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Working Paper No. 02/2015

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Investigating the Dimensions of Youth Wellbeing:
An Exploratory Structural Equation Modelling Approach Applied to Palestine

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Abstract
This paper illustrates the capability approach to the measurement of youth wellbeing using the newly developed exploratory structural equation modelling (ESEM). It offers insights into how the capability to achieve wellbeing can be measured in a conflict-affected and resource-constrained setting. The methodology is applied to nationally representative data taken from the Palestinian Family Survey. The population of interest is youth aged 15 to 29. Results show the importance of capabilities for indicators in other dimensions. It is especially important to note the effect of knowledge capabilities on both health knowledge and living conditions indicators. Results also confirm the importance of some (exogenous) factors in the conversion of capabilities into achievements. Capabilities are shown to be highest in the West Bank for both knowledge and living conditions compared to the Gaza Strip.

JEL Classification: *I31, I32, C35, C38, 053*

Keywords: *Capability approach, exploratory structural equation model, health knowledge, knowledge, wealth, wellbeing, developing countries, the occupied Palestinian territories.*

FUNDING: This work was completed thanks to the support of the A*MIDEX project (no. ANR-11-IDEX-0001-02) funded by the "Investissements d'Avenir" French Government program, managed by the French National Research Agency (ANR).

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1. Introduction

Recent years have witnessed a rising interest in the capability approach (CA) as an alternative framework to measuring wellbeing e.g. (Sen 1985, Sen 1992, Nussbaum 2000). The CA advocates a broader space of evaluation based on 'functionings' (i.e., the actual outcome or the level of achievements attained *ex-post* in the various dimensions) and 'capabilities' (i.e., the *ex-ante* ability to do or be something valuable, reflecting the choices that one has). Among the basic human capabilities are, being able to live a long and healthy life, being adequately nourished and sheltered, being able to be educated, and being able to participate in political life (Alkire 2010).

Following the pioneering contributions of Sen (1985; 1992) and Nussbaum (2000), the underlying theoretical foundations of the capability framework are now well established. Yet, as far as empirical applications are concerned, methodological challenges emerge (Alkire 2010). This stems from the conceptual issues that underlie the proposed approach. Indeed, capability is an abstract concept that is not empirically observable and is multidimensional (Lelli 2008, Chopra et Duraiappah 2008, Krishnakumar and Ballon 2008). Other difficulties, however, relate to the measurement issues involved.

Although the CA has received a lot of interest with significant progress in the formal theoretical development and with models being proposed e.g. (Kuklys and Robeyns 2005, Fleurbaey 2005), the few studies that endeavour to operationalise the CA e.g. (Anand 2005, Bleichrodt and Quiggin 2013, UNDP 1990-2013) have focused on the realised functionings rather than individual capabilities to achieve these functionings[3].

While attempts to measure capability have focused on pre-specified dimensions using the classical Item Factor Analysis (IFA) or Confirmatory Factor Analysis (CFA) and Structural Equation Modelling (SEM) techniques e.g. (Wagle 2005, Krishnakumar 2007), recent developments have shown that these ignore the possibility that some indicators might actually load on to other factors (i.e. the possibility that health capabilities will affect both health indicators and say educational indicators directly). The development of the Exploratory Structural Equation models (ESEM) has led to a new breed of models that allows for these cross-loadings (Asparouhov et Muthén 2009).

In this paper, we develop an ESEM model to study youth wellbeing. The model is initially compared to the classical IFA to test the goodness-of-fit (gof) of each model. We find that the ESEM performs better than the classical IFA. In addition, the indicators appear not to load on to their factors as pre-specified in the classical IFA. We therefore use the ESEM model to study youth wellbeing in the occupied Palestinian territories (oPt).

To our knowledge, this is the first attempt to explore the use of ESEM in the study of wellbeing. The empirical analysis is based on a nationally representative data taken from the Palestinian Family Survey (PFS-2010), carried out by the Palestinian Central Bureau of Statistics (PCBS) in 2010 (PCBS, 2013). The survey provided up-to-date information on key wellbeing indicators that allows monitoring the progress towards the achievement of the Millennium Development Goals (MDGs). This application targets adolescents and young adults (15 to 29 year old).

The rest of the paper is organised as follows. **Section 2** presents the econometric model which forms the basis of our empirical analysis. The dataset and variable definitions used in the analysis are summarised in **Section 3**. Our main empirical findings are presented in **Section 4** while **Section 5** discusses the results. **Section 6** concludes the paper with some policy recommendations and directions for further research.

[3] A notable exception is the study of Krishnakumar & Ballon (2008).

2. Econometric Analysis

To measure youth wellbeing, the ESEM approach, first developed by (Asparouhov et Muthén 2009) and often applied in clinical psychology (Marsh, Morin, et al. 2014) is used. ESEM is of importance to the study of wellbeing as it combines Exploratory Factor Analysis (EFA) with SEM without requiring a pre-specification of the pattern of factor loadings.

Previous studies often employed steps that began with an EFA and ended with an SEM (Browne 2001, Marsh, Morin, et al. 2014). In ESEM, just as in EFA, one does not need to specify the pattern of factor loadings between the observed functionings and the latent factors beforehand as one does in classical SEM analysis (Bollen 2002, Krishnakumar 2007, Krishnakumar and Ballon 2008). In addition, one is able to compare alternative models of relationships among latent variables in the ESEM (Strauss et Smith 2009, Marsh, Morin, et al. 2014). While loadings are freely estimated in EFA, they tend to be constrained in SEM (i.e., cross-loadings fixed to zero), therefore, it is often difficult to find support of well-established EFA relationships in an SEM (Marsh, Muthén, et al. 2009, Marsh, Lüdtke, et al. 2010). In addition, the classical SEM does not allow for cross-loadings, which implies that items with multiple determinants are not correctly measured (Asparouhov et Muthén 2009, Marsh, Morin, et al. 2014).

