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South Sudan Population Movement Analysis

for the

World Bank Enhancing Community Resilience and Local Governance Project

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1 Introduction

The Government of South Sudan requested World Bank support for a project that improves local services, strengthens local governance, and increases social cohesion. Accordingly, the World Bank (WB) created the "Enhancing Community Resilience and Local Governance" project which will focus on addressing basic service delivery needs on the ground, particularly in areas where the displaced have returned. The World Bank approached IOM South Sudan to perform tailored research and analysis that will assist the World Bank task team, host country clients, and implementation partners as they design and prepare the new operation. The research requested includes population movement analysis, which – building on IOM South Sudan's Displacement Tracking Matrix (DTM) data as well as existing secondary data – addresses the following research questions:

(1) The World Bank has identified 34 agglomerations as large and most rapidly growing population centers in the South Sudan. Using DTM data, the analysis requested shall determine the degree of overlap between these agglomerations and DTM data with regard to the concentration of returnees in the country. It shall thereby assess the extent to which population growth in these areas is attributable to return movements of refugees and IDPs.

(2) The analysis requested shall identify other agglomerations (whether rural or urban) additional to the 34 identified by the World Bank, which show rapid population growth due the inflow of returnees, using DTM and other available data.

(3) The analysis requested shall provide overall trends in population movement over the last 44 months, including: nationwide rates of return; direction and regional patterns of returns; predominant ethnic composition of population flows; demographic changes in key areas of returnee concentrations resulting from these flows; settlement patterns of returning refugees and IDPs.

The above research questions are being addressed in the following report.

2 Data

For this report, several data sources have been consulted and analyzed in order to answer the aforementioned research questions: The 34 agglomerations provided by the World Bank, DTM South Sudan Mobility Tracking Data, the World Population Prospects of the UN Department of Economic and Social Affairs (UN DESA) as well as the Global Human Settlement Layer (GHSL) of the European Commission's Joint Research Centre (JRC).

2.1 WB Agglomerations

The World Bank has identified 34 agglomerations (consisting of urban centers and smaller towns) that it considers the largest and most rapidly growing population centers in the country. The agglomerations were extracted in a multi-step process and then used to summarize a number of geo-spatial data sets to assess change over time. Nighttime lights (2015 annual composite) were used to identify all lit areas in the country. That is for every month in the VIIRS repository (nighttime lights 2012-2018), the total brightness of all cells in each agglomeration was calculated, as well as a yearly maximum. Change was measured as percent growth in nightlight from 2012-2018. Additionally, the World Settlement Footprint was consulted which measures total built-area in each year from 1985-2015. Here, change was measured as growth from 2010-2015. Settlements were then ranked according to growth in these

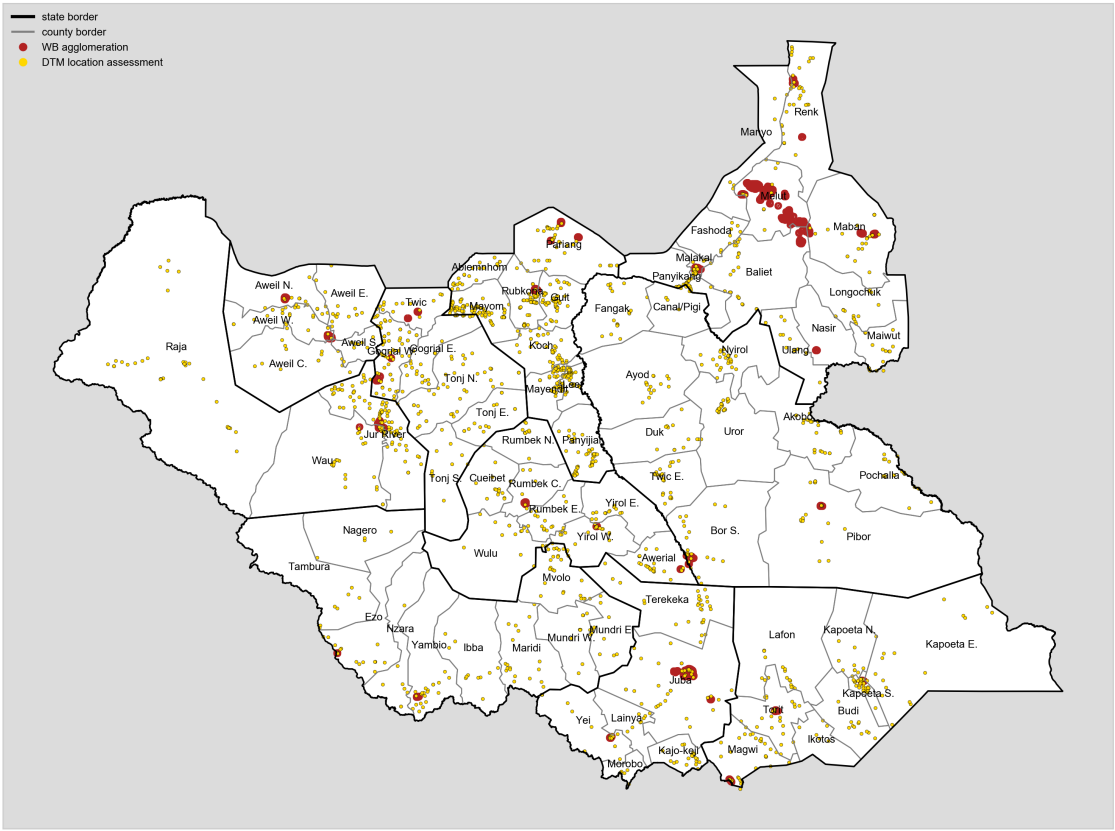

Figure 1: Map of South Sudan with the 34 agglomerations identified by the World Bank as well as DTM Mobility Tracking locations. The boundaries on the map do not imply official endorsement or acceptance by the Government of the Republic of South Sudan or by IOM. IOM cannot guarantee that the map is error free and therefore accepts no liability for consequential damages arising from its use.

two metrics and absolute value. Numerous areas were subsequently eliminated because of a lack of build-up in areas of high lights. It is assumed these are resource extraction activities. Additional areas were added as they are larger built-up area without lights. These adapted agglomerations were then shared with a local expert who identified areas that had been overlooked. Adding these led to the final data set of 34 agglomerations.

2.2 DTM Mobility Tracking

Data collection for Mobility Tracking round 6 took place in June 2019, nine months after the signing of the Revitalized Agreement on the Resolution of the Conflict in the Republic of South Sudan (R-ARCSS). DTM's payam-level Baseline assessment reached 470 payams while the subsequent multi-sectoral Village/Neighbourhood and Site assessments reached a total of 1,776 villages and neighbourhoods and 84 camp/camp-like sites across all 10 states of South Sudan. Information is obtained through a network of key informants, with data captured at the location level during multi-sectoral Village/Neighbourhood and Site assessments serving to verify and detail initial estimates obtained through the payam-level Baseline assessment. Key informants commonly comprise local authorities, community leaders, religious leaders and humanitarian partners. DTM enumerators consulted more than 5,600 key informants. Data was triangulated with direct observation by the enumerators and consultation with the local population. Figure 1 displays a map of locations assessed by DTM Mobility Tracking as well as the 34 agglomerations identified by the World Bank. As can be seen from this map, most of the World Bank's agglomerations are being assessed by

DTM. Exceptions occur in Melut, Pariang and Renk Counties, where isolated agglomerations are situated without nearby DTM assessment locations.

