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STRUCTURAL TRANSFORMATION AND GENDER-SPECIFIC LABOUR MARKET FRICTIONS: EVIDENCE FROM NIGERIA

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Structural Transformation and Gender-Specific Labour Market Frictions: Evidence from Nigeria*

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Abstract

The paper studies the implication of sectoral reallocations—the shift of labor from low- to high-productivity sectors— on gender gaps in labor participation in Nigeria. We estimate a household model that allows household production and labor market supply to differ by gender and sectoral productivity to highlight the consequences of gender-specific labor market frictions on women's labor market participation. First, as an outcome of structural transformation, we examine the effect of urbanization on gender differences in employment levels using the household-level dataset in Nigeria from 2010 to 2016. We show that aggregate household workweeks decrease after urbanization, but the negative effects for women are significantly larger than for men. Consistent with the "consumption cities" hypothesis, we find an increase in households' demand for imported food and lower demand for locally grown food as urbanization increases. Second, as a source of structural transformation, we examine the effects of hydrocarbon expansion on gender-specific labor market frictions. Using a difference-in-differences model that exploits variation in oil production and proximity, we compare households residing within 20 km and outside the 20 km of hydrocarbon production in the urban and rural sectors. We find that proximity to oil wells has an adverse effect on women's work, which is more pronounced for women in rural areas. Exploring barriers to transitioning from home to market, we show that proximity to oil fields increases home production activities. These results are robust to multiple specifications and support policies that address the macroeconomic misallocation of female labor resources.

JEL Codes: L16; O18; O55; R11

Keywords: Structural transformation, Gender equality, Labor market integration, Urbanization, Resource Curse, Nigeria

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1 Introduction

A structural transformation that engenders resource reallocation from low to high-productivity sectors is important for enhancing economic development in developing economies. Social scientists have long speculated on the connection between structural transformation and women's labor market participation (Olivetti & Petrongolo 2016, Olivetti et al. 2015, Mammen & Paxson 2000). Yet the question remains (Dinkelman & Ngai 2021): are women significantly worse-off than men in terms of labor market participation as households reallocate from low to high-productivity sectors in developing countries? Alternatively, does extractive sector-led structural transformation improve women's labor market participation? Importantly, do barriers women face due to increased home production during structural transformation constitute talent misallocation? Understanding these gender-specifics is important given the link between women's labor market participation and political influence (Andersen 1975), intra-household bargaining power (Majlesi 2016, Aizer 2010), and children's wellbeing (Modena & Sabatini 2012, Cruces & Galiani 2007).

Following the existing literature, structural transformation drives urbanization (Michaels et al. 2012), and when accompanied by industrialization, this promotes further economic growth (Duranton 2008, De Long & Shleifer 1993). Whenever urban manufacturing and services sectors coexist with rural agriculture, people will move out of rural areas into urban centers to engage in higher productivity sectors and earn a wage that improves their welfare (Shutters et al. 2022, Henderson 2010, Gollin et al. 2002). This connects with the earlier dual economy model highlighting the core-periphery, rural-urban dichotomy, with the urban sector serving as the center of high productivity growth that drives structural transformation (Glaeser & Gottlieb 2009, Glaeser et al. 1992, LEWIS 1954). However, across developing countries, employment patterns in urban centers are markedly different, pointing to spatial disparities in drivers of growth, institutions, and market conditions as labor flow from the rural to the urban sector (Gollin et al. 2016). This argument on the falling patterns and levels of employment in urban cities due to primitive structural transformation is well known (Gollin et al. 2016, Jedwab & Vollrath 2015, Jedwab 2013). However, less is known of the consequences of activities that women perform in the labor market, the gender-specific labor market frictions, and the implication of gender differences on employment levels. If urbanization can arise without industrialization, then urbanization can no longer be an efficient equilibrium outcome that promotes gender equality in labor market participation.

This paper fills this gap in the literature. First, as a source of structural transformation, we study the effects of urbanization on gender equality in labor market participation. We provide a closer perspective on women's labor market participation by looking at differences in labor market work following urbanization for a large sample of households

in Nigeria. Our source of household data is the Nigerian General Household Surveys (GHS), which cover the 36 states and the federal capital territory of Nigeria collected in 2010-2011, 2012-2013, and 2015-2016. The panel structure of the dataset allows us to exploit the within-household variation in rural and urban demographic transition among households that changed location from data obtained from the three rounds of the National Survey. We then estimate the effect of this differential exposure on our outcomes of interest.

The study uses the weeks of work by the wife and the male head to measure the labor participation by the men and women, respectively. We include household, Local Government Area, zone, and time-fixed effects to reduce endogeneity bias. Besides, we control for household- and LGA-specific time-varying characteristics that may influence outcomes. We clustered the idiosyncratic errors at the household level to account for possible correlation of the standard error terms within households. We used the household weights in the surveys to account for heteroscedasticity associated with household sizes. In addition to controlling for heteroscedasticity, population-weighted models allow us to estimate impacts on an average person rather than an average household.

Overall, we show that aggregate household workweeks decrease after urbanization, but the negative effects for women are significantly larger than men's. Our results on why women are less likely to work as labor transitions from rural to urban sectors align with Alesina et al. (2013) and Boserup (2007). Societies with a gender-based division of labor before economic transformation exhibit greater gender inequality in market employment even if the economy moves out of agriculture. Reports show that discriminatory social institutions restrict women's rights and empowerment opportunities across 17 West African countries (Bouchama et al. 2018). In Nigeria, the labor force participation rate among females is 47.9%, and among males is 59.6% for 2021; compared with labor force participation in the lower-middle income group, this gap between men and women is lower in Nigeria (International Labour Organization 2022). Attempt to address women's rights in Nigeria are growing, but the guiding principles and the framework adopted are weak (Abdulraheem 2018, Kura & Yero 2013). Early findings suggest that religion-cultural influences, a pluralistic legal system, and a weak policy and implementation framework limit Nigerian women's potential to utilize economic opportunities (Osinaike 2020). Addressing critical areas of gender disparity will require understanding factors limiting the roles of women in society as well as removing barriers to the imbalance of women in the labor market.

