Population, Resources and Political Violence: A Sub-National Study of India 1956-2002

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Keywords: armed conflict, resource scarcity, population pressure, youth bulges, India

Authors note: I am grateful to Nils Petter Gleditsch, Øystein Kravdal, Jim Fearon, Eric Neumayer, Hanne Hagtvedt Vik, Guro Aandahl, Dan Banik, Bethany Lacina, Monty Marshall, Steen Nordstrøm, Kaare Strøm, Siddharth Swaminathan, Ole Magnus Theisen, Steven Wilkinson and two anonymous reviewers for comments to previous versions, data, and literature. I am grateful to the Centre for the Study of Civil War (CSCW) at the International Peace Research Institute, Oslo and to the East-West Center, Honolulu, Hawaii, for hosting me during my research, and to the Research Council of Norway for funding my work. Replication data are available along with the electronic version of the article at http://jcr.sagepub.com/, and at www.prio.no/cwp/datasets. Contact address: henriku@prio.no.

Abstract:

Recent cross-national studies have found only moderate support for the idea that population pressure and resource scarcity may lead to political violence, contrary to much of the case study literature in the field. This article suggests that the level of analysis may be at heart of this discrepancy. In a time-series study of political violence in 27 Indian states for the 1956-2002 period, it is tested whether high population pressure on renewable natural resources, youth bulges and differential growth rates between religious groups are associated with higher levels of armed conflict, political violent events, and Hindu-Muslim riots. The results are generally more supportive of the resource scarcity and conflict scenario than recent global studies. The article further suggests that youth bulges affect all three forms of violence, and that differential growth rates are positively related to armed conflict.

1. Introduction

In 2005, nearly half of all active armed conflicts in the world took place in South and South-East Asia, five of them within India (Harbom et al., 2006). Recent civil war literature has focused on national-level characteristics to explain the global distribution of armed conflict, in particular on the significance of poverty, state incapacity and governance (see Sambanis (2002) for a review of recent quantitative literature). Among the more broadly accepted empirical regularities are the findings that poor and institutionally weak countries are more susceptible to internal conflict (Collier & Hoeffler, 2004; Fearon & Laitin, 2003), as are semi-democracies as opposed to both democratic and autocratic states (Hegre et al., 2001). As summarized by Sambanis (2002: 216) 'well-established democracies with high levels of per capita income are highly unlikely to have a civil war'. Hegre & Sambanis (2006) find low income levels and political inconsistency and instability to be among the most robust predictors of civil war in a sensitivity analysis running 4.7 million regressions.

Using India as an illustration, Lacina (2005) argues that many countries which are not normally considered to be weak, and certainly not failed, face low-intensity armed conflicts that can be best understood as political lobbying by the insurgent groups. Rebel organizations may use moderate violence to signal political demands that echo sentiments among their constituents. In democratic societies, the political costs of a military solution to such conflicts are potentially very high, and states may be willing to make political concessions rather than to use coercive means.

The structural factors discussed above are the primary factors determining the opportunities for rebellion. However, state characteristics do not address how and why conflicts arise in certain local areas and not in other. Most conflicts are located in a limited geographical area; it is rarely the case that all parts of a country at war are equally affected (Buhaug & Gates, 2002). An important question is then: given state characteristics, what are

the local determinants of conflict? This study addresses causes of regional variation in political violence in India, and thus implicitly controls for macro-level characteristics such as state strength and regime type.

After the end of the Cold War, an increased interest in demographic factors as potential causes of armed conflict has emerged. The debate about demography and conflict originates from the 'resource scarcity' or 'neo-Malthusian' school of thought. Rapidly growing populations, especially in developing countries, may outpace the local natural resource base, eventually forcing groups to fight over resource access. While some observers have clearly overstated the significance of population and environmental factors (Kaplan, 1994; Myers, 1993), more cautious approaches have examined the subtle mechanisms that may link population growth and environmental change to armed conflict (Bächler, 1999; Homer-Dixon & Blitt, 1998; Kahl 2006). More recently, a much broader debate on security implications of demographic factors has emerged (Goldstone, 2001; JIA, 2002; Weiner & Russel, 2001a; Weiner & Teitelbaum, 2001). Common to these approaches is that they see demographic change as processes that fundamentally and continuously influence and change society, and they assume that such change may stimulate violent conflict under certain conditions.

Previous cross-national studies employing national-level measures of population pressure and resource scarcity have found only marginal if any support for the resource scarcity conflict scenario (de Soysa 2002b; Esty et al., 1998; Hauge & Ellingsen, 1998; Theisen 2006; Urdal, 2005. See Appendix D for an overview of quantitative empirical studies of demography and conflict compared with the results obtained here). The level of analysis may be at heart of the discrepancies in findings between cross-national and case studies. National demographic aggregates may not capture the diversity of local population dynamics very well, and such local processes may be argued to cause local, low-intensity conflicts.

This study combines the rigor of quantitative studies with the need to go below national aggregates to see if regional population pressure may influence the distribution of violent conflict in India. To the best of my knowledge, no other studies have previously attempted to test this relationship using such design.[1]

India is an ideal case for a disaggregated study of population pressure and political violence, both because of the great variance in political violence and because of the good Indian record keeping. Demographically, India is very diverse,[2] and demographic, socio-economic and environmental data are readily available from census publications and other surveys. The availability of such data provides opportunities for testing some of the more specific claims of the resource scarcity perspective than can be tested in cross-national studies.

2. Population Pressure and Political Violence

While this study is primarily concerned with the issue of whether scarcity of natural resources may increase the risk of political violence, it also addresses two other prominent demographic concerns in the security literature: youth bulges and differential growth between ethnic groups. While all three perspectives primarily fall into what is generally referred to as the motive tradition in recent empirical studies of political violence, youth bulges have also been argued to potentially increase the opportunity (e.g. Collier & Hoeffler, 2004) for violence.

2.1 Population Pressure and Resource Scarcity

According to a resource scarcity perspective, population growth and density may lead to scarcity of renewable natural resources such as productive land, freshwater, and forests. Resource scarcity is assumed to lead to increased inter-group competition, and under unfavorable economic and political conditions, such competition can take the form of violent

conflict. Poor countries are argued to be particularly susceptible to resource conflicts as they often lack the capacity to adapt to environmental change. Weiner & Russell argue that societies have very different political, financial, and administrative capacity to respond adequately to increasing resource demands, and that such strains can threaten stability and security (2001b: 3).

A major reference point in this debate is Thomas Homer-Dixon (1991; 1994; 1999; Homer-Dixon & Blitt 1998). He distinguishes between three main sources of resource scarcity (e.g. Homer-Dixon & Blitt, 1998: 6). *Supply-induced scarcity* results from degradation or depletion of natural resources. It simply becomes less of a resource as a result of non-sustainable use that does not allow the resource to regenerate.[3] *Demand-induced scarcity* is primarily caused by population growth. If a resource base is constant, the availability of resources per person will diminish with the increasing number of people that have to share it. Such scarcity can also arise from an increase in demand per capita. A third form is *structural scarcity*. This is a form of scarcity that only applies to certain groups that, relative to other groups, are excluded from equal access to particular resources. Such unequal social distribution of a resource does not presuppose actual scarcity if the resource was distributed evenly. The likelihood of violent conflict is greatest when these three forms of scarcity interact.

