juvenile period is higher in high-fertility communes.

Our aim is therefore to verify these hypotheses by using municipal data from General Census of Population and Habitat -2014⁴ and the National Population and Family Health Survey ENPSF-2011⁵. This survey has the advantage of collecting data on the health of under five children and their nutritional status. Linked to data from GDPR-2014, they

4- Sixth RGPH carried out in Morocco and whose data made available by the High Commission for the Plan, the Moroccan national institution responsible for statistical production, planning, forecasting, analysis and economic forecasting.

5- This survey carried out by the Department of Health Studies and Information (SEIS) reporting to the Financial Planning and Resources Directorate - Ministry of Health with the technical assistance of PAPFAM of the League of Arab States.

will be processed via a factor analysis in main components to test possible links between the level of communal fertility and the well-being of children under the age of five.

The following sections reserved for the description of the data and indicators generated to measure certain aspects of children's well-being.

2- Data and Methods

2.1- Data and indicators

As noted above, this study used the ENPSF-2011 and RGPH-2014 data. The ENPSF is a sample survey, based on a nationally representative sample and by place of residence. The questionnaires used to collect information are standard, internationally validated and adapted to the Moroccan context. The core is formed of a household questionnaire tracing the socio-demographic profile of household members (age; sex; relationship to head of household; level of education; marital status; general health; anthropometric measurements of children under 6 years old...) and housing conditions and the quality of surrounding it. This questionnaire makes it possible, in particular, to identify women of reproductive age eligible for the individual questionnaire. It is designed to gather information on the characteristics of women and their reproductive life (Socio-demographic characteristics; resources and marriage; reproduction and survival of children; maternity care). The individual questionnaire also contains specific modules for under five children (health, nutrition, childcare...). The household questionnaire completed with an adult member of the household while the individual questionnaire completed via a direct interview with the woman concerned. She also answers questions about her last live birth regardless of his survival at the time of the interview.

It should be noted that this survey involved a national sample stratified by type of habitat around 16000 households distributed among 640 groups of 25 households each (of which 240 in rural areas). This survey targeted women of reproductive age (15-49) and under five children. Response rates were high (98.5% and 95% respectively for household and individual-woman questionnaires).

The household survey reached 75061 people, of whom 38410 were women. Among these, 11697 were eligible for the individual questionnaire addressed to any woman aged 15 to 49. The survey also covered 8136 under five children for anthropometric measurements. Other modules related to the health of the child, its nutrition and childcare only provided for the last birth of the women concerned by the individual survey over the past five years prior to the interview. 5890 children were covered. For analytical purposes, and given that the nutritional status of under five children years on age is considered by the literature to be an indicator of their well-being, the above data were fed by the size-for-age indices measuring chronic malnutrition; weight-for-height as a measure of acute malnutrition and weight-for-age information on low weight. These indices transformed into Z-scores using the WHO/MGRS - 2006 reference standard. The resulting data file used to generate measurement indicators of children well-being at the municipal level. 355 municipalities are concerned.

Indicator	% by municipality of children under 5 years
Social interest	who has benefited from a social interest
Severity_knowledge	whose mothers know no symptoms of the severity of the disease
Prenatal_qualified	whose mothers were followed during pregnancy
Vit A_WHO	having taken the doses of vitamin A in accordance with WHO standards
Breast feeding_WHO	having been breastfed in accordance with WHO standards
Vit D_WHO	having taken the doses of vitamin D in accordance with WHO standards
Delivery_supervised	whose birth took place in a supervised environment
Pneumonia_care	having received care for pneumonia
Diarrhea_care	who have been treated for diarrhea
Guard_child	never left alone or with a child under ten
Certificate_birth	having a birth certificate
complet_vacc	completely vaccinated by municipality
malnutrition_moderate_WHO	suffering from moderate malnutrition according to the WHO Reference Standard 2006
malnutrition_severe_WHO	suffering from severe malnutrition according to the WHO Reference Standard 2006
Wealth Index_pgt	Belonging to the richest quintile
Wealth Index_plt	Belonging to the poorest quintile

Other municipal indicators from the 2014 General Census of Population and Habitat have enriched the file thus constructed⁶. These indicators⁷ relate to fertility such as the total fertility rate as a measure of current fertility and the average parity of women aged 45 to 49 as a proxy of past fertility; school enrolment rates of children aged 7 to 12; illiteracy rates; lodging equipment of water, electricity, bath and sanitary and unemployment rates.