Recent evidence for why urbanization fails at stimulating employment, especially in natural resource exporting countries, highlights the absence of industrialization, but an income boost from resource exports makes cities appear richer (Gollin et al. 2016, Jedwab & Vollrath 2015, Jedwab 2013). That is, 'consumption cities' but not necessarily better in terms of improved quality of life. The idea that cities in countries that export significant

resources appear to be 'consumption cities' echoes patterns previously explained in the standard Balassa-Samuelson and the "Dutch Disease" model of the resource curse framework (see, Venables & Harding 2016, Ploeg 2011, Corden & Neary 1982). Traditionally, the Dutch disease framework has been used to explain why rents from natural resource exports cause a substitution away from rural food production, thereby causing a greater shift toward imported goods and services and less contribution from locally produced ones.

To test the "consumption cities" hypothesis of Gollin et al. (2016) and Jedwab (2013), we investigate whether, despite the decline in employment, urbanization exerts a consequential influence on spending on the imported share of imported food such as rice in contrast to traditionally grown foods (e.g., yam, cassava). Consistent with Gollin et al.'s (2016), we find a strong and robust positive relationship between urbanization and household expenditure on imported food items and a weak and insignificant effect on locally grown food (Jedwab & Vollrath 2015).

We now turn to a closer analysis of the underlying mechanisms related to labor market frictions and the imperfect substitutability of men and women for home and market production in resource-dependent societies. Part of the impact of urban-led growth likely reflects the decline of industrialization, poor institutions, and the persistence of cultural norms as the household transition from rural to urban settings. However, women may face significant market barriers that are less conducive to participation in activities outside the domestic sphere. Specifically, female participation in market activities is less not because of the appropriateness of work activities but because home production activities increase with structural transformation, which limits market participation (Dinkelman & Ngai 2021).

To isolate the effect of structural transformation, we examine whether proximity to extractive sector-led structural transformation improves women's labor market participation in urban and rural centers. We allow households' location and proximity to oil fields to vary heterogeneously by rural or urban sector. This allows the advantage of comparing households with similar preferences and likely more homogeneous in both observable and unobservable factors. There are multiple reasons to focus on hydrocarbon extractive activities to understand the gender implication of structural transformation. First, the extractive sector is a source of local structural transformation (Aragón et al. 2018, Allcott & Keniston 2018, Aragón & Rud 2013) and structural labor market shifts in SSA (Krauser et al. 2019, Kotsadam & Tolonen 2016). Second, they are formed because of geological characteristics that are plausibly random and uncorrelated with the pre-existing local economies and population characteristics. Third, a major obstacle to accurately estimating the impact of mining development on women's work is the presence of correlated unobservables (e.g., skills, capital, and talent) that may confound identification (Tolonen 2019). Unlike mining, hydrocarbon production has a high capital-to-labor

ratio dominated by big multinationals (Animashaun & Emediegwu 2022), making it less reliant on the local labor market, which helps to mitigate the selection bias.

We match large-scale hydrocarbon production with household-level data for the households in the nine oil-producing states in the Nigerian Niger Delta. The primary empirical strategy is a difference-in-difference approach using the spatial and temporal variation—precise oil production location and opening year—for households within 20 km from the hydrocarbon location. With state-year and LGA fixed effects, the analysis depends on the timing of the hydrocarbon's opening being exogenous to local changes in gender roles.

Women living near hydrocarbon production ($<$ 20km) work fewer hours. The effect on men is insignificant. In addition, the effect heterogeneously varies by rural and urban location. The effect is more significant for women in rural areas, weakly insignificant for women in urban areas, and positively insignificant for men in urban areas. The results are robust to different specifications, including LGA-year fixed effects, district time trends, and clustering at different spatial units. Suppose women are not working because the time spent on home production and activities are high. In that case, women's non-participation in the labor market reflects the cost and additional burden associated with work that does little to improve household welfare. To provide a formal understanding, we examine whether time spent on household home production activities, like the time it takes to collect firewood and water costs, reduces significantly with proximity to oil production and wells. Women's increased time allocation for home production increased significantly by proximity to oil fields, suggesting that the misallocation of time could explain some of the gender gaps in labor market outcomes in developing countries. Traditionally women are the main source of labor for home production, and these home demands have an important implication on intensive as well as the extensive margin of labor market participation and the type of work they choose. More recently, the increase in home production, i.e., cleaning and cooking, has become a barrier limiting women's time for labor market participation (Dinkelman & Ngai 2021).

Contribution. Despite the substantial literature on the relationship between structural transformation and rural-to-urban migration, there is little systematic work on the gendered perspective on employment patterns in developing countries. Our first contribution is the gendered perspective to findings illustrating falling patterns in welfare and employment when urbanization and industrialization are not synonymous (Lagakos 2020, Bryan et al. 2020, Henderson & Kriticos 2018, Gollin et al. 2016, Glaeser 2014, Jedwab 2013). This is important for two reasons. First, some distinct features of structural transformation in many SSA countries presuppose a labor market at a primitive developmental stage. A consideration for women's labor market participation becomes more relevant given that societies with deeply entrenched agricultural practices develop a gender-based division of labor, which persist as the economy moves out of agriculture

and the rural sector (Alesina et al. 2013, Boserup 2007). Second, most gender-based labor policies, such as affirmative action and interventions like child-care and maternity subsidies, are centered on heterogeneous households and household production models (Alesina et al. 2011). Since men's and women's labor market inputs are imperfect substitutes, the implication of the gender gap in labor participation highlights a potential policy improvement for women's labor force participation.

Our second contribution draws attention to the possibility of the inherent differences between mining and hydrocarbon-based extractive sectors and the social costs of home production that might constitute a barrier to women's work in hydrocarbon communities (Animashaun & Emediegwu 2022). Natural resources production activities affect local economies, which causes a sectoral reallocation of labor since a booming extractive sector might increase local wages and attract workers from other industries (Aragón et al. 2018). However, studies have documented gender-specific labor market effects of mining operations in African countries (see, Krauser et al. 2019, Kotsadam & Tolonen 2016). Others show that despite the mining sector's traditional association with male labor, women access new jobs in mining communities (Tolonen 2019). Similarly, it is possible that relative to men, an increase in women's work may be burdensome as immigrant working wives experience a heavy double burden since the household division of labor is unequal (Foner 2018, Stockman et al. n.d., Mu & Van de Walle 2011, Tzannatos 1999).