The resource scarcity perspective is challenged by a resource optimistic or *cornucopian* view. Cornucopians concede the premise that more people means less resources per person. They believe, however, that an increased pressure on resources leads to innovation and implementation of new technology that make resource scarcity and resource dependency increasingly less likely. Population pressure is thus believed to be either a neutral factor among determinants of armed conflict, or even a possible contributor to economic growth that can reduce conflict propensity in the longer run (Boserup, 1981; Simon, 1989;

Boserup & Schultz, 1990). Optimists also claim that population pressure on natural resources will be less of a problem in the future as world population growth is slowing down (Lomborg 2001: 45–49).

Most of the empirical work on the population-resource-conflict nexus has been conducted through case studies. Many of these, including Homer-Dixon's own empirical research, have been criticized for methodological deficiencies related to the careful selection exclusively of cases where both resource scarcity and armed conflict are present (Gleditsch, 1998). More rigorous empirical research has so far found ambiguous evidence for a resource scarcity and conflict scenario. Both Hauge & Ellingsen (1998) and de Soysa (2002b) have found some support for a link between high population density and internal armed conflict in large cross-national time-series studies. The State Failure Task Force (Esty et al. 1998), on the other hand, found no statistical relationship between population growth and density and different forms of state failure, while Theisen (2006) found no effect of population growth and density on either civil conflict or inter-communal conflict. Urdal (2005) concluded that there was no clear support for a relationship between population pressure and internal armed conflict. On the contrary, scarcity of arable land on an aggregate level appeared to reduce the risk of conflict, as proposed by Boserup and Simon.

Homer-Dixon mentions India as a particularly pivotal state because of high population growth, serious water scarcity, cropland fragmentation, erosion, deforestation and desertification. He claims that these factors threaten to cause major internal violence or disintegrate the whole state (Homer-Dixon, 1999: 19–21). The aim of this study is to investigate whether states in India that experience the greatest demographic pressures on natural resources are indeed more violence prone.

The great availability of Indian data enables a more specific test of some of the claims advanced by proponents of the resource scarcity perspective. The study addresses both

aspects of resource demand, supply and distribution, their interactions, and social consequences assumed to be potential triggers of violence. *Rural population growth* and *per capita availability of potentially productive land* is seen as indicators of resource demand, expecting that the greatest level of scarcity-driven grievances and thus the greatest potential for political violence, is found in states with high rural population growth and already high levels of land scarcity. *Agricultural yield* is seen as an indicator of resource supply, while *rural inequality,* measured by an income distribution measure (GINI coefficient), is presumed to capture inequalities in land ownership and used to proxy structural scarcity. We would expect to see that the risk of violence is greatest where different forms of scarcity interacts, in particular when high per capita land scarcity occurs simultaneous with either low agricultural output or great rural inequality.

Furthermore, the study addresses two of Homer-Dixon's 'key social effects' of resource scarcity (Homer-Dixon & Blitt, 1998: 9). First, high rural population growth and declining agricultural return is expected to depress *agricultural wages*. Secondly, if people are less likely to be able to survive on their rural livelihood due to greater pressure on resources, this is likely to offset rural to *urban migration*. Both these factors may be argued to potentially increase the risk of political violence. Homer-Dixon is not very specific as to what kind of political violence that may be caused by resource scarcity. The analysis of several different political violence measures may tell us whether population pressure on natural resources is more likely to produce some forms of violence rather than others.

Hypotheses:

H_1: The higher the rural population growth rates, the greater the risk of political violence.

H_2: The higher the rural population density relative to productive land, the greater the risk of political violence.

H_3: High rural population density is more likely to be associated with political violence the higher the rural population growth.

H_4: High rural population density is more likely to be associated with political violence the greater the rural inequality.

H_5: High rural population density is more likely to be associated with political violence the lower the agricultural productivity.

H_6: The lower the growth in agricultural wages, the greater the risk of political violence.

H_7: The higher the urban population growth rates, the greater the risk of political violence.

2.2 Youth Bulges

Much of the developing world has experienced a recent mortality decline, while fertility many places has remained high. This has produced youthful populations in many countries, often referred to as 'youth bulges'. The literature on youth bulges and political violence has focused in particular on spontaneous and low-intensity violence, but recent empirical results suggest that youth bulges may also increase the risk of more organized forms of political

violence like internal armed conflict. Following September 11 2001, youth bulges have been argued to be an important driver of Islamic fundamentalism and international terrorism (Sciolino, 2001; Zakaria, 2001). Huntington argues that the resurgence of Islamism has been fueled by the young age structures of many predominantly Islamic countries, increasing the risk of instability and violence (1996: 116-118). More demographically dynamic ethnic groups experiencing higher growth rates and younger populations exert political, economic, and social pressures on less dynamic groups (ibid.:261). In Sri Lanka, cycles of political violence have apparently followed changes in the age structure of the perpetrator groups (ibid.:259).

Youth bulges have been argued to provide both opportunities and the motives for political violence. Collier (2000: 94) has suggested that relatively large youth cohorts may be a factor that reduces recruitment costs through the abundant supply of rebel labor with low opportunity cost, increasing the risk of armed conflict. According to the opportunity perspective, rebellion is feasible only when the potential gain from joining is so high and the expected costs so low that rebel recruits will favor joining over alternative income-earning opportunities. Studies in economic demography also suggest that large cohorts are likely to experience a pressure on wages, so that the opportunity cost of a person belonging to a large cohort is on average lower than that of a person belonging to a smaller cohort (Easterlin, 1987; Machunovich, 2000).

Much literature also focuses on how youth bulges may provide motives for political violence. Large youth cohorts are likely to be motivated for violence if they face unemployment, expansions in higher education with limited employment opportunities, lack of political openness, and crowding in urban centers (Moller, 1968; Choucri, 1974; Braungart, 1984; Huntington 1996; Goldstone, 1991; 2001; Cincotta et al., 2003). In India, the youth unemployment is particularly high, especially among educated youths (McNally et

al., 2004: 162). This study will investigate two specific claims, whether youth bulges are more likely to be associated with political violence when urbanization is high (Goldstone, 1991, 2001; Lia, 2005), and if they may pose a greater risk in states where the sex ratios are particularly skewed. Hudson & den Boer (2004) have suggested that great surpluses of young males represent a considerable security risk, and mention India as a particularly vulnerable country due to high male to female ratios in certain states.

Previously, Fearon & Laitin (2003) as well as Collier & Hoeffler (2004) have not found any support for the youth bulge hypothesis in cross-national studies of civil war. Esty et al. (1998) found a statistical relationship between youth bulges and ethnic conflict, while Urdal (2006) has found an effect of youth bulges on low-intensity internal armed conflict, as well as on terrorism and rioting.

Hypotheses:

H_8: The larger the proportion of youth relative to the total adult population, the greater the risk of political violence.

H_9: Youth bulges are more likely to be associated with political violence the greater the relative size of the male population.

H_{10}: Youth bulges are more likely to be associated with political violence the greater the urban growth.