6- Combining these two data sources was possible by creating a unique identifier from geographic codes available in both databases.

7- Several other indicators are available on both files but we just kept the indicators that we think have a good presentation quality based on CPA results.

2.2- Methods

The information technology (IT)⁸ tool has greatly facilitated the processing of numerous databases. Taking into account the quantifiable nature of the indicators used, we applied the technique of factorial analysis in main components (ACP). This technique is a descriptive (not explanatory) method whose principle is to find common axes between the variables and project all the data on it while permitting restitution of the original image. The right proposal is the one that restores the cloud point while keeping the variability between points as much as possible. The CPA rotates on the axes while preserving the maximum variance between the points. Orthogonal rotation used when we want to identify factors that are independent of each other. This solution is preferable because it indicates that each factor provides unique information not shared by another factor. However, this solution is rarely possible in social sciences because there are generally conceptual links between factors and oblique rotation (OBLIMIN) which seems to correspond more to reality.

The CPA process based on a correlation matrix⁹ (or covariances depending on whether the data is reduced or not). For relevant analysis, the variables must be correlated. Variables that are highly correlated with the same factor(s) are also assumed to correlate strongly between them. A first method is to examine the matrix of correlations. The Kaiser-Meyer-Olkin (KMO) test allows comparing the magnitudes of the correlation coefficients observed with the magnitudes of the partial correlation coefficients. Small values of this index indicate that correlations between pairs of variables cannot be explained by other variables and that factor analysis is irrelevant. Bartlett's sphericity test outcomes in the same result by testing the null hypothesis in which variables are not correlated (p-value <0.05). A KMO tending towards 1 or a p-value tending towards 0 means that the ACP is applicable. The factors retained are those whose eigenvalues are greater than 1. In practice, a variance threshold that we seek to restore can be set in advance and then we retained the number of axes needed to reach this threshold¹⁰.

3- Results and discussions

The CPA is perfectly adapted to our data as the three criteria for its use are verified (high correlation between indicators ($r > 0.4$); Kaiser-Meyer-Olkin index exceeds 0.89 and Bartlett's sphericity test is very significant (p-value tends to 0.000)). The first model (any indicator included¹¹) generated six eigenvalues greater than 1 with a total explained variance of 66%. The first factor plane explains more than 43%. However, six factors¹² have not a good presentation quality and so we discarded them before we did the analysis again. The CPA applied to nineteen retained variables generated four eigenvalues greater than 1 with a more higher total explained variance (67%). The first component alone accounts for 43.5% while the second explains 10.5% (Table 2).

According to the above table and Figure 1, the first factor axis defined by the indicators relating to access to:

- preschool education;
- equipping housing with drinking water and sanitation;
- to present and past fertility; to the quintile of household well-being;
- the management of the woman at the time of pregnancy and the birth of the child;
- the preventive health of the child and the social interest granted to him by his parents and other members of the household.

This axis opposes the richest to the poorest and the prevalence of illiteracy in children's general access to schooling. Current and past fertility indicators appear to contribute negatively to the formation of the first axis. Moreover, the second factor axis does not have a clear meaning and even the variables correlated to it also intervene in the determination of the first axis and therefore are not specific to it. On the other hand, the third factor axis distinguished by its strong relationship with the prevalence of both moderate and severe malnutrition in all forms¹³.

8- SPSS version 25 (Statistical Package for the Social Sciences) is used for statistical data processing.

9- Correlation matrix presented in appendix 1.

10- A threshold of approximately 60% generally accepted in the social sciences.

11- Social interest ; Prenatal_qualified; Vit A_WHO ; Vit D_WHO; delivery supervised; Complet_vacc ; Malnutrition_moderate_WHO; Tscol; Tanalhab; Malnutrition_severe_WHO ; Severity_knowledge ; Breast_feeding_WHO; Pneumonia_care ; Diarrhea_care ; Guard_child; Certificate_birth ; PM45_49 ISF ; W.C ;Bathroom ; Elect ; Water ; Wealth Index_plt ; Wealth Index_pgt ; TCHOM

12- Severity_knowledge; Breast_feeding_WHO; Pneumonia_care ; Diarrhea_care ; Guard_child ; Certificate_birth

13- Stunting, wasting or underweight.

