

A research paper titled

**DEMOGRAPHIC CHANGE, FORCED DISPLACEMENT, AND URBAN
GROWTH IN A BORDER CITY: EVIDENCE FROM MAFRAQ, JORDAN**

Prepared by

Hani Fahid Men'e AlFawaz

Head of the Planning Department

Sabha and Al-Dafyana Municipality

Abstract

Rapid demographic change can place substantial pressure on the urban form, land-use structure, housing supply, and public services of cities located near displacement corridors. This study examines the relationship between demographic change and urban development in Mafraq, Jordan, with particular attention to the period of Syrian forced displacement beginning in 2011. The study draws on the source thesis's review of demographic records, municipal plans, historical aerial imagery, field observations, interviews with local stakeholders, and a questionnaire analyzed using SPSS. The thesis reports a questionnaire sample of 489 respondents and identifies unplanned housing, pressure on infrastructure, and the need to revise urban-development plans as central concerns. The reported overall mean for the study criteria was 3.48 (SD = 1.12). The item stating that unplanned housing contributes to urban expansion and environmental and economic problems received a mean of 3.87 (SD = 1.09), while the item stating that population growth improved service quality received a mean of 3.12 (SD = 1.17). The thesis proposes managing future expansion along north-western and southern corridors and considering planned satellite neighborhoods connected to the existing urban core. The findings support a planning approach that links demographic monitoring with land-use regulation, infrastructure capacity, and inclusive neighborhood development.

Keywords: forced displacement; Syrian refugees; urban growth; urban morphology; land-use planning; Mafraq; Jordan.

المخلص

يمكن أن يؤدي التغير الديموغرافي السريع إلى فرض ضغوط كبيرة على النسيج العمراني، وهيكلة استخدام الأراضي، وتوفير السكن، والخدمات العامة في المدن الواقعة بالقرب من مسارات النزوح. تبحث هذه الدراسة في العلاقة بين التغير الديموغرافي والتنمية الحضرية في مدينة المفرق بالأردن، مع التركيز بشكل خاص على فترة النزوح القسري للسوريين التي بدأت عام 2011. وتستند الدراسة إلى مراجعة السجلات الديموغرافية، والمخططات البلدية، والصور الجوية التاريخية، والملاحظات الميدانية، والمقابلات مع الأطراف المعنية محلياً، بالإضافة إلى استبانة تم تحليل بياناتها باستخدام برنامج (SPSS) وقد شملت عينة الدراسة 489 مشاركاً، وأظهرت النتائج أن السكن غير المخطط له، والضغط على البنية التحتية، وضرورة مراجعة خطط التنمية الحضرية، تُعد من القضايا الجوهرية. بلغ المتوسط العام لاستجابات المشاركين حول معايير الدراسة 3.48 (بانحراف معياري قدره 1.12). وقد حصلت العبارة التي تشير إلى أن السكن غير المخطط له يسهم في التوسع العمراني ويخلق مشكلات بيئية واقتصادية على متوسط 3.87 (بانحراف معياري 1.09)، في حين حصلت العبارة التي تقيد بأن النمو السكاني أدى إلى تحسين جودة الخدمات على متوسط 3.12 (بانحراف معياري 1.17). وتوصي الدراسة بإدارة التوسع المستقبلي على طول المحورين الشمالي الغربي والجنوبي، والنظر في إنشاء أحياء تابعة (أحياء ساتلية) مخططة ترتبط بمركز المدينة القائم. وتدعم هذه النتائج نهجاً تخطيطياً يربط بين الرصد الديموغرافي وتنظيم استخدام الأراضي، وقدرة البنية التحتية، والتنمية الشاملة للأحياء السكنية.

الكلمات المفتاحية: النزوح القسري؛ اللاجئين السوريون؛ النمو الحضري؛ المورفولوجيا الحضرية؛ تخطيط استخدام الأراضي؛ المفرق؛ الأردن.