This study involves several steps. The ESEM model is specified and explained in the next section. The model consists of two parts: (i) a set of structural equations capturing the influence of latent variables on one another as well as the influence of exogenous variables on them, and (ii) a set of measurement equations specifying the relationships between observed variables (functionings) and latent variables (capabilities). The estimation results are then used to derive capability indices (CI) for each dimension at the individual level. Finally, the empirical distributions for each CI is computed and analysed.

Model Specifications: Generalised ESEM

Following (Asparouhov et Muthén 2009), assume there exists $\boldsymbol{p}$ dependent underlying unobserved variables, $\boldsymbol{Y}^*$, one for each categorical variable, $\boldsymbol{Y}$ such that $\boldsymbol{Y = k\ if\ \tau_k < Y^* < \tau_{k+1}}$ and $\boldsymbol{q}$ independent variables $\boldsymbol{X}$ with $\boldsymbol{m}$ latent variables $\boldsymbol{\eta}$. The general ESEM model is then specified using the following two equations

$$\boldsymbol{Y = \nu + \Lambda\eta + \mathrm{K}X + \varepsilon} \quad \textbf{(1)}$$

$$\boldsymbol{\eta = \alpha + \mathrm{B}\eta + \Gamma X + \zeta} \quad \textbf{(2)}$$

Eq. (1) represents the measurement part – also referred to as the qualitative response model (QRM). The QRM specifies how the latent variables are related to the observed responses. $\boldsymbol{\nu}$ is the vector of intercepts. Eq. (2) represents the latent variable model or the structural simultaneous equation model (SEM), with $\boldsymbol{\Gamma}$ and $\boldsymbol{B}$ being the respective coefficient matrices and $\boldsymbol{\alpha}$ a vector if intercepts. The latent variables, $\boldsymbol{\eta}$**,** are made up of both explanatory factors and item factors (confirmatory). The respective error terms of the SEM and QRM vectors ($\boldsymbol{\varepsilon}$ and $\boldsymbol{\zeta}$) are assumed to be (i) with zero expectations, (ii) uncorrelated with each other ($\boldsymbol{\zeta}$ uncorrelated with $\boldsymbol{\varepsilon}$**),** but (iii) correlated within each. Formally,

$$\boldsymbol{E(\varepsilon_i) = 0,\ \ E(\zeta_i) = 0;\ V(\varepsilon_i) = E(\varepsilon_i, \acute{\varepsilon}_i) = \ \Phi;\ V(\zeta_i) = E\left(\zeta_i, \acute{\zeta}_\iota\right) = \Psi} \quad \textbf{(5)}$$

where $\boldsymbol{\Phi}$ and $\boldsymbol{\Psi}$ are the covariance matrices for the residuals in the QRM and the SEM equations, respectively; Ψ is assumed to be diagonal and $\boldsymbol{\Lambda}$ non-singular.

Multi-group Tests of Invariance and Latent Mean Differences: Regions

In order to study the invariance of the model over the youth's region of residence, we apply a taxonomy of 9 ESEM model, (Jöreskog 2002, Marsh, Muthén, et al. 2009, Marsh, Vallerand, et al. 2013, Marsh, Morin, et al. 2014). An advantage of the ESEM is the ability to incorporate an EFA into and SEM so that one is able to carry out invariance tests for an exploratory model. Here we study how the identified indicators of youth capabilities exhibit measurement and structural invariance across the two regions of the oPt: the West Bank and the Gaza Strip.

Measurement invariance involves analysing whether the factor structure (configural), factor loadings (metric), item thresholds (scalar) and item variances (residual), vary across the two regions. By structural invariance, we study whether the factor means, variances and covariances are the same or not. Though the ideal goal is to have full invariance of all parameters, it has been shown that achieving partial invariance such that a portion of the parameters is not constrained to be invariant is very useful (Marsh, Vallerand, et al. 2013).

Effects of Socio-Economic Variables: The ESEM in MIMIC Model

To study the effects of several other socio-economic and demographic variables on the identified dimensions of youth, we proceed to use the ESEM MIMIC model. It is very similar to the model expressed by equations (1) and (2) with the exception that the covariates are not included in the measurement equation and the structural equation model no longer includes other latent variables as covariates, that is, equations (1) and (2) become,

$$\boldsymbol{Y} = \boldsymbol{\nu} + \boldsymbol{\Lambda\eta} + \boldsymbol{\varepsilon} \quad \textbf{(1a)}$$
$$\boldsymbol{\eta} = \boldsymbol{\alpha} + \boldsymbol{\Gamma X} + \boldsymbol{\zeta} \quad \textbf{(2a)}$$

All other conditions hold. For this analysis, we first run a model where the covariates are included for the four identified factors. We then run a model where the covariates are included only for the indicator variables. The final model includes covariates for both the factors and their indicators. Estimations are carried out using purpose-built procedures in version 7 of the Mplus statistical package (Muthén et Muthén 1998-2012).

Identification and Indeterminacy

The weighted least squares means and variance adjusted (wlsmv) estimator is used in the analysis. There are two main identification problems in the classical IFA models: one relates to the scale of the latent variable and the other relates to the number of latent factors. To correct for the first either the variances are fixed at 1 or one of the factor loadings is fixed to 1. In ESEM however, this is not the case as all factor loadings are estimated (Marsh, Muthén, et al. 2009). Therefore, for the model to be identifiable, the variances of the latent variables are fixed to 1. Having more than one latent variable creates indeterminacies. In the orthogonal model $\boldsymbol{\Psi}$ is restricted to the identity matrix and hence residual correlations are removed while in the oblique case all residual correlations of the latent variables are estimated. To correct for this non-identification problem the factor means are constrained to 0.