2.3 Ethnic Heterogeneity and Differential Growth

Two issues have been dominating the study of nationalism and ethnicity more generally, and also that of ethnic conflict. The first is over the emergence of ethnic identification; whether ethnic identities are elite constructs and products of state modernization, or represent perennial cultural differences. The second relates to the issue of agency and instrumentality, addressing the relative importance of ethnicity as an opportunity for elites to mobilize versus the independent force of the masses. Recent contributions emphasize weaker forms of these arguments (Kaufmann, 2005). In particular there is now a broader agreement that ethnic identity, regardless of the degree of 'inventedness', represents an important psychological attachment to a collective of individuals of shared identity. Kaufman (2001), Horowitz (1985; 2001) and Petersen (2002) all emphasize the role of emotions as motives for ethnic conflict, and while Kaufman (2001) emphasizes elite manipulation, Petersen (2002) argues that ethnic violence is not always instrumentally conducted by political entrepreneurs, it may also be instigated from below and sometimes it is the masses that provide leaders rather than the other way around. Assessing the structural conditions for ethnic conflict, Toft (2003) argues that settlement patterns are important, and that ethnic minorities that are geographically concentrated are more likely to see their territory as indivisible and hence more likely to attempt to secede. She posits that populations in intermixed areas and particularly those of urban conglomerates are less prone to conflict. Bates (1974: 468) argues that differences in resource distribution due to the uneven spatial distribution of modernization create increased stratification leading less advantaged groups to pressure for better distribution of benefits. Olzak (1992), on the other hand, identifies desegregation and increased competition, particularly in the labor marked, as drivers of ethnic conflict. She holds that it is when ethnic inequalities and racially stratified systems break down that conflict is most likely. Connor

argues that even though ethnic and economic differences often overlap 'ethnonationalism appears to operate remarkably independent from the economic variables' (1984: 356).

Many scholars have noted the importance of changes in the relative strength of ethnic groups. When groups grow at different rates, this may lead to fears of an altered political balance, potentially causing political instability and violent conflict (Horowitz, 2001; Lake & Rotschield, 2001; Toft, 2002; 2007; Weiner & Teitelbaum, 2001). Horowitz argues that it is not only the numbers as such that matter, but that the 'apprehensions about numbers are equally important' (2001: 170). Weiner & Teitelbaum (2001: 22) claim that over the past years, many episodes of violent conflict 'seem to be driven in part by competitive fears resulting from […] compositional shifts'. Differential growth is assumed to influence conflict behavior by shaping the *perception*[4] of individuals and groups of being losers or winners of a demographic battle. As Horowitz (1985: 194, 196) notes: 'Numbers are an indicator of whose country it is [...] it is clear that a census needs to be "won". So the election is a census, and the census is an election'.

With one notable exception, no attempts have been made to theoretically model the relationship between differential growth and ethnic conflict. Toft (2007) formulates the relationship applying power transition theory, positing that civil war would most likely break out just before or just after a demographic transition. She argues that rising minorities that are unhappy with the status quo would seek to change the resource distribution within the state, but also that vanishing majorities would be tempted to strike preemptively. In her previous work (Toft 2002), she posits that democratic states are more likely than autocratic states to be destabilized by differential growth, and that the greater the difference in growth and the closer in magnitude the two growing groups are, the greater is the risk that democratic states are destabilized.

Cross-national studies find mixed evidence for a relationship between multiethnicity and armed conflict or civil war. While some find that multiethnicity does increase the risk somewhat, particularly where there are two equal-sized groups (Ellingsen, 2000; Henderson & Singer, 2000; Sambanis, 2001), others report no statistically significant effects (Henderson 2000; Fearon & Laitin, 2003). Hegre & Sambanis (2006) concludes that ethnic fractionalization is only robustly related to low-intensity armed conflict, and not large-scale civil wars. Also some of the more specific claims have been tested statistically. Toft (2003) found that concentrated-majority groups were more likely to engage in violent conflict, as were groups living in the area that they perceived as their homeland, and further that the risk of conflict increased with the duration of a group's residence in an area. Groups living in resource rich areas were found to be less prone to conflict, and groups concentrated in urban areas were least likely to engage in conflict. Furthermore, Besancon (2005) finds that the risk of ethnic conflict is greater in societies with high levels of economic equality (providing opportunities for rebellion) and low levels of social (educational) equality (providing motives). Østby (2008) somewhat contrarily finds that systematic differences in group entitlements, both economic and social, are associated with an increased risk of armed conflict.

Only Toft (2007) has empirically tested the differential growth argument systematically for a global sample of states. She finds some support for the differential growth hypothesis in the increased risk experienced by countries with a decreasing majority group and a static minority, while societies with decreasing majorities and increasing minorities do not experience an elevated risk. Similar to several other studies of multiethnicity, she finds that the more equal the size of the two largest groups, the greater the risk of conflict.

This study addresses whether religious or linguistic fractionalization and differential growth may account for some of the variation in low-intensity political violence between Indian states. As a culturally diverse country with a long history of democratic governance, India is a good case for testing whether changes in group strength may have a greater impact on the sub-national level. While the Hindus make up more than 80 per cent of the total Indian population, the variation is great between states. DeVotta (2002) shows how differential growth has been used in political agitation in India, particularly by radical Hindu leaders who have argued that high Muslim growth rates will outnumber Hindus. Given the relatively high level of autonomy enjoyed by Indian states, we may expect to see that high Hindu growth rates compared to other religious groups may provoke violent response.

Hypotheses:

H_{11}: The greater the religious heterogeneity, the greater the risk of violent political conflict.

H_{12}: The greater the linguistic fractionalization, the greater the risk of violent political conflict.

H_{13}: Regions with a non-Hindu majority are more likely to experience violent political conflict.

H_{14}: The greater the growth of the Hindu population relative to that of the largest non-Hindu religious group in a state, the greater the risk of violent political conflict.

3. Research Design and Operationalizations

The study covers the 27 largest Indian states for the period from 1956 to 2002 (see Appendix A).[5] The current Indian state system came into effect in 1956 following the 'States Reorganisation Act', with a differentiation between states that enjoy substantial autonomy, and union territories that are mostly geographically small units run by a Governor appointed by the federal government. Language has been the most central criterion for delineating states, but the Indian federal government has been strongly opposed to the idea that states should encompass religious groups. Since 1956 there have been several changes in the state system, with larger states splitting and some union territories achieving statehood.

There are three different and independently collected measures for political violence analyzed in this study.[6] Data on *internal armed conflict* (Appendix B) is based on the PRIO/Uppsala dataset (Gleditsch et al., 2002). For a conflict to be listed, it has to be between the federal or local government and one or more organized opposition groups, and there has to be at least 25 annual battle-related casualties. The incompatibility is defined as being over either governance or territory. During this period there were 11 conflicts taking place in nine different states. Two of the conflicts are defined as being over government while nine were over territorial issues. However, this analysis does not distinguish between the two forms of conflict. I have been using the conflict location dataset developed by Halvard Buhaug (Buhaug & Gates, 2002) to identify the state associated with each conflict. The total number of state years in conflict is 119. The variable is coded as a dummy variable with the value 1 for years in conflict and 0 for years in peace. Following de Soysa (2002a), I analyze all years in conflict rather than onset only. I am using logistic regression with a control for *conflict previous year* to account for dependence between years of continuing conflict, and the models are clustered on states to account for dependence between observations over time

within states. I am also accounting for spatial dependence in the form of conflict spillovers by controlling for ongoing conflict in neighboring states, defined by a shared border.