Table 3: Contribution of the different indicators for measuring child well-being and from fertility to the formation of factor axes corresponding to own values (λ) greater than 1

indicator	component	component_1 ($\lambda_1 = 8.269$; explained variance = 43.5%)	component_2 ($\lambda_2 = 2.007$; explained variance = 10.56%)	component_3 ($\lambda_3 = 1.4$; explained variance = 7.37%)	component_4 ($\lambda_4 = 1.146$; explained variance = 6.03%)
illiteracy rate		-0,8881	-0,1835	-0,0550	0,0664
average parity of women aged 45_49		-0,8214	0,1730	0,0438	0,2816
% poor		-0,7815	-0,0709	0,0624	-0,2329
% water		0,7808	0,1732	0,1357	-0,0873
% by municipality of children under 5 born in a supervised environment		0,7803	-0,1281	-0,0671	0,0563
enrollment rate of children aged 7 to 12		0,7582	0,2585	0,1606	0,1703
% by municipality of children under 5 benefiting from a qualified prenatal consultation		0,7420	-0,1470	-0,1315	0,0783
% by municipality of children under 5 benefiting from a social interest		0,7167	-0,0504	0,1627	-0,1563
% of rich		0,6841	0,1115	-0,0429	-0,2229
% WC		0,6579	0,4989	-0,0246	0,3200
% per municipality of children under 5 benefiting from vitamin A intake in accordance with WHO standards		0,6057	-0,4329	0,2484	-0,0068
% per municipality of children under 5 benefiting from vitamin D intake in accordance with WHO standards		0,5919	-0,5603	0,3607	0,1460
Total fertility rate		-0,5812	-0,0261	0,0870	0,5628
unemployment rate		0,5702	0,0599	-0,1157	-0,4390
% of children <5 years completely vaccinated by municipality		0,5167	-0,5523	0,3475	0,3329
% electricity		0,5075	0,6438	0,1201	0,2340
% of children under 5 suffering from moderate malnutrition according to the WHO 2006 reference standard		-0,4762	0,2642	0,6539	-0,1418
% bath		0,4432	0,3774	-0,1254	0,1445
% of children under 5 suffering from severe malnutrition according to the WHO 2006 reference standard		-0,3291	0,3194	0,7109	-0,2188

Source: ACP applied to community data from ENPS-2011 and RGPH-2014

The projection of the municipalities on factor axes 1 and 3 shows that under five children of age living in an urban municipality generally enjoy a higher level of well-being compared to their rural counterparts (Figure 2)¹⁴. Indeed, of the 162 urban municipalities covered by the ENPS-2011, only (8) eight municipalities (5%)¹⁵ have a negative score on the first factor axis. This axis positively determined by the indicators relating to:

- monitoring of pregnancy and childbirth;
- vaccination of the child and taking of food supplements according to recommendations of WHO;
- access to preschool education;
- drinking water and sanitation housing equipment;
- the frequency of rich households in the municipality and the interest given to the child by the child's parents and other household members.

On the other hand, the variables relating to illiteracy, at current and past fertility levels and the frequency of households in the poorest quintile of well-being in the municipality seem to contribute negatively to the formation of this axis.

Figure 1 shows that children living in urban communities are more likely to be vaccinated; to benefit from follow-up during the prenatal period and to be assisted by qualified personnel at birth. These children are also more likely to live in low fertility households and having a high level of well-being. They also live in housing equipped with water, electricity and sanitation. The projection of urban municipalities on the third factor axis, defined positively by the indicators of malnutrition, shows that of the 162 municipalities studied, fourteen (14) have positive scores indicating a relatively high prevalence of malnutrition among under five children in these communities. Under five children in the urban municipality Sidi Mohamed Lahmar, province of Kénitra, have scores indicating an unfavourable level of well-being on the two factorial axes retained.