ESEM allows for cross loadings. As the size of the estimated factor correlations vary, the type of rotation chosen is of importance (Browne 2001, Marsh, Morin, et al. 2014). However, there are no goodness-of-fit measures for making a choice between the various rotational methods available (Marsh, Morin, et al. 2014). It has been shown that the geomin oblique rotation with epsilon 0.5 performs better (Asparouhov et Muthén 2009) and so this paper employs this type of rotation.

Goodness-of-Fit Measures

As indicated in (Bhattacharya and Banerjee 2012), the *Root Mean Square Error of Approximation* (*RMSEA*) is a meaningful measure of the goodness of fit of the model. An RMSEA value below 0.05 reflects an excellent fit to data with values between 0.08 and 0.05 considered as acceptable. In addition, the Comparative Fit Index (CFI) (Bentler 1990) and the

Tucker–Lewis Index (TLI) (Tucker et Lewis 1973) are used with values from 0.950 and above considered to be good fits while values between 0.900 and 0.950 are considered to be acceptable. We also report the χ^2 statistic.

3. Data Description and Variable Definitions

The PFS-2010 was a two-stage stratified cluster-random sample covering 25,180 individuals, 13,619 in the West Bank and 11,561 in the Gaza Strip. The dataset provided information on morbidity, utilization of health services, and other demographic and socioeconomic variables. The survey included four modules covering the households, women, the youth and the elderly. For the purpose of our analysis, we focus on the youth – defined to be between the ages of 15 years and 29 years inclusive. This made up roughly 27 per cent of the population.

Roughly 38 per cent of the youth lived in the Gaza Strip with 55 per cent living in either area A or B. Areas A and B are respectively under full (civil and security) and partial (security) control of the Palestinian authority while the Gaza Strip is under full Palestinian internal control, even though borders, and access to the sea and airspace remain under full Israeli and Egyptian control. Those living in Areas A and B have some access to quality health and knowledge amenities as well as better living conditions compared to Area C and the Gaza Strip.

The average age of our youths was 20.98 with a little over half of them being male. Close to half of them were considered to be refugees. A majority of the youth were single. The average youth came from a household with about 7 members. Almost all of the youth came from households with the household head being on average 47 years of age. Over half of the youth came from households with heads who were employed. Urban areas are more likely to have higher infrastructural development compared to their rural counterparts, thus, are more likely to facilitate improvements in capabilities. Only about two out of ten youths were in rural areas.

In order to assess youth wellbeing, focus was placed on indicators relating to their health, health knowledge, lifestyle, general knowledge and living conditions. These indicators are presented in Table 1 and described in Table 2.

The two self-assessed health (SAH) indicators are binary variables. The first indicator (good health) takes on a value of 1 if the individual considers themselves to be of better health compared to their age mates and 0 otherwise. The second indicator (improved health) takes on a value of 1 if the individual considers their health to have improved compared to the previous year and 0 otherwise. Roughly four in five youths (83.92%) were classified as being in a good health while a quarter (27.47%) considered themselves in improved health.

<Insert Table (1) >

Table 1: Summary of Capabilities and Indicators

Proposed Dimensions	**Indicators**
Self Assessed Health	Good health, Improved health
STI Knowledge	Syphilis, Gonorrhoea, Fungal infections, Genital warts
Lifestyle	Regular sports, Energy drink consumption, Not Smoking
Knowledge	Reads Newspapers, Listens to the Radio, Uses the Internet, At least secondary school educated, Attended/Graduated School
Living Conditions	Good floor, Good water source, Good toilet facilities, Number of assets, Number of utilities

Individuals were asked questions related to their lifestyle including whether they practice regular sports, consumed energy drinks and on whether they currently smoked or had previously smoked. The never smoked indicator takes on a value of 0 if they had ever smoked and a value of 1 if they had never smoked and likewise the regular sports indicator takes on a value of 1 if they regularly practised a sport and 0 otherwise. In addition, the energy drink consumption indicator takes on a value of 1 if they consumed energy drinks and 0 otherwise. Only a little over 15 per cent of the youth in the oPt had ever smoked. About a third (33.51%) regularly practised sports.

Finally, information on STI knowledge was collected with individuals being asked if they had heard of different sexually transmitted diseases including syphilis, gonorrhoea, fungal infections and genital warts. An indicator variable was created for each of these STIs with the indicator taking a value of 1 if the individual had heard of the infection and 0 otherwise. On average close to nine out of ten (95.97%) of the youth knew of at least one STI.

<Insert Table (2) >

Table 2: Descriptive Statistics of the Variables

Panel A	**Functionings/ Indicators**			
Good Health	0.84	0.37	0	1
Improved Health	0.28	0.45	0	1
Never Smoked	0.84	0.36	0	1
Energy Drinks	0.20	0.40	0	1
Regular Sports	0.34	0.47	0	1
Syphilis	0.15	0.35	0	1
Gonorrhoea	0.31	0.46	0	1
Fungal Infection	0.16	0.36	0	1
Genital Warts	0.06	0.25	0	1
Reads Newspapers	0.50	0.50	0	1
Listens to Radio	2.05	1.01	0	1
Uses Internet	1.82	0.99	0	1
Secondary School or More	0.41	0.49	0	1
Attended/Graduated	0.69	0.46	0	1
Good Floor	0.92	0.26	0	1
Good Toilet Facilities	0.85	0.36	0	1
Good Drinking Water Source	0.54	0.50	0	1
Good Cooking Water Source	0.74	0.44		
Number of Assets	8.53	2.52	0	1
Number of Utilities	2.10	0.83	0	4

A binary indicator variable was constructed to measure if the youth had at least secondary level education or not and on whether they had attended or graduated from school the year of the interview. Information was also collected on the frequency with which they read newspapers, listened to the radio and used the internet. Roughly half of the youth read newspapers daily. Roughly half of the youth did not use the internet and about 70% listened to the radio at least once a month. About two fifths of the youth had at least secondary level education.