The second data source is a count measure of *political violence events* collected from Keesing's Record of World Events covering the 1960-2000 period, called the 'India Problem Set' (IPS). The data have been collected for the State Failure Task Force project (Marshall, 2001), and covers a total of 793 events, most of which involved at least one death. While these data covers events related to organized armed conflicts, they also encompass forms of political violence that are less organized like inter-communal violence, political assassinations and rioting.[7] A third dependent variable, a strict event count measure of *Hindu-Muslim riots*, is constructed on the basis of an event dataset collected by Ashutosh Varshney and Steven Wilkinson (Varshney & Wilkinson, 2004). I use negative binomial regression to analyze both sets of event count data. This is the proper approach due to the skewed distribution of events with a few high-violence observations and a majority of relatively peaceful ones. Also, the negative binomial model does not generate implausible negative predictions as might OLS. I include a *lagged dependent variable* to control for previous violent events, and run fixed effects models to account for unobserved state specific factors.[8] I account for spatial dependence with dummy variables for high-level violence in neighboring states, defined as 5 events or more annually for the violent political events (IPS), and 20 or more annual deaths for Hindu-Muslim riots.

A valid concern when studying the causes of recurring political violence is endogeneity. High-intensity armed conflicts may seriously impact migration, mortality and fertility (e.g. Brunborg et al., 2006), and hence question the direction of causality in studies of the population–conflict nexus.[9] Since political violence in India primarily has been of relatively low intensity it is not very likely that such violence generally has exerted significant impact on the broader population trends analyzed here. However, to remedy more

specific potential problems of endogeneity, three procedures have been performed. First, I assume that among the independent variables, growth rates of religious groups would be the most likely to be influenced by ongoing conflict through conflict-induced migration. This potential problem is mitigated by lagging the religious growth rate variables. Second, I control for political violence in all neighboring states, also capturing potential spill-over effects due to conflict-induced migration. Third, I tested whether excluding the only state with sustained high-intensity armed conflict, Kashmir, affected the results.[10]

Demographic explanatory variables are based on data from the Indian censuses of 1951, 1961, 1971, 1981, 1991 and 2001. Census information on *population growth*, *urban and rural populations*, and *religious composition* and *change* are published annually in Statistical Abstract India (CSO, annual). The Statistical Abstract publishes data for current states, taking inter-census territorial changes into account. All population growth rates are for entire decades. Growth rates for urban and rural populations are assigned to the actual decade the growth took place (the decadal growth rates for the period 1961–1971 are for example assigned to the years 1961…1970). For growth of religious groups, however, the rates are assigned to the following decade (i.e. growth rates for the 1961–71 period are assigned to the years 1971…1980). The rationale for lagging this variable is, as previously argued, the assumption that it is the perception of imbalances in growth between groups that matters to conflict behavior.

Data on land utilization, used to calculate an index of rural per capita availability of productive land (termed *rural population density*), were collected from CSO (annual). Rural population density is measured as the number of rural inhabitants per hectare of productive land, defined as the state's total reporting area for land utilization statistics less area classified as 'forests' and 'not available for cultivation'. Data on *agricultural yield* is defined as the

total production of food grains (cereals and pulses) divided by the total area reported to be under the relevant crops. These data are also collected from CSO (annual).

Data on age and gender distribution are not available from Statistical Abstract India and have been collected from census publications (Census of India 1961, Census of India 1971, Census of India 1981, Census of India 1991).[11] *Youth bulges* measures the cohorts aged 15-24 as a fraction of the total adult population of 15 years and above. *Sex ratio* is defined as the number of males per female. The index of *linguistic fractionalization* is produced by Wilkinson (2004b). Data on rural and urban inequality and poverty, as well as agricultural wages originate from a World Bank project on poverty in India (Özler et al., 1996). *Inequality* is measured by income distribution (the GINI coefficient, where a higher value indicates greater inequality), while *poverty* is measured as the percentage of people below the poverty line set by India's government. Based on the World Bank data on agricultural sector real wage, I have calculated short-term (annual) and long-term (average of annual fluctuations over five years) changes in *agricultural wages*.

I further control for two factors that have been found to robustly affect conflict risk between states (Hegre & Sambanis, 2006): state size, measured as the natural logarithm of total population size, and level of development, measured as literacy rates. The literacy rate is defined as the number of literates per 1,000 persons aged 7 years and above, and data are collected from CSO (annual).

Indian census data are assumed to be comparable over geographical units and over time. Compared to cross-national analyses where data reliability varies significantly between units of observation, within-country sub-national statistical studies have the great advantage that data are collected and disseminated by highly similar procedures for different regions and local communities. While acknowledging that Indian census data reliability also varies

between states and over time, discrepancies due to variation in data collection procedures are likely to be small compared to that between countries over time.

4. Results

Correlating demographic data for India with the armed conflict data (Table 1) provides support for some of the concerns in the resource scarcity literature. Rural population density is negatively and significantly associated with armed conflict, and also long-term declines in agricultural wages are associated with an increased risk of conflict (Model 3). On the other hand, rural land scarcity is not associated with a particularly increased risk of conflict when interacting with high rural population growth, with low agricultural yield or with high rural inequality.[12] High rates of urban population growth are, contrary to what is posited in the resource scarcity literature, associated with a clearly statistically significant reduction in conflict propensity. Rural poverty is associated with a lower risk of conflict, and urban inequality with an increased risk.

Youth bulges increase the risk of armed conflict, particularly in states with large male compared to female populations (Model 5). These results are also robust to different model specifications. Urbanization does not appear to be important to the effect of youth bulges on armed conflict propensity. While conflict is not more common in religiously heterogeneous states nor in states with non-Hindu majorities, the states that experience strong growth rates among the Hindu population compared to the largest non-Hindu religious group are considerably more conflict prone.[13] This result is also highly robust. Linguistic fractionalization is associated with a greater risk of conflict. While cross-national studies find level of development to be one of the strongest predictors of conflict, different levels of development, measured here by literacy, appears to have no bearing on conflict risk. States with smaller populations are more likely to experience conflict, a result that is driven by the

many secessionist conflicts in small states in North-East India. But there is no indication of a general spill-over effect between states.

- Table 1 here -

The analysis of political violence events data from the State Failure project (Table 2) supplements the findings from the armed conflict data. Also here, the results provide some support for the resource scarcity perspective. In particular, where there is little potentially productive land, high rural population growth is strongly associated with an increased risk of armed conflict. Where land scarcity goes together with low agricultural yields, the risk of conflict is significantly higher (Model 7). As for the armed conflict data, there does not seem to be any relationship between rural inequality and violence, not even when interacting with land scarcity (Model 9). Urbanization and growth in agricultural wages is not associated with higher risks of violence.

Youth bulges are also associated with increased risks of political violent events, but neither male surpluses nor urbanization appear to be contributing factors. Neither of the fractionalization measures nor any measures of differential growth are associated with increasing levels of political violence. States with high literacy rates somewhat surprisingly have more violent events, while state size is unrelated to violence. Again a state's proneness to political violence seems unrelated to what goes on in the neighboring states.