In addition, 46% of rural communes among the 193 studied have a level of well-being of children in the period infanto-juvenile qualified as unsatisfactory¹⁶ (27% very unsatisfactory and 19% unsatisfactory). Only 7% of rural municipalities ranked into the category "very satisfactory level of child well-being" and 29% in the "satisfactory" category. Nevertheless, several municipalities, which classified in the latter category according to the first factorial axis, are not in this category according to the third factorial axis. In other words, if the children of these communes enjoy well-being related to preventive care from pregnancy to all vaccines and micronutrients, etc... they appear to be at greater risk of having some form of malnutrition. However, several municipalities are in the "very unsatisfactory" category according to the first component are well ranked under the third component. For the 7% of municipalities very well classified according to the first component, they also ranked in the third component and therefore their children benefit from well-being measured by the various indicators previously defined.

14- This figure shows all the municipalities, on factor axes 1 and 3 of the ACP results, by residential setting and by region. The interpretation of this factorial plan takes into account the indicators of well-being, which are involved in the formation of each of the two axes (Figure and Table 1).

15- it concerns municipalities of Aghbala (Beni Mellal) ; Sidi Mohamed Lahmar (Kenitra) ; Sidi dahbi (Settat) ; Kridid (El jadida) ; Talsint (Figuig) ; Timhdit (Ifrane) ; Oulmes (Khémisset) et Tighssaline (Khénifra).

16- The scores of the municipalities on the first factor axis have been transformed into a variable measuring the level of well-being of under five children: very unsatisfactory (<-1); unsatisfactory (between -1 and -0.5), Medium (between -0.5 and 0); satisfactory (between 0 and 0.5) and very satisfactory (0.5 and +).

Figure 1: The contribution of various indicators of child well-being to the formation of the first and third factorials axes, Morocco 2014