Focusing on housing characteristics, we measure the materials used for the floor of dwellings. A majority of the youth lived in houses with high quality floor materials (92.5%). Sanitation facilities included the type of toilet facility.

Though most of the youth belonged to households that had electricity, only half of them belonged to households with telephone access. The average number of utilities available was 2. Out of 15 assets, the youth on average owned 9 assets. Most of the youth lived in households that owned TV sets (97.7%), washing machines (94.8%) and satellite dishes (92.7%).

4. Results

This section presents the results of the structural model followed by the measurement model based on the two main parts of the ESEM model described in Section 3. For comparison purposes, the standardised coefficients of these models are used. These are obtained by multiplying the estimated coefficient by the ratio of the standard deviation of the explanatory variable to the standard deviation of the explained variable. Therefore, they measure the change in units of standard deviations of the explained variable (y) for one standard deviation unit change in the explanatory variable (x). The section concludes with an estimation of the capability indices and the wellbeing index.

4.1. Internal Consistency

Before we proceed with the models, we first examined the correlation matrix of the indicators of interest. Based on Table A1, there are five possible dimensions of study, namely health, lifestyle, health knowledge, knowledge and living conditions. The correlation matrix is an easy way to establish whether the indicators for each proposed dimension do indeed contain indicators measuring the same construct and also allows us check for redundancies. Too high a correlation between two variables could imply that the indicators are more or less the same while too low a correlation implies they are measuring two very different constructs and therefore do not belong together.

From Table A1 it is immediately evident that the health factors do not really belong to the same dimension as they appear to be measuring very different constructs. In addition, the lifestyle indicators also appear to measure very different constructs and therefore do not belong under the same dimension. On the contrary, we find that, indeed the indicators for health knowledge do appear to sufficiently correlate with each other and therefore might belong to the same construct. We find similar results for the knowledge indicators and for the living conditions indicators. Thus, our set of indicators seems to propose three dimensions, namely health knowledge, knowledge and living conditions. We do not have enough information to allow us analyse reliably neither the health nor the lifestyle dimensions.

These results are confirmed by the Kuder-Richardson 20 (KR-20) coefficient, a variant of the cronbach alpha, used to measure the internal consistency of factors (Kuder et Richardson 1937, Cronbach 1951). The difference between the two is the fact that, while the former is for binary variables, the latter focuses more on continuous variables. They both vary between the values of 0 and 1 with higher values considered more acceptable. The main drawback of these measures, as pointed out in numerous studies, is that they are affected by the number of indicators for each construct, the item difficulty and the variance of the indicators, (Marsh et Nagengast 2013). We obtain KR-20 coefficients of 0.63, 0.53 and 0.50 for the health knowledge, knowledge and living conditions, respectively. As was evident with the correlation analysis, the KR-20 coefficients for health and lifestyle were very low, at 0.16 and -0.01, respectively. The low result for health is again, most likely related to the fact that we only have two indicators for this construct and for the latter, there appears to be a negative correlation between individuals having never smoked and consuming energy drinks while find positive, albeit very low correlations for the others. Given these results, therefore, we focus our analysis on three dimensions, namely, health knowledge, knowledge and living conditions. In the next section, we discuss the results obtained from the comparison of the IFA model with the ESEM model.

4.2. Factor Structure

The analysis starts with a comparison of the IFA with the ESEM to establish whether doing an ESEM is indeed necessary. As is suggested by (Marsh, Muthén, et al. 2009), before carrying out an ESEM, it is important to study whether it will provide better results compared to the

IFA/SEM models. We therefore compare the different gof measures. They are presented in Table 3 with the factor loadings and factor correlations presented in Tables A2. From the gofs, it is immediately clear that while both models fit the data well the ESEM fits it slightly better. The CFI and TLI are both higher for the ESEM. In addition, the RMSEA is slightly lower for the ESEM compared to the IFA. Based on these measures alone, the ESEM slightly edges out the IFA. We therefore take a look at both the factor loadings and the factor correlations to see if one model outperforms the other. The results are shown in Tables A2 in the appendix.

<Insert Table (3) >

Table 3: Goodness-of-Fit Measures

Model	χ^2	Df	N° of Free Param.	CFI	TLI	RMSEA (95% CI)
IFA	595.793	60	31	0.929	0.908	0.045 (0.042-0.049)
ESEM	332.619	40	51	0.961	0.924	0.041 (0.037-0.045)
ESEM MIMIC	582.698	150	97	0.937	0.902	0.026 (0.024-0.028)

Comparing Tables A2, it is immediately noticeable that the indicators do not load to the factors in exactly the same way as is pre-specified. For instance, the radio and newspaper indicators load onto factor 3 rather than factor 2. In addition, we observe some positively significant cross-loadings in the ESEM, which are ignored in the classical IFA. A very important advantage of the ESEM lies with its factor correlations, which appear to be smaller compared to the IFA. In addition, the factor correlations appear to be smaller in the ESEM compared to the IFA. For example, while the correlation between factor 1 and 2 is 0.485 in the IFA it is 0.269 for the ESEM. Similar results are found for the other factor correlations. The IFA correlations appear to be positively biased as it fails to include significant cross-loadings (Marsh et Nagengast 2013). Thus, in addition to performing slightly better than the IFA, the correlations of the ESEM appear less biased compared to that of the IFA. In the next section, therefore, we study how different the wellbeing structure is for youth in the different oPt regions, namely the West Bank vs. the Gaza Strip using the ESEM.