Finally, our study contributes to the growing literature on urbanization, labor gaps, and African employment (Sulemana et al. 2019, Van den Broeck & Kilic 2019, Yeboah & Jayne 2018, McCullough 2017, De Brauw et al. 2014). A common feature across countries in Sub-Saharan Africa (SSA) has been the movement of people from low (agricultural-rural) sectors to higher productivity (urban) sectors (Van Neuss 2019, Page 2018, McMillan et al. 2014). For instance, as of 2021, urban population growth is about 3.9 percent per annum, while the rural population dropped by 1.7 percent per annum in the SSA region (World Bank 2020).[1][2] Although our study exploits variation across households in Nigeria, our results are relatively applicable to other SSA countries undergoing urbanization due to similar structural transformations (Green 2018, Farrell 2018, Fox et al. 2018).

2 Related Literature & Conceptual Framework

This Section provides an integrated overview of this fast-growing literature. It offers a conceptual framework for thinking about structural transformation, labor relocation,

[1]Urban population refers to people living in urban areas as defined by national statistical offices. The data are collected and smoothed by United Nations Population Division.

[2]Rural population refers to people living in rural areas as defined by national statistical offices. It is calculated as the difference between total population and urban population.

and the implication of gender imbalance in talent allocation. In particular, this Section reviews two main mechanisms through which labor market reallocation can either provides an opportunity or constitutes a barrier to the gender gap. First, industrialization and manufacturing sector growth can generate productivity growth and agglomeration effects in urban areas that promote women's labor participation. Second, it is also possible that labor market restriction due to natural resource endowment limits the opportunity for multifactor productivity, aggravates prevailing social norms and cultural barriers, and lowers women's participation. Then, to simplify things, we schematize in a chart these opportunities and barriers in Figure 1.

As presented in the previous Section, empirical evidence suggests that urbanization can happen alongside structural change and economic development. However, it can also occur that urbanization happens without development. The close connection between economic development models and the positive spillovers from urbanization in developed countries is well-studied, and the findings are attractive (Di Clemente et al. 2021, Michaels et al. 2012, Glaeser & Gottlieb 2009, Lucas 2004). Understandably, the pioneering dual economy literature has grown tremendously, moving towards multi-sector growth and an increasing attempt to document the different paths of urbanization. But their usefulness for studying the consequence of urbanization in developing countries suffers obvious defects making them, ultimately, constrained in explaining why gains from urbanization differ markedly across developing countries (Duranton 2008). This is likely because they do not investigate whether the drivers of the growth in cities vary heterogeneously across space. As a result, key features of urbanization and how it relates to the evolution of observed economic activities in many developing countries are absent.

In contrast to the models of urbanization that are linked to the dual economy models, there is a new generation of models which attempt to address some of these defects as they relate to developing countries (Lagakos 2020, Bryan et al. 2020, Glaeser 2014). Much of the concern these new models address centers on identifying the factors driving the labor pull in rural areas, the weak institutional structures, and limited industrialization in urban centers. Urbanization, driven by low agricultural productivity in the rural sectors and non-tradable (growth of the natural resource endowments) exports, only creates "consumption megacities," which perform worse along several welfare measures and offer employment opportunities (Gollin et al. 2016). This is in contrast to production-driven urbanization, which consists of a tradable sector that produces goods or services that can be internationally traded and a non-tradable sector that encompasses government and personal services as well as local retail, transportation, construction, education, and health (Gollin et al. 2016, Jedwab & Vollrath 2015, Jedwab 2013).

Within this framework, another branch of the literature explores whether the tendency for men to benefit more than women is high as sectoral reallocation of labor occurs (see, Dinkelman & Ngai 2021). Although the concern about urbanization, structural transfor-

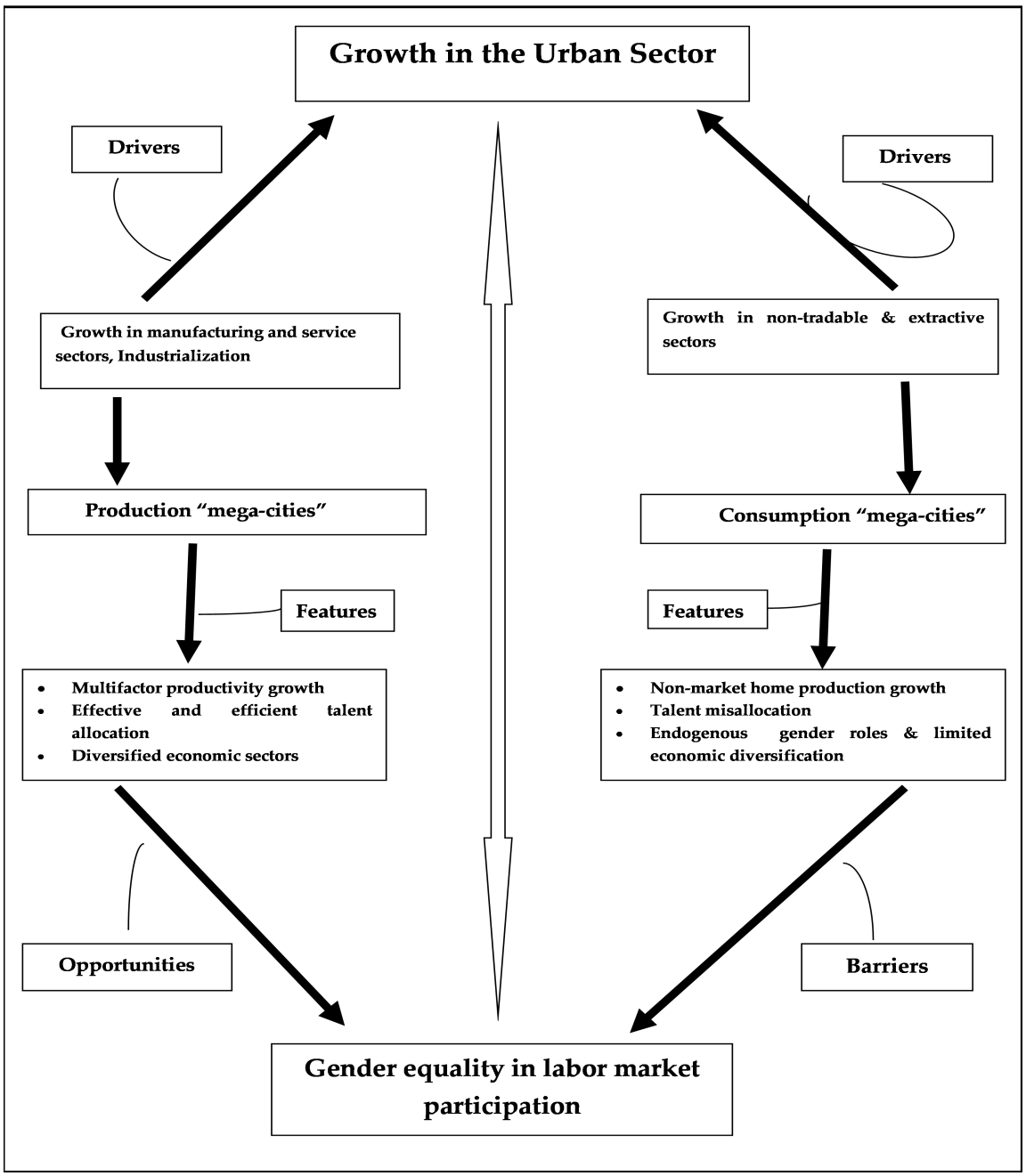

Figure 1: **Structural Transformation and Gender Equality Labor Market Participation**