The following population categories are captured by DTM Mobility Tracking:

IDPs Persons or groups of persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognized state border. IDPs are counted as such if their time of arrival in the assessed area ranges between the beginning of hostilities in December 2013 and the last Mobility Tracking assessment in June 2019. The number of IDPs who experienced secondary or multiple displacement is also recorded at the payam level, representing 7.4% (n=108k) of all IDPs.

Returnees Someone who was displaced from their habitual residence either within South Sudan or abroad, who has since returned to their habitual residence. The returnee category, for the purpose of DTM data collection, is restricted to individuals who returned to the exact location of their habitual residence, or an adjacent area based on a free decision. South Sudanese displaced persons having crossed the border into South Sudan from neighboring countries without having reached their home are still displaced and as such not counted in the returnee category. As of Mobility Tracking round 6, returnees were counted as such if they arrived in the assessed area between January 2016 and June 2019.

Relocated individuals Someone who was displaced from their habitual residence either within South Sudan or abroad, who has since relocated voluntarily (independently or with the help of other actors) to another location than their former habitual residence, without an intention to return to their former habitual residence. Relocations are relatively infrequent in South Sudan, accounting for only 4.1% (n=54k) of the total number of relocated and returned individuals.

2.3 UN DESA World Population Prospects

Rooted in the United Nations Charter and guided by the transformative 2030 Agenda for Sustainable Development, the UN Department of Economic and Social Affairs (UN DESA) upholds the development pillar of the United Nations.[1] The 2019 Revision of World Population Prospects, which is employed in this report in order to compare IDP and returnee demographics to those of the general public in South Sudan, is the twenty-sixth round of official United Nations population estimates and projections that have been prepared by the UN DESA's Population Division. The main results are presented in a series of Excel files displaying key demographic indicators for each UN development group, World Bank income group, geographic region, Sustainable Development Goals (SDGs) region, subregion and country or area for selected periods or dates within 1950-2100.[2]

2.4 JRC Global Human Settlement Layer

For the analysis of returnee figures with respect to urban and rural areas, the definitions as constituted by the Global Human Settlement Layer (GHSL) provided by the European Commission's Joint Research Centre have been consulted.[3] This is in line

[1] https://www.un.org/development/desa/
[2] https://population.un.org/wpp/
[3] https://ghsl.jrc.ec.europa.eu/

with the voluntary commitment to develop a global, people-based definition of cities and settlements launched by the European Union, the OECD and the World Bank during the UN-Habitat III conference in October 2016.[4] The GHSL Settlement Model grid (SMOD) used in the analysis relies on Landsat imagery from 2014 for built-up and CIESIN Gridded Population of the World v4.10 estimates for 2015.

3 Analysis

This section describes the results and implications of the analysis performed in order to answer the research questions above.

3.1 Research Question 1: Displacement and Return-induced Local Population Growth

This subsection determines the degree of overlap between the agglomerations identified by the World Bank and DTM data with regard to the concentration of returnees in the country. Thereby, it assesses the extent to which population growth in these areas is attributable to return movements of refugees and IDPs.

3.1.1 Overlap Between the WB Agglomerations and DTM Data

The proportion of IDPs and returnees, captured by DTM, that are located within the World Bank's 34 agglomeration extents has been determined based on DTM round 6 Village / Neighbourhood and Site assessment data[5]. The results are summarized in Figure 2. Only 5.4% (n=100) of all IDP/returnee locations fall within the extent of the 34 agglomerations provided by the World Bank. Interestingly, while a similar proportion of 4.5% (n=80) applies to IDP and/or returnee locations in host communities (villages and town neighbourhoods), a much higher proportion of 23.5% (n=20) of the IDP camps (or camp-like settings) falls within the 34 World Bank agglomerations.

In terms of IDP and returnee populations, the World Bank agglomerations comprise 23.6% (n=309k) of all IDPs and 13.9% (n=155k) of all returnees captured by the DTM assessments. Again, the proportion differs largely between IDPs in camps / camp-like locations and IDPs in host communities. While 57.1% (n=254k) of the former are located in the World Bank agglomerations, only 8.2% (n=105k) of the latter are. Considering the urban / rural distribution of IDPs and returnees, the agglomerations host 68.2% (n=108k) of IDPs and 68.5% of returnees (n=141k) living in urban and peri-urban settlements according to the GHSL, but only 17.6% (n=202k) of IDPs and 1.6% (n=15k) of returnees living in rural areas. The 34 agglomerations also account for 13.0% of all relocated individuals tracked in the Baseline assessment, which is in line with the share of returnees. In absolute terms, however, the relocaed population is much smaller, with only 7,010 relocated individuals living in the agglomerations as compared to over 155,000 returnees.

3.1.2 Development of IDP and Returnee Figures within WB Agglomerations

The analysis further sought to document the extent to which population growth in the World Bank's agglomeration areas is attributable to return movements of refugees

[4] https://ec.europa.eu/commission/commissioners/2014-2019/cretu/blog/presenting-voluntary-commitments-eu-meet-new-urban-agendas-objectives

[5] That is, the analysis is based on 1,860 settlements directly assessed by DTM enumerators, as opposed to the longer list of 2,312 settlements retrieved from payam authorities. Settlements included in the Village / Neighbourhood and Site assessment components comprise 88.2% of returnees and 88.9% of all IDPs estimated in Mobility Tracking. The overall results are unchanged when using the longer Baseline list.