<https://jaspss.com>

1. Introduction

Urban growth is shaped by the interaction of natural population increase, migration, economic opportunity, housing demand, transport accessibility, and planning policy. When demographic change occurs rapidly, the pace of development may exceed the capacity of existing plans and infrastructure. The resulting pressures can be reflected in outward expansion, increased building density, changes in land use, and greater demand for water, sanitation, education, health care, roads, and affordable housing. These challenges are especially relevant to cities near international borders that receive displaced populations. In northern Jordan, Mafraq is close to the Syrian border and has experienced demographic and service-delivery pressures associated with the displacement of Syrians since 2011. The source thesis describes a city whose earlier growth was concentrated along major roads and whose later development raised concerns about unplanned housing, the adequacy of structural plans, and the ability of basic services to respond to changing demand. Despite the importance of this issue, a useful urban-planning assessment must distinguish between three related but different processes: demographic change, the physical expansion of the built-up area, and residents' or stakeholders' perceptions of the consequences of that change. Treating these as equivalent can lead to overstated causal claims. This study therefore frames the Mafraq case as a mixed-source assessment combining demographic context, documentary and spatial interpretation, and questionnaire evidence.

1.1. Aim and research questions

The aim is to assess how demographic change, including forced displacement, is associated with urban development pressures and planning needs in Mafraq. The analysis is guided by three questions:

1. How has Mafraq's demographic context changed, and what pressures on the urban system are identified in the source study?
2. How do questionnaire respondents assess the relationship between population change, unplanned development, and urban services?
3. Which spatial planning directions are proposed to accommodate future growth while maintaining the city's identity and service capacity?

2. Study area and context

Mafrq is located in northern Jordan, near the Syrian border. The thesis selected the city because of its exposure to natural population growth and the arrival of Syrian refugees. It describes historical urban development as initially following major road corridors, with subsequent expansion and increasing pressure on the built environment and public services. The thesis uses municipal plans and aerial imagery for selected years from 1978 to 2016 to discuss changes in the built-up area.

The demographic figures quoted in the thesis refer to the historical study period, particularly 2011–2016. They should not be interpreted as current population or refugee estimates. A journal updates the context using official Jordanian Department of Statistics and UNHCR datasets, while preserving the historical period needed to analyse the thesis's original case.

3. Materials and methods

3.1. Research design

The source study uses a multi-method design combining (i) a review of published and administrative documents, (ii) interpretation of municipal plans and historical aerial imagery, (iii) field visits and interviews with local stakeholders and urban-design specialists, and (iv) a questionnaire analyzed in SPSS. This design provides complementary contextual, spatial, and perception-based evidence. However, the manuscript should not claim that questionnaire responses alone establish a causal effect of refugee arrivals on physical urban expansion.

3.2. Data sources and spatial assessment

The thesis reports using population statistics from Jordan's Department of Statistics, municipal structural and regulatory plans, information from the Greater Mafrq Municipality, refugee-related information attributed to UNHCR Jordan, and historical aerial imagery obtained from municipal sources and Google Earth. The years discussed for built-up development include 1978, 1984, 1992, 2004, and 2016. In the current manuscript draft, these images are treated as documentary evidence of urban-form change rather than as a fully quantified remote-sensing time series.

<https://jaspss.com>

The images should be georeferenced to a common coordinate system, clipped to a clearly defined study boundary, and classified using a consistent built-up/non-built-up scheme. The analysis should report built-up area in square kilometres or hectares for each date, absolute and percentage change between dates, classification accuracy, and the uncertainty associated with image resolution and boundary differences. These measurements are not invented in this draft because the thesis extract does not provide a complete, reproducible area dataset.

3.3. Questionnaire and statistical analysis

The thesis reports a questionnaire sample of 489 respondents. It describes the use of SPSS, descriptive statistics, factor analysis with Varimax rotation, Cronbach's alpha, one-sample t-tests, collinearity assessment using the variance inflation factor (VIF), and multiple regression. The full questionnaire, sampling frame, response rate, scale anchors, missing-data procedure, and complete SPSS output should be reported in the final manuscript. The exact values in the original inferential tables must be checked against the source output because the extracted thesis text contains apparent inconsistencies in some test statistics.

3.4. Ethical considerations

Before submission, the authors should state whether institutional ethical approval was obtained, how participants were informed about the study, whether consent was recorded, and how questionnaire and interview data were anonymized. These details are not sufficiently established in the material extracted for this draft and must be completed from the original research records.

4. Results

4.1. Demographic and urban-development pressures

The thesis describes substantial demographic change in Mafraq during the period associated with the Syrian displacement crisis. It links this change to rising demand for housing and public services and to concerns about unplanned development. These observations are consistent with later city-level planning work that identifies population growth, infrastructure gaps, affordable housing, and service provision as central urban challenges in Mafraq (UN-Habitat, 2024). However, the present study does not provide a complete, consistently dated population series that would allow the independent contribution of natural increase and forced displacement to be quantified. The results

<https://jaspss.com>

are therefore interpreted as evidence of perceived and spatially observed pressure, rather than as a causal estimate of refugee-related urban growth.

