Measuring consensus in the perception of national efforts to harness a demographic dividend among local experts in six Sub-Saharan African countries

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Abstract (max 150 words)

The African region will double its population by 2050, and more than half will be below age 25. Under favorable policy conditions, these countries have a unique opportunity to boost their economy by harnessing the benefits of a demographic dividend. This study aims to assess whether higher consensus among local experts who scored the level of efforts being placed to set a favorable policy environment to harness the benefits of a demographic dividend was translated into higher effort scores in six Sub-Saharan African countries. The analysis was done across six sectors. We identified the following typology: i) significant positive correlation, significant negative correlation, and non-significant correlation. Tanzania, Senegal, and Rwanda had a significant positive correlation in the family planning and women's empowerment sectors. These findings can aid countries' planning and evaluation purposes. We hypothesize that the strength of institutions is behind this typology and intend to explore it further.

Background

A demographic dividend (DD) presents countries with the opportunity to accelerate economic growth and achieve sustainable development and social change (D. Bloom, Canning, & Malaney,1999; D. E. Bloom & Williamson, 1998). However, this dividend does not result automatically from changes in the population age structure. It needs to be cultivated, and multiple sectors must work together to create a favorable policy environment (Cardona et al., 2020). In addition, it mustbe approached as an interrelated system in which collaboration across key sectors is required.

Previous literature identified that in Asian countries, the demographic dividend was responsible for around one-third of their economic growth between the 1960s and 1990s (D. Bloomet al., 1999). This dividend resulted from changes in the population age structure that occurred from declines in both child mortality and fertility during the third stage of the demographic transition period (Herzer, Strulik, & Vollmer, 2012; Reher, 2011). This stage is characterized by alarge number of working-age individuals compared to the number of youth dependents. This largeworking-age cohort has the potential to boost the economy and improve living standards if a favorable policy environment is established to support these changes.

The majority of nations in sub-Saharan Africa (SSA) (34 out of 48), nearly 75% of the continent's population in 2015, have already embarked on a population transition and are not expected to reach their transitional peak before 2050 (WPP, 2019). SSA began its demographic transition in the mid-1970s when fertility levels declined from an average of 6.8 children per woman to an average of 4.8 children by the mid-2010s. Working-age individuals represent about 60% of the population, and this proportion is expected to keep increasing. Over the coming decades, the majority of SSA nations will continue to experience a decline in fertility and an increase in the working-age population. These countries have a unique opportunity to grow their economies and capitalize on the benefits of the demographic dividend as a result of these shiftingpopulation dynamics.

The opportunity to harness the benefits of a demographic dividend as a key component to achieving economic development has also been acknowledged by the African Union (AU). In 2017, the AU established the theme of the year as "Harnessing the Demographic Dividend Through Investments in Youth." This theme generated momentum for the demographic dividendacross the continent and led to the development of the demographic dividend roadmap. The roadmap identifies labor, education, health, governance, and youth empowerment as fundamentalpillars of the demographic dividend (African Union Commission, 2017).

Due to the momentum gained under the AU's 2017 theme, the AU decided to expand and implement the theme into the next decade to ensure continued progress. Countries such as Kenya, Rwanda, and Ethiopia have developed demographic dividend profiles to inform novel development

strategies and policies. In addition to these country demographic dividend profiles, several institutions have developed tools to keep track of outcome indicators, such as the use of modern contraception and women's participation in the labor market, in order to monitor changes in population dynamics and inform decision-makers of the potential benefits of the demographic dividend. Some of these tools are *DemDiv* developed by the Health Policy Project and the United States Agency for International Development (USAID), and *The Four Dividends*, developed by the Population Reference Bureau (PRB).

These monitoring tools are clearly needed to keep track of the ongoing changes captured by objective measures. However, changes in these outputs do not happen overnight. We need to invest in them, and we need to have policies that support these changes. We can think of these "investments" as efforts that need to happen before we can observe changes in the output indicators we track. Measuring the level of existing efforts in a country to promote change in output indicators is not new. A well-established tool developed in the early 70s is the Family Planning Effort Index (J. Ross & Stover, 2001), which has collected data periodically for close to 100 countries. Similar tools are the AIDS Program Effort Index (USAID et al., 2003) and the Maternal and Neonatal Program Effort Index (J. A. Ross, Campbell, & Bulatao, 2001). These tools provide several benefits for countries, particularly for planning and evaluation purposes. However, they measure efforts in silos, despite the interconnectedness and potential synergy between these sectors, especially when discussing the demographic dividend.