- Table 2 here -

Overall, demographic variables appear to matter little to the production of Hindu-Muslim riots in India. It is not so surprising to see that resource scarcity in rural areas are not

affecting rioting, primarily an urban phenomenon[14], directly. However, given the expectations that rural scarcity is likely to produce pressures on urban centers, we would expect to see an effect of high urbanization rates. But high urban growth rates do not seem to be important for levels of rioting. The only possible link between resource scarcity and rioting may be found in Model 13, assessing only the riots that have led to fatalities. Short-term reductions in agricultural wages increase the risk of lethal riots. This may reflect the significance of shocks in the agricultural sector, assumed to push rural unemployed into urban areas. Such short-term effects would not be captured well by the inter-census measure for urban growth used here, and may be better proxied by agricultural wage data. However, long-term *growth* in agricultural wages is associated with *higher* levels of rioting.

Youth bulges are associated with higher levels of rioting in states where urban inequality is great. The relationship between youth bulges and riots is not conditioned on the gender balance, and states with a large excess male population unexpectedly have less riots. Unlike Wilkinson (2004a), I find that urban inequality is an important predictor of riots also in the absence of large youth bulges. High levels of urban poverty, however, appear to suppress rioting. Religiously fractionalized states and states with a non-Hindu majority have higher levels of Hindu-Muslim riots, while differential growth between the two groups is unrelated to riots. Higher levels of literacy appear to have a moderate inhibiting effect, as one may expect.[15] Furthermore, riots is the only form of political violence where there seems to be a very strong diffusion effect, where events in one state significantly increase the risk of spill-over into neighboring states.

- Table 3 here –

5. Discussion and Conclusions

This analysis of the nexus between population pressure and political violence in India provides support for several of the hypotheses derived from the literature (see Table 4 for a summary of the results). Some forms of demographic pressure identified in the resource scarcity literature seem to have an impact on violence propensity. Organized armed conflict is more likely in states where potentially productive land is scarce, and also when agricultural wages are declining over time.[16] Both these factors reflect key expectations in the causal scheme of Thomas Homer-Dixon. Similar results are found for the political violence data from the State Failure project. Scarcity of productive land increases the risk of violence when the rural population is growing at a high rate, and when the agricultural yield is low. Again, these findings are supportive of a resource scarcity perspective. There are, however, central aspects of Homer-Dixon's scheme that are not supported by the empirical evidence for India. First, rural inequality does not appear to have an impact on any form of political violence, even when interacting with high land scarcity. Second, urban growth is described in the resource scarcity literature as a negative outcome of rural resource scarcity pressuring rural landless to urban centers. But it does not appear to increase the risk of political violence, not even rioting, which is a predominantly urban phenomenon. The very clear lack of support for the 'structural scarcity' and the 'urban hotspots' hypotheses presents a great challenge to the resource scarcity perspective. The distribution of resources plays a very important role in the causal schemes of central scholars like Homer-Dixon (1999) and Kahl (2006), particularly in the way maldistribution is posited to interact with other forms of scarcity. This study instead confirms on a disaggregated scale the findings from cross-national studies showing no or little relationship between inequality and armed conflict. While this study assumes that inequalities in land ownership are captured by the rural inequality measure, a more direct measure of 'structural scarcity' in land ownership could have performed differently.

- Table 4 here –

The study reports considerable support for the youth bulge hypothesis. A young age structure is the only demographic factor that is statistically associated with increased risks of all three forms of political violence. The risk of armed conflict is particularly pronounced when youth bulges go together with great male surpluses. This underscores that from a conflict prevention position it is particularly important to focus on providing opportunities for young men. A better insight into this relationship could be provided by the analysis of variables that more directly capture opportunities, such as unemployment and education levels. Furthermore, riots are more likely in states where youth bulges coincide with greater levels of urban inequality. High urban growth rates, on the other hand, appear to be unrelated to the youth bulge-conflict nexus. Overall, these results are consistent with those of a recent global study (Urdal, 2006). The support for the fractionalization hypotheses is mixed, as it is for similar cross-national studies. States where the two largest religious groups are more equal in size have more riots, and linguistic fractionalization is associated with a higher risk of armed conflict. Riots are also more prevalent in states with non-Hindu majorities. More interesting, perhaps, is the finding of a relatively weak link between differential growth rates and political violence. Despite the attention paid to the demographic balance between religious groups in India, there is only limited support for the differential growth hypothesis. In states where the Hindu population has a relatively high growth rate, the risk of armed conflict is higher, but differential growth does not increase the risk of less organized, and presumably more spontaneous, forms of political violence. Hence,

The most significant conclusion from this study is that while cross-national studies have provided very little support for the resource scarcity perspective, disaggregated studies

seem to capture this dynamic better. These findings support claims that environmental scarcity and conflict relationships should be studied at the local level. But they also suggest that relative regional differences in natural resource endowments may impact conflict risk even in the absence of any 'absolute' scarcity in the country as a whole. While it may be argued that this result is in accordance with the distributional aspect of the resource scarcity argument, it is notable that structural inequalities among rural people and groups within Indian states do not appear to affect the risk of political violence. This observation may be compatible with a centre-periphery motive perspective, assuming that groups in relative resource scarce regions may be more likely to challenge state governments. But it may also be compatible with the opportunity perspective if resource scarcity leads to lower alternative costs for potential rebel recruits through lower wages or higher unemployment rates. Furthermore, the relationship between regional resource scarcity and conflict may be seen as originating from either the lack of ability or willingness by central governments to address relative resource scarcity between regions, from inability by regional and local governments to adopt measures to avoid resource scarcity and adapt to a changing environment, or from low adaptability of people, including low geographical mobility. In any case, the results underscore that the relationship between scarcity and conflict is highly conditional on the governance of natural resources.

Two limitations should be noted. The first is that this detailed of propositions derived from the resource scarcity perspective cannot be conducted for a global sample of states. Comparable data on rural land availability, rural and urban inequalities, agricultural productivity and growth in agricultural wages are not widely available across countries and over time periods. Hence, it is not possible to conclude whether the discrepancies in results may be a consequence of our inability to test more detailed aspects of the resource scarcity hypothesis cross-nationally. Second, while this study represents a more specific test of the

resource scarcity perspective, the relatively strong performance of scarcity-related factors do not necessarily represent a similar pattern between environmental scarcity and political violence in other countries.

The study suggests that there is a need for more systematic research into the relationship between regional or local population pressure on natural resources and political violence. Additional quantitative sub-national studies of political regions within countries will tell us whether the results obtained in the study of Indian states can be replicated for other political contexts. As more geographically distributed data becomes available, more detailed studies using sub-national units of analysis could shed more light on the regional and local population-conflict nexus. In particular longer time-series of demographic and environmental data, as well as geo-referenced data on ethnicity, poverty and state penetration may provide more detailed insights. Furthermore, the three relationships studied could be extended by looking at different variables. To study the effect of scarcity, extensions should consider migration, precipitation, freshwater availability and land use measures that better capture the variance in climate zones and soil quality; studies of age composition should look at the importance of contextual factors like unemployment, schooling, age at first marriage; while the study of identity variables could expand the current analysis to look at horizontal inequality, caste, and differential age structures.