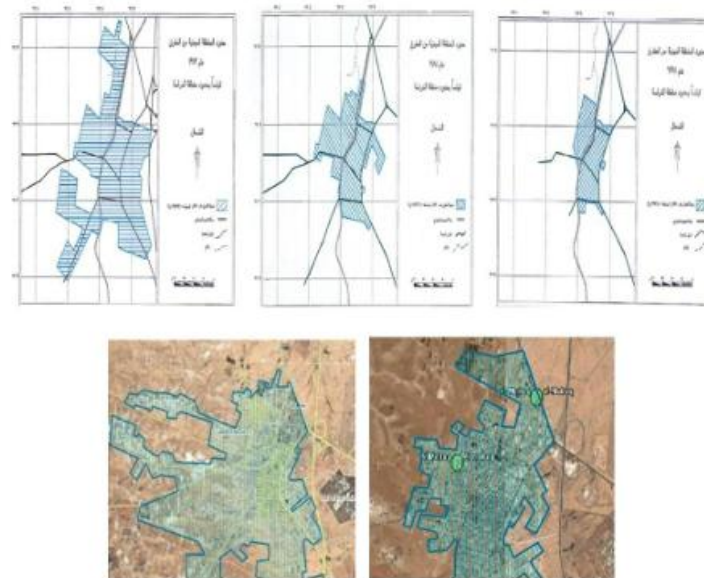


Figure 1. Historical stages of built-up expansion in Mafrq City (1979, 1984, 1992, 2004, and 2016). Source: reproduced from Al-Fawaz's thesis; the original sources are identified as the Royal Geographic Centre and Google Earth, edited by the researcher.

4.2. Descriptive questionnaire findings

The questionnaire data recovered from the thesis indicate an overall mean of 3.48 (SD = 1.12) across the study criteria. Among the individual items that could be read reliably, respondents most strongly endorsed the statement that unplanned housing contributes to urban expansion and environmental and economic problems (M = 3.87, SD = 1.09). The item stating that population growth had improved service quality received a lower mean (M = 3.12, SD = 1.17). Taken together, these descriptive results suggest that respondents were more concerned about the consequences of unplanned development than convinced that population growth had improved service delivery. The interpretation remains descriptive because the questionnaire scale anchors and full item-level dataset must be checked against the original instrument before inferential claims are made.



Figure 2. Urban fabric and selected road connections in Mafrq City. Source: reproduced from Al-Fawaz's thesis; based on Google Earth imagery (2016), edited by the researcher.

Table 1. Descriptive statistics for selected questionnaire indicators reported in the source thesis.

Questionnaire indicator	Mean	Standard deviation	Interpretation reported/indicated
Overall study criteria	3.48	1.12	Moderate overall level (as described in the thesis)
Unplanned housing contributes to urban expansion and environmental/economic problems	3.87	1.09	Highest of the recoverable items; relatively strong concern
Population growth has improved the quality of services provided in the city	3.12	1.17	Lowest of the two recoverable items; moderate agreement/assessment

Note: The questionnaire scale anchors and the full set of item statistics must be restored from the original thesis/SPSS output before submission. The table intentionally includes only values that can be read with reasonable confidence from the extracted text.

4.3. Hypothesis testing and model reporting

The thesis reports one-sample t-tests for its hypotheses and a multiple-regression model in which natural population growth and the increase in migrants were treated as predictors of urban growth.

<https://jaspss.com>

The available extracted table and narrative are not fully consistent: one test statistic is reported differently in the table and accompanying text, and the regression coefficients cannot be recovered with sufficient confidence. Accordingly, this manuscript does not reproduce the uncertain regression coefficients or claim that either predictor has a statistically established independent effect. Before submission, the authors should re-export the original SPSS tables and verify the test statistic, degrees of freedom, p-values, regression coefficients, confidence intervals, model fit, VIF values, and the exact dependent-variable definition.





Figure 3. Field photographs illustrating selected street, building-frontage, traffic, and waste-management conditions recorded in Mafraq on 14 May 2016. Source: researcher's photographs reproduced from the thesis. These images document historical conditions and should not be read as current observations.