In this study, we used innovative data that measured the level of national efforts implemented across six sectors relevant to a demographic dividend. Our objective is to assess the level of consensus among local experts who provided their perception and judgment about national efforts in six sectors that could set a favorable policy environment to harness a demographic dividend. We hypothesized that the level of consensus is positively correlated with the level of national efforts.

Methodology

We used cross-sectional data collected by the Demographic Dividend Effort Index (DDEI) project between August-November 2020 and March-May 2021 from 440 Ethiopian, Kenyan, Nigerian, Rwandan, Senegalese, and Tanzanian sectorial experts. The DDEI measured the perception of experts who judged the details of their respective countries' efforts in setting a favorable policy environment to harness a demographic dividend. Experts worked in the following sectors: family planning (FP), maternal and child health (MCH), education (ED), women's empowerment (WE), labor market (LM), and governance and economic institutions (GEI). Each participant respondedonly to the questionnaire that represented their expertise sector, and responses were recorded on a10-point Likert scale. Each sectorial questionnaire was structured around five practice dimensions: policy, services and programs, advocacy, research, and civil society. The internal validation of thistool was assessed elsewhere, implementing a psychometrics approach.

We measured the consensus of these ordinal data by computing an l-square measure, which is a normed measure of ordinal concentration ranging from 0 to 1. The closer to 1, the higher the consensus, and the closer to 0, the lower the consensus. This metric is better suited to measure consensus than the variance, given that the variance depends on the assumption that data is continuous. Our analysis estimated consensus stratified by sector and dimension at the country level and for a pooled sample of the six countries. In addition, we calculated Pearson correlations between the mean DDEI score and the consensus metric by question and country in order to assess whether the level of consensus was positively correlated with the level of national efforts. All estimates computed 95 % confidence intervals (CI) following Student's t-distribution to account for the small sample size.

Preliminary Findings

Our sample consisted of 73 Ethiopian, 69 Kenyan, 67 Nigerian, 54 Rwandan, 81 Senegalese, and 96 Tanzanian experts (Table 1). Rwanda recorded the highest DDEI score (7.7, 95% CI: 7.5–7.9), followed by Senegal (6.3, 95% CI: 5.9-6.7), Tanzania (6.1, 95% CI: 5.8-6.4), Kenya (5.8, 95% CI: 5.5-6.1), Nigeria (5.5, 95% CI: 5.1-5.9), and Ethiopia (5.4, 95% CI: 5.1-5.8). By far, Rwandans also reported the highest levels of consensus, 0.816 on average (interquartile range (IQR): 0.764 –0.868), compared to the other five countries whose average level of consensus was 0.500 (IQR: 0.417 – 0.582). The pooled analysis showed that consensus was statistically significantly different

across the six sectors (F-statistic = 11.6). The average level of consensus was highest for women's empowerment, 0.582 (IQR: 0.485 - 0.675), and lowest for family planning (0.531, IQR: 0.408 - 0.644) and maternal and child health (0.531, IQR: 0.401 - 0.620). However, this pattern varied by country and sector.

Table 2 presents the average score of the DDEI and the average level of consensus by sector and country, with their corresponding interquartile range. Family planning experts recordedeither the lowest or second-lowest levels of consensus in Ethiopia, Nigeria, and Tanzania—0.528(IQR: 0.443 - 0.613)¸ 0.421 (IQR: 0.356 - 0.483), and 0.484 (IQR: 0.425 - 0.545), respectively—while it was the second highest in Rwanda—0.832 (IQR: 0.800 - 0.891). This consensus pattern was somewhat correlated with the ranking of the DDEI score in the family planning sector. Ethiopia, Nigeria, Kenya, and Tanzania were at the bottom of the family planning DDEI score distribution, while Rwanda was at the top. Maternal and child health experts recorded the lowest or second lowest levels of consensus in Ethiopia, Kenya, and Nigeria—0.370 (IQR: 0.309 - 0.421), 0.449 (IQR: 0.396 - 0.520), and 0.432 (IQR: 0.361 – 0.500)), respectively— although this level was the highest in Rwanda, the second highest in Senegal, and Tanzania was in the middle— 0.867(IQR: 0.840 - 0.896), 0.548 (IQR: 0.490 - 0.626), and 0.523 (IQR: 0.467 - 0.580), respectively. Inthe women's empowerment sector, experts recorded the second lowest level of consensus in Rwanda (0.78 (IQR: 0.755 - 0.814) while it was the highest or second highest for Kenya, Nigeria,and Tanzania— 0.568 (IQR: 0.484 - 0.636), 0.554 (IQR: 0.517 - 0.594), and 0.553 (IQR: 0.480 - 0.611), respectively. Rwanda, Senegal, and Tanzania had higher DDEI scores in this sector compared to the scores in Nigeria, Kenya, and Ethiopia, which were lower.