mation, and the implication for women's labor participation is not new (Jayachandran 2021, Mammen & Paxson 2000, Lele 1986). However, it is not accounted for under the earlier models of urban-led growth.

Understanding and accounting for these distributional effects can play an important role in policies that improve labor and welfare outcomes for women in SSA. This question has spurred many empirical studies but is surprisingly tricky to answer. Part of the problem may lie with the question. We are interested in how an outcome evolves, but the underlying distributions of the outcomes are endogenously complex and can behave in complex ways. The influence of endogenous gender roles on gender imbalance in labor outcomes following economics is well-known in the literature (Benshaul-Tolonen 2022, Krauser et al. 2019, Mammen & Paxson 2000, Lele 1986). As in the literature on endogenous cultural norms (Alesina et al. 2013), part of the interest in women's local market participation evolves around more complex possibilities. These include distinct endogenous gender roles, and barriers from home production activities, which are barriers women, face as they transition from home to market during the structural transformation.

Recent studies highlight the potential of natural resources, mining specifically, for generating sectoral reallocation of labor that attract workers from other industries (Allcott & Keniston 2018, Kotsadam & Tolonen 2016, Aragón & Rud 2013). However, a gendered allocation of work at home and gender differences in market participation is more pronounced in extractive industries, as most workers are men (Baum & Benshaul-Tolonen 2021, Animashaun et al. 2020, Krauser et al. 2019, Aragón et al. 2018, Ross 2012, 2008). If women have less bargaining power in the extractive sector, they assume more home duties. Hence, the nature of the extractive sector as a source of structural transformation and the implication on endogenous gendered labor participation in the oil sector provides an opportunity to conceptualize and isolate channels through which employment can be qualitatively different for men and women.

In developing countries, the opportunity costs of time for formal work, prevailing social norms, and the inefficient labor markets weigh heavily in informing analyses and normative judgments on women's labor participation (Mammen & Paxson 2000). In societies where men work outside the home and women specialize in activities within the home, this gender-based division of labor might persist even if the economy moves out of the rural economy (Alesina et al. 2013, Boserup 2007). Using pre-industrial ethnographic data on plough agriculture with contemporary views about gender roles, Alesina et al. (2013) associate traditionally practiced plough agriculture with cultural beliefs about women's role in society and contemporary participation in economic activities outside the home. A likely implication is that as these countries' economies and hydrocarbon sectors continue to grow, policies relevant to removing barriers and stimulating women's transition from home to market might be challenging to implement.

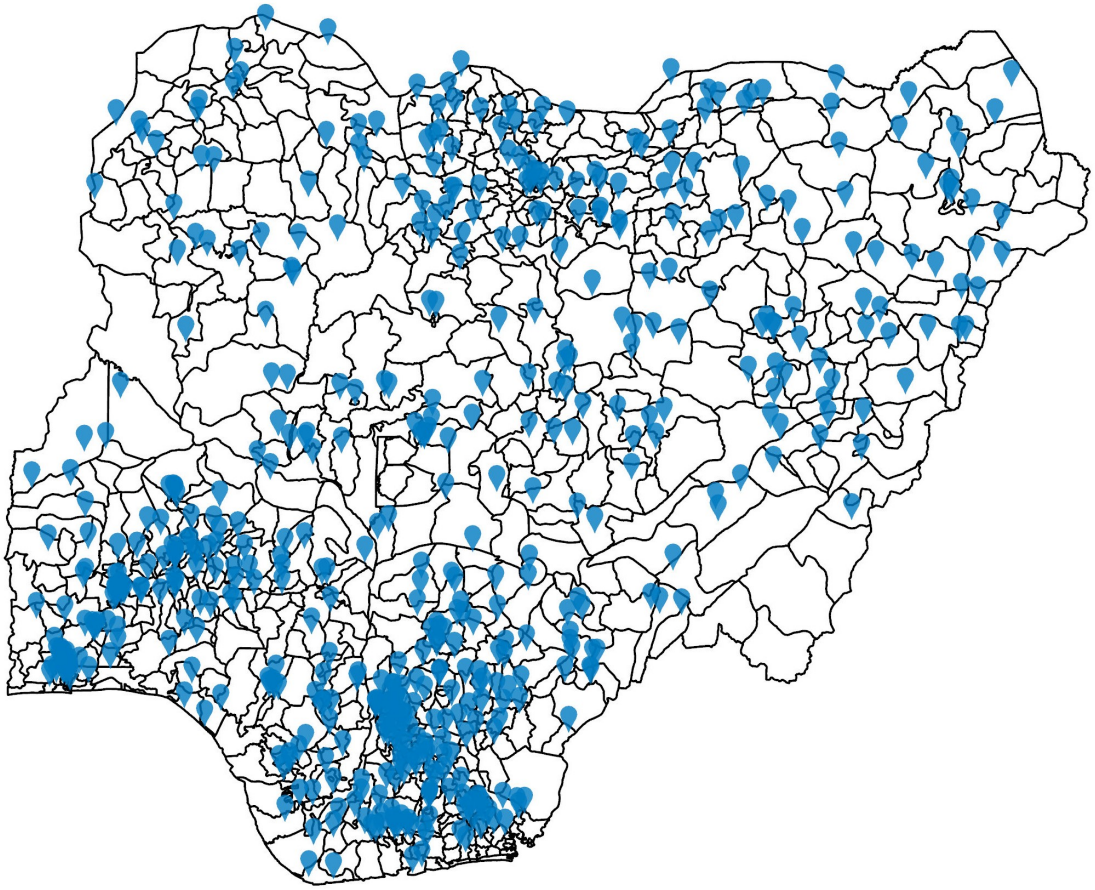

Figure 2: **Households sampled across Nigeria**
Note: Each blue point represents a household where data was collected. The black polygons represents local governent areas in Nigeria.