Table 2. Statistical analyses reported by the source thesis and items requiring verification.

Analysis in the thesis	Purpose	Information required for a publishable report
One-sample t-test: natural population growth	Test the first stated hypothesis	Test value, mean difference, t, df, exact p, 95% CI, and rationale for the test value
One-sample t-test: increase in migrants	Test the second stated hypothesis	Test value, mean difference, t, df, exact p, 95% CI, and rationale for the test value
Multiple regression: demographic factors and urban growth	Assess the combined association of natural growth and migrant increase with the urban-growth measure	Outcome definition, unstandardised and standardised coefficients, SE, 95% CI, p-values, R ² /adjusted R ² , F statistic, sample size, VIF, and diagnostics

4.4. Planning directions identified in the source study

The thesis proposes two planning directions: controlled expansion along the north-western and southern corridors, or the development of planned satellite neighbourhoods connected to the existing urban core. The spatial figures reproduced below provide context for these proposals by showing historical built-up patterns, the current urban fabric, and the road corridors discussed in the thesis. These maps are useful for identifying planning questions, but they are not a substitute for a new GIS-based suitability analysis. Any decision on future growth should test land availability, infrastructure capacity, access to public facilities, environmental constraints, and transport connectivity. The need for coordinated, evidence-based neighborhood planning is also emphasized in the Mafrq Spatial Profile and the associated area-planning work for Al Hussein neighborhoods (UN-Habitat, 2024a, 2024b).



Figure 4. Main and secondary roads and the future expansion corridors discussed in the thesis. Source: reproduced from Al-Fawaz's thesis; Google Earth imagery and researcher annotations (2016).

5. Discussion

The findings point to a linked demographic and spatial challenge in Mafrq. The questionnaire results show that respondents recognised unplanned housing as a significant concern, while the historical maps included in the thesis show changes in the built-up footprint across the observation years. These two strands of evidence complement one another: the questionnaire captures local perceptions of urban pressure, whereas the maps illustrate the spatial pattern of development. Neither strand alone establishes that forced displacement caused a specific amount of land conversion. Sqour et al. (2016) similarly describe Mafrq, growth as shaped by several interacting factors, including road connections, institutional and military land uses, and the presence of the Za'atari refugee camp. The current study should therefore frame displacement as one important driver within a wider urban system rather than the sole explanation for expansion.

The proposed north-western and southern growth corridors, together with the alternative of planned satellite neighborhood's, raise an important question of urban form. Corridor-based expansion may connect new development to existing roads, but if it occurs without coordinated infrastructure investment it can also lengthen service networks and reinforce dispersed growth. A multi-nodal strategy may help distribute housing and services, provided that new neighborhoods

<https://jaspss.com>

are connected to public transport, schools, health facilities, water and wastewater systems, and employment opportunities. The 2024 UN-Habitat spatial profile for Mafraq likewise stresses that planning decisions should be grounded in mapped service gaps and coordinated across city and neighborhoods scales (UN-Habitat, 2024a). These are planning implications rather than tested outcomes of the thesis, and they should be presented as such.

The results must be interpreted in light of several limitations. First, the questionnaire findings represent respondents' assessments and should not be treated as direct measurements of demographic causation. Second, the historical maps use different source materials and years, including aerial imagery and Google Earth imagery; the thesis does not report a consistent classification protocol or quantified built-up area for every year. Third, the original statistical outputs contain discrepancies or unreadable values. Finally, the field photographs document selected street and infrastructure conditions at the time they were taken in 2016; they should not be described as evidence of current conditions. These limitations do not remove the value of the case study, but they do mean that stronger causal and spatial claims require verification and additional analysis. This cautious interpretation is consistent with research on the physical and social effects of urban Syrian displacement in Mafraq, which treats urban change as multidimensional and context-dependent (Alhusban et al., 2019).

6. Planning implications

- Update the city's structural plan using a verified population and housing-demand baseline, with explicit scenario assumptions.
- Use GIS-based monitoring to map built-up expansion, vacant or developable land, public facilities, and infrastructure constraints.
- Priorities serviced and connected neighborhood's rather than allowing fragmented expansion along road corridors.
- Assess water, wastewater, health, education, road, and public-transport capacity against projected demand.
- Include residents, municipal planners, service providers, and displaced communities in transparent planning and consultation processes.

<https://jaspss.com>

- Coordinate local development decisions with national agencies and humanitarian actors, while protecting the rights and dignity of displaced populations.