Education experts recorded the lowest or second lowest level of consensus in Rwanda, Kenya, and Senegal— 0.733 (IQR: 0.710 - 0.746), 0.450 (IQR: 0.375 - 0.538), and 0.436 (IQR: 0.375 - 0.490), respectively— and Nigeria the highest, 0.598 (IQR: 0.534 - 0.662). Rwanda and Nigeria had higher DDEI scores in the education sector, while the other four countries—Kenya, Senegal, Ethiopia, and Tanzania— had lower DDEI scores. In the Labor market sector, experts recorded the lowest levels of consensus in Senegal and Tanzania—0.432 (IQR: 0.365 - 0.474), and 0.427 (IQR: 0.360 - 0.495), respectively. In contrast, they recorded the highest and the second highest levels of consensus in Ethiopia and Kenya—0.601 (IQR: 0.495 - 0.715), and 0.567 (IQR: 0.506 - 0.627), respectively. We observed that the labor market DDEI score in Rwanda and Tanzania was higher compared to the score for the other four countries (Kenya, Senegal, Ethiopia, and Nigeria). Finally, governance and economic institutions experts recorded the highest and the second highest level of consensus in Senegal, Tanzania, and Ethiopia— 0.572 (IQR: 0.518 - 0.625), 0.561 (IQR: 0.474 - 0.660), and 0.570 (IQR: 0.489 - 0.660), respectively— while they didnot record low levels of

consensus compared to the other sectors. Rwanda, Kenya, and Senegal had higher DDEI scores in this sector compared to the scores in Nigeria, Tanzania, and Ethiopia.

Figure 1 shows a heat map of the correlation between the average DDEI score and the average level of consensus by sector and country. Significant positive correlations are colored in blue, and significantly negative correlations are colored in pink. In the family planning sector, Rwanda recorded the highest positive correlation, 0.58 (p-value < 0.01), followed by Tanzania, Kenya, and Senegal (0.36 (p-value <0.01), 0.30 (p-value <0.01), 0.26 (p-value <0.01), respectively). Ethiopia was the only country with a negative significant low correlation, -0.22 (p-value < 0.05). All countries recorded significant correlations in the maternal and child health sector. The lead was Senegal, 0.57 (p-value<0.01), followed by Tanzania and Kenya, 0.36 (p- value<0.01) and 0.30 (p-value<0.01), respectively. In contrast, the correlation in Rwanda, Ethiopia, and Nigeria was negative and significant (-0.36 (p-value<0.01), -0.31 (p-value<0.01), and -0.22 (p-value<0.05), respectively). Tanzania (0.57, p-value<0.01), Senegal (0.48, p- value<0.01), and Rwanda (0.42, p-value<0.01) reported a significant positive correlation betweenthe women's empowerment DDEI score and the level of consensus; while Kenya reported a significant negative correlation (-0.27, p<0.05).

Only Tanzania recorded a significant correlation in the education sector, which was negative, -0.23 (p-value<0.1). In the labor market sector, only Ethiopia and Senegal recorded a significant correlation, though this correlation was negative (-0.42 (p-value<0.01) and -0.33 (p- value<0.01), respectively). Kenya (0.61, p-value<0.01), Nigeria (0.45, p-value<0.01), and Senegal (0.25, p-value<0.05) recorded a significant positive correlation between the DDEI score and the consensus metric for governance and economic institutions; while Rwanda (-0.65, p-value<0.001)and Tanzania (p-value<0.05) recorded a negative correlation.

Discussion and next steps

Effort indices can be highly informative for program development to improve mid and long-run outcomes. For example, the family planning effort index (FPEI) has provided rich information about the strength of family planning programs and their evolution over time (J. Ross & Stover, 2001). The DDEI is an effort measurement tool with good internal validity and collects innovativedata to inform decision-makers about the perception of current policies and programs. This studymeasured the level of consensus among local experts from six sectors who provided theirperception and judgment about national efforts being placed to set a favorable policy environmentto harness the benefits of a demographic dividend in a sample of six sub-Saharan African countries.