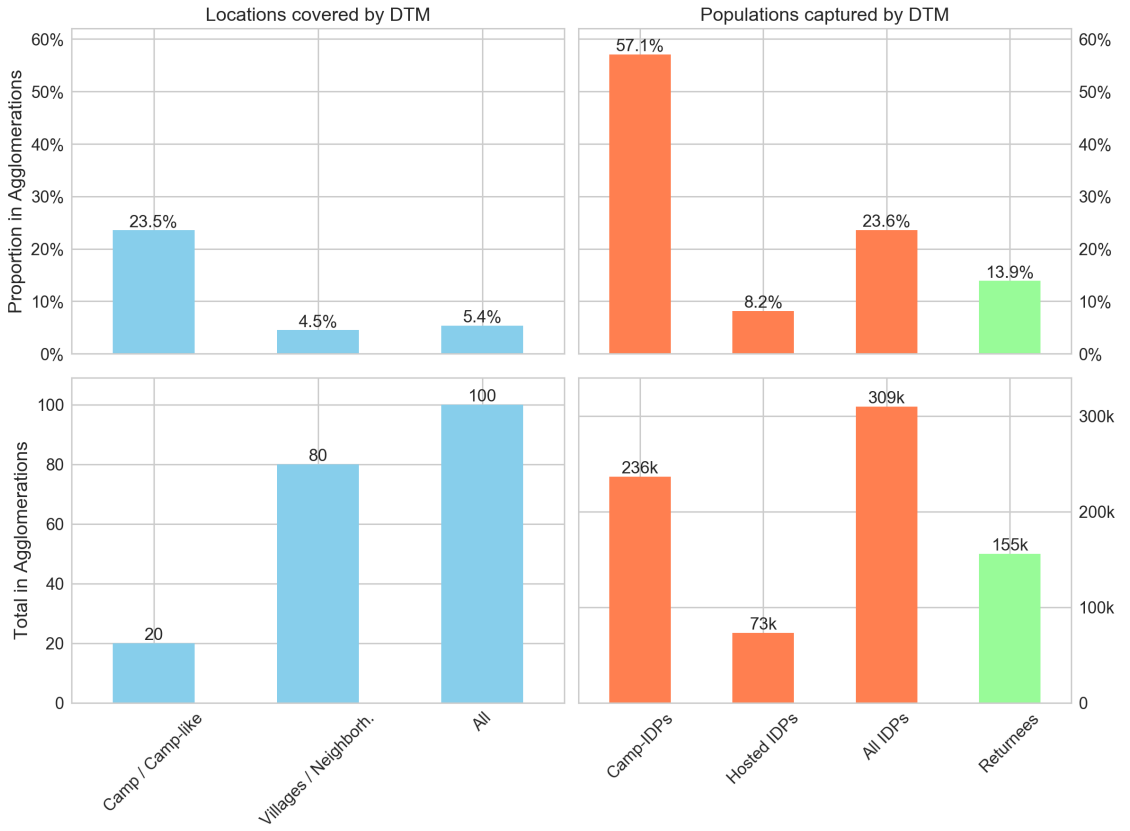

Figure 2: Proportion of IDPs and returnees, captured by DTM round 6 Mobility Tracking, that are located within the World Bank's agglomeration extents.

and IDPs. To this end, two different features of DTM displacement data can be employed a) the timeseries constituted by the total IDP and returnee figures per DTM Mobility Tracking round and b) the disaggregation of IDP and returnee figures by period of arrival as given in the latest round of DTM Mobility Tracking. Both features bear their respective advantages and shortcomings. On the one hand, using the total population figure per round is more precise yet only allows to look back to December 2018. Furthermore, DTM coverage kept increasing since then and IDP/returnee caseload growth caused by growth in coverage has to be carefully distinguished from actual IDP/returnee population growth. On the other hand, employing the disaggregation by period of arrival allows to look back until 2014, but with lower accuracy. Disaggregated population figures by period of arrival are only collected as part of the DTM Baseline, which is area-based. Therefore, all locations within one Payam are assigned the same relative disaggregation, omitting differences within each Payam. Moreover, the disaggregation based on round 6 data alone – by nature – cannot reveal decreasing trends in a population. That is because it solely refers to the population that is present at the moment of assessment and disaggregates that population by time of arrival. It therefore omits all information on individuals who arrived and left again any time between 2014 and the date of assessment. Below, both approaches are applied and contrasted.

DTM Village/Neighbourhood and IDP Site assessment data allows to distinguish between locations falling within a World Bank agglomeration and those which do not. In Figure 3, the left-most panels depict the cumulated disaggregation by arrival period for returnees (upper panel) and IDPs in host communities as well as camps/camp-like settings (lower panel) based on Mobility Tracking round 6 data. That is, the data

point at a particular time-marker represents the population present in June 2019 that was stated to have arrived in any period before or equal to that time marker. While the nation-wide total of returnees captured by DTM shows a significant increase in absolute terms after the R-ARCSS in September 2018, this increase is much less pronounced for the returnee population that falls within the World Bank's agglomerations. The same is true for the increase in the number of out-of-camp IDPs. In relative terms, the increases in population for the three groups pre and post R-ARCSS in 2018 are similar within the World Bank agglomerations (3.9% for dispersed IDPs, 0.9% for IDPs in camps and 50.0% for returnees) and outside of them (respectively 3.8%, 3.5% and 52.5%). Some differences appear between the last quarter of 2018 and the first half of 2019, in particular for IDPs in camps (1.8% increase within the agglomerations against 11.2% outside of them) and returnees (32.8% increase within the agglomerations against 22.7% outside of them), while the percentage increase in dispersed IDPs remains similar within and outside the agglomerations (respectively 12.3% and 9.2%).

The center panels of Figure 3 display the timeseries as obtained from DTM population totals per round. As mentioned before, the increase that can be observed in the number of returnees and out-of-camp IDPs is mostly caused by an increase in locations covered by DTM. Therefore, the rightmost panels show the same timeseries yet restricted to locations that have been covered by all the three rounds considered[6]. These adjusted timeseries show only a slight increase in the overall number of returnees, which is nearly absent for the returnees located in World Bank agglomerations. Likewise, the overall decrease observed in both camp and out-of-camp IDPs can be hardly observed for IDPs located in the 34 World Bank agglomerations.

In conclusion, on an aggregate level the growth of the agglomerations identified by the World Bank appears unlikely to have been triggered primarily by an influx of returnees and/or IDPs. However, this overall finding hides important variation between individual agglomerations. Figure 4 disaggregates the change in the number of IDPs and returnees over time for the five agglomerations with the highest estimated population by group. A sharp increase in both IDPs and returnees is visible for the Wau agglomeration after the signing of the R-ARCSS in September 2018, with the trend continuing in 2019. There is also a consistent increase in the number of IDPs living in the Yei agglomeration, which reflects the ongoing conflict in the Equatorias region between NAS and SSPDF. Finally, the Malakiya agglomeration in Magwi County shows an increase in both IDPs and returnees according to the disaggregation by period of arrival in round 6, although this cannot be confirmed by the differences between round totals since the agglomeration was not covered in round 4.

3.2 Research Question 2: Identification of Areas of Increasing Returns

Other agglomerations (whether rural or urban) additional to the 34 agglomerations identified by the World Bank, which show rapid population growth due the inflow of returnees, have been determined using DTM and other available data. To this end, DTM South Sudan's County Return Ranking has been employed. This ranking was jointly developed by DTM and IOM South Sudan's transition and recovery experts. It takes into account DTM Baseline population figures (for IDPs, relocatees, returnees and absent residents), Payam total population estimates (as provided by WorldPop[7] and consistent with the UN DESA population projections), as well as data on security incidents and related fatalities provided by the Armed Conflict and Event Data

[6] By construction this excludes any changes in population numbers that resulted in the creation of new settlements or in some settlements losing all of their population.