3 Data and Model Specification

3.1 Data Sources

We combine household survey data with satellite imagery to construct a comprehensive dataset containing socio-economic and meteorological variables. Our final dataset is panel data consisting of over 5000 observations from 2010 to 2015. Figure 2 shows that the households sampled are well dispersed geographically, hence appropriate for the purpose of spatial variation within observations.

Socio-economic Dataset

Our source of household data is the Nigerian General Household Surveys (GHS), which cover Nigeria's 36 states and federal capital territory. The three waves used in this study are chronicled as follows: wave 1 (2010-2011), wave 2 (2012-2013), and wave

3 (2015-2016).[3] In each wave, households are interviewed twice - in the post-planting period (August to November) and the post-harvesting period (February to April). The Nigerian GHS was sourced from the World Bank Microdata library, which houses household survey data for several countries.[4] The surveys, part of the World Bank Living Standards Measurement Study Integrated Surveys on Agriculture (LSMS-ISA) project, were implemented by the National Bureau of Statistics (NBS) with support from various national and international partners.[5]

The survey asks household members to report the number of weeks they spent in employment in the reporting year. We use this information to construct measures of gendered labor activity. The main dependent variable is the number of weeks men and their wives worked, respectively, measured at the household level. Besides, the GHS includes other relevant household variables such as the location (rural/urban), age, sex, and marital status of the household head; whether the house is owned or rented; household distance to market; and administrative capital (in km).

Weather Data

Our temperature and precipitation datasets are sourced from CRU TS v4.05, the most recent dataset released by Climate Research Unit (CRU) of the University of East Anglia. This latest dataset (released 26th March 2022) provides gridded time series data for several monthly weather measures, including annual average temperature (°C) and total precipitation (mm) for all land areas in the world (excluding Antarctica) at 0.5° resolution (approx. 56 km × 56 km across the equator) for the period January 1901 to December 2021.[6]

We use these gridded datasets to construct LGA-level weather information. To link the weather information to the relevant LGAs by overlaying a polygon of Nigeria on the average temperature and total precipitation for each grid cell and taking the simple average across all grid cells per LGA using geospatial software.[7]

3.2 Model Specification

We use a reduced-form log-linear model specification to estimate the relationship between urbanization and labor activities in Nigeria. Our dependent variable is y_{iht}, where $i \in \{female, male\}$ with female (male) for the number of weeks females (males) work in employment in household h and in year t. The model is specified as

[3]Year 2014 is missing from the survey.

[4]https://microdata.worldbank.org/index.php/catalog/lsms

[5]These partners include the Federal Ministry of Agriculture and Rural Development (FMA&RD), the National Food Reserve Agency (NFRA), the Bill and Melinda Gates Foundation (BMGF), and the World Bank.

[6]See **?** for a complete description of the dataset.

[7]The R package "raster" has sophisticated functions for implementing this exercise.

$$y_{iht} = \alpha_h + \gamma_l + \lambda_t + \beta urb(D = 1)_{ht} + \rho c_{ht} + \delta d_{lt} + \epsilon_{ht} \quad (1)$$

where our main parameter of interest, β, measures the sensitivity of labor activities to the location of the household, that is, whether a household is in the urban area (=1) or not (=0). In all our specifications, we include household (α_h), LGA (γ_l), and time (λ_t) fixed effects. Besides, (c_{ht}) and (d_{lt}) are respective matrices of household- and LGA-specific time-varying characteristics that may influence household spending. Lastly, (ϵ_{ht}) are idiosyncratic errors clustered at the household-level to account for possible correlation of the standard error terms within households.

We used the household weights in the surveys to account for heteroscedasticity associated with household sizes. In addition to controlling for heteroscedasticity, population-weighted models allow us to estimate impacts on an average person rather than an average household.

4 Results and Discussion

4.1 Urbanization and Labor Market Participation

This Section establishes the relationship between within household variation in urbanization during the survey period (2010-2016) and household labor participation. Following Becker's theory of the division of labor (Becker 1985), we assume heterogeneity in households' production function that allows gender differences in employment patterns for the woman and a man separately. This heterogeneous household model allows labor market supply to differ by gender to highlight gender gaps in labor participation following structural transformation.

Table 1 shows the results, with columns reflecting the heterogeneity by workweek combinations. The study uses the combined number of weeks of work for the husband and the wife during the last 12 months. Column (1) uses the combined week of both husband and wife. Column (2) observes only workweeks for men, and Column (3) only uses workweeks for women. A household comprises a male and a female participating in market and home activities. Theoretically, urban-sector-led structural transformation involves the relocation of resources and exposure to more productivity for the market. Following Becker (1974), none of them is strategically lazy, "selfish," and able to work if given the opportunity (Chiappori 1988). The return to labor participation is wage, and when both the husband and wife work, they spend their wages on improving welfare outcomes. We treat households' relocation to urban centers as an exogenous event uncorrelated with other factors affecting the gender gap in labor market supply. This is a strong but not implausible assumption. The empirical literature on drivers of urbanization without structural transformation often highlights the role of climate change (Emediegwu et al.

Table 1: **Main Estimates**

	Dep Var		
	Combined weeks	Male weeks	Female weeks
Urban	-17.023**	-7.313	-12.069***
	(7.834)	(5.248)	(0.472)
Observations	9,651	9,754	6,323
R^2	0.56	0.58	0.58
HH controls	Yes	Yes	Yes
LGA controls	Yes	Yes	Yes
HH FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
LGA FE	Yes	Yes	Yes

Standard errors (in parentheses) are clustered at household level.
***p<0.01, **p<0.05, *p<0.1.

2022, Henderson et al. 2017). If this is the case, urbanization is not likely to be limited by household time-varying characteristics.

As can be seen in Table 1, urbanization statistically decreases labor market participation (Column 1), but after disaggregating, we find that the effect for women is significant and very strong (Column 3) and that for men is not significant (Column 2). To further test the validity of our result, we use the number of months of work to determine if there are any changes in labor market participation following urbanization. Results are reported in Table 2; work months for women significantly declined following urbanization, and the effect on men, although negative, is not significant. We also estimate models of sectoral affiliation, i.e., agricultural and non-agricultural-based occupation, in Table 3. We show that women work less in the agricultural sector after urbanization compared to the insignificant effect in the non-agricultural sector.