We found that Rwandan experts demonstrated the highest levels of consensus and DDEI scores across sectors; however, the correlation between these two metrics was positive and significant

only in two of the six sectors analyzed (family planning and women's empowerment).The other sectors either had a significant negative correlation (maternal and child health, and governance and economic institutions) or a non-significant correlation (education and labor market). On the other hand, Senegal was the country in which this correlation was positively significant in four of the six sectors; however, the level of consensus was low in most of the sectorsdespite having high DDEI scores in most of them. Ethiopian experts recorded DDEI scores and consensus level around the middle point; however, the correlations were either negatively significant or non-significant. The results for the other countries were less unanimous. The rankingof these countries according to their level of consensus is similar to the ranking according to theirlevel of effort to harness a demographic dividend; however, the direction of the correlation variedacross sectors.

Our findings suggest three typologies: countries with a significant positive correlation between the DDEI score and the level of consensus, countries with a significant negativecorrelation, and countries with a non-significant correlation. One potential explanation for this typology could be the strength of institutions and programs in respective sectors. Evidence has shown there exists a positive relationship between the improvement of institutions and economic development and growth (Alonso & Garcimartín, 2013). It could be that countries with strong institutions and programs are more likely to have experts with homogenous perceptions. In contrast, countries with weaker institutions and programs could be more likely to have experts with heterogeneous perceptions. We intend to explore this further in future analysis by leveragingthe fact that the DDEI project structured its data across five dimensions: civil society, research, advocacy, service or programs, and policymaking. We present preliminary computations of the exploration of these data in Table 3.

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Tables and figures

Table 1: Number of participants

	Ethiopia	Kenya	Nigeria	Rwanda	Senegal	Tanzania
Family Planning	17	17	18	7	7	38
Maternal and Child Health	15	18	8	9	16	19
Women's Empowerment	8	10	9	16	17	13
Education	15	5	12	7	11	10
Labor Market	9	13	8	9	12	8
Governance and Economic Institutions	9	6	12	6	18	8
Total	**73**	**69**	**67**	**54**	**81**	**96**

Table 2: Summary statistics by sector within the country

	DDEI Score		Consensus	
	Mean	IQR	Mean	IQR
Ethiopia				
Family Planning	5.656	[5.067 - 6.467]	0.528	[0.443 - 0.613]
Maternal and Child Health	5.779	[5.154 - 6.333]	0.370	[0.309 - 0.421]
Women's Empowerment	4.804	[4.167 - 5.500]	0.540	[0.456 - 0.619]
Education	5.213	[4.321 - 5.964]	0.538	[0.487 - 0.587]
Labor market	5.042	[4.286 - 5.889]	0.601	[0.495 - 0.715]
Governance and Economic Institutions	5.046	[4.000 - 5.944]	0.570	[0.489 - 0.660]
Kenya				
Family Planning	5.799	[5.067 - 6.647]	0.478	[0.407 - 0.536]
Maternal and Child Health	6.023	[5.500 - 6.667]	0.449	[0.396 - 0.520]
Women's Empowerment	5.054	[4.600 - 5.667]	0.568	[0.484 - 0.636]
Education	5.583	[5.000 - 6.100]	0.450	[0.375 - 0.538]
Labor market	5.374	[4.846 - 5.769]	0.567	[0.506 - 0.627]
Governance and Economic Institutions	6.603	[6.000 - 7.000]	0.478	[0.396 - 0.564]
Nigeria				
Family Planning	6.068	[5.375 - 6.867]	0.421	[0.356 - 0.483]
Maternal and Child Health	5.049	[4.286 - 5.875]	0.432	[0.361 - 0.500]
Women's Empowerment	5.103	[4.778 - 5.444]	0.554	[0.517 - 0.594]
Education	6.028	[5.683 - 6.400]	0.598	[0.534 - 0.662]
Labor market	4.353	[3.750 - 5.125]	0.525	[0.424 - 0.604]
Governance and Economic Institutions	5.640	[5.042 - 6.111]	0.533	[0.467 - 0.595]
Rwanda				
Family Planning	6.354	[5.857 - 7.000]	0.832	[0.800 - 0.891]
Maternal and Child Health	7.408	[7.250 - 7.556]	0.867	[0.840 - 0.896]
Women's Empowerment	8.350	[8.188 - 8.438]	0.780	[0.755 - 0.814]
Education	8.203	[8.000 - 8.429]	0.733	[0.710 - 0.746]
Labor market	7.575	[7.375 - 7.778]	0.821	[0.770 - 0.889]
Governance and Economic Institutions	7.757	[7.600 - 8.000]	0.818	[0.778 - 0.840]
Senegal				
Family Planning	6.175	[5.200 - 7.143]	0.440	[0.321 - 0.565]
Maternal and Child Health	7.141	[6.455 - 7.933]	0.548	[0.490 - 0.626]
Women's Empowerment	6.286	[5.833 - 6.867]	0.498	[0.432 - 0.556]
Education	5.379	[4.764 - 5.826]	0.436	[0.375 - 0.490]
Labor market	5.101	[4.500 - 5.556]	0.427	[0.360 - 0.495]
Governance and Economic Institutions	6.338	[6.000 - 6.625]	0.572	[0.518 - 0.625]