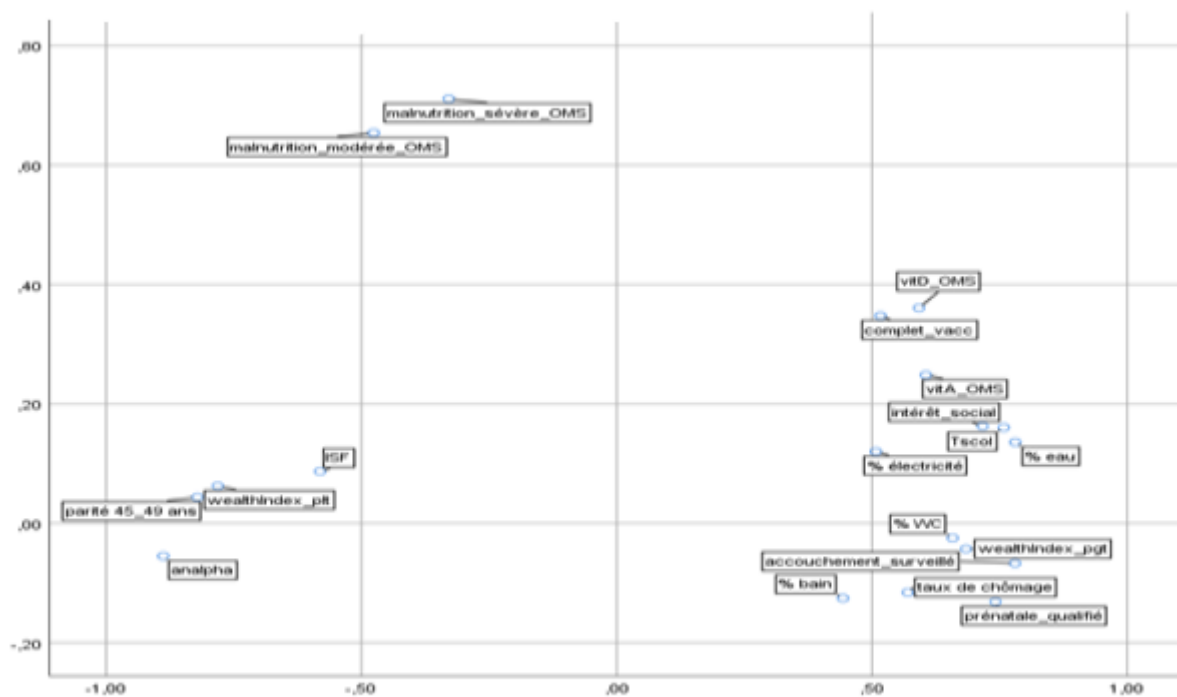
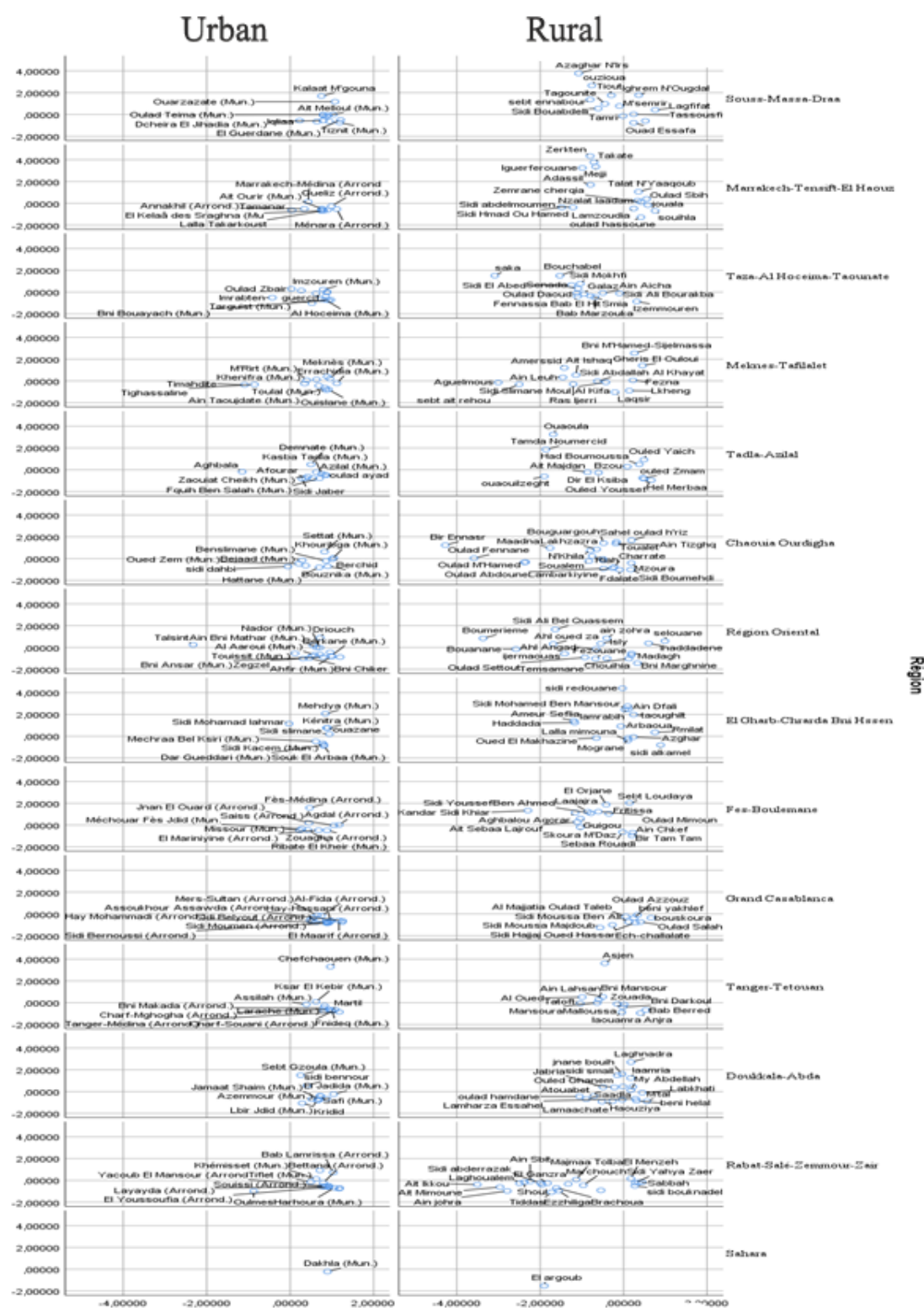


Figure 2: The distribution of municipalities according to their scores on the first and third factorial axes, Morocco 2014



The results obtained confirm the link between fertility and the well-being of children. Indeed, children are more likely to benefit from all forms of well-being in municipalities with low fertility. However, the analysis model applied to the

data does not allow to precise the meaning of the liaison or its intensity. Indeed, several factors explaining the decline in fertility may also explain the differential level of child well-being. Nevertheless, our conclusions do not deviate from the results of other similar studies. Indeed and as mentioned above, high fertility has a negative impact on the nutritional status of the child (King 2003). Similarly, high parity reduces the chances of vaccination of the child (Parashar 2005). Birth spacing provides the child greater opportunity to benefit from a social interest (Reher, 2011).