[7] `https://www.worldpop.org`

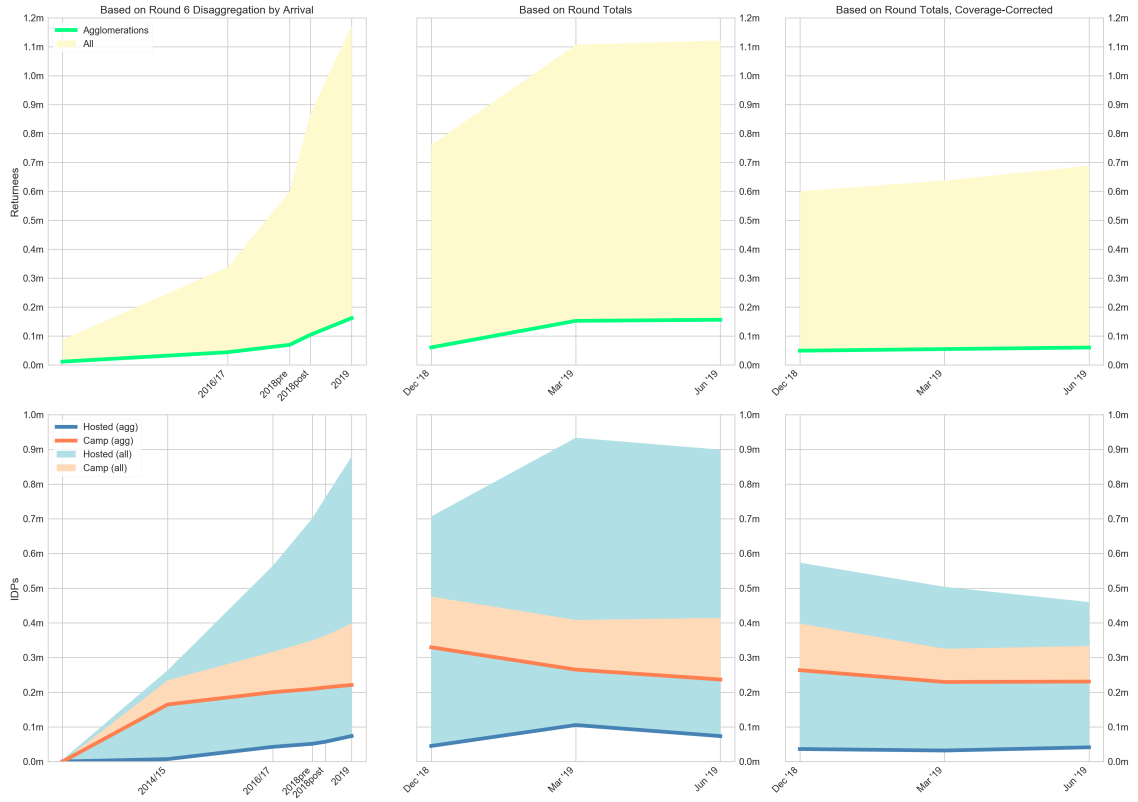

Figure 3: Comparison of growth of populations assessed by DTM within and outside the World Bank's agglomerations.

Project[8] (ACLED). That data is then combined along three dimensions: magnitude of returns (i.e. absolute returnee numbers), relevance of returns (i.e. returnee numbers relative to Payam population[9], IDP caseload, population yet to return) and stability (number of security incidents and related fatalities over time, as well as volatility of returnee numbers).

According to DTM South Sudan's round 6 County Return Ranking, the counties ranking highest in terms of sheer magnitude of return numbers are Wau (Western Bahr el Ghazal State), Rumbek North (Lakes), Magwi (Eastern Equatoria), Juba (Central Equatoria) and Bor South (Jonglei) (see top panel in Figure 5). However, the latter two rank low in terms of stability, which indicates a comparatively high number of security incidents and related fatalities in the 12 months prior to DTM's round 6 Mobility Tracking assessment (June 2019) and/or volatility of returnee numbers observed. Instead, counties ranking highest in terms of relevance of returnee numbers (middle panel in Figure 5) also rank high in terms of stability. These are Nagero, Ezo, Tambura and Mvolo (Western Equatoria State), Rumbek North and Rumbek Centre (Lakes), Wau (Western Bahr el Ghazal), Maban (Upper Nile) and Terekeka (Central Equatoria). In the bottom panel of Figure 5, counties scoring at least 8 out of 10 in terms of magnitude (solid light green) and relevance (dark green hatch) are mapped and compared to the agglomeration extents determined by the World Bank.

The five counties scoring at least 8 out of 10 in terms of returnee magnitude in the ranking (see map in Figure5), corresponding to returnee populations above 45,000 individuals in each county, comprise 165 IDP and/or returnee locations included in the

[8] https://www.acleddata.com
[9] WorldPop 2020 population estimates modelled from the 2008 census.

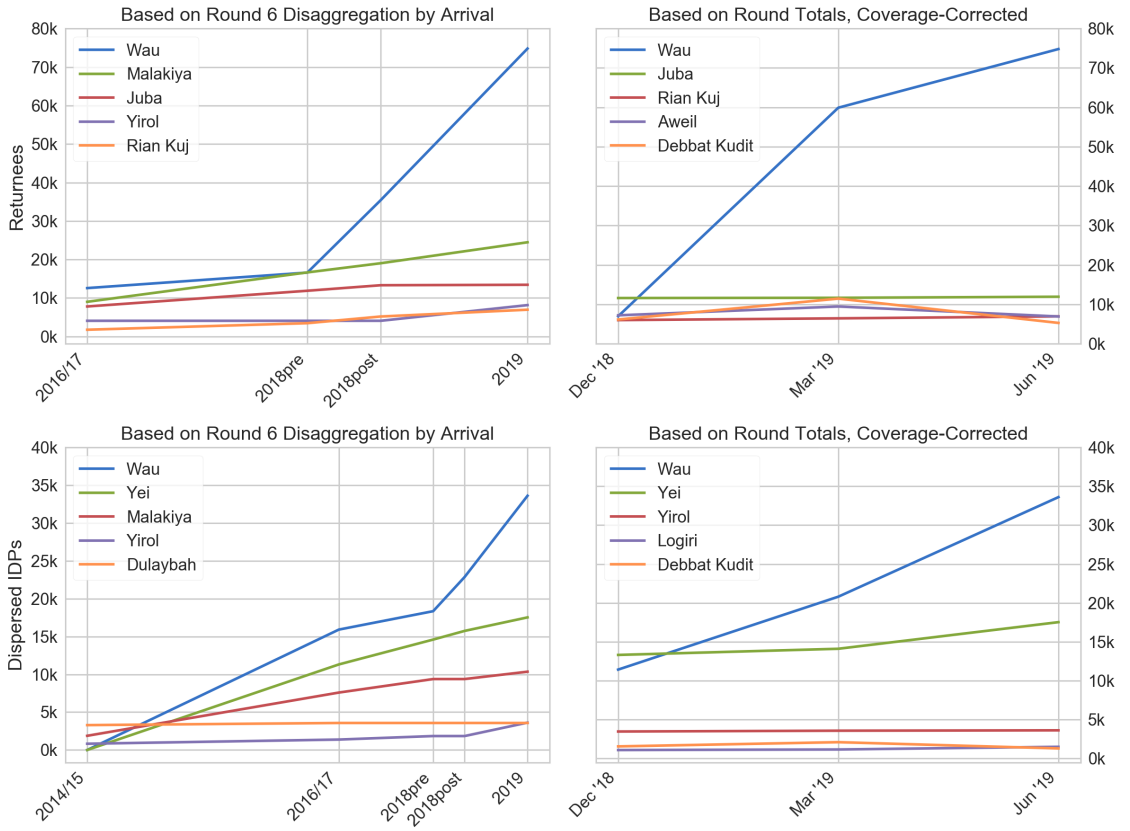

Figure 4: Comparison of growth of returnees and dispersed IDPs in the five World Bank agglomerations with the highest respective populations recorded by DTM.