4.2 Multigroup Tests of Invariance and Latent Mean Differences across Regions.

We are interested in finding out if the region of residence leads to different factor structure for indicators of youth wellbeing. The results are shown in Table 4. We started with an analysis of configural invariance where the factor loadings, item thresholds and variances were estimated simultaneously for both groups. The factor mean was fixed to 0 with the factor variances fixed at 1 for identification. The results are presented in row MG1 of Table 4. The gof measures indicate a very good fit, (CFI & TLI >0.950, RMSEA < 0.05). In addition, when compared to row ESEM of Table 3, we notice that the degrees of freedom and χ^2 are almost twice the original.

The next step is to test whether the factor loadings are equal across the two groups by examining the metric invariance models (MG2a &b). For identification purposes, factor means and variances were fixed at 0 and 1, respectively for the West Bank. While factor means were also fixed at 0 for the Gaza Strip, factor variances were allowed to be free. In model MG2a, we tested whether the loadings were indeed the same for all indicators across the two groups and while the fit indices we high, the χ^2 test was significant, imply that there were some variations in the loadings across the two groups. Using the modification indices, we relaxed equality conditions for the health knowledge indicators and the internet indicator for factor 1 as well as the good floor and good water source indicator for factor 2 and all of the knowledge indicators except for internet use for factor 3. After this, we were able to obtain an insignificant χ^2 test result (**$\Delta\chi^2$**=28.932, p-value >0.1), indicating partial metric invariance. The result is presented in MG2b. This indicates that while most of the indicators relate to the latent factors equally across the groups, some of them do not.

<Insert Table (4) >

Table 4: Taxonomy of Invariance Tests

ASESSMENT OF MODEL FIT USING WLSMV							Difference Testing			
Model	# Free Param.	χ^2	df	CFI	TLI	RMSEA Estimate	$\Delta\chi^2$	Δdf	p-value	Compared with
MG1	98	331.522	84	0.972	0.949	0.037				
MG2a	68	451.972	114	0.962	0.949	0.037	140.744	30	0.0000	Baseline
MG2b	76	296.104	106	0.979	0.969	0.029	28.932	22	0.1468	MG1
MG3a	66	513.833	116	0.956	0.941	0.040	204.031	10	0.0000	MG2b
MG3b	73	298.925	109	0.979	0.970	0.028	5.631	3	0.1310	MG2b
MG5a	73	289.952	109	0.979	0.970	0.028				
MG5b	70	241.073	112	0.966	0.952	0.036	59.787	3	0.0000	MG5a

We then tested for scalar invariance. that is. equality of unstandardised thresholds across groups (MG3a&b). For this model. factor variances and means were fixed at 0 and 1. respectively for the West Bank but both allowed to be free for the Gaza Strip. This model built on the MG2b model and thus while some factor loadings were free for some indicators. they were equal for others. We find a worse fit for the full scalar invariance model. MG3a ($\Delta\chi^2$=204.031. p-value <0.05). Looking at the modification indices. it became evident that the thresholds for the health knowledge variables as well as those for internet use. good water source and utilities had to be freed. Once this was done. one after the other. the fit indices improve and in addition. the χ^2 test became insignificant ($\Delta\chi^2$=5.631. p-value >0.1). indicating that there was partial scalar invariance. Thus. while the observed differences in the proportion of responses in each category of most of our indicators were due to factor mean differences only. those that were held to be free were lower for the West Bank compared to the Gaza Strip. We were unable to establish neither residual variance-invariance nor structural invariance. Thus. establishing partial measurement invariance implies that the relationships of the indicators to the latent factors of wellbeing are generally equivalent across the two youth groups. However. health knowledge in particular appears to be lower for the West Bank. Our inability to establish structural invariance however implies that there is less variability for youth in the Gaza Strip compared to the West Bank.

4.3 Effects of Socio-Economic Variables

Recall that the MIMIC models include covariates for the latent factors in the structural model. The covariates include personal characteristics as well as household and community level variables. In terms of gof measures. we find that both the CFI and TLI fit measures have values above 0.900 *(CFI: 0.937. TLI: 0.902)* indicating an acceptable fit. with RMSEA below 0.05. These results can be found in the last row of Table 3. We now present the results of the model. beginning with the measurement model followed with the structural model where we discuss the effects of the various covariates. We conclude by presenting the distribution of the factor scores for each dimension.

The Measurement Model

The measurement model shows how the three wellbeing factors affect individual achievements. Only standardised results are presented. These measure the effect of a unit change in a factor on the achievements in question. For the unstandardised results please refer to the **supplementary appendix**.

It is immediately evident from the left had side of Table 5 that although each factor can uniquely be identified by how the various indicators load on to it they all include cross-loadings. The first factor (F1) can clearly be identified as health knowledge capabilities with the second being more of knowledge capabilities (F2). The last factor leans more towards living conditions capabilities (F3).

The youth knowing about STIs is positively affected by both their health knowledge capabilities and their knowledge capabilities. Living condition capabilities have no such effects. The youth's knowledge capability. as one would expect. affects most of the indicators. especially their knowledge and living conditions related indicators. This is most likely due to the fact that knowledge affects not only the educational achievements of individuals but also their ability to live in good conditions and to know about STIs. Finally focusing on the living conditions capabilities. as expected. they affect positively all the living conditions indicators and also the knowledge indicators. Their effects on health knowledge appear not to be positively significant. We next turn our attention to the effects of socio-economic and demographic factors on the four identified dimensions of youth wellbeing in the next section.

The Structural Model

The right hand side of Table 4 presents the results of the structural model. This is the part we are most interested in as it shows the effect of exogenous variables on youth wellbeing in the three identified dimensions. Recall that the dimensions (factors). F1-F3. are respectively their health knowledge. knowledge and living condition capabilities. It is immediately clear that living in areas A and B as opposed to area C positively and significantly affect the youth's knowledge and living conditions capabilities (by 0.152 and 0.331 standardised units respectively). Similarly. living in the Gaza Strip as opposed to area C positively affects the individual's capabilities in health knowledge and living conditions (by 1.623 and 0.478 standardised units respectively).