4- Conclusion

Study of the relationship between the well-being of Moroccan under five children and the level of fertility resulted in consistent conclusions with common sense and the results of studies realised in other socio-demographic contexts.

The choice of several indicators to measure children's well-being aims to verify the consistency of the relationship. These indicators have linked to the level of communal fertility according to the factorial method in main components. The choice of method dictated by the quantifiable nature of the indicators. The application of factorial analysis into major components has also enabled to consider other indicators of household and commune well-being, which could affect both the level of fertility, and the well-being of the child. This analysis highlighted a strong link between a high level of well-being for under five children and low fertility. Indeed, the well-being of children and fertility as measured by the ISF (current fertility) and the average parity of women aged 45-49 (past fertility) take two opposite paths. The well-being of the household positively affects the well-being of children. Moreover, as the illiteracy rate is too high in the municipality, the well-being of his children too more reconsidered. On the other hand, as the enrolment rate of children aged 7-12 is too high, the children have more likely a satisfactory level of well-being.

In conclusion, children living in urban communities are more fortunate enjoy a high level of well-being. However, the coexistence of all forms of well-being in the same communes is not evident.

Finally, we can noted that other indicators could be generated and further analysis is recommended to understand the nature of this linkage by integrating variables from different levels including the political, economic, cultural, natural and social context; family environments, educational and community.

References

- Bourdeau-Lepage, L., Texier, P., & Carré, H. (2018). Évaluer les déterminants du bien-être sur un territoire : Illustration à travers le cas d'une commune rhônalpine. *Revue d'Économie Régionale & Urbaine*, Octobre(4), 775. <https://doi.org/10.3917/reru.184.0775>
- Conde-Agudelo, A., Rosas-Bermudez, A., Castaño, F., & Norton, M. H. (2012). Effects of Birth Spacing on Maternal, Perinatal, Infant, and Child Health : A Systematic Review of Causal Mechanisms. *Studies in Family Planning*, 43(2), 93-114. <https://doi.org/10.1111/j.1728-4465.2012.00308.x>
- Giroux, S. C. (2008.). Child Stunting Across Schooling and Fertility Transitions: Evidence from Sub-Saharan Africa: DHS WORKING PAPERS N°57.43.
- Joshi, S., & Schultz, T. P. (2013). Family Planning and Women's and Children's Health : Long-Term Consequences of an Outreach Program in Matlab, Bangladesh. *Demography*, 50(1), 149-180. <https://doi.org/10.1007/s13524-012-0172-2>.
- Karra, Mahesh, David Canning, et Joshua Wilde. (2017). « The Effect of Fertility Decline on Economic Growth in Africa: A Macrosimulation Model: The Effect of Fertility Decline on Economic Growth in Africa ». *Population and Development Review*, Supplement : Fertility Transition In Sub-Saharan Africa vol. 43, n° S1, pp. 237-263. <https://doi.org/10.1111/padr.12009>
- King, J. C. (2003). The Risk of Maternal Nutritional Depletion and Poor Outcomes Increases in Early or Closely Spaced Pregnancies. *The Journal of Nutrition*, 133(5), 1732S-1736S. <https://doi.org/10.1093/jn/133.5.1732S>
- Kravdal, Ø., & Kodzi, I. (2011). Children's stunting in sub-Saharan Africa : Is there an externality effect of high fertility? *Demographic Research*, 25, 565-594. <https://doi.org/10.4054/DemRes.2011.25.18>
- Lee, R. (2003). The Demographic Transition : Three Centuries of Fundamental Change. *Journal of Economic Perspectives*, 17(4), 167-190. <https://doi.org/10.1257/089533003772034943>
- Lee, R., & Mason, A. (2010). Fertility, Human Capital, and Economic Growth over the Demographic Transition. *European Journal of Population / Revue Européenne de Démographie*, 26(2), 159-182. <https://doi.org/10.1007/s10680-009-9186-x>
- Leridon, H. (2015). Théories de la fécondité : Des démographes sous influence ? *Population (French Edition)*, 70(2), 331-373.