Village/Neighbourhood and Site assessments. These locations host a total of 336,014 returnees, or 29.9% of the total returnee population in the Village/Neighbourhood assessment. While IDP population was not a criterion used to select the five counties, they also host 251,553 IDPs or 19.3% of the total IDP population in the Site and Village/Neighbourhood assessments, suggesting that conditions conducive to return have also acted as a pull factor for displaced populations. Forty-five of the 165 DTM locations fall within four of the World Bank's agglomerations (Wau, Juba, Malakiya in Magwi County and Mading in Bor South County), hosting 33.1% (n = 111k) of the returnees and 47.1% of the IDPs living in the five counties. As expected, according to the settlement model of the Global Human Settlement Layer (GHSL) most of the locations falling within the World Bank agglomerations in the five counties are located in urban areas (37 locations), with fewer in rural (6 locations) and peri-urban (2 locations) areas. On the contrary, the IDP and/or returnee settlements located in the five counties outside of the World Bank agglomerations are mostly rural (116 locations in rural areas against 6 in urban areas and 2 in peri-urban areas), despite accounting for the majority of the returnee and IDP populations in the five counties. Consistently with national level findings, secondary displacement (5,049 IDPs) and voluntary relocation (6,132 individuals) account for a small share of the estimated population in the five counties according to round 6 Baseline figures.

3.3 Research Question 3: Trends in Population Movements

This section analyses geographical and time trends in population movement since the outset of the crisis, including nationwide rates of return as well as direction and regional patterns of displacement and returns, and settlement characteristics of re-

Rank	County	Magnitude	Relevance	Stability	State
2	Rumbek North	8	9	8	Lakes
4	Wau	10	8	6	Western Bahr El Ghazal
24	Magwi	8	4	7	Eastern Equatoria
26	Juba	8	7	4	Central Equatoria
39	Bor South	8	5	4	Jonglei

Rank	County	Magnitude	Relevance	Stability	State
1	Mvolo	6	9	10	Western Equatoria
2	Rumbek North	8	9	8	Lakes
3	Nagero	5	10	10	Western Equatoria
4	Wau	10	8	6	Western Bahr El Ghazal
6	Maban	6	8	8	Upper Nile
7	Ezo	6	8	8	Western Equatoria
10	Terekeka	6	8	7	Central Equatoria
14	Tambura	6	8	6	Western Equatoria
22	Rumbek Centre	5	8	6	Lakes

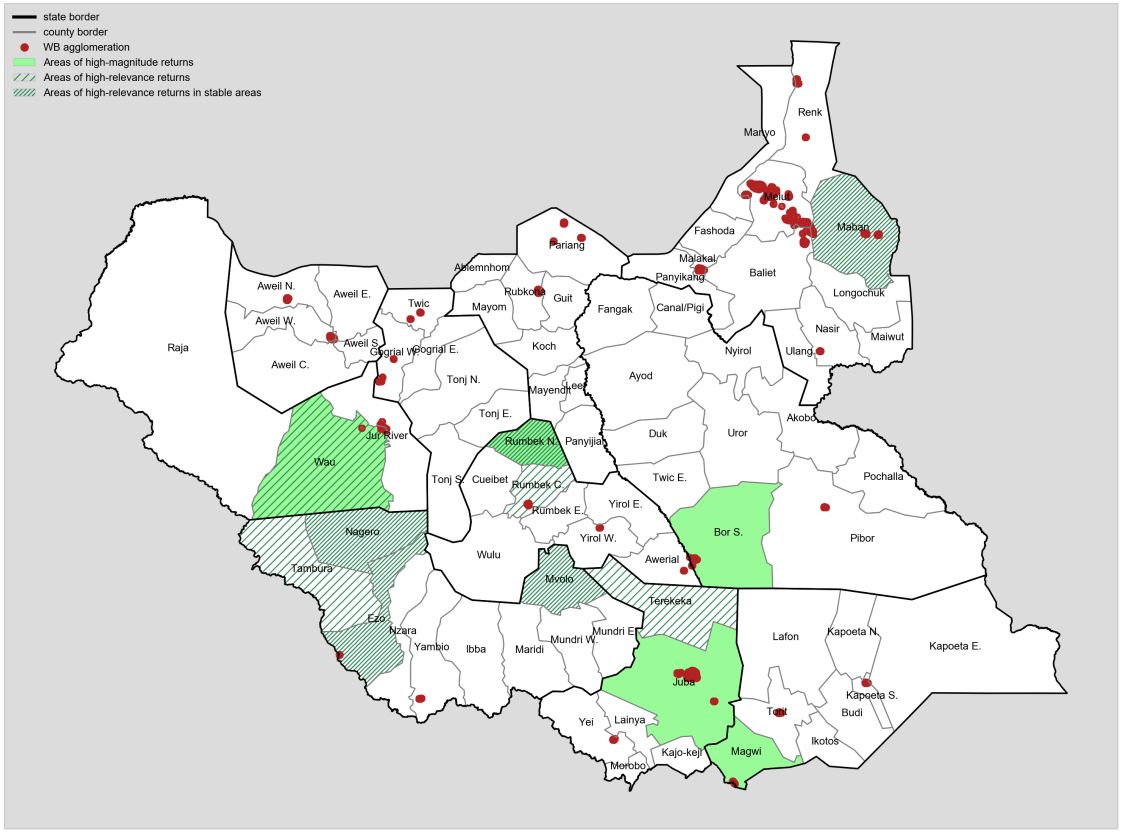

Figure 5: Upper table: Counties ranking highest in terms of sheer magnitude of return numbers according to DTM South Sudan's round 6 County Return Ranking. Lower Table: Counties ranking highest in terms of relative magnitude (with respect to IDPs and residents) of return numbers according to DTM South Sudan's round 6 County Return Ranking. Bottom panel: Map of counties scoring at least 8 out of 10 in terms of magnitude (solid light green) and relevance (dark green hatch) of returns according to DTM South Sudan's round 6 County Return Ranking. The boundaries on the map do not imply official endorsement or acceptance by the Government of the Republic of South Sudan or by IOM. IOM cannot guarantee that the map is error free and therefore accepts no liability for consequential damages arising from its use.

turnees. Further, demographic changes that may have resulted from displacement and return flows are discussed.

3.3.1 Nationwide Rates of Return

Rates of return over time are investigated by looking at the relative difference in county-level returnee numbers as assessed in DTM Mobility Tracking round 6 (June 2019) with respect to round 5 (March 2019). The analysis is necessarily restricted to the 74 counties which were assessed in both rounds[10]. In seven counties (Maban, Leer, Raja, Nzara, Rumbek North, Mayiendit and Gogrial East), the returnee population as of June 2019 had more than doubled relative to March 2019. On the other hand, six counties (Awerial, Pariang (Ruweng), Torit, Jur River, Yirol East and Twic East) showed a decline in the number of returnees above 30%.[11] While these are extreme cases, the upper panel of Figure 6 provides a histogram reflecting the distribution of relative return rates across the 288 payams analyzed. Among the majority of counties (64.9%) which experienced an increase in returnees during the period, close to two thirds showed a moderate increase under 50%. For comparison, the distribution of relative return rates across the subset payams that overlap with one or more of the 34 World Bank agglomerations is given as well. Both distributions exhibit a similar shape, indicating that the World Bank agglomerations do not exhibit a specific tendency towards positive or large rates of return. This is further confirmed by the map in the lower panel of Figure 6. This map indicates the location of positive and negative return rate payams with respect to the World Bank agglomerations and reveals no correlation between these areas.