Recent advances at closing gender gaps in labor markets in many SSA countries happen in the higher productivity sector; for many women transitioning from the informal (rural) sector with limited skills, our results show wide gaps in female labor participation with respect to men. Our result on why women are less likely to work aligns with Alesina et al. (2013) and Boserup (2007). That is, in societies where men tended to work outside the home, while women specialized in home production resulted in a gender-based division of labor. Reports show that discriminatory social institutions restrict women's rights and empowerment opportunities across 17 West African countries (Bouchama et al. 2018). If prevailing cultural or social norms limit women's ability to accept paid employment, promoting policy-making attuned to cultural norms could narrow gender gaps in the labor market. Suppose it is due to gender imbalance in factor productivity. In that case, opportunities for women could improve by providing the requisite schooling and

Table 2: **Estimates with number of months worked**

	Dep Var		
	Combined	Male	Female
Urban	-1.174	-0.297	-1.290***
	(0.935)	(0.976)	(0.099)
Observations	9,668	9,770	6,330
R^2	0.57	0.59	0.57
HH controls	Yes	Yes	Yes
LGA controls	Yes	Yes	Yes
HH FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
LGA FE	Yes	Yes	Yes

Standard errors (in parentheses) are clustered at household level.
***p<0.01, **p<0.05, *p<0.1.

transferable skills to enhance women's productivity and make it easy for them to find suitable employment in productive firms. Finally, suppose the economic cost of working outweighs the benefits. In that case, i.e., women's work does little to improve welfare, a labor policy that recognizes additional costs working women face could improve welfare outcomes for working women.

4.2 Mechanisms: Consumption Megacities and the Workings of the Dutch-Disease

We have presented evidence that urbanization lowers labor market participation, and the effect is pronounced for women more than for men. A simple model of urbanization in resource-exporting countries suggests the labor-pull hypothesis, except that, in this case, resource revenue is the main driver of this transformation. However, while urbanization might lead to less labor market supply, in these countries, the income boost from resource exports makes cities richer, which are used to purchase additional food and other tradable goods on the world market (Gollin et al. 2016, Jedwab 2013).

Based on this, we postulate that while labor market participation deteriorates following urbanization; however because income from resource exports earnings raises revenues, it allows the increased demand for food and other tradable goods on the world market. We provide empirical results that support this claim in Table 3. Results in Table 3 show that households' expenditures on imported food, like rice and alcoholic drinks, are positively significant compared to consumption expenditure on locally grown foods like yam, vegetables, and cassava. Similarly, urbanization reduces the costs associated with water access and firewood collection, highlighting the possible increase in government income

due to export earnings on providing basic infrastructure in the urban centers.

Table 3: Mechanism on Women's Work - Consumption Expenditures

	Urban	Observations	R^2
Panel A: Cereals			
Rice	0.514***	15,743	0.51
	(0.126)		
Sorghum	0.380	2,084	0.55
	(0.401)		
Panel B: Pulse			
Beans	1.127*	12,675	0.53
	(0.611)		
Vegetables	0.241	21,880	0.47
	(0.212)		
Panel C: Roots			
Cassava	0.579*	7,777	0.55
	(0.306)		
Yam	0.105	6,526	0.52
	(0.187)		
Panel D: Animal products			
Fat	0.393*	19,291	0.44
	(0.216)		
Meat	0.309	12,589	0.50
	(0.202)		
Fish	0.307	15,289	0.54
	(0.329)		
Poultry	0.008	731	0.64
	(0.269)		
Panel E: Drinks			
Alcoholic drink	0.492***	1,704	0.54
	(0.090)		
Non-alcoholic drink	0.764*	9,452	0.54
	(0.460)		
Panel F: Others			
Restaurant	0.002	17,008	0.53
	(0.235)		
Water	-1.470***	5,604	0.83
	(0.269)		
Dist to firewood	-1.269***	14,486	0.53
	(0.277)		
Miscellaneous	0.372	14,128	0.49
	(0.290)		

Standard errors (in parentheses) are clustered at household level.
***p<0.01, **p<0.05, *p<0.1.

Resource-rich countries in SSA countries like Nigeria tend to be less industrialized

and specialize in oil exports. Urbanization is not driven by direct employment as in the extractive sector but by increased government revenue due to oil rents. A temporary positive shock in oil prices causes a sizeable real appreciation in the currency, making imports cheaper and increasing government spending (Frankel 2010). A resultant shift of labor out of the rural sector may reflect the increased spending and the comparative advantage brought because of the appreciation of real exchange that makes imports cheaper. Thus, while urbanization does not lead to improved employment opportunities, it causes a substitution away from rural food production and increases food importation from the global market. Therefore, resource rents impact producer prices, raising agricultural production costs and making food imports cheaper through the import-weighted exchange rate. In both cases, the resource sector increases urbanization but limits agricultural productivity, with a far-reaching consequence of the increase in costs of food on welfare than in the classical deindustrialization case (Lauvsnes 2021).

5 Evidence from Hydrocarbon Expansion in Nigeria's Niger Delta

We now turn to a closer analysis of the underlying mechanisms of our results. We undertake an alternative strategy to isolate better the causal impact of structural transformation on women's work and examine variation among households by proximity to hydrocarbon production. We allow location to differ by rural and urban and exploit the closeness to oil fields using the households in the nine-oil procuring states of the Niger Delta region in Nigeria.[8] This exercise allows us to hold constant the external cultural and social environment that affects women's work while examining variation in work across households in rural and urban settings.

For this analysis, we follow Animashaun & Emediegwu (2022), by identifying oil activities in oil fields that are within 20km radius from any LGA as shown in Figure 3. Technically, we assign the aggregate oil production in the oil field if it is within 20km of an LGA and zero otherwise.[9] The implication of this assignment is that LGAs with oil fields within 20km radius are regarded as the treatment group while those without oil fields within the buffer location are seen as the control group.

We start by presenting results of the effect of hydrocarbon-based extractive activities on labor market participation for all the households in both rural and urban and only allow the gender of work hours to differ in Table 4. Similar to previous studies, we find that work for men is insignificantly for households residing within 20km of oil production and

[8]See Figure 4 in the Appendix for distribution of (onshore) oil fields across the Niger Delta region of Nigeria.

[9]Here we summed up the oil production of all oil fields within 20km to a LGA. Oil production is in hundred thousands cubic meter.