- Martinez, L. J. V. (2014). Bridging the Gap : Conceptual and Empirical Dimensions of Child Wellbeing in Rural Mexico. *Social Indicators Research*, 116(2), 567-591, 659.
- Munyaradzi Mawere¹, Tapuwa R. Mubaya², Mirjam van Reisen³, Gertjan van Stam, 4: (2016). *MaslowsTheoryofHumanMotivationanditsDeepRootsinIndividualismLangaa2016.pdf*.
- Panda, B. K., Kumar, G., & Mishra, S. (2019). Understanding the full-immunization gap in districts of India : A geospatial approach. *Clinical Epidemiology and Global Health*, S221339841930418X. <https://doi.org/10.1016/j.cegh.2019.11.010>
- Parashar, S. (2005). Moving beyond the mother-child dyad : Women's education, child immunization, and the importance of context in rural India. *Social Science & Medicine*, 61(5), 989-1000. <https://doi.org/10.1016/j.socscimed.2004.12.023>
- Pawin, R. (2014). Le bien-être dans les sciences sociales : Naissance et développement d'un champ de recherches. *L'Année sociologique*, 64(2), 273. <https://doi.org/10.3917/anso.142.0273>
- Reher, D. S. (2011). Economic and Social Implications of the Demographic Transition. *Population and Development Review*, 37, 11-33. <https://doi.org/10.1111/j.1728-4457.2011.00376.x>
- Ross, J. A., & Blanc, A. K. (2012). Why Aren't There More Maternal Deaths? A Decomposition Analysis. *Maternal and Child Health Journal*, 16(2), 456-463. <https://doi.org/10.1007/s10995-011-0777-x>
- Rutstein, S. O. (2000). Factors associated with trends in infant and child mortality in developing countries during the 1990s. *Bulletin of the World Health Organization*, 15.
- Sanderson, S. K., & Dubrow, J. (2000). Fertility Decline in the Modern World and in the Original Demographic Transition : Testing Three Theories with Cross-National Data. *Population and Environment*, 21(6), 511-537.
- Shen, C., & Williamson, J. B. (2001). Accounting for Cross-National Differences in Infant Mortality Decline (1965-1991) among Less Developed Countries : Effects of Women's Status, Economic Dependency, and State Strength. 33.
- Shin, D. C. (1980). Does rapid economic growth improve the human lot? Some empirical evidence. *Social Indicators Research*, 8(2), 199-221. <https://doi.org/10.1007/BF00286477>
- Smith-Greenaway, E. (2017). Community Context and Child Health : A Human Capital Perspective. *Journal of Health and Social Behavior*, 58(3), 307-321. <https://doi.org/10.1177/0022146517718897>
- Streuli, N., Woodhead, M., & Camfield, L. (2009). What's the Use of « Well-Being » in Contexts of Child Poverty? Approaches to Research, Monitoring and Children's Participation. *The International Journal of Children's Rights*, 17(1), 65-109. <https://doi.org/10.1163/157181808X357330>
- White, S. C. (2010). Analysing wellbeing : A framework for development practice. *Development in Practice*, 20(2), 158-172.
- Yount, K. M., Zureick-Brown, S., Halim, N., & LaVilla, K. (2014). Fertility Decline, Girls' Well-being, and Gender Gaps in Children's Well-being in Poor Countries. *Demography*, 51(2), 535-561.

Annex 1: Correlation matrix between the different indicators selected for multidimensional analysis