3.3.2 Direction and Regional Patterns of Displacement/Return Movements

The analysis of displacement and return movement patterns based on DTM Mobility Tracking data is challenging due to the fact that Mobility Tracking is a response oriented data collection tool and hence focuses much more on the location and situation of displacement/return than the location and situation of origin of IDPs or location of previous displacement of returnees. The latter however are crucial ingredients for the identification and reconstruction of population movement patterns and networks from data.

More specifically, the DTM Baseline assessment captures: a) the county of origin of the relative majority of IDPs that arrived during a given period in a given payam, and b) the county of previous displacement of the relative majority of IDP returnees that returned during a given period to a given payam. A disadvantage of this data, however, is that – owing to the linkage of origin / previous displacement data to the disaggregation by period of arrival – no precise statement about the area of origin / previous displacement of the overall relative majority of IDPs/returnees present in a location can be made. As an approximation, the entire IDP/returnee population that arrived in a certain period has been assigned to the area of origin / previous displacement reported for the relative majority associated with that period. Hence, any result obtained is only indicative and in no way to be interpreted in a quantitative manner.

Figure 7 illustrates the indicative patterns of IDP (red) and returnee (green) movements approximated based on DTM round 6 Baseline Assessment data. Several characteristics of these patterns stand out from that Figure and are discussed below.

[10] Despite being assessed in both rounds, Luakpiny (Nasir) was excluded due to anomalies in round 5 data.

[11] Declining numbers of returnees were often linked to communal clashes resulting in new displacements, including of recently returned populations. For instance, clashes between the Dinka from Warrap and Jur community of Western Bahr el Ghazal State, affected the population of Jur River County, resulting in significant displacement that is the subject of a separate DTM report.

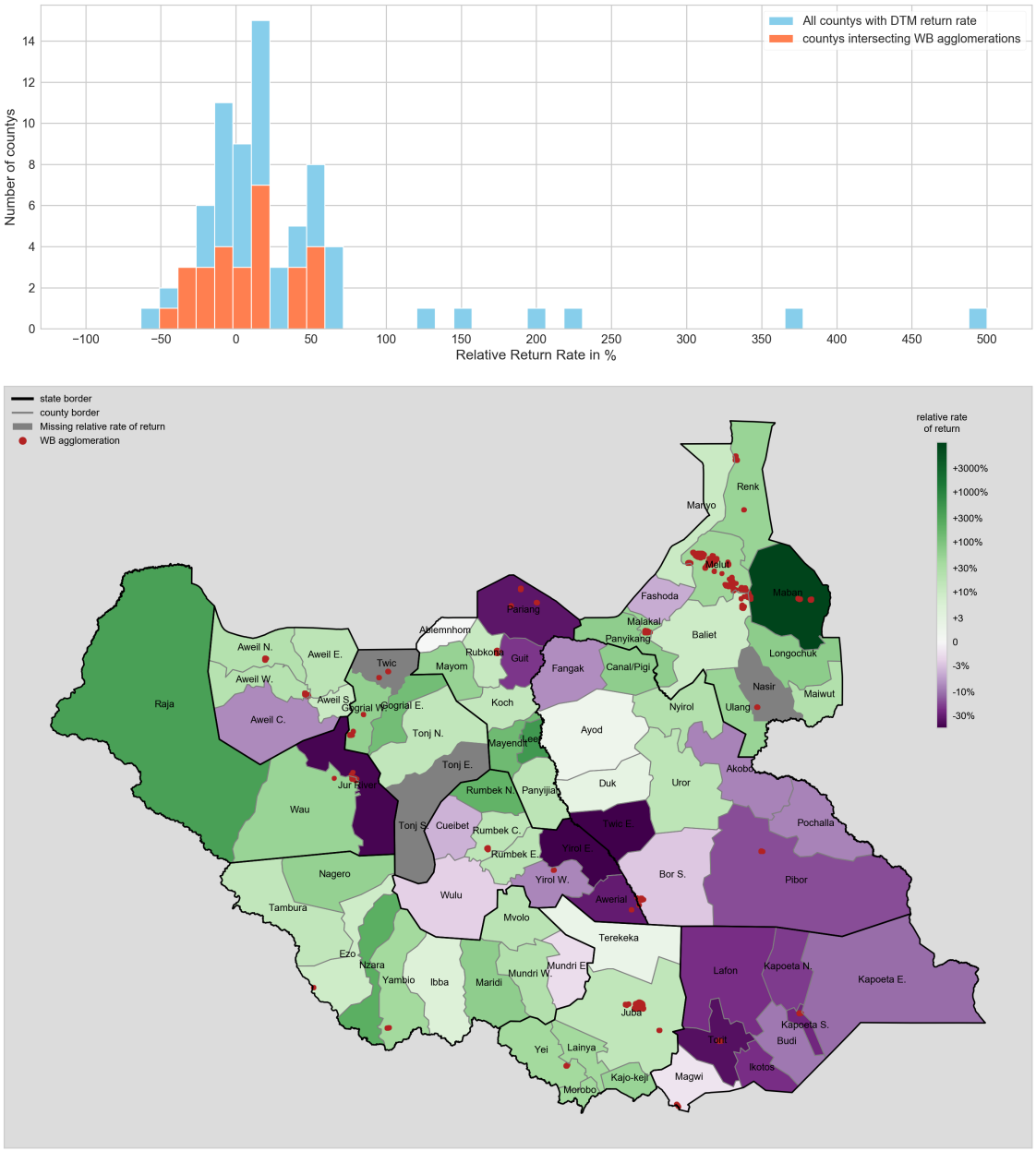

Figure 6: Upper panel: Histogram of the distribution of relative return rates across the 74 return counties assessed by DTM Mobility Tracking in both round 5 and 6 (blue) as well as the subset of those counties that overlap with one or more of the 34 World Bank agglomerations (orange). Maban County had a rate of return higher than the range displayed in the histogram. Lower panel: location of positive and negative return rate payams with respect to the 34 World Bank agglomerations. The boundaries on the map do not imply official endorsement or acceptance by the Government of the Republic of South Sudan or by IOM. IOM cannot guarantee that the map is error free and therefore accepts no liability for consequential damages arising from its use. Payam boundaries are estimated based on voronoi cells.

Intra-state displacement. The significantly darker patches on the diagonal of the left panel of Figure 7 indicate that displacement (and consequently IDP return) predominantly takes place within one and the same state. See (1) in Figure 7; the upper right and lower panels in the same figure provide a breakdown of intra- and inter-county flows for the three states with the highest intra-state IDP populations (Unity, Western Bahr el Ghazal and Jonglei).