	DDEI Score		Consensus	
	Mean	IQR	Mean	IQR
Tanzania				
Family Planning	5.971	[5.297 - 6.735]	0.484	[0.425 - 0.545]
Maternal and Child Health	6.644	[6.250 - 7.000]	0.523	[0.467 - 0.580]
Women's Empowerment	7.001	[6.500 - 7.308]	0.553	[0.480 - 0.611]
Education	5.153	[4.750 - 5.563]	0.498	[0.418 - 0.566]
Labor market	5.705	[5.125 - 6.286]	0.432	[0.365 - 0.474]
Governance and Economic Institutions	5.388	[4.857 - 5.857]	0.561	[0.474 - 0.660]

Figure 1: Correlation between the mean score and consensus by sector within the country

Correlation between the mean score and consensus

	FP	MCH	WE	ED	LM	GEI
Tanzania	0.36***	0.36***	0.57***	-0.23*		-0.25**
Senegal	0.26***	0.57***	0.48***		-0.33***	0.25**
Rwanda	0.58***	-0.36***	0.42***			-0.65***
Nigeria		-0.22**				0.45***
Kenya	0.30***	0.30***	-0.27**			0.61***
Ethiopia	-0.22**	-0.31***			-0.42***	

Legend: High-Positive | Low-Positive | No-Significant | Low-Negative | High-Negative
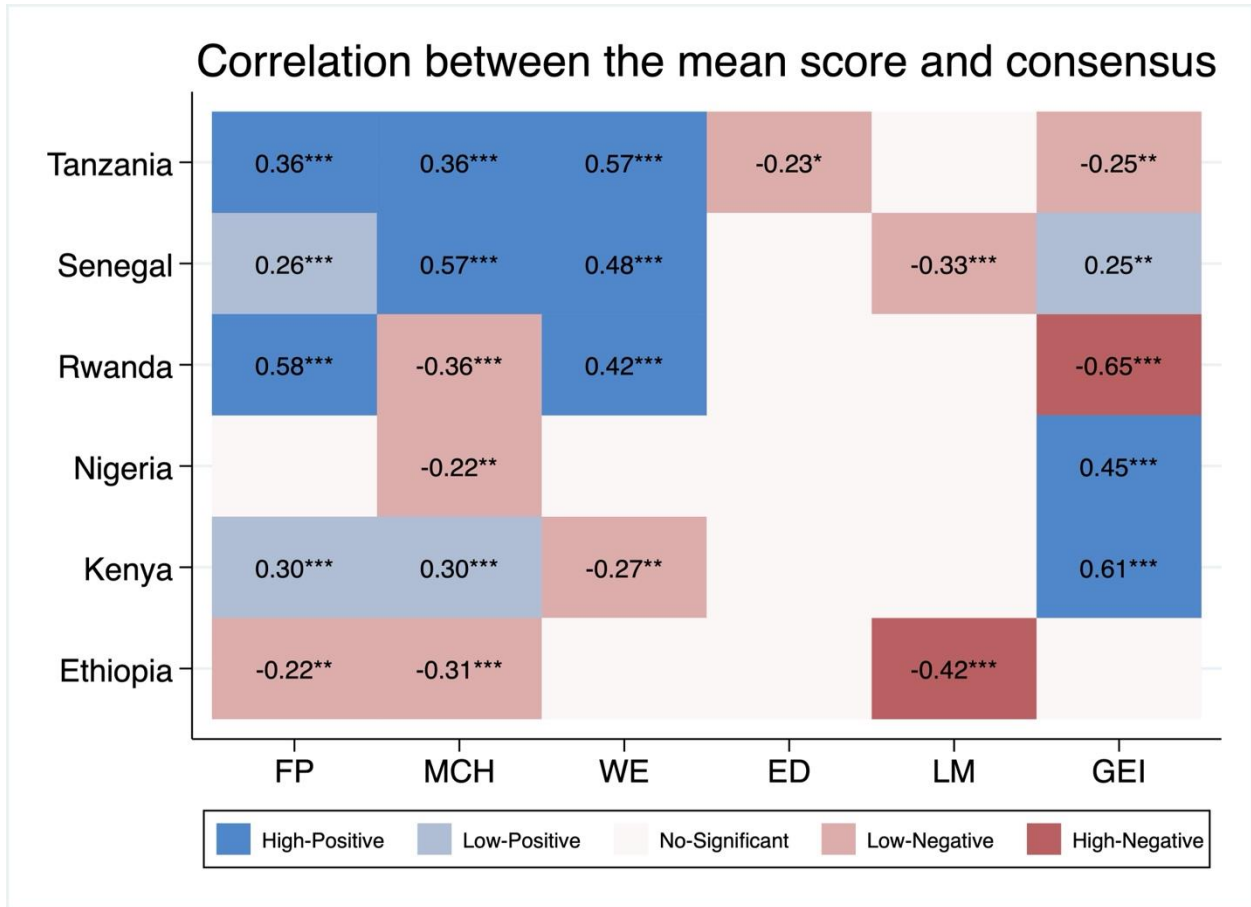
Table 3: Summary statistics by dimension within the country