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	
Indice synthétique de la fécondité	V1	1	.604**	-.403**	0.046	-.347**	-.327**	.245**	-.303**	-.401**	.111*	0.056	-.082	-.0104	-.137**	.248**	.148**	.321**	-.440**
parité moyenne des femmes 45-49	V2	.604**	1	-.569**	.166**	-.599**	-.516**	.218**	-.501**	-.695**	.221**	.168**	-.064	-.134**	-.402**	.396**	.274**	.568**	-.536**
% par commune des enfants de moins de 5 ans bénéficiant d'un	V3	-.403**	-.569**	1	-.210**	.448**	.421**	-.054	.451**	.514**	-.237**	-.139**	-.0001	.167**	.390**	-.281**	-.121*	-.516**	.625**
% par commune des enfants de moins de 5 ans dont les mères ne	V4	0.046	.166**	-.210**	1	-.183**	-.124**	0.000	-.194**	-.200**	0.091	0.067	0.025	-.122*	-.217**	.153**	0.098	.222**	-.136**
% par commune des enfants de moins de 5 ans bénéficiant d'une	V5	-.347**	-.599**	.448**	-.183**	1	.426**	-.192**	.440**	.667**	-.178**	-.117*	.143**	.194**	.389**	-.393**	-.313**	-.609**	.451**
% par commune des enfants de moins de 5 ans bénéficiant d'une	V6	-.327**	-.516**	.421**	-.124**	.426**	1	0.050	.635**	.471**	-.095	-.122*	0.082	.163**	.521**	-.233**	-.192**	-.440**	.357**
% par commune des enfants de moins de 5 ans bénéficiant d'un	V7	.245**	.218**	-.054	0.000	-.192**	0.050	1	.199**	-.206**	.152**	0.064	-.109*	-.009	.256**	.161**	0.086	.177**	-.240**
% par commune des enfants de moins de 5 ans bénéficiant d'une	V8	-.303**	-.501**	.451**	-.194**	.440**	.635**	.199**	1	.441**	-.046	-.053	0.043	0.084	.770**	-.237**	-.193**	-.376**	.289**
% par commune des enfants de moins de 5 ans mis au monde dans	V9	-.401**	-.695**	.514**	-.200**	.667**	.471**	-.206**	.441**	1	-.350**	-.212**	.148**	.141**	.417**	-.403**	-.247**	-.682**	.472**
% par commune des enfants de moins de 5 ans bénéficiant de soins	V10	.111*	.221**	-.237**	0.091	-.178**	-.095	.152**	-.046	-.350**	1	.437**	-.132*	-.143**	-.099	.150**	0.019	.287**	-.231**
% par commune des enfants de moins de 5 ans bénéficiant de soins	V11	0.056	.168**	-.139**	0.067	-.117*	-.122*	0.064	-.053	-.212**	.437**	1	-.119*	-.086	-.126*	.127*	.114*	.214**	-.153**
% par commune des enfants de moins de 5 ans jamais laissés seuls ou	V12	-.082	-.064	-.001	0.025	.143**	0.082	-.109*	0.043	.148**	-.132*	-.119*	1	0.011	0.069	-.148**	-.121*	-.097	0.077
% des enfants <5 ans ayant un certificat de naissance par commune	V13	-.0104	-.134**	.167**	-.122*	.194**	.163**	-.009	0.084	.141**	-.143**	-.086	0.011	1	0.103	-.122*	-.0103	-.111*	.155**
% des enfants <5 ans complètement vaccinés par commune	V14	-.137**	-.402**	.390**	-.217**	.389**	.521**	.256**	.770**	.417**	-.099	-.126*	0.069	0.103	1	-.239**	-.180**	-.366**	.191**
% des enfants de moins de 5 ans souffrant d'une malnutrition modérée	V15	.248**	.396**	-.281**	.153**	-.393**	-.233**	.161**	-.237**	-.403**	.150**	.127*	-.148**	-.122*	-.239**	1	.595**	.374**	-.290**
% des enfants de moins de 5 ans souffrant d'une malnutrition sévère	V16	.148**	.274**	-.121*	0.098	-.313**	-.192**	0.086	-.193**	-.247**	0.019	.114*	-.121*	-.0103	-.180**	.595**	1	.265**	-.199**
% des pauvres par commune	V17	.321**	.568**	-.516**	.222**	-.609**	-.440**	.177**	-.376**	-.682**	.287**	.214**	-.097	-.111*	-.366**	.374**	.265**	1	-.461**
% des riches par commune	V18	-.440**	-.536**	.625**	-.136**	.451**	.357**	-.240**	.289**	.472**	-.231**	-.153**	0.077	.155**	.191**	-.290**	-.199**	-.461**	1

**. La corrélation est significative au niveau 0.01 (bilatéral).
*. La corrélation est significative au niveau 0.05 (bilatéral).