While being a child of the head negatively affects health knowledge capabilities. it favours the development of capabilities in knowledge and living conditions. Males are more likely to have higher health knowledge and living conditions capabilities but surprisingly a negative effect on knowledge capabilities.

Youth in regions with a higher number of students per teacher are less likely to develop health knowledge capabilities more likely to develop knowledge capabilities. Turning our attention to educational expenditure. we find that it positively and significantly affect the development of knowledge capabilities yet somehow disfavouring the development of health knowledge capabilities. High costs of referrals discourage the development of knowledge capabilities though it appears to favour the development of health knowledge capabilities. The number of primary healthcare physicians in the governorate of residence appears to negatively affect the development of health knowledge capabilities but appears not to significantly affect the other capabilities.

An employed or at least post secondary educated household head positively and significantly favours the development of capabilities however having a large household size generally discourages the development of capabilities in all dimensions except health.

<Insert Table (4)>

Table 4: Results for MIMIC Model

	Measurement			
Indicators	**F1**	**F2**	**F3**	$\mathbf{R^2}$
Syphilis	$\mathbf{0.833}^{***}$	0.318^{***}	0.025	0.809
Gonorrhoea	$\mathbf{0.658}^{***}$	0.593^{***}	-0.056^{**}	0.783
Fungal Infections	$\mathbf{0.590}^{***}$	0.443^{***}	0.029	0.564
Genital Warts	0.341^{***}	$\mathbf{0.547}^{***}$	-0.055	0.406
Listen to Radio	-0.037	0.004	$\mathbf{0.159}^{***}$	0.028
Use Internet	0.164^{***}	0.192^{***}	$\mathbf{0.630}^{***}$	0.542
Read Newspapers	0.088^{***}	$\mathbf{0.252}^{***}$	0.041	0.082
Secondary Educ. +	0.186^{***}	$\mathbf{0.353}^{***}$	0.199^{***}	0.251
Attend/Graduated Sch.	-0.114^{**}	$\mathbf{0.536}^{***}$	0.208^{***}	0.433
Good Floor	0.034	0.053	$\mathbf{0.420}^{***}$	0.197
Good Water Source	-0.214^{***}	0.204^{***}	$\mathbf{0.228}^{***}$	0.182
Assets	-0.051^{**}	0.118^{***}	$\mathbf{0.766}^{***}$	0.681
Utilities	-0.070^{**}	0.161^{***}	$\mathbf{0.567}^{***}$	0.429

	Structural		
Variables	**F1**	**F2**	**F3**
Area A/B	0.016	0.152^{**}	0.331^{***}
Gaza Strip	1.623^{***}	-0.491	0.478^{**}
Child of HH Head	-0.214^{**}	0.371^{***}	0.237^{***}
Male	0.360^{**}	-0.513^{***}	0.162^{***}
Students per Teacher	-0.665^{***}	0.246^{*}	-0.140
Educ. Expenditure	-0.295^{***}	0.261^{***}	0.079
Cost of Referrals	1.164^{***}	-0.542^{**}	0.310^{**}
Social Protection	-0.248^{***}	0.150^{**}	0.088^{**}
N° of PHC Physicians	-1.333^{***}	0.471	-0.261
Household Size	0.052	-0.140^{***}	-0.141^{***}
HH Head Post Sec.	-0.025	0.285^{***}	0.327^{***}
HH Head Employed	-0.022	0.033	0.160^{***}
$\mathbf{R^2}$	0.694	0.447	0.625

i.Only the standardised factor loadings are presented here. The full results with unstandardised coefficients can be found in the supplementary appendix.

ii.A coefficient of 0.150 for good health implies that a 1 standardised unit increase in health capabilities will lead to a 0.150 standardised unit increase in the probability that the youth will be in good health.

iii. p-value <=0.1. ** p-value <= 0.05. *** p-value <= 0.01*

5. Discussion

This paper sought to assess the capability of youth to achieve wellbeing in the particular context of the occupied Palestinian territory using the capability framework proposed by Sen (1992). It employed the ESEM framework such that. no relationships were pre-specified. Instead indicators were allowed to freely load on to the three identified dimensions. The results shed light on youth wellbeing in terms of the three dimensions related to health knowledge. knowledge and living conditions. A number of key findings are worth highlighting.

The ESEM model. which performed better than the classical SEM model. indicated that both health knowledge and knowledge indicators were extremely interrelated and that ignoring the cross-loadings led to biased results. By establishing measurement invariance. we were able to establish that. based on the data we had. the capabilities of youth in the West Bank are comparable to those of the Gaza Strip. Results indicated that while capabilities in health knowledge were higher in the Gaza Strip. capabilities in knowledge and living conditions were higher in the West Bank. However. there appears to be less variability in capabilities for youth in the Gaza Strip compared to those in the West Bank. This could. in part. be related to the presence of both Areas A and B as well as Area C. These two regions are very different with Area C. most likely being on the lower side of capabilities compared to Areas A and B.

While the health knowledge capabilities affect only their respective indicators. knowledge capabilities not only affect the knowledge indicators such as educational level. they also affect health knowledge indicators as well as some living conditions indicators such as having a good water source. The relationship between knowledge capabilities and the health knowledge indicators is quite straight forward. The higher your capabilities to achieve good knowledge. the more likely you are to know about STIs. Most of the information on STIs is spread through facilities where knowledge is also acquired. In relation to living conditions. it is more likely that the higher your knowledge capabilities. the higher the ability to have good living conditions. especially if parental knowledge capabilities are related to the child's knowledge capabilities. It is therefore not surprising that we observe that parental education positively and significantly affects the child's knowledge capabilities (Becker 1964, Glomm et Ravikumar 1992). In fact. it is shown. together with parental employment. to positively and significantly affect all three capabilities. In the context of the oPt. education has an additional value as it has long been seen as a highly rewarding investment in human capital. Human capital formation has become a driving mechanism for economic development. especially in the low-income setting where the accumulation of physical capital is lacking (Schultz 1960, Temple et Johnson 1998).