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Table 1: Population, Resources and Armed Conflict in India 1956-2002

Explanatory Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Rural population growth β z	-0.006 (-0.42)	0.007 (0.37)	-0.075 (-1.50)	0.046 (0.69)	-0.067** (-2.01)
Rural population Density	0.166** (1.99)	0.240* (1.85)	-0.169 (-0.38)	0.222 (0.57)	0.278** (2.01)
Rural population growth * Rural population density	-0.008 (-1.47)	-0.010 (-1.31)	0.011 (0.51)	0.044 (0.74)	0.002 (0.36)
Rural share	0.020 (0.60)	0.047 (1.15)	0.004 (0.10)	0.126 (1.54)	0.041 (0.95)
Urban growth	-0.020*** (-4.27)	-0.023*** (-4.15)	-0.014* (-1.94)	-0.018 (-1.14)	-0.034*** (-4.71)
Agricultural yield (inverted)		-0.051 (-1.37)			
Rural density * Agricultural yield (inverted)		0.035 (1.50)			
Growth agricultural wages (5 yr avg)			-0.202*** (-2.75)		
Rural inequality				0.011 (0.06)	
Rural population density * Rural inequality				0.031 (0.56)	
Rural poverty				-0.066** (-2.11)	
Urban poverty				0.001 (0.02)	
Urban inequality				0.081* (1.88)	
Youth bulges					22.02* (1.78)
Sex ratio					3.96 (0.47)
Youth bulges * Sex ratio					828.16*** (4.15)
Youth bulges * Urban population growth					0.377 (0.67)
Religious heterogeneity					-1.257 (-0.85)
Non-Hindu majority					0.396 (0.38)
Hindu relative growth					0.009*** (3.49)
Linguistic fractionalization					3.781** (2.17)
Total population (ln)	-0.340** (-1.98)	-0.322* (-1.78)	-2.403*** (-2.96)	-0.247 (-0.65)	-0.333** (-2.54)
Literacy	-0.002 (-1.26)	-0.003 (-1.51)	0.001 (0.31)	0.0001 (0.04)	-0.001 (-0.37)
Conflict previous year	5.67*** (12.22)	5.49*** (14.56)	5.61*** (5.85)	5.65*** (5.80)	5.16*** (10.46)
Conflict in neighboring state	0.617 (0.99)	0.530 (0.81)	2.30*** (5.74)	0.959 (1.15)	-0.107 (-0.15)
Constant	-0.997 (-0.31)	-2.72 (-0.69)	18.79** (2.29)	-11.06** (-2.27)	-5.59 (-1.15)
N Log Likelihood Pseudo R^2	945 -109.62 0.66	945 -106.76 0.67	475 -33.88 0.70	559 -46.43 0.67	804 -96.28 0.65

* Sign at 0.1 ** Sign at 0.05 ***Sign at 0.001. Robust z statistics in parentheses.

Table 2: Population, Resources and Political Violence Events in India 1960-2000

Explanatory Variables	Model 6	Model 7	Model 8	Model 9	Model 10
Rural population growth β z	0.014 (1.31)	0.014 (1.32)	0.041* (1.86)	0.035* (1.67)	-0.003 (-0.21)
Rural population density	0.020 (0.38)	0.066 (1.12)	-0.078 (-0.71)	-0.090 (-0.87)	0.020 (0.30)
Rural population growth * Rural population density	0.010*** (2.60)	0.009** (2.30)	0.006 (0.58)	0.0001 (0.01)	0.012*** (2.61)
Rural share	0.035* (1.75)	0.031 (1.51)	0.014 (0.51)	0.003 (0.12)	0.037 (1.48)
Urban growth	0.004 (0.95)	0.0004 (0.11)	-0.002 (-0.17)	-0.007 (-0.77)	0.004 (0.93)
Agricultural yield (inverted)		0.007 (0.40)			
Rural density * Agricultural yield (inverted)		0.016** (2.23)			
Growth agricultural wages (5 yr avg)			0.002 (0.13)		
Rural inequality				-0.021 (-0.77)	
Rural population density * Rural inequality				0.008 (0.60)	
Rural poverty				0.013 (1.35)	
Urban poverty				0.003 (0.21)	
Urban inequality				0.024 (1.07)	
Youth bulges					11.19* (1.91)
Sex ratio					3.79 (1.23)
Youth bulges * Sex ratio					62.00 (0.67)
Youth bulges * Urban population growth					-0.168 (-0.91)
Religious heterogeneity					-1.85 (-1.57)
Non-Hindu majority					-0.553 (-1.02)
Hindu relative growth					0.001 (0.62)
Linguistic fractionalization					0.052 (0.06)
Total population (ln)	0.164 (1.50)	0.127 (1.14)	0.441* (1.69)	0.360* (1.67)	0.004 (0.02)
Literacy	0.002** (1.96)	0.002* (1.69)	0.002 (1.37)	0.002 (1.51)	0.001 (1.45)
Violent events previous year	0.104*** (5.39)	0.106*** (5.51)	0.093*** (4.11)	0.084*** (3.67)	0.101*** (5.13)
Violent events in neighboring state	0.077 (0.44)	0.085 (0.49)	0.157 (0.60)	0.132 (0.60)	0.142 (0.76)
Constant	-5.71** (-2.51)	-4.67 (-2.03)	-6.87* (-1.71)	-6.45** (-2.00)	-3.14 (-0.92)
N Number of states Log Likelihood	817 22 -788.89	817 22 -786.26	406 13 -463.20	523 16 -539.33	766 21 -749.07

* Sign at 0.1 ** Sign at 0.05 ***Sign at 0.001. Robust z statistics in parentheses.

Table 3: Population, Resources and Hindu-Muslim Riots in India 1956-1995

Explanatory Variables	Model 11	Model 12	Model 13 (lethal riots)	Model 14	Model 15
Rural population growth β z	0.0002 (0.01)	-0.0001 (-0.01)	0.022 (0.96)	-0.007 (-0.34)	0.017 (0.71)
Rural population density	0.064 (0.83)	-0.021 (-0.22)	0.067 (0.56)	-0.043 (-0.46)	-0.140 (-1.26)
Rural population growth * Rural population density	0.001 (0.17)	-0.003 (-0.38)	0.012 (1.15)	0.005 (0.62)	0.004 (0.50)
Urban share	0.055*** (2.77)	0.053*** (2.68)	0.007 (0.25)	0.036 (1.59)	0.046* (1.84)
Urban growth	-0.002 (-0.37)	-0.003 (-0.54)	-0.007 (-0.83)	-0.005 (-0.63)	-0.003 (-0.33)
Agricultural yield (inverted)		-0.038 (-1.28)			
Rural density * Agricultural yield (inverted)		0.008 (0.77)			
Growth agricultural wages from previous year			-0.019*** (-2.82)		
Growth agricultural wages (5 yr avg)			0.044** (2.30)		
Rural inequality				0.004 (0.15)	
Rural population density * Rural inequality				0.011 (1.06)	
Rural poverty				0.004 (0.47)	
Urban poverty				-0.031*** (-2.69)	
Urban inequality				0.037 (1.63)	
Youth bulges * Urban inequality				2.410** (2.27)	
Youth bulges * Urban poverty				-0.244 (-0.64)	
Youth bulges				6.501 (1.06)	5.84 (0.82)
Sex ratio					-9.51** (-2.34)
Youth bulges * Sex ratio					-71.10 (-0.68)
Religious heterogeneity					3.916*** (2.75)
Non-Hindu majority					2.007** (2.03)
Hindu-Muslim differential growth					0.003 (0.25)
Linguistic fractionalization					-0.720 (-0.68)
Total population (ln)	0.619*** (3.81)	0.622*** (3.83)	0.816** (2.50)	0.759*** (3.86)	1.320*** (4.53)
Literacy	-0.001 (-1.40)	-0.002* (-1.68)	0.003* (1.72)	-0.002 (-1.35)	-0.002 (-1.45)
Riots previous year	0.033*** (3.11)	0.034*** (3.14)	0.029 (1.43)	0.024** (1.96)	0.027** (2.47)
Riots in neighboring state	0.456*** (3.44)	0.435*** (3.26)	0.489*** (2.75)	0.376*** (2.70)	0.396*** (2.86)
Constant	-8.01*** (-4.68)	-7.73*** (-4.49)	-10.29*** (-2.92)	-8.96*** (-4.28)	-16.29*** (-5.11)

N	660	660	439	520	555
Number of states	18	18	13	16	17
Log Likelihood	-768.36	-767.09	-465.03	-743.87	-696.46

[*] Sign at 0.1 [**] Sign at 0.05 [***]Sign at 0.001. Robust z statistics in parentheses.