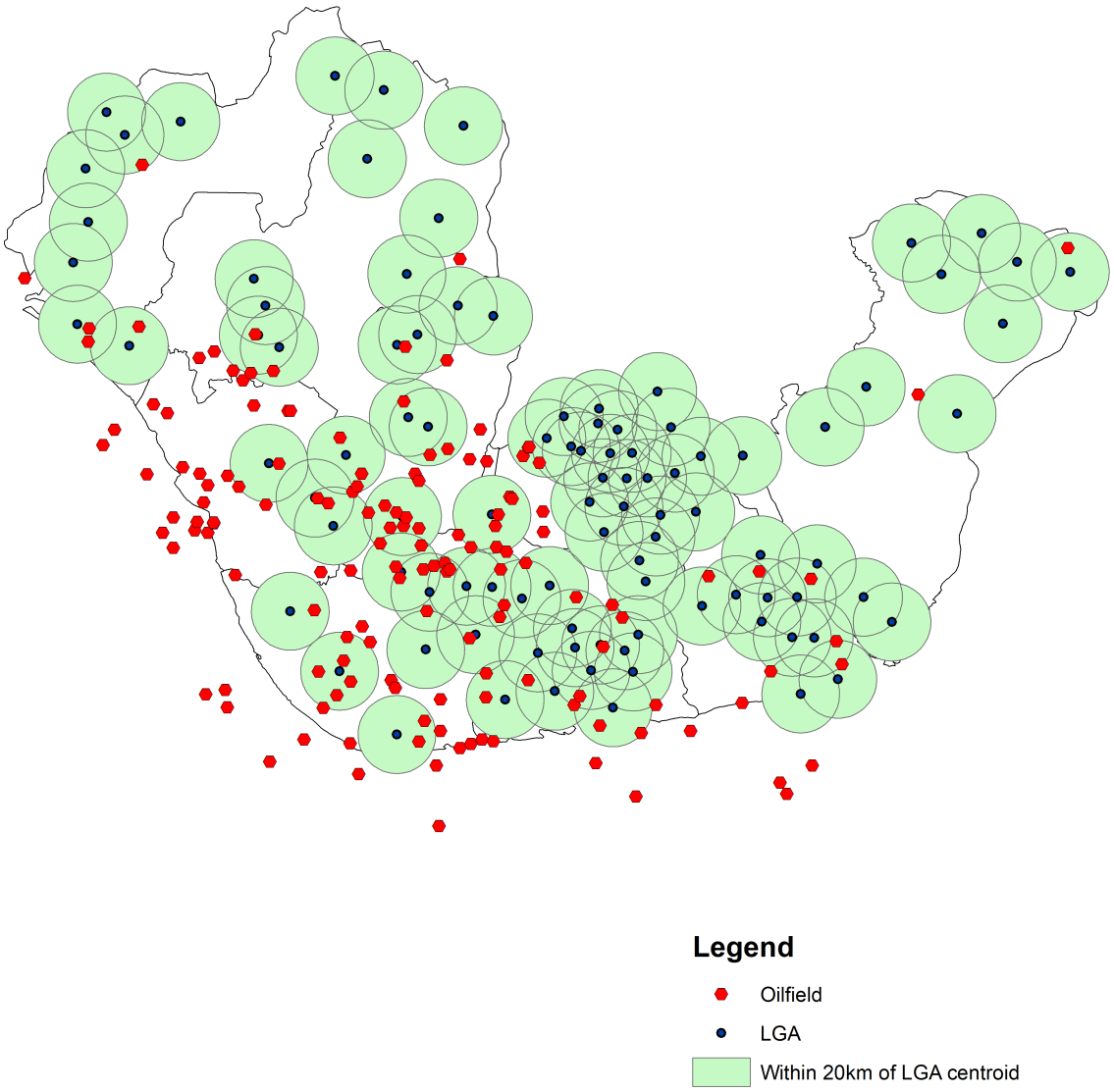

Figure 3: **Oil fields within 20km of LGAs**

Table 4: **Oil Production and Labor Activity**

	Dep Var	
	Male hour	Female hours
Panel A: Full Sample		
oil prod × oil field	-0.134	-0.214*
(<20km)	(0.148)	(0.132)
Observations	2,288	2,288
R^2	0.63	0.62
Panel B: Rural Sample		
oil prod × oil field	-0.386*	-0.536***
(<20km)	(0.226)	(0.206)
Observations	1,411	1,411
R^2	0.64	0.63
Panel C: Urban Sample		
oil prod × oil field	0.009	-0.115
(<20km)	(0.204)	(0.184)
Observations	877	877
R^2	0.63	0.60
HH controls	Yes	Yes
LGA controls	Yes	Yes
HH FE	Yes	Yes
Year FE	Yes	Yes
LGA FE	Yes	Yes

Standard errors (in parentheses) are clustered at household level. All specifications include a dummy variable of being within 20km of an oil field. Oil production in measured in hundred thousands of meter cube.
***p<0.01, **p<0.05, *p<0.1.

those outside this range in the Niger Delta region. For women, we find a slight decrease in work hours by closeness to oil production. This finding that oil wealth decreases the labor market integration of females is supported by literature showing that oil wealth growth that is based on the sale of oil and gas does not produce more jobs for women (Baum & Benshaul-Tolonen 2021, Animashaun et al. 2020, Krauser et al. 2019, Ross 2012, 2008).

To isolate the tendency of prevailing social norms, we allow households' locations to vary heterogeneously by rural or urban sector. This allows the advantage of comparing households with similar preferences and likely more homogeneous in both observable and unobservable factors. Comparing households by proximity to oil fields depending on whether they are urban or rural, results in Panel B show that the effect is only significant for females in rural households and insignificant for both men and female households in the urban sector.

5.1 Gender-Specific Labour Market Frictions and Home Production: Evidence from proximity to Hydrocarbon Expansion

This Section seeks to understand and quantify the impacts of proximity to oil and gas extraction on home production activities. According to Dinkelman & Ngai (2021), home production typically involves time spent on activities like wood and water fetching in developing countries. Although they can be outsourced, these activities are unpaid for when carried on by and for the members (Reid et al. 1934, p11). Part of the impact of urban-led growth likely reflects the persistence of cultural norms as the household transition from a rural to an urban setting. However, women may face significant market barriers that are less conducive to the participation of women in activities outside the domestic sphere. Also, female participation in market activities may be less not because of the appropriateness of work activities but because home production activities increase with structural transformation, limiting market participation.