Living conditions capabilities. not only affect the living conditions indicator but also some of the knowledge indicators such as use of internet and listening to the radio. An individual's capability to either use the internet or listen to the radio depending on their living conditions capabilities as having a high living condition capability affects the probability that the household within which the child lives as a radio or even a computer/telephone and access to electricity. All three of which are needed for the youth to listen to the radio or use the internet.

Other institution and contextual factors such as relation to household head. gender. regional educational expenditure. regional students per teacher. cost of referrals. social protection adherence rates. number of primary healthcare physicians and the household size affects the development of capabilities. Our results reveal some variations between and across the different Palestinian administrative regions. Living in Areas A and B positively affects development of both knowledge and living conditions capabilities especially because these two areas are the most developed. Access to schools. public services and utilities are high in these regions. Living in Gaza Strip as opposed to Area C positively affects development of health knowledge and living conditions capabilities. This relates to the fact that. in as much as the Gaza Strip is under developed compared to the West Bank. it is slightly more developed compared to Area C and so access to services are better in the Gaza Strip than they are in Area C. In addition. multiple physical barriers (e.g.. checkpoints and separating walls) exist throughout the territories. Indeed. those living in Areas A and B do enjoy better capabilities (Batniji, et al. 2009). Previous studies e.g. (Giacaman, et al. 2009, Mataria, et al. 2009, Abu-Zaineh, et al. 2011) have already shown that the lack of highly specialised medical services leads to many cases being referred for treatment abroad. Such practice imposes an undue financial burden on both patients and the health care system.

In spite of their usefulness. a few practical limitations of our results should be acknowledged. First. the age group under consideration encompassed individuals who were still in school (15 – 24 years) and those who had most likely graduated (24 – 29 years). This made knowledge capability a little difficult to estimate. For instance. a variable that measures the lag in an individual's education. schooling-for-age (SAGE). could not be included as it overestimated the lag in the education of graduates. Yet. another limitation relates to the imperfect representation of the health indicators. Finally. a low number of individual in Area C in the sample. made it difficult to split the West Bank data into Areas A and B versus Area C and study measurement invariance across these two regions. Future studies. in the presence of sufficient data. should aim to study the impact of physical and financial barriers on capability development in the oPt.

6. Conclusion

The research on capabilities has been motivated by the underlying normative proposition that measuring wellbeing. human development and social justice may entail a broader evaluative space than direct measures of wealth (Robeyns 2005, Coast, Smith et Lorgelly 2008). Though considerable theoretical and methodological developments have taken place since the publication of Sen's Tanner lecture on capability (Sen 1980). there has been scepticism on the applicability and usefulness of the capability approach for purposes of measurement and policy analysis (Alkire 2010). This paper offers further insights into the applicability and usefulness of the CA using the ESEM approach. Analyzing wellbeing this way is promising as it offers a distinctive angle and provides useful information on how to think about human development. It also helps inform policy-makers about the appropriate measures to enhance capabilities.

In effect. the results based on the above concepts have provided useful information on which a number of policy recommendations can be advanced. In order to draw some concluding remarks. we shall lean on a line of arguments inspired from the capability approach Amartya Sen (1985. 1999. 2002). The capability to be knowledgeable does not only affect an individual's schooling but also their knowledge on health issues. including STIs and their living conditions. As (Sen 1999) rightfully points out. the capability to achieve wellbeing requires eliminating all factors that limit an individual's "substantive freedom" to lead a dignified life of their choice. These factors make it difficult to acquire the desired level of health knowledge. knowledge (e.g.. to attend school and use of technological infrastructure) and living conditions (e.g.. to live under good housing conditions). The factors may be driven by the individual's innate ability to achieve wellbeing or by contextual factors which relate to the circumstances within which they live. In a conflict-affected fragile-setting. the impact of the latter factors is of greater import. The lack of substantive freedom is closely related to the lack of public services and facilities. restrictions on movements. denial of political and civil liberties. and the absence of effective institutions (Sen 1999).

Our analysis alludes to a set of policy-relevant factors which ought to be addressed in any future development plans in the oPt. Among the policy measures is the reduction in both. financial and non financial barriers access. For policy-makers in the oPt it may be worthwhile to highlight the fact that capability deprivation in the local context seems also to derive from geographical access barriers. This is captured by the contribution of location of residence (Area C). which seems to reflect not only the disparities in the availability of public services. but also the geopolitical segregation that restricts the movement of people and goods (Bulmer 2003). It is important to point out that. under the current conditions of the chronic conflict. the issue of accessibility to health and educational services remains a political one. hanging on the improvement of the socio-economic and political situation of the oPt. However. there is a critical need to identify appropriate polices capable of reducing spatial-inequalities in the distribution of services across different agglomerations and enhancing the inter-providers (e.g.. public. private and NGOs) and inter-sectors (e.g.. education. health and social affairs) coordination. Promotive (e.g.. micro-finance programs and vocational training) and transformative (e.g.. social inclusion and legislation development) measures can also be relevant in mitigating the adverse impact of geographical disparities on capability. especially to protect the rights of vulnerable groups such as those living in Area C. To sum up. the most relevant measures would be the ones challenging the current status quo of on-going military occupation. and capable of removing the prevalent causes of deprivations in the oPt.