Table 4: Summary of Results

	Armed conflict	Violent political events	Riots
H_{1-3} Rural population growth * density	Higher risk (moderate, density)	Higher risk	Not significant
H_4 Rural density * rural inequality	Not significant	Not significant	Not significant
H_5 Rural density * low agricultural yield	Higher risk	Higher risk	Not significant
H_6 Low agricul-tural wage growth	Higher risk	Not significant	Higher risk (short-term only, fatal riots only)
H_7 Urban population growth	Lower risk	Lower risk (weak)	Not significant
H_{8-10} Youth bulges	Higher risk (esp. when male surplus)	Higher risk	Higher risk (when urban inequality)
H_{11-12} Fractionalization	Higher risk (linguistic)	Not significant	Higher risk (religious)
H_{13} Non-Hindu majority	Not significant	Not significant	Higher risk
H_{14} Differential growth	Higher risk	Not significant	Not significant

Appendix A. Indian States Included in the Analysis

Name	Start	End
ANDHRA PRADESH	1956	2002
ARUNACHAL PRADESH	1972	2002
ASSAM	1956	2002
BIHAR	1956	2002
BOMBAY	1956	1959
CHHATTISGARH	2001	2002
GUJARAT	1960	2002
HARYANA	1967	2002
HIMACHAL PRADESH	1956	2002
JAMMU AND KASHMIR	1956	2002
JHARKHAND	2001	2002
KARNATAKA (MYSORE)	1956	2002
KERALA	1956	2002
MADHYA PRADESH	1956	2002
MAHARASHTRA	1960	2002
MANIPUR	1956	2002
MEGHALAYA	1972	2002
MIZORAM	1972	2002
NAGALAND	1964	2002
ORISSA	1956	2002
PUNJAB	1956	2002
RAJASTHAN	1956	2002
TAMIL NADU	1956	2002
TRIPURA	1956	2002
UTTAR PRADESH	1956	2002
UTTARAKHAND	2001	2002
WEST BENGAL	1956	2002

Appendix B. Armed Conflicts in India 1956-2002

State	Opposition	Territory	Begin	End
Andhra Pradesh	Naxalites/PWG, MCC	(Government)	1989	1994
Andhra Pradesh	Naxalites/PWG, MCC	(Government)	1996	2002
Assam	NNC, NSCN	Nagaland	1956	1959
Assam/Nagaland	NNC, NSCN	Nagaland	1961	1968
Assam	MNF	Mizoram	1966	1968
Assam	ABSU, BPAC	Assam	1989	1990
Assam	ULFA	Assam	1991	1991
Assam	BDSF, ULFA, BLTF, NDFB	Assam	1992	2002
Bihar	Jharkand Mukti Morcha	Jarkhand	1993	1993
Jammu and Kashmir	Kashmir Insurgents	Kashmir	1989	1989
Jammu and Kashmir	Kashmir Insurgents	Kashmir	1990	1993
Jammu and Kashmir	Kashmir Insurgents	Kashmir	1994	1998
Jammu and Kashmir	Kashmir Insurgents	Kashmir	1999	2002
Manipur	PLA	Manipur	1982	1989
Manipur	PLA	Manipur	1991	1994
Manipur	UNLF, KNF, PLA	Manipur	1997	2000
Nagaland	NNC, NSCN	Nagaland	1989	1997
Orissa	Naxalites/CPI (-Marxist)	(Government)	1967	1972
Punjab	Sikh insurgents	Punjab/Khalistan	1983	1986
Punjab	Sikh insurgents	Punjab/Khalistan	1987	1987
Punjab	Sikh insurgents	Punjab/Khalistan	1988	1992
Punjab	Sikh insurgents	Punjab/Khalistan	1993	1993
Tripura	TNV	Tripura	1978	1988
Tripura	ATTF	Tripura	1993	1993
Tripura	ATTF, NLFT	Tripura	1995	2002

Appendix C. Descriptive statistics

Variable	Obs.	Mean	Std	Min	Max
Rural pop density	1,008	3.0	2.2	0.48	22
Rural growth	1,005	22.1	9.8	-5.2	74.3
Rural share	1,016	80.9	9.0	50.5	99.5
Urban growth	1,000	50.0	36.3	7.6	221.1
Agricultural yield	1,012	11.7	5.8	4.6	40.3
Agricultural wage growth (annual)	487	2.1	12.4	-46.1	69.7
Agricultural wage growth (5 yr avg)	487	2.1	4.3	-11.7	18.4
Rural inequality	578	29.0	4.4	18	46
Rural poverty	578	51.1	14.2	11	81
Urban inequality	578	32.8	4.1	19	48
Urban poverty	578	43.0	13.2	7	80
Youth bulges	889	0.30	0.02	0.25	0.36
Sex ratio	1,016	1.07	0.05	0.95	1.18
Religious heterogeneity	990	0.36	0.22	0.04	0.95
Non-Hindu majority	1,010	0.19	0.39	0	1
Hindu relative gr.	862	-5.9	30.0	-83.8	200.5
Hindu-Muslim differential growth	862	26.1	57.3	0.1	422.9
Linguistic fractionalization	944	0.39	0.24	0.08	1.0
Total pop (ln)	1,016	9.4	1.6	5.8	12.0
Literacy	974	373	168	77	898

Armed conflict	1,380	0.09	0.28	0	1
Political violence	1,226	0.7	1.6	0	19
Riots	1,150	0.9	3.0	0	41

Appendix D: Summary of studies on population and internal armed conflict[17]