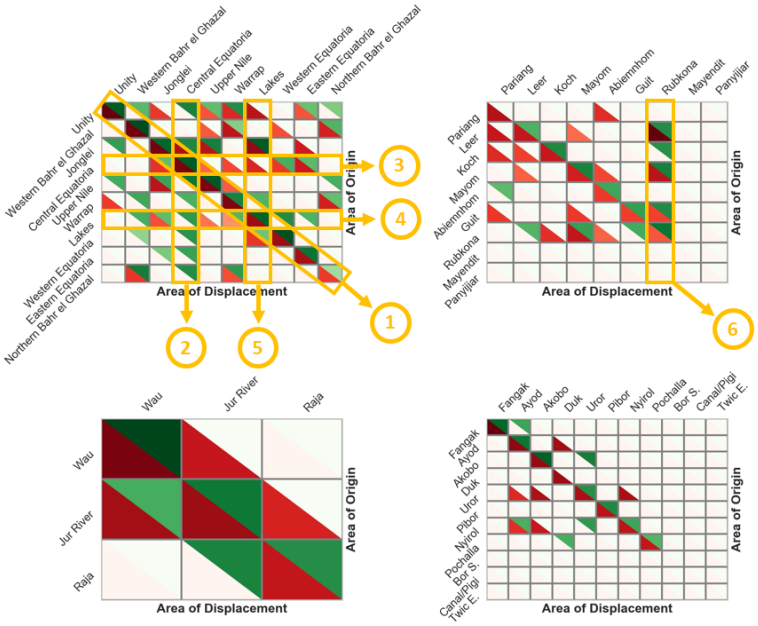

Figure 7: Indicative patterns of IDP (red) and returnee (green) movements according to DTM round 6 Baseline Assessment. The darker the color the larger the population that fled/returned from one area to another. Upper left panel: approximated magnitude of IDP and returnee flows between all 10 states of South Sudan. Upper right panel: approximated magnitude of IDP and returnee flows between the counties of the state of Unity. Upper right panel: approximated magnitude of IDP and returnee flows between the counties of the state of Western Bahr el Ghazal. Lower right panel: approximated magnitude of IDP and returnee flows between the counties of the state of Jonglei. Notes: 1 – intra-state displacement and returns, close to no intra-state returns in Northern Bahr el Ghazal; 2 – many returns of population that had been displaced to Central Equatoria to outside Central Equatoria; 3 – many returns from outside Lakes to Lakes and little remaining displacement from Lakes to outside Lakes; 4 – Rubkona observes a wide range of counties of origin and largest IDP populations in Rubkona stem from Leer and Mayom rather than Rubkona itself.

Diversity of origins. Simultaneously to the predominant intra-state displacement, however, the fact that the left panel of Figure 7 is far from scarcely populated, indicates a variety of states of origin outside the state of displacement. These cross-state displacement and return flows are lower in magnitude but can be observed for all 10 states of South Sudan without exception.

Central Equatoria. Central Equatoria is the most diverse state in terms of displacement and return movements from and to other states. Remarkably, while significant return movements are estimated to have taken place from Central Equatoria to other states, return flows from outside back to Central Equatoria are estimated to be small and populations originating from Central Equatoria and remaining in displacement outside of it are significant and present in six different states. See (2) and (3) in Figure 7.

Lakes. The state of Lakes is notable as the only state which, in the past, had observed displacement from its locations to all but one (Northern Bahr el Ghazal) other state in South Sudan. Despite that, it experienced significant returns from all but two of these states. Populations remaining displaced outside Lakes as of DTM Mobility Tracking round 6 (June 2019) are observed only for Jonglei, Upper Nile and Warrap. In the case of all other states, remaining displaced populations from Lakes are estimated to be very small as Lakes counties are no longer recorded as county of origin for relative majorities of IDPs having arrived outside Lakes in a given period. Lastly, Lakes is estimated to host a significant IDP population stemming from the state of

Jonglei, as well as IDP populations from Unity, Central and Western Equatoria. See (4) and (5) in Figure 7.

Unity. Unity is the state with the largest remaining case-load of both intra-state and total IDPs, which can be inferred from dark color and top left position in the left panel of Figure 7 whose diagonal is sorted by magnitude of intra-state IDP population. Hosting such a large IDP intra-state caseload, displacement and return patterns within Unity have been studied more closely and are depicted in the upper right panel of Figure 7. Similar to the state-level flows, county-level displacement and return flows in Unity involve important intra-county flows but also significant instances of inter-county displacement and return. Key counties displaying inwards displacement are Rubkona – whose largest IDP populations stem from Leer and Mayom rather than Rubkona itself – Mayom and Pariang. As of round six, significant returns had taken place intra-county, with the exception of Pariang, and inter-county primarily from and to Rubkona. See (6) in Figure 7.

3.3.3 Settlement Characteristics of IDPs/Returnees

The majority of IDPs, returnees and relocated individuals are concentrated in rural areas. One hundred forty-two locations included in the Site and Village / Neighbourhood assessment are located in urban or peri-urban areas according to the GHSL, hosting 18.4% (n=206k) of returnees and 12.2% (n=159k) of IDPs. According to Baseline figures, the share of relocated individuals living in urban areas is 15.2% (n=8k)[12].

3.3.4 Demographic Changes Resulting from IDP and Returnee Flows

DTM Village/Neighbourhood Assessment provide an estimate of the demographics of IDPs and returnees present in a given location. If aggregated to a nationwide estimate of South Sudan's IDP and returnee populations' demographics, this can be compared to the 2020 population prospects provided by the Population Division of the UN Department of Economic and Social Affairs (UN DESA) for South Sudan. Such comparison is illustrated in Figure 8. As can be inferred from the figure's upper left panel, depicting the UN DESA prospect, the South Sudanese population pyramid exhibits the typical features of an expansive pyramid: highly populated younger age groups, as observed for countries with high birth rate and low life expectancy. Such populations are fast-growing, with each birth cohort exceeding in size the previous year's one. DTM demographic estimates for IDPs and returnees (see panels in upper center and upper right of Figure 8) do not allow for an immediate conclusion on the type of population structure, as its age groups are not equidistant. A regrouping of both the UN DESA and DTM demographic data enables to make some relative statements, though even so the different bins do not allow a perfect comparison. The result of such regrouping is depicted in the lower panels of Figure 8. The comparison reveals that children and adults older than 45 are over-represented among IDPs and returnees with respect to the general population of South Sudan. There is also a noticeable gender bias, with more women and girls than men and boys among IDPs and returnees than in the general population.

[12] DTM publishes updated breakdowns of the IDP and returnee population by IDP settlement type (site or host community), IDP / returnee settlement size and urban class in the summary reports for each Mobility Tracking round available at `https://displacement.iom.int/south-sudan`.