7. Limitations and required revisions before submission

This draft is based on the supplied thesis and its extracted text. Several original tables are not fully recoverable, and at least one test statistic differs between the table and narrative. The study period is historical, and the spatial analysis is not yet presented as a reproducible GIS measurement. The sampling procedure, response rate, questionnaire scale, ethics information, and complete model diagnostics also need to be confirmed. These limitations should be resolved before submission; they should not be concealed by estimating missing values.

- Restore all tables directly from the original thesis or SPSS output, especially factor loadings, Cronbach's alpha, VIF, and regression results.
- Verify population figures and refugee estimates against dated official sources and clearly state the geographical unit (city, district, or governorate).
- Quantify built-up area from consistent imagery and include map scale, north arrow, coordinate reference system, data source, and classification method.
- Rebuild the literature review around recent peer-reviewed work on forced displacement, urban morphology, refugee-hosting cities, and spatial planning.

8. Conclusions

This study examines the relationship between demographic change, Syrian forced displacement, and urban development pressures in Mafraq, Jordan. The source thesis combines documentary and spatial interpretation, field engagement, interviews, and questionnaire analysis. Its recoverable descriptive findings indicate concern about the consequences of unplanned housing and a less positive assessment of improvements in service quality. The thesis recommends guiding future growth along selected urban corridors or through planned satellite neighborhood's connected to the existing center, alongside revision of structural plans and improvement of basic services. For a journal-level contribution, these planning insights should be supported by verified inferential statistics and a reproducible GIS analysis that quantifies the scale, direction, and timing of built-up expansion.

<https://jaspss.com>

References

- Abdu, M., Salagoor, J., & Al-Harigi, F. (2002). Jeddah urban growth and development process: The underlying factors. Scientific Journal of King Faisal University (Basic and Applied Sciences).
- Abu - Ghazalah, S., 21st Century reform of cities, 1990.
- Aga Khan Award for Architecture and Academy Editions (1992), Architecture for a changing World, Academy Editions, London.
- Alhusban, A. A., Alhusban, S. A., & Al-Betawi, Y. N. (2019). Assessing the impact of urban Syrian refugees on the urban fabric of Al Mafraq city architecturally and socially. International Journal of Disaster Resilience in the Built Environment, 10(2/3), 99-129.
<https://doi.org/10.1108/IJDRBE-09-2018-0039>
- Al-Rawashdeh, S., & Saleh, B. (2006). Satellite monitoring of urban spatial growth in the Amman area, Jordan. Journal of Urban Planning and Development, 132(4), 211-216.
[https://doi.org/10.1061/\(ASCE\)07339488\(2006\)132:4\(211\)](https://doi.org/10.1061/(ASCE)07339488(2006)132:4(211))
- Architecture theories, Frank Lloyd Wright and his vision for the urban future, 2011
- Development and Trends of Urban Growth in Mafraq City, Jordan, 2016
- Pilder, Andrew David (2011). Urbanization and Identity: the building of Amman in the Twentieth century. Diss. Miami University
- Preston, Samuel (1979). Urban growth in developing countries: a demographic reappraisal. Population and Development Review (New York), vol. 5, No. 2, pp. 195-215)
- Saqer Mustafa Sqour, (2014), Urban Planning and Design in Times of Rapid-moving Events in Jordan, Journal of Modern Science and Technology.
- Sharaf, F (1996) Releasing the Potential of Neighborhood Regeneration Through Community Participation and Action Planning, Master thesis, York university, U.K
- Spreiregen, Paul D. (1965) Urban design: the architecture of towns and cities, 1st ed, New York: McGraw-Hill.

<https://jaspss.com>

Tarek Abu-zekry, (1989), city size distribution of regional cities and national development - P.H.D
- Cairo university.

Sqour, S. M., Rjoub, A., & Tarrad, M. (2016). Development and trends of urban growth in Mafraq City, Jordan. Architecture Research, 6(5), 116–122. <https://doi.org/10.5923/j.arch.20160605.02>

United Nations Human Settlements Programme. (2024a). Mafraq spatial profile. <https://unhabitat.org/mafra-q-spatialprofile>

United Nations Human Settlements Programme. (2024b). Vision, area planning, and action plan report for Al Hussein neighbourhood. <https://unhabitat.org/ar/vision-area-planning-action-plan-report-for-al-hussein-neighbourhood>