	DDEI Score		Consensus	
	Mean	IQR	Mean	IQR
Ethiopia				
Policy	5.681	[4.854 - 6.420]	0.505	[0.418 - 0.590]
Services or programs	5.521	[4.857 - 6.357]	0.501	[0.374 - 0.617]
Advocacy	5.590	[4.571 - 6.467]	0.472	[0.390 - 0.542]
Research	4.995	[4.400 - 5.600]	0.539	[0.449 - 0.630]
CSOs	4.751	[4.231 - 5.200]	0.541	[0.463 - 0.637]
Kenya				
Policy	5.780	[5.000 - 6.574]	0.494	[0.431 - 0.569]
Services or programs	6.052	[5.308 - 7.000]	0.515	[0.425 - 0.585]
Advocacy	6.022	[5.167 - 6.800]	0.509	[0.415 - 0.609]
Research	5.469	[4.833 - 6.000]	0.485	[0.411 - 0.556]
CSOs	5.587	[5.200 - 6.000]	0.449	[0.387 - 0.522]
Nigeria				
Policy	5.228	[4.375 - 6.146]	0.501	[0.415 - 0.583]
Services or programs	5.232	[4.444 - 6.143]	0.473	[0.389 - 0.552]
Advocacy	5.819	[5.100 - 6.400]	0.476	[0.411 - 0.546]
Research	5.447	[4.875 - 6.091]	0.509	[0.403 - 0.594]
CSOs	5.733	[5.000 - 6.467]	0.527	[0.431 - 0.627]
Rwanda				
Policy	7.953	[7.563 - 8.286]	0.807	[0.751 - 0.874]
Services or programs	7.017	[6.429 - 7.833]	0.814	[0.759 - 0.855]
Advocacy	7.187	[6.571 - 7.833]	0.795	[0.759 - 0.827]
Research	7.691	[7.375 - 8.188]	0.818	[0.770 - 0.868]
CSOs	7.505	[7.143 - 8.000]	0.848	[0.787 - 0.896]
Senegal				
Policy	6.123	[5.694 - 6.806]	0.450	[0.364 - 0.546]
Services or programs	6.707	[5.812 - 7.714]	0.498	[0.418 - 0.601]
Advocacy	6.382	[5.833 - 7.263]	0.499	[0.396 - 0.601]
Research	5.833	[5.202 - 6.517]	0.478	[0.412 - 0.568]
Civil Society Organizations	5.560	[5.000 - 6.273]	0.548	[0.460 - 0.625]
Tanzania				
Policy	5.945	[5.299 - 6.725]	0.492	[0.420 - 0.566]
Services or programs	6.065	[5.250 - 6.833]	0.503	[0.430 - 0.562]
Advocacy	6.001	[5.294 - 6.853]	0.480	[0.438 - 0.546]
Research	5.900	[5.143 - 6.538]	0.536	[0.474 - 0.612]
CSOs	6.385	[5.893 - 6.857]	0.519	[0.438 - 0.584]