Appendix A: Tables

Table A1: Item Correlation

	Good Health	Improv. Health	Regular Sports	Never Smoked	Energy Drinks	Syphilis	Gonorr.	Fungal Infect.	Genital Warts	Radio	News.	Internet	Sec.Sch. +	Attend/ Grad.	Good Toilet Fac.	Good Floor	Good Drinking Water	Good Cooking Water	Assets	Utilities
Good Health	1.0000																			
Improved Health	0.0902	1.0000																		
Regular Sports	0.0603	0.1828	1.0000																	
Never Smoked	0.0209	0.0094	0.0422	1.0000																
Energy Drinks	-0.0363	0.0087	0.0534	-0.1431	1.0000															
Syphilis	0.0309	-0.0120	0.0613	-0.0653	-0.0059	**1.0000**														
Gonorrhoea	0.0438	-0.0324	0.1056	0.0134	-0.0005	**0.4701**	**1.0000**													
Fungal Infections	0.0430	-0.0311	0.0351	0.0023	0.0335	**0.3494**	**0.3538**	**1.0000**												
Genital Warts	-0.0328	-0.0191	0.0618	0.0182	0.0456	**0.1682**	**0.2352**	**0.2549**	**1.0000**											
Radio	0.0193	0.0313	0.0698	-0.0787	0.1396	0.0057	0.0214	0.0637	0.0214	**1.0000**										
Newspapers	-0.0251	-0.0117	0.1367	-0.0089	0.1214	0.0458	0.1091	0.0983	0.0840	**0.2304**	**1.0000**									
Internet	0.0825	0.0813	0.1430	-0.0525	0.1271	0.1674	0.1752	0.1599	0.0911	**0.1600**	**0.2014**	**1.0000**								
Sec. Sch. Or More	0.0605	-0.0369	-0.0159	0.0037	-0.0234	0.1637	0.1952	0.1576	0.1001	**0.0396**	**0.1663**	**0.2652**	**1.0000**							
Attend/Graduate	0.0983	0.0549	0.1033	0.1880	0.0041	0.0675	0.1656	0.0932	0.0453	**0.0224**	**0.1169**	**0.3099**	**0.3528**	**1.0000**						
Good Toilet Facilities	0.0202	0.0229	0.0081	0.0447	-0.0082	-0.0069	-0.0031	-0.0061	-0.0004	0.0014	0.0110	0.0884	0.0402	0.0168	1.0000					
Good Floor	0.0042	-0.0367	0.0210	0.0086	0.0372	0.0488	0.0541	0.0260	0.0223	-0.0005	0.0207	0.1019	0.0710	0.0384	0.0990	**1.0000**				
Good Drinking Water	-0.1021	-0.0649	0.0665	-0.1029	0.1974	-0.0774	0.0214	0.0319	0.0750	0.1661	0.1830	0.0888	0.0117	0.0369	-0.0652	**0.0544**	**1.0000**			
Good Cooking Water	-0.0445	-0.0696	0.0327	-0.0408	0.0998	-0.0320	0.0029	0.0344	0.0427	0.0463	0.0693	0.0582	0.0148	0.0161	0.0164	**0.0489**	**0.6089**	**1.0000**		
Assets	-0.0067	-0.0094	0.0760	-0.0090	0.1018	0.0256	0.1118	0.0784	0.0531	0.1393	0.1389	0.3420	0.1695	0.1987	0.0795	**0.1682**	**0.2238**	**0.0722**	**1.0000**	
Utilities	0.0491	0.0053	0.0604	-0.0045	0.0494	0.0288	0.0933	0.0629	0.0553	0.0649	0.0742	0.2106	0.1172	0.1820	0.0561	**0.1912**	**0.1419**	**0.0630**	**0.4013**	**1.0000**

Table A2: Factor Loadings with Correlations

	IFA				ESEM			
Indicators	**F1**	**F2**	**F3**	**R^2**	**F1**	**F2**	**F3**	**R^2**
Syphilis	**0.830*****	0.000	0.000	0.689	**0.884*****	0.085***	-0.155***	0.816
Gonorrhoea	**0.909*****	0.000	0.000	0.827	**0.860*****	0.072***	0.041**	0.789
Fungal Infections	**0.745*****	0.000	0.000	0.556	**0.666*****	0.105***	0.103***	0.524
Genital Warts	**0.619*****	0.000	0.000	0.383	**0.562*****	-0.026	0.268***	0.409
Listen to Radio	0.000	**0.215*****	0.000	0.046	0.002	-0.056	**0.406*****	0.155
Use Internet	0.000	**0.787*****	0.000	0.619	0.136***	**0.480*****	0.394***	0.558
Read Newspapers	0.000	**0.439*****	0.000	0.193	0.108***	0.186***	**0.323*****	0.203
Secondary Educ. +	0.000	**0.687*****	0.000	0.472	0.152***	**0.708*****	-0.037***	0.568
Attend/Graduated Sch.	0.000	**0.680*****	0.000	0.462	-0.017	**0.839*****	-0.025***	0.686
Good Floor	0.000	0.000	**0.471*****	0.222	0.023	0.159***	**0.330*****	0.168
Good Water Source	0.000	0.000	**0.380*****	0.144	-0.035	-0.141***	**0.690*****	0.440
Assets	0.000	0.000	**0.989*****	0.979	-0.047**	0.273***	**0.589*****	0.501
Utilities	0.000	0.000	**0.744*****	0.554	-0.008	0.243***	**0.368*****	0.243

Factor Correlations								
F1	1.000				1.000			
F2	0.485	1.000			0.269	1.000		
F3	0.172	0.550	1.000		0.109	0.281	1.000	

i.Only the standardised factor loadings are presented here. The full results with unstandardised coefficients can be found in the supplementary appendix.
ii.A coefficient of 0.150 for good health implies that a 1 standardised unit increase in health capabilities will lead to a 0.150 standardised unit increase in the probability that the youth will be in good health.
*iii.p-value <=0.1. ** p-value <= 0.05. *** p-value <= 0.01*

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