Hypothesis	Variables	Summary results for previous studies	Summary results for the India study
H_1– H_3 Rural population pressure	Rural population density, rural population growth, and their interaction	*Global studies* Positive effect: Hauge & Ellingsen (1998), de Soysa (2002a; 2002b) (density) No effect: Collier & Hoeffler (1998; 2004), Esty et al. (1998), Hegre & Sambanis (2006), Theisen (2006) (density). Urdal (2005) (density, growth and their interaction) *Geographically disaggregated studies* No effect: Buhaug & Rød (2006) (density, sub-Saharan Africa) Positive effect: Raleigh & Urdal (2007) (density and growth combined, for low-income countries only)	*Partly supported* High rural population density is associated with a higher risk of armed conflict, and high rural density and population growth combined with increasing levels of violent political events Rural population pressure is unrelated to Hindu-Muslim riots
H_4 – H_6 Secondary effects	Inequality, agricultural productivity and agricultural wages	Not previously tested in comparable studies	*Partly supported* No effect of rural inequality, some effect of low agricultural yield and declining agricultural wages
H_7 Urban population pressure	Urban population growth	Negative effect: Urdal (2005)	*Not supported* Urban growth negatively affects the risk of armed conflict, unrelated to other forms of political violence
H_8–H_{10} Youth bulges	Youth bulges, interactions with sex ratio and urban population growth	Positive effect: Cincotta et al. (2003), Mesquida & Wiener (1996), Urdal (2006) No effect: Collier & Hoeffler (2004), Fearon & Laitin (2003)	*Supported* Youth bulges increase the risk of all forms of violence, for riots this effect is conditioned on urban inequality. The effect on violent events is stronger the larger the male population
H_{11}–H_{14} Ethnic factors	Ethnic and religious fractionalization,	Positive effect (fractional.): Ellingsen (2000), Henderson &	*Partly supported* Linguistic fractionalization

	non-Hindu majority, high Hindu relative growth	Singer (2000), Sambanis (2001), Hegre & Sambanis (2006) <u>No effect (fractionalization):</u> Collier & Hoeffler (2004), Fearon & Laitin (2003), Henderson (2000) <u>Some effect (differential growth):</u> Toft (2007)	increases risk of armed conflict; religious fractionalization and non-Hindu majority associated with more Hindu-Muslim riots. Differential growth associated with greater risk of armed conflict only

Appendix E. Correlation matrix

VARIABLE	Rur d	Tot p	Rur sh	Rur gr	Urb gr	Yield	Wag1	Wag5	Rur In	Urb In	R Pov	U Pov	Youth	Sex R	Relhet	Non H	H diff	HM d	Langf	Lit
Rural pop density	1.00																			
Total pop (ln)	0.10	1.00																		
Rural share	0.01	-0.37	1.00																	
Rural growth	-0.15	-0.44	0.32	1.00																
Urban growth	-0.16	-0.63	0.41	0.21	1.00															
Agricultural yield	0.42	0.03	-0.31	-0.22	-0.20	1.00														
Agri. Wage gr (annual)	0.06	0.04	0.00	-0.01	-0.04	0.09	1.00													
Agri. Wage gr (5 yr)	0.13	0.15	0.00	-0.02	-0.03	0.09	0.33	1.00												
Rural inequality	-0.20	0.19	-0.17	-0.19	-0.06	-0.09	-0.01	0.07	1.00											
Urban inequality	0.10	0.28	-0.08	-0.32	-0.16	-0.02	-0.09	0.04	0.36	1.00										
Rural poverty	-0.12	0.33	0.16	0.06	0.08	-0.57	0.03	-0.11	0.17	0.21	1.00									
Urban poverty	-0.17	0.36	0.23	-0.09	0.10	-0.45	0.05	-0.05	0.35	0.34	0.68	1.00								
Youth bulges	0.12	-0.35	-0.26	0.12	0.06	0.35	0.02	-0.01	0.02	-0.03	-0.50	-0.46	1.00							
Sex ratio	-0.22	-0.14	-0.02	0.37	0.17	0.09	0.00	0.05	-0.23	-0.39	-0.50	-0.52	0.12	1.00						
Religious heterogen.	0.36	-0.43	0.09	0.15	0.29	0.24	0.02	0.04	-0.15	-0.05	-0.33	-0.44	0.21	0.21	1.00					
Non-Hindu majority	-0.19	-0.48	-0.09	0.27	0.25	0.20	0.00	-0.03	-0.15	-0.26	-0.52	-0.47	0.42	0.34	0.39	1.00				
Hindu relative growth	0.02	-0.10	0.13	0.00	0.23	-0.06	-0.01	-0.07	-0.16	-0.22	-0.18	-0.24	-0.07	0.22	0.11	0.01	1.00			
Hindu-Muslim diff. gr.	-0.11	-0.54	0.22	0.33	0.62	-0.04	0.00	0.01	0.04	0.03	-0.22	-0.19	0.06	0.31	0.34	0.30	0.37	1.00		
Linguistic fractional.	0.03	-0.65	0.12	0.54	0.33	-0.07	-0.05	-0.09	-0.45	-0.26	-0.06	-0.39	0.28	0.12	0.45	0.54	-0.02	0.49	1.00	
Literacy	0.40	0.02	-0.54	-0.28	-0.21	0.55	0.02	0.05	0.03	0.27	-0.14	-0.19	0.47	-0.23	0.07	0.09	-0.19	-0.07	-0.02	1.00

[1] While I'm not aware of any previous disaggregated studies of demography and conflict analyzing *political* units, Buhaug & Rød (2006) apply a *geographically* disaggregated design for sub-Saharan Africa, using grid cells as unit of observation. Raleigh & Urdal (2007) apply a similar design for a global study of environmental and demographic factors. Generally, there is a growing interest in studying variation in political violence on a sub-national level. See for example Østby et al. (2006) for a study of armed conflict analyzing sub-national regions in Sub-Sahara Africa, and Tadjoeddin & Murshed (2007) for a study of violence in Javanese districts.

[2] For an updated status on India's demography and environment, see Dyson et al. (2004).

[3] Homer-Dixon focuses mainly on degradation of natural resources resulting from human activity. But he acknowledges that natural resources may also be degraded and depleted from causes that are not human-induced, such as natural disasters or less dramatic natural variation.

[4] Such an approach also allows for factors such as changes in census categories and changes in people's own perception of national/ethnic identity to influence the magnitude of differential growth.

[5] For Jammu & Kashmir, data is only available from the parts of the territory controlled by India.

[6] Initially, also a fourth measure, of terrorism (SATP, 2004), was analyzed. This analysis provided very similar results to those of the armed conflict data.

[7] That violence is categorized as less organized does not necessarily imply that it is entirely spontaneous, only that violence is not committed within strict organizational settings. See Brass (2003) and Wilkinson (2004a) for excellent accounts of the organization of riots in India.

[8] Estimating the internal armed conflict models with fixed effects is not feasible since states that always score '0' on the conflict variable have no impact on the parameter estimates. See Beck & Katz (2001) for a critique of the use of fixed effects in IR time-series cross-section models with a binary dependent variable.

[9] Endogeneity is indeed a problem in many studies of armed conflict and war, and has perhaps been most thoroughly discussed and analyzed in studies of democracy, economic interdependence and interstate war (e.g. Oneal et al., 2003).

[10] Excluding Kashmir from the sample produced virtually no significant changes in any of the 15 models, and no changes that can reasonably be attributed to endogeneity. These reduced models are not reported in full.

[11] Religious, gender and age composition data from the 2001 census were not yet released by the time the study was conducted.

[12] Other results of environmental variables not reported here include clearly statistically insignificant results for deviations in rainfall, income from mineral resources, and forest cover. These factors have been suggested to influence the distribution of armed conflict on the global level, but were statistically insignificant for all three forms of political violence studied for India.

[13] The risk of conflict is not affected, however, by the size of the ethnic groups, or by whether there is a non-Hindu majority population.

[14] This is underscored by the positive effect of 'urban share'.

[15] Wilkinson finds that literacy is positively associated with higher levels of rioting for a sample of only 11 states. This may be a selection effect.

[16] This finding is also coherent with the opportunity literature, as declining agricultural wages lower the opportunity cost of rebel labor.

[17] This overview is partly based on Theisen (2006).