During the structural transformation, most barriers women face likely arise due to the difficulty of shifting women's time out of home production. One argument often presented in the literature for the gender gap in labor market participation is that men and women are imperfect substitutes in the labor market and home production. That is, while the male population finds employment opportunities. Their spouses are likely to engage in home production by working as housewives (Lee 2022). Distinct from the prevailing social norms, some sectors, such as the oil industry, have higher frictions against women (Aragón et al. 2018), further highlighting the importance of considering the impact of extractive industries on home production activities as barriers to women's work.

Our results in Table 5 suggest that time to take water, an important home production activity in the Niger delta, increases for households living within 20km of oil or gas wells. Similarly, the time it takes to get firewood increases for households within 20 km of oil and

gas extraction in rural areas. Our results show that policies intended to mitigate the risks of extractive–sector-led structural transformation on women's labor market participation can provide market substitutes for these activities. Like developed countries, employment growth in these home productions can be a tool for expanding the service sectors and improving women's labor participation (Addati 2021). These findings also add impetus for regulators to increase regulations that reduce air pollution emissions from drilling operations, and for industry actors to increase voluntary action to reduce air pollution emissions.

Table 5: Mechanisms for Oil-Producing Areas

	Dep Var	
	Time to Firewood (in mins)	Time to get water (in mins)
oil prod × oil field (<20km)	4.362	28.227*
		(14.816)
Mean value	31.94	22.31
Observations	1,153	2,122
R^2	0.47	0.25
HH controls	Yes	Yes
LGA controls	Yes	Yes
HH FE	Yes	Yes
Year FE	Yes	Yes
LGA FE	Yes	Yes

Standard errors (in parentheses) are clustered at household level. Oil production in measured in hundred thousands of meter cube.
***p<0.01, **p<0.05, *p<0.1.

6 Conclusion

This paper provides evidence of the consequences of structural transformation on the gender gap in labor market participation. We highlight the importance of considering the heterogeneous effects of structural transformation by gender and recognizing the significance of gender-specific frictions and barriers to labor market participation across developing countries. We use the Nigerian General Household Surveys (GHS), which cover Nigeria's 36 states and the federal capital territory and was collected in 2010-2011, 2012-2013, and 2015-2016.

To provide more informative evidence, we isolate the impact of extractive industries on local labor markets by allowing labor hours to vary by gender and proximity to hydrocarbon production heterogeneously. We allow location to differ by rural and urban and

exploit the closeness to oil fields using the households in the nine-oil procuring states of the Niger Delta region in Nigeria. This exercise allows us to hold constant the external cultural and social environment that affects women's work while examining variation in work across households in rural and urban settings. Similar to previous studies, women's work hours decrease by closeness to oil production. This finding that oil wealth decreases the labor market integration of females is supported by literature showing that oil wealth growth that is based on the sale of oil and gas does not produce more jobs for women (Baum & Benshaul-Tolonen 2021, Animashaun et al. 2020, Krauser et al. 2019, Ross 2012, 2008). Similarly, home production activities like the time it takes to get water increase for households living within 20km of oil or gas wells. Policies intended to mitigate the risks of extractive–sector led structural transformation on women's labor market participation can provide market substitutes for these activities.

There are, however, issues with whether our results hold external validity. Although there are costs associated with external validity when moving from a cross-country to a within-country setting. What may be true for Nigeria might not generalize to other countries. Importantly, our study's limitation is the implication of urbanization in Nigeria. At the same time, it may apply to a similar oil-based economy in SSA and may be different in non-resource-based countries, and hence caution is needed in generalizing the results. An alternative is to examine variation using cross-sectional or panel techniques to provide systematic statistical evidence. These exercises have some limitations as different countries are characterized by very different institutional and cultural features, which may well correlate with the level of development and the extent of women's involvement in economic activities. Because we use variation within Nigeria households, many institutional, cultural, and policy variables that confound the cross-country relationship between urbanization and women's labor participation and macroeconomic outcomes are held constant, enhancing our ability to make inferences.

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A Additional Figures

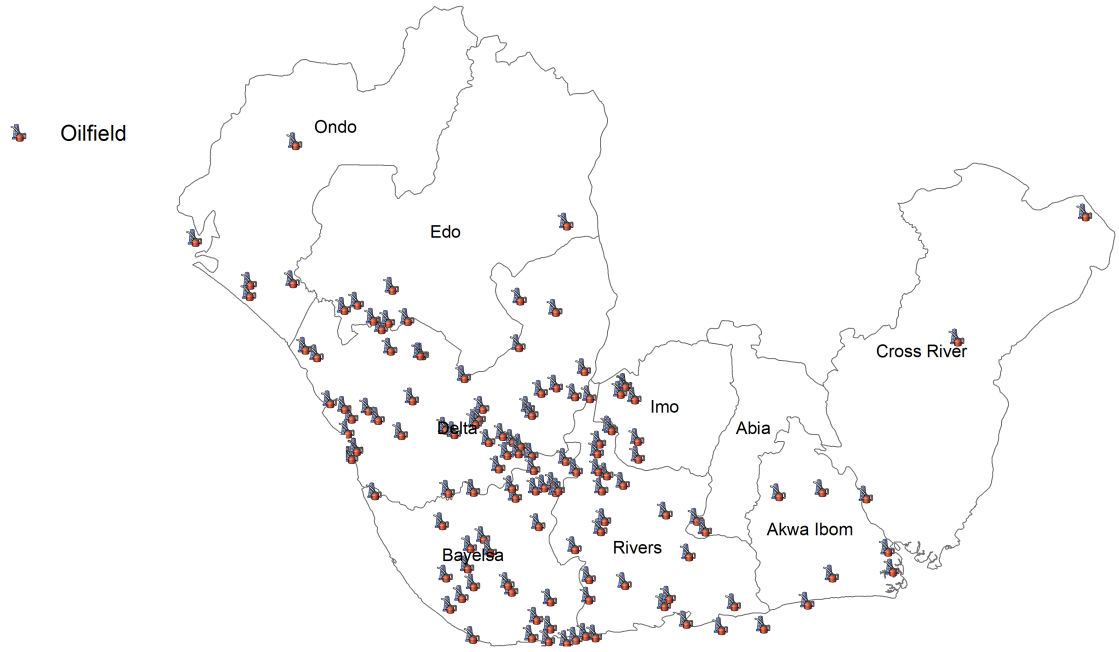

Figure 4: **Onshore Oil fields across the Niger Delta**