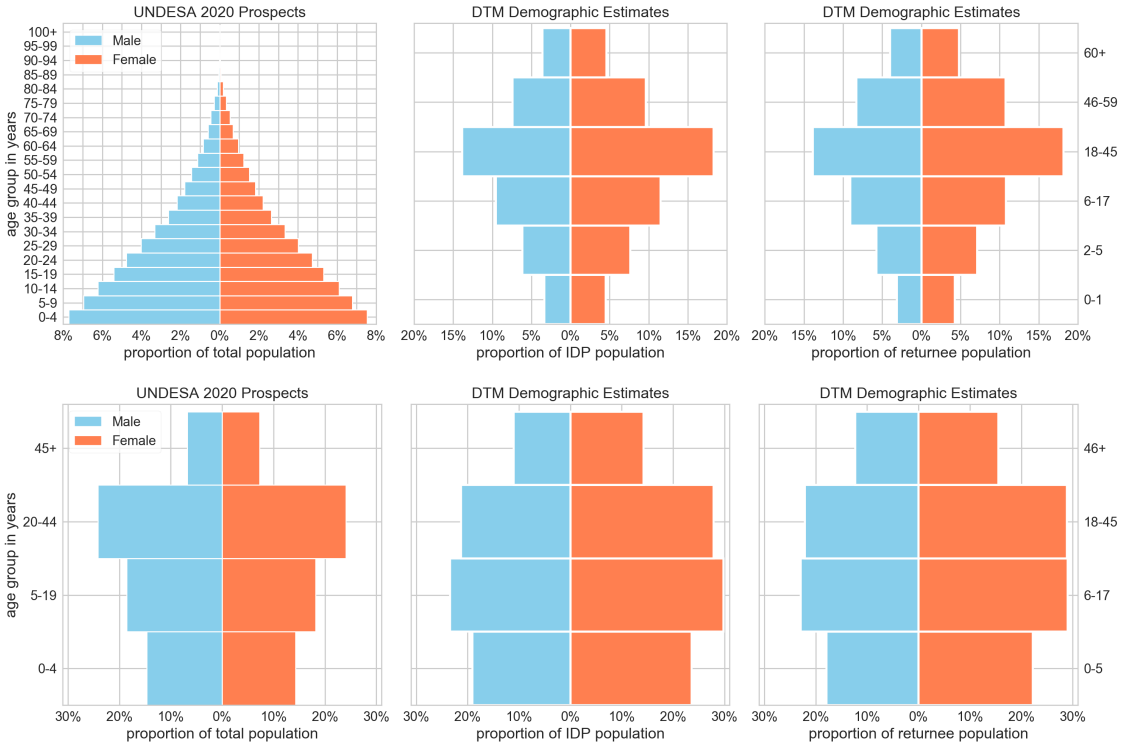

Figure 8: Upper left panel: 2020 population prospects provided by the Population Division of the UN Department of Economic and Social Affairs (UN DESA) for South Sudan. Upper center panel: DTM round 6 estimate of South Sudan's IDP population in June 2019. Upper right panel: DTM round 6 estimate of South Sudan's returnee population in June 2019. Lower panels: same population data as in upper panels but grouped into similar bins for better comparison.

4 Discussion

The overlay of the World Bank agglomerations with DTM Mobility Tracking data on IDP and returnee populations does not suggest that these agglomerations experienced, on aggregate, displacement or return induced population growth. This result may have been driven by a mis-identification of non-residential built-up during the process of agglomeration selection and by the use of a built-up layer pre-dating the 2016 conflict, and thus not adequately capturing recent constructions.

In the bottom panel of Figure 5, counties scoring at least 8 out of 10 in terms of magnitude and relevance of IDP and refugee returns according to IOM South Sudan's Return Payam Ranking are contrasted with the agglomeration extents determined by the World Bank. The overlap is small in both cases. Moreover, while the 34 World Bank agglomerations comprise only 5.4% of all IDP and returnee locations covered by DTM round 6 Village/Neighbourhood and Site assessments, a much larger share of 23.5% of the IDP camp and camp-like settings assessed by DTM fall within the agglomerations.

One reason might be that the World Bank's agglomerations are identified based on built-up and nightlights drawn from satellite imagery. As street lights are extremely rare in South Sudan, the agglomerations may tend to represent military bases, oil stations and large IDP camps, which are often lit and accompanied by large building infrastructure. The agglomerations identified in Melut, for example, are very likely related to oil extraction activities rather than to IDP or returnee influxes.[13] This hy-

[13] https://unmiss.unmissions.org/profile-melut-county-lure-oil

pothesis is further supported by the observation that most settlements identified by DTM as experiencing relevant return movements are situated in rural areas and therefore tend to lack night light infrastructure.

5 Conclusion and way forward

In the above analysis, 34 agglomerations selected by the World Bank as potentially large and rapidly growing population centers were characterized based on IDP and returnee population data provided by IOM South Sudan's Displacement Tracking Matrix. Using DTM data, the analysis determined the degree of overlap between these agglomerations and the concentration of returnees in the country. Of all IDP and returnee locations covered by DTM round 6 Mobility Tracking Assessments, 5.4% (n=100) fall within the extent of the 34 agglomerations provided by the World Bank. In terms of IDP and returnee populations, the World Bank agglomerations comprise 23.6% (n=309k) of all IDPs and 13.9% (n=155k) of all returnees captured by the DTM Site and Village/Neighbourhood assessment. Based on DTM time series data, the aggregate growth in the 34 agglomerations does not appear to be due to an influx of IDPs, returnees and/or relocated individuals. There are, however, exceptions to this aggregate finding among individual agglomerations, most notably Wau.

The analysis identified instead five counties – Wau (Western Bahr el Ghazal State), Rumbek North (Lakes), Magwi (Eastern Equatoria), Juba (Central Equatoria) and Bor South (Jonglei) – showing rapid population growth due the inflow of returnees based on DTM data. The majority of the IDPs and, especially, returnees living in these five counties are not located in agglomerations identified by the World Bank but live in primarily rural settlements outside of the 34 agglomerations. Seven additional counties with lower overall returnee figures were identified as potential areas of interest given their relative stability and high share of returnees relative to total population.

Finally, this report investigated geographical, temporal and demographic trends in population movements. It was shown that while most displacement took place intrastate, there is significant diversity in the geographic spread of displaced populations. Nationwide rates of return were provided for 74 counties, showing an increasing trend for a majority of counties between March and June 2019. Lastly, potential demographic changes in areas of return where studied by comparing DTM's demographic estimates of the nationwide IDP and returnee population to UN DESA general population prospects for South Sudan. It was found that IDP and returnee populations comprise comparatively larger proportions of adults older than 45 years, children and women.

The current analysis suggests a number of areas for further research that could help inform transition and early recovery planning. Firstly, as the situation in South Sudan remains fluid with both spontaneous returns and new displacement ongoing, it would be advisable to revisit the analysis of population movement trends on a yearly basis – relying on new rounds of Mobility Tracking – in order to account for new developments. Future iterations of this analysis could dedicate additional space to smaller population groups that could not be discussed in detail in the current report, such as relocated individuals and those affected by secondary or multiple displacement. Secondly, the current analysis identifying key areas of return could be expanded by investigating push and pull factors correlated with return movements and lack thereof. The factors in question would include both conflict dynamics and access to services, and the analysis could be disaggregated geographically, by type of settlement (rural/urban as well as displacement in camps/camp-like settings or host communities) and, to the extent possible with existing data, by proxied ethnic origin of the displaced population. Thirdly, future household-level data collection on displaced and returned

populations would enable a more in-depth analysis of demographic trends, including vulnerabilities and known determinants of